



# Heart failure

## Key points

- Heart failure is a major burden on the community due to the high costs of care, the lower quality of life and premature death of those affected, claiming 2,729 lives in 2002 (2.0% of all deaths).
- It is estimated that at least 300,000 Australians have chronic heart failure, with 30,000 new cases diagnosed each year. As the diagnosis is commonly missed in mild cases, the actual numbers could be as high as twice these estimates.
- Heart failure death rates fell by 43.3% among males and 41.5% among females over the period 1991–02.
- In 2000–02, death rates from heart failure among Indigenous Australians were almost three times as high as for other Australians.

Heart failure is a major cause of illness and the third largest cause of death among heart, stroke and vascular diseases, claiming 2,729 lives in 2002. It is a major burden on the community, due to the high costs of care and the lower quality of life and premature death of those affected. The number of Australians with heart failure is likely to increase in the future despite rapid declines in death rates from the disease of around 60% since the 1980s. Reasons for the increase include the ageing of the population, improved survival from heart attack and heart failure, the increased prevalence of diabetes and obesity in the population, and the wider use of sensitive diagnostic technology. The lifetime risk of developing heart failure has been estimated at around 20% for Western countries.

## What is heart failure?

Heart failure describes a condition where the heart functions less effectively to pump blood around the body. It can result from a variety of diseases that impair or overload the heart, notably heart attack, high blood pressure or a damaged heart valve. It can

occur suddenly, although it usually develops slowly, often over many years, as the heart gradually becomes less able to cope with the additional demands and works less effectively. People with mild heart failure may have very few symptoms but in more severe cases it can result in chronic tiredness, reduced capacity for physical activity and shortness of breath. Once diagnosed, it is often associated with poor survival.

Congestive heart failure refers to a specific type of heart failure characterised by 'congestion' or build-up of fluid in the lungs, liver or legs that frequently occurs in people with untreated heart failure. Chronic heart failure is a general term that refers to length of duration of heart failure, usually where the heart muscle has been irreversibly damaged. Not all heart failure is chronic, however. In some cases, acute (new onset or acute worsening of) heart failure is caused by particular impairments, such as heart valve defects or after heart attack, and can sometimes be reversed.

## Risk factors for heart failure

The most important risk factors for heart failure are coronary heart disease and high blood pressure. Other common causes are diseases of the heart muscle (cardiomyopathy) due to alcohol abuse or infections, diseases of the heart valves (such as with chronic rheumatic heart disease), diabetes and obesity.

## How many Australians have heart failure?

There are no national data on the incidence and prevalence of heart failure in Australia. Based on overseas findings, it is estimated that at least 300,000 Australians have chronic heart failure (about 4% of the population aged 45 years or more), with 30,000 new cases diagnosed each year. As the diagnosis is commonly missed in patients with mild heart failure, the actual numbers could be as high as twice these estimates.

### Trends

No national trend data on the incidence of heart failure are available for Australia. However, data from the United States indicate that between 1950 and 1999 the incidence of heart failure declined by around 30–40% among women but remained relatively unchanged for men.

### International comparisons

Data for the United Kingdom indicate that the prevalence of heart failure is about 3% in people aged 45 years or more. According to the US National Health and Nutrition surveys, heart failure in the United States affects an estimated 2% of people aged 40–59 years, 5% aged 60–69 years and 10% aged 70 years or more.

## Hospitalisation

In 2001–02, there were 41,874 hospitalisations in Australia where heart failure was the principal diagnosis (0.7% of all hospitalisations). Of the hospitalisations for heart, stroke and vascular diseases, heart failure accounted for 9.5%.

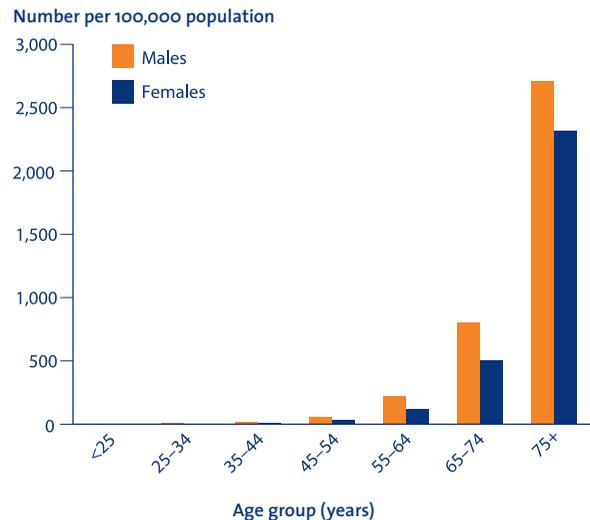
### Trends

Between 1993–94 and 2001–02, the age-standardised hospitalisation rate for heart failure has remained relatively stable. However, the actual number of hospitalisations has increased from 32,323 to 41,874 over this period.

### Sex and age

In 2001–02, males were 28.4% more likely to be hospitalised for heart failure than females. Hospital use for heart failure increases rapidly with age, with rates among those aged 75 years and over almost four times as high as those aged 65–74 years. Around two-thirds of hospitalisations for heart failure occur among those aged 75 years and over.

### Hospitalisations for heart failure in Australia, 2001–02



Source: AIHW National Hospital Morbidity Database.

### Aboriginal and Torres Strait Islander peoples

In 2001–02, hospitalisation rates for heart failure among Aboriginal and Torres Strait Islander peoples<sup>13</sup> were around two to three times those of other Australians.

### Length of stay in hospital

In 2001–02, 14.5% of hospitalisations for heart failure were same-day hospitalisations, an increase from 10.1% in 1993–94.

Among those hospitalised for at least one night, the average length of stay was 9.1 days, a decline from 1993–94 when it was 11.7 days.

### Deaths in hospital

In 2001–02, 8.6% of hospitalisations for heart failure ended in death, a decline from 1993–94, when it was 9.8%.

<sup>13</sup> The reporting of the Indigenous identifier in hospital records is not always complete, so the rates presented may underestimate true hospital use by Aboriginal and Torres Strait Islander peoples (see Methods and data sources section for more information).



## Deaths

Heart failure is the third largest cause of death from heart, stroke and vascular diseases in Australia, accounting for 2,729 deaths or 2.0% of all deaths in 2002.

Heart failure is more likely to be listed as an associated cause of death than as the underlying cause. It is frequently reported as an associated cause with diseases such as kidney (renal) failure (listed as an associated cause in 29% of all kidney failure deaths), coronary heart disease (24% of all coronary heart disease deaths), diabetes (19%) and chronic lower respiratory diseases (17%).

### Trends

Between 1991 and 2002, death rates from heart failure declined at a rate of 5.6% per year for males and 5.5% per year for females. This produced a total decline of 43.3% among males and 41.5% among females over the 12-year period.

### Sex and age

In 2002, more females died from heart failure than males, but death rates among males aged less than 85 years were higher than for females. This can be explained by the greater number of women than men who live into older age, when death rates from heart failure are considerably higher.

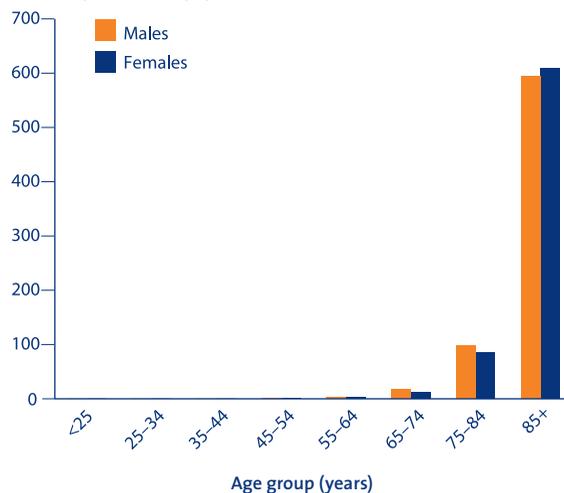
Deaths from heart failure occur mainly among older Australians, with 90.4% of the deaths occurring among those aged 75 years and over.

### Socioeconomic status

In 2000–02, Australians in the most disadvantaged areas experienced higher death rates from heart failure than their counterparts from the least disadvantaged areas.

## Deaths from heart failure, 2002

Number per 100,000 population



Source: AIHW National Mortality Database.

## Aboriginal and Torres Strait Islander peoples

In 2000–02, Aboriginal and Torres Strait Islander<sup>14</sup> males were almost four times as likely to die from heart failure as other Australian males, and for females the death rate was twice as high among Aboriginal and Torres Strait Islander females.

## Region

In 2000–02, death rates from heart failure were higher in regional and remote areas of Australia compared with major cities. The higher death rate in remote areas may reflect the high proportion of the Indigenous population in these areas and the higher rate of deaths for Indigenous people overall in Australia.

## State and territory

In 2002, death rates for heart failure varied among the states and territories from 47.4% above the national average to 27.4% below the national average. Death rates were highest in the Northern Territory and lowest in Queensland. For more information see the National Cardiovascular Disease Database <<http://www.aihw.gov.au/cvdhtml/cvd-menu.htm>>.

<sup>14</sup> Includes data for only Queensland, Western Australia, South Australia and the Northern Territory as these states and territory are considered to have sufficient coverage of Indigenous Australian deaths.

## Health inequalities

### Deaths from heart failure

Year	Population subgroup	Males	Females	Persons
Number per 100,000 population				
<b>2002</b>	<b>Age group (years)</b>			
	45–54	0.9	0.4	0.6
	55–64	3.4	2.1	2.7
	65–74	16.8	11.0	13.8
	75–84	97.4	85.0	90.2
	85 and over	594.7	609.7	605.0
	<i>All ages (ASR)</i>	<i>14.1</i>	<i>13.0</i>	<i>13.4</i>
<b>2000–02</b>	<b>Socioeconomic status (IRSD)</b>			
	1st quintile (most disadvantaged)	15.5	13.8	14.6
	2nd quintile	16.0	14.3	15.0
	3rd quintile	14.9	13.8	14.3
	4th quintile	14.4	13.3	13.9
	5th quintile (least disadvantaged)	11.1*	11.1*	11.2*
<b>2000–02</b>	<b>Aboriginal and Torres Strait Islander status</b>			
	Standardised mortality ratio	3.8 <sup>#</sup>	2.2 <sup>#</sup>	2.8 <sup>#</sup>
<b>2000–02</b>	<b>Region (ASGC remoteness structure)</b>			
	Major cities	12.6	11.8	12.2
	Regional	17.0*	15.8*	16.4*
	Remote	25.3*	20.2*	22.9*

\* Statistically significant difference when compared with the first row in the population subgroup.

<sup>#</sup> Statistically significant difference from 1.0 (other Australians).

#### Notes

1. Standardised mortality ratio = observed deaths divided by expected deaths. For further information see Methods and data sources section.
2. Data for all ages.
3. Significance testing was not performed on the age groups.
4. All rates other than age-specific rates and standardised mortality ratio are age-standardised (ASR) to the 2001 Australian population.

Source: AIHW National Mortality Database.



## Further reading

AIHW 2003. Rural, regional and remote health: a study on mortality. AIHW Cat. No. PHE 45. Canberra: AIHW (Rural Health Series No. 2).

AIHW: Field B 2003. Heart failure...what of the future? AIHW Cat. No. AUS 34. Canberra: AIHW (Bulletin No. 6).

Campbell DJ 2003. Heart failure: how can we prevent the epidemic? *Med J Aust* 179:422–5.

Davies MK, Hobbs FDR, Davis RC et al. 2001. Prevalence of left-ventricular systolic dysfunction and heart failure in the echocardiographic heart of England screening study: a population based study. *Lancet* 358:439–44.

## Peripheral vascular disease

### Key points

- Peripheral vascular disease claimed 2,581 lives in 2002 (1.9% of all deaths) and was responsible for 24,288 hospitalisations in 2001–02.
- No national data are available on the number of Australians who have peripheral vascular disease.
- Death rates for peripheral vascular disease fell by 40.2% among males and 37.1% among females over the period 1991–02.
- In 2000–02, there were no significant differences in death rates from peripheral vascular disease between Indigenous Australians and other Australians.

Peripheral vascular disease mainly affects older Australians and its prevalence is likely to increase considerably as the population ages. It claimed 2,581 lives in 2002 and was responsible for 24,288 hospitalisations in 2001–02. People with peripheral vascular disease have a higher risk of death from stroke and heart attack, due to generalised atherosclerosis.

### What is peripheral vascular disease?

Peripheral vascular disease<sup>15</sup> (also commonly known as peripheral artery disease) refers to diseases of arteries outside the heart and brain. It occurs when fatty deposits build up in the inner walls of these arteries and affect blood circulation, mainly in the arteries leading to the legs and feet. It ranges from asymptomatic disease, through pain on walking, to pain at rest and limb-threatening reduced blood supply that can lead to amputation. A major form of peripheral vascular disease is abdominal aortic aneurysm, which is an abnormal widening of the aorta (the main artery leading from the heart) below the level of the diaphragm. These aneurysms can be life-threatening if they rupture so surgery is performed in severe cases. The major cause of death in people with peripheral vascular disease is coronary heart disease, reflecting the generalised nature of the disease process.

### Risk factors for peripheral vascular disease

The major preventable risk factors for peripheral vascular disease are diabetes, tobacco smoking, high blood cholesterol, high blood pressure, and overweight and obesity.

### How many Australians have peripheral vascular disease?

No national data are available on the number of Australians who have peripheral vascular disease.

### Hospitalisation

In 2001–02, there were 24,288 hospitalisations where peripheral vascular disease was the principal diagnosis (0.4% of all hospitalisations) in Australia. Of the hospitalisations for heart, stroke and vascular diseases, peripheral vascular disease accounted for 5.5%. Atherosclerosis of the peripheral arteries accounted for over half of the hospitalisations (13,564) and abdominal aortic aneurysm accounted for almost one in five (4,577).

### Trends

Between 1993–94 and 2001–02 there was a 21.4% increase in the age-standardised hospitalisation rate for peripheral vascular disease. This has coincided with increases in hospitalisations for coronary heart disease and stroke, and large declines in deaths from peripheral vascular disease over the last decade.

### Sex and age

In 2001–02, males were twice as likely to be hospitalised for peripheral vascular disease as females. Hospital use for peripheral vascular disease increases rapidly from age 60, with rates among those aged 75 years and over twice as high as those

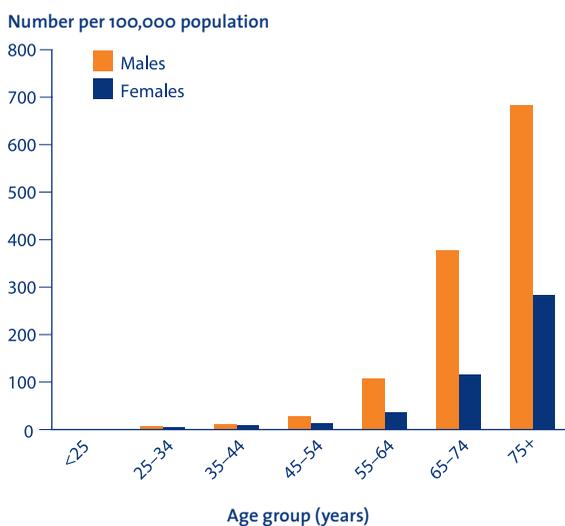
<sup>15</sup> In this report, the term 'peripheral vascular disease' (commonly known as peripheral artery disease) is used to refer to diseases of arteries and arterioles (atherosclerosis of peripheral arteries, aneurysm, arterial embolism and thrombosis, and other peripheral vascular disease).



aged 65–74 years and six times as high as those aged 55–64 years. Around two-thirds of hospitalisations for peripheral vascular disease were among those aged 70 years and over.

For abdominal aortic aneurysm, the sex difference is even greater than for peripheral vascular disease overall, with rates almost five times higher in men. Almost all hospitalisations for abdominal aortic aneurysm (88.6%) occur among those aged 65 years and over.

### Hospitalisations for peripheral vascular disease in Australia, 2001–02



Source: AIHW National Hospital Morbidity Database.

### Aboriginal and Torres Strait Islander peoples

In 2001–02, hospitalisation rates for peripheral vascular disease among Indigenous Australians<sup>16</sup> were slightly less than other Australians.

### Length of stay in hospital

In 2001–02, 40.3% of hospitalisations for peripheral vascular disease were same-day hospitalisations, an increase from 1993–94 when the percentage was 25.3%.

Among those hospitalised for at least one night, the average length of stay was 11.5 days, a decline from 1993–94 when it was 13.3 days. On average, those hospitalised for peripheral vascular disease tended to stay almost twice as long as those hospitalised for coronary heart disease.

### Deaths in hospital

In 2001–02, 5.5% of hospitalisations for peripheral vascular disease ended in death, and this rate has declined from 1993–94 when it was 7.1%.

Around 43.2% of these deaths were for people admitted for abdominal aortic aneurysm, and the in-hospital death rate for this condition (12.7%) was twice that for peripheral vascular disease overall.

### Deaths

Peripheral vascular disease accounted for 2,581 deaths or 1.9% of all deaths in 2002.

### Trends

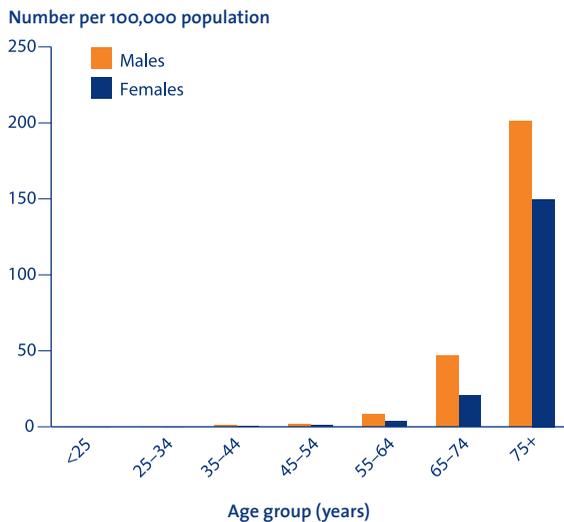
Between 1991 and 2002, deaths from peripheral vascular disease declined at a rate of 5.1% per year for males and 4.7% per year for females. This produced a total decline of 40.2% among males and 37.1% among females over the 12-year period.

### Sex and age

In 2002, males were almost twice as likely to die from peripheral vascular disease as females. Deaths from peripheral vascular disease increase greatly with age, with 76.1% of deaths occurring among those aged 75 years and over.

<sup>16</sup> The reporting of the Indigenous identifier in hospital records is not always complete, so the rates presented may underestimate true hospital use by Aboriginal and Torres Strait Islander peoples (see Methods and data sources section for more information).

### Deaths from peripheral vascular disease, 2002



Source: AIHW National Mortality Database.

### Socioeconomic status

In 2000–02, Australians in the most disadvantaged areas experienced higher death rates from peripheral vascular disease than their counterparts from the least disadvantaged areas.

### Aboriginal and Torres Strait Islander peoples

Among Aboriginal and Torres Strait Islander peoples<sup>17</sup> there are relatively few deaths attributed to peripheral vascular disease. This may be a reflection of the younger age structure of Aboriginal and Torres Strait Islander peoples compared with the overall Australian population. In 2000–02, there were no significant differences in peripheral vascular disease death rates between Aboriginal and Torres Strait Islander Australians and other Australians.

### Region

In 2000–02, death rates from peripheral vascular disease were higher in regional areas than in major cities. Death rates in remote areas were not significantly different to those in major cities.

### State and territory

In 2002, death rates for peripheral vascular disease varied among the states and territories from 45.7% above the national average to 7.0% below the national average. Death rates were highest in Tasmania, and lowest in Western Australia and the Australian Capital Territory. For more information see the National Cardiovascular Disease Database <<http://www.aihw.gov.au/cvdhtml/cvd-menu.htm>>.

<sup>17</sup> Includes data for only Queensland, Western Australia, South Australia and the Northern Territory as these states and territory are considered to have sufficient coverage of Indigenous Australian deaths.



## Health inequalities

### Deaths from peripheral vascular disease

Year	Population subgroup	Males	Females	Persons
Number per 100,000 population				
2002	<b>Age group (years)</b>			
	45–54	1.9	0.7	1.3
	55–64	8.5	3.5	6.0
	65–74	46.5	20.5	33.1
	75–84	147.0	78.4	107.4
	85 and over	434.7	339.5	369.1
	<i>All ages (ASR)</i>	<i>16.9</i>	<i>9.9</i>	<i>12.8</i>
2000–02	<b>Socioeconomic status (IRSD)</b>			
	1st quintile (most disadvantaged)	18.9	11.4	14.6
	2nd quintile	19.6	10.8	14.5
	3rd quintile	16.5	10.0	12.7
	4th quintile	16.8	9.7	12.7
	5th quintile (least disadvantaged)	14.5*	9.2	11.4*
2000–02	<b>Aboriginal and Torres Strait Islander status</b>			
	Standardised mortality ratio	0.8	1.3	1.0
2000–02	<b>Region (ASGC remoteness structure)</b>			
	Major cities	15.9	9.6	12.2
	Regional	19.6*	11.5*	15.0*
	Remote	18.6	9.5	13.9

\* Statistically significant difference when compared with the first row in the population subgroup.

#### Notes

1. Standardised mortality ratio = observed deaths divided by expected deaths. For further information see Methods and data sources section.
2. Data for all ages.
3. Significance testing was not performed on the age groups.
4. All rates other than age-specific rates and standardised mortality ratio are age-standardised (ASR) to the 2001 Australian population.

Source: AIHW National Mortality Database.

## Rheumatic fever and rheumatic heart disease

### Key points

- Australia's Aboriginal and Torres Strait Islander peoples living in remote areas have among the highest rates of acute rheumatic fever and chronic rheumatic heart disease in the world.
- Acute rheumatic fever and chronic rheumatic heart disease accounted for 274 deaths in 2002 (0.2% of all deaths).
- Acute rheumatic fever is frequently misdiagnosed or underreported and, therefore, its true incidence is underestimated. In 2002, there were 58 people identified with acute rheumatic fever in the Top End of the Northern Territory and 27 in Central Australia—all were Aboriginal and Torres Strait Islander peoples.
- Death rates for acute rheumatic fever and chronic rheumatic heart disease fell by 33.0% among males and 20.4% among females over the period 1991–02.
- In 2000–02, death rates from acute rheumatic fever and chronic rheumatic heart disease among Indigenous Australians were 19 times those of other Australians.

Acute rheumatic fever and chronic rheumatic heart disease accounted for 274 deaths in 2002, and were responsible for 2,258 hospitalisations in 2001–02. Australia's Aboriginal and Torres Strait Islander peoples living in remote areas have among the highest rates of these diseases in the world. However, acute rheumatic fever and chronic rheumatic heart disease are almost entirely preventable causes of illness and death. Since the 1950s, these diseases have largely become diseases of economically disadvantaged people.

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

Acute rheumatic fever is a delayed complication of an untreated throat infection from Group A *Streptococcus* bacteria and there is some evidence that it may also be caused by streptococcal skin sores. It can be difficult to diagnose but the more common manifestations include fever, joint pain and swelling, movement disorders and heart valve damage. The disease can affect the heart valves, the heart muscle and its lining, the joints and the brain. Its effect on the heart (rheumatic heart disease) is the only permanent manifestation and may be asymptomatic or may result in shortness of breath and chest pain. Those most at risk are children and young adults. After an attack of acute rheumatic fever, people are at high risk of recurrences if they are infected with the bacterium again. Recurrences lead to cumulative heart damage, but can be prevented by strict follow-up and monthly injections of penicillin for at least five years (and often longer) after the last episode. Because rheumatic heart valve lesions are the cumulative result of repeated or prolonged episodes of acute rheumatic fever in childhood and adolescence, the prevalence of rheumatic heart disease rises steadily with age, peaking in adults aged 20 to 40 years.

### Risk factors for rheumatic fever and rheumatic heart disease

Poverty and overcrowding, poor sanitary conditions, lack of education and limited access to medical care for adequate diagnosis and treatment are recognised as contributing factors to rheumatic fever.

### How many Australians have rheumatic fever and rheumatic heart disease?

Registers of people with known or suspected acute rheumatic fever and chronic rheumatic heart disease have been established in the Top End of the Northern Territory and Central Australia. This section draws on data from these two registers.



### Incidence of acute rheumatic fever

Acute rheumatic fever is frequently misdiagnosed or underreported and, therefore, its true incidence is underestimated.

In 2002, there were 58 people registered with acute rheumatic fever in the Top End of the Northern Territory and 27 in Central Australia—all were Aboriginal and Torres Strait Islander peoples. In the Top End, most cases (83%) required hospitalisation and 35% were for recurrences. In Central Australia, 30% were recurrences. Recurrences are defined as cases diagnosed in someone with established rheumatic heart disease three months or more after the most recent episode of acute rheumatic fever. Children aged 5–14 years accounted for the majority of cases (55%), with an incidence rate of 346 per 100,000 population in the Top End of the Northern Territory and 365 per 100,000 population in Central Australia. While the peak age group is 5–14 years, cases do occur in adults but are rare in children under four years of age. Females accounted for over two-thirds of acute rheumatic fever in the Top End of the Northern Territory.

#### Trends

There may be some evidence that acute rheumatic fever among Aboriginal and Torres Strait Islander children in the Top End has declined over the past

decade. During 1998–02 the rate of Aboriginal and Torres Strait Islander children aged 5–14 years with acute rheumatic fever was 245 per 100,000 population, compared with 254 per 100,000 population in 1989–93. By contrast, in Central Australia the incidence of acute rheumatic fever appears to have increased among 5–14-year-olds from 198 per 100,000 population in 1995 to 365 per 100,000 population in 2002.

However, these variations over time need to be interpreted with caution. In Central Australia, they may simply reflect increased coverage of active surveillance, which was quite low in the early years (below 50%) but was estimated to be nearly 90% in 2001–02. In the Top End they may reflect different methods of case ascertainment in the two time periods.

### Prevalence of rheumatic heart disease

In 2002, there were 696 people registered with chronic rheumatic heart disease in the Top End of the Northern Territory and 283 people in Central Australia. Almost all of these (92–94%) were Aboriginal or Torres Strait Islander peoples. The prevalence rate among Aboriginal and Torres Strait Islander peoples was 16.6 per 1,000 population in the Top End of the Northern Territory and 12.5 per 1,000

#### People with chronic rheumatic heart disease in the Top End of the Northern Territory and in Central Australia, 2002

Age group (years)	Top End		Central Australia	
	Indigenous Australians	Other Australians	Indigenous Australians	Other Australians
Number per 1,000 population				
5–14	5.8	0.2	7.6	0.0
15–24	19.8	0.3	18.6	0.5
25–44	29.4	0.8	15.8	0.4
45 and over	18.6	0.8	14.9	1.4
<b>Total</b>	<b>16.6</b>	<b>1.7</b>	<b>12.5</b>	<b>0.6</b>

Sources: Top End Rheumatic Heart Disease Register; Central Australian Rheumatic Heart Disease Register.

in Central Australia, compared with 1.7 per 1,000 and 0.6 per 1,000 among other Australians living in the Top End and Central Australia, respectively.

Chronic rheumatic heart disease occurs mainly in those aged 15 years and over. In 2002 in the Top End of the Northern Territory 8% of cases occurred in those aged 5–14 years. Results from Central Australia indicated that over two-thirds of cases occurred in the 15–44-year age range.

### Trends

The reported prevalence of chronic rheumatic heart disease continues to increase in the Top End of the Northern Territory. In 2002, there were 17 cases per 1,000 Aboriginal and Torres Strait Islander peoples, compared with 9 per 1,000 in 1995. This increase is likely to be due to an improvement in reporting and case finding, and better awareness of the condition and its symptoms rather than an actual rise in the number of cases.

### Hospitalisation

In 2001–02, there were 2,258 hospitalisations in Australia for acute rheumatic fever and chronic rheumatic heart disease as the principal diagnosis (0.04% of all hospitalisations). Of the hospitalisations for heart, stroke and vascular diseases, acute rheumatic fever and chronic rheumatic heart disease accounted for 0.5%. Most (89.9%) hospitalisations are for rheumatic heart disease.

### Trends

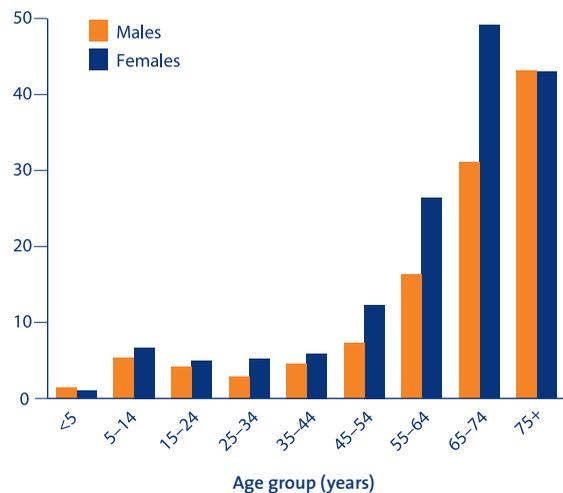
While the actual number of hospitalisations has increased from 1,836 to 2,258 between 1993–94 and 2001–02, the age-standardised hospitalisation rate for acute rheumatic fever and chronic rheumatic heart disease has remained relatively stable.

### Sex and age

In 2001–02, females were 28.4% more likely to be hospitalised for acute rheumatic fever and chronic rheumatic heart disease than males. Hospital use for chronic rheumatic heart disease increased with age up to 80 years, with 70.7% of such cases aged 45–79 years. Acute rheumatic fever is more common among the younger age groups, with 55.5% of hospitalisations occurring among those aged 5–19 years.

### Hospitalisations for acute rheumatic fever and chronic rheumatic heart disease in Australia, 2001–02

Number per 100,000 population



Source: AIHW National Hospital Morbidity Database.

### Aboriginal and Torres Strait Islander peoples

In 2001–02, although Aboriginal and Torres Strait Islander peoples<sup>18</sup> represent about 2% of the population, they accounted for 15.1% of hospitalisations for acute rheumatic fever and chronic rheumatic heart disease. Hospitalisation rates for acute rheumatic fever and chronic rheumatic heart disease were much higher among Aboriginal and Torres Strait Islander peoples (six times for males and eight times for females) than among other Australians in 2001–02.

<sup>18</sup> The reporting of the Indigenous identifier in hospital records is not always complete, so the rates presented may underestimate true hospital use by Aboriginal and Torres Strait Islander peoples (see Methods and data sources section for more information).



### Length of stay in hospital

In 2001–02, 32.2% of hospitalisations for acute rheumatic fever and chronic rheumatic heart disease were same-day hospitalisations, an increase from 1993–94 when the figure was 26.4%.

Among those hospitalised for at least one night, the average length of stay was 11.1 days, an increase from 1993–94 when it was 10.0 days.

### Deaths in hospital

In 2001–02, 2.0% of hospitalisations for acute rheumatic fever and chronic rheumatic fever ended in death, and this has remained stable since 1993–94.

## Deaths

Acute rheumatic fever and chronic rheumatic heart disease accounted for 274 deaths in Australia, 0.2% of all deaths in 2002. Chronic rheumatic heart disease accounted for 98% of these deaths.

### Trends

Between 1991 and 2002, death rates from acute rheumatic fever and chronic rheumatic heart disease declined at a rate of 2.4% per year for males and 2.6% per year for females. This produced a total decline of 33.0% among males and 20.4% among females over the 12-year period.

### Sex and age

In 2002, females were almost twice as likely to die from acute rheumatic fever and chronic rheumatic heart disease as men. Around 73.0% of deaths occur in those aged 65 years and over.

### Socioeconomic status

In 2000–02, there were no significant differences in death rates from acute rheumatic fever and chronic rheumatic heart disease between the most and least disadvantaged areas.

### Aboriginal and Torres Strait Islander peoples

Aboriginal and Torres Strait Islander peoples<sup>19</sup> are far more likely to die from acute rheumatic fever and chronic rheumatic heart disease than other Australians. In 2000–02, Indigenous males were almost 17 times and Indigenous females 21 times as likely to die from acute rheumatic fever and chronic rheumatic heart disease as other Australians.

### Region

In 2000–02, death rates from acute rheumatic fever and chronic rheumatic heart disease were four times higher in remote areas of Australia than in major cities. The higher death rate in remote areas largely reflects the high proportion of the Indigenous population in these areas and the higher rate of deaths for Indigenous people overall in Australia. Death rates in regional areas were not significantly different to those in major cities.

### State and territory

In 2002, death rates for acute rheumatic fever and chronic rheumatic heart disease varied among the states and territories from five times above the national average to 18.9% below the national average. Death rates were highest in the Northern Territory and lowest in South Australia and New South Wales. For more information see the National Cardiovascular Disease Database <<http://www.aihw.gov.au/cvdhtml/cvd-menu.htm>>.

### International comparisons

Despite the much lower incidence and prevalence of acute rheumatic fever and chronic rheumatic heart disease in developed countries, they remain important causes of illness and deaths in Australia and New Zealand. In New Zealand, acute rheumatic fever and chronic rheumatic heart disease continue to be major health problems, particularly among Maori and Pacific Islander peoples. Between 1995 and 2000, the annual incidence of acute rheumatic fever was

19 Includes data for only Queensland, Western Australia, South Australia and the Northern Territory as these states and territory are considered to have sufficient coverage of Indigenous Australian deaths.

2.8 per 100,000. The annual incidence rate among those aged 5–14 years was 13.8 per 100,000 among these peoples.

The World Health Organization (WHO) estimated in 1994 that acute rheumatic fever and chronic rheumatic heart disease affected 12 million people in

developing countries, with 400,000 deaths annually. It has also been estimated that acute rheumatic fever and chronic rheumatic heart disease are responsible for almost half of the heart, stroke and vascular diseases in all age groups worldwide and are the leading causes of heart, stroke and vascular diseases deaths in the first five decades of life.

## Health inequalities

### Deaths from acute rheumatic fever and chronic rheumatic heart disease

Year	Population subgroup	Males	Females	Persons
Number per 100,000 population				
2002	<b>Age group (years)</b>			
	45–54	0.6	1.0	0.8
	55–64	1.1	2.7	1.9
	65–74	2.9	5.8	4.4
	75 and over	8.1	14.9	12.2
	<i>All ages (ASR)</i>	<i>1.0</i>	<i>1.7</i>	<i>1.4</i>
2000–02	<b>Socioeconomic status (IRSD)</b>			
	1st quintile (most disadvantaged)	1.2	2.0	1.6
	2nd quintile	1.2	1.5	1.3
	3rd quintile	1.0	1.5	1.3
	4th quintile	0.9	1.7	1.4
	5th quintile (least disadvantaged)	1.0	1.1	1.1
2000–02	<b>Aboriginal and Torres Strait Islander status</b>			
	Standardised mortality ratio	16.6 <sup>#</sup>	21.1 <sup>#</sup>	18.9 <sup>#</sup>
2000–02	<b>Region (ASGC remoteness structure)</b>			
	Major cities	1.0	1.4	1.2
	Regional	1.1	1.6	1.4
	Remote	2.6*	5.9*	4.1*

\* Statistically significant difference when compared with the first row in the population subgroup.

<sup>#</sup> Statistically significant difference from 1.0 (other Australians).

#### Notes

1. Standardised mortality ratio = observed deaths divided by expected deaths. For further information see Methods and data sources section.

2. Data for all ages.

3. Significance testing was not performed on the age groups.

4. All rates other than age-specific rates and standardised mortality ratio are age-standardised (ASR) to the 2001 Australian population.

Source: AIHW National Mortality Database.



## Further reading

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## Congenital heart diseases

### Key points

- Congenital heart diseases represent around one-third of all congenital malformations. They are one of the biggest killers of infants less than one year old.
- In 2002, congenital heart diseases accounted for 224 deaths (0.17% of all deaths) in Australia.
- In 1997, there were 1,380 births with congenital heart diseases—a rate of 54 per 10,000 live births.
- Death rates from congenital heart diseases fell by 27.6% among males and 32.2% among females over the period 1991–02.
- In 2000–02, death rates from congenital heart diseases among Indigenous Australians were 2.6 times those of other Australians.

Congenital heart diseases (those present at birth) represent around one-third of all congenital malformations. They are one of the biggest killers of infants less than one year old. Over 42% of the deaths from congenital heart diseases occur in those aged under five years.

Improvements in medical care such as better diagnostic tests (such as foetal cardiac diagnosis), new medications and surgical techniques have increased survival from congenital heart diseases. Over the past two decades, death rates from congenital heart diseases have fallen by around 48.9%. Hospitalisations for these conditions have increased by 19% in the last ten years.

### What are congenital heart diseases?

Congenital heart diseases refer to disorders of the heart or central (main) blood vessels present at birth. Congenital conditions include abnormalities of the heart or heart valves, defects of vessels such as the aorta and pulmonary artery or combinations of defects. Symptoms may appear at birth or sometime thereafter and can include breathlessness or a failure to attain normal growth and development. However,

clinical signs can vary with each defect. Most children with congenital heart defects are treated with surgery or catheter-based techniques, usually in infancy or early childhood.

### Risk factors for congenital heart diseases

In most cases, the cause of a baby's congenital heart disease is unknown. Some of the known risk factors include genetic factors; viral infections, such as rubella (German measles); maternal use of alcohol, over-the-counter and prescription medications, and illicit drugs during pregnancy; and maternal health factors, such as poorly controlled diabetes and poor nutrition.

### How many Australians have congenital heart diseases?

It is not known how many Australians have congenital heart diseases. New cases are registered each year with state and territory birth defects registers—these data are presented below.

In 1997, there were 1,380 births with congenital heart diseases—a rate of 54 per 10,000 live births. This represents around one-third of all congenital malformations during 1997. The most common congenital heart defects in Australia are septal defects.

#### Septal defects

Septal defects allow blood to flow between the heart's right and left chambers due to an abnormal opening in the wall (septum) that separates the two sides of the heart. The defect is sometimes called 'a hole in the heart'. The two most common types of this defect are atrial septal defect and ventricular septal defect.

**Ventricular septal defect** refers to a hole in the wall (septum) between the heart's two pumping chambers (the ventricles). In 1997, there were 484 births with ventricular septal defects, representing a rate of 19 per 10,000 births.



**Atrial septal defect** refers to a hole in the wall (septum) between the heart's two collecting chambers (the atria). In 1997, there were 218 births with atrial septal defects, representing a rate of 9 per 10,000 births.

#### **Patent ductus arteriosus (also known as persistent ductus arteriosus)**

This is a defect in which the ductus arteriosus, which allows the blood to bypass the lungs during foetal life, fails to close at, or soon after, birth.

In 1997, there were 207 births with patent ductus arteriosus, representing a rate of 8 per 10,000 births.

#### **Obstruction defects**

An obstruction (or stenosis) is a narrowing that partially or completely blocks the flow of blood. The obstruction can occur in heart valves, arteries or veins. The three most common forms are pulmonary stenosis, coarctation of the aorta and aortic stenosis.

**Pulmonary stenosis** refers to narrowing of the pulmonary valve—located between the right ventricle and the pulmonary artery. In 1997, there were 68 births with 'isolated' pulmonary stenosis, representing a rate of 3 per 10,000 births.

**Coarctation of the aorta** refers to a narrowing of the aorta. The narrowing restricts blood flow to the lower body and increases blood pressure above the constriction. In 1997, there were 63 births with coarctation of the aorta, representing a rate of 3 per 10,000 births.

**Aortic stenosis** refers to an abnormality (narrowing) of the aortic valve—located between the left ventricle and the aorta—which results in the valve opening incompletely. In 1997, there were 50 births with aortic stenosis, representing a rate of 2 per 10,000 births.

#### **Cyanotic defects**

With these types of defects, blood pumped to the body contains less oxygen than normal. It causes a condition called cyanosis, a blue discolouration of the skin, and babies are often referred to as 'blue babies'. The most common cyanotic defects are Transposition of the great arteries and Tetralogy of Fallot.

**Transposition of the great arteries** refers to the reversal of the pulmonary artery and aorta. The aorta is connected to the right ventricle instead of the left and the pulmonary artery is connected to the left ventricle. In 1997, there were 79 births with transposition of the great arteries, representing a rate of 3 per 10,000 births.

**Tetralogy of Fallot** comprises four defects: narrowing of the pulmonary artery and its valve (pulmonary stenosis); a hole in the wall between the two lower chambers of the heart (ventricular septal defect); abnormal rightward positioning of the aorta (above the ventricular septal defect); and thickening (hypertrophy) of the right ventricle of the heart. In 1997, there were 54 births with Tetralogy of Fallot, representing a rate of 2 per 10,000 births.

#### **Hypoplastic left heart syndrome**

This refers to underdevelopment of the left side of the heart. This defect affects the aorta, aortic valve, left ventricle and mitral valve. In 1997, there were 54 births with hypoplastic left heart syndrome, representing a rate of 2 per 10,000 births.

#### **Hospitalisation**

In 2001–02, there were 4,960 hospitalisations where congenital heart diseases were the principal diagnosis (0.08% of all hospitalisations). Of the hospitalisations for congenital malformations, congenital heart diseases accounted for 14.6%.

### Trends

Between 1993–94 and 2001–02, there was a 19.2% increase in the age-standardised hospitalisation rate for congenital heart diseases. The increase in congenital heart disease hospitalisations may be influenced by the changes in diagnostic technology over this period, such as foetal diagnosis.

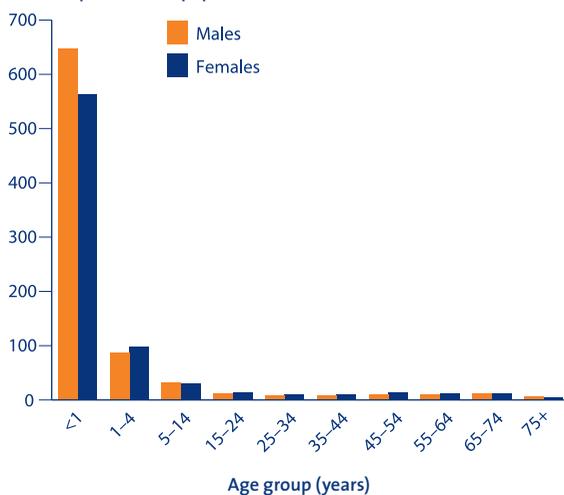
### Sex and age

In 2001–02, male and female hospitalisation rates for congenital heart diseases were similar.

Children aged less than 10 years accounted for 59.7% of hospitalisations. Only 15.3% of hospitalisations were in people aged 45 years or more.

### Hospitalisations for congenital heart diseases, 2001–02

Number per 100,000 population



Source: AIHW National Hospital Morbidity Database.

### Length of stay in hospital

In 2001–02, 52.9% of hospitalisations for congenital heart diseases were same-day hospitalisations, a large increase from 32.5% in 1993–94.

Among those hospitalised for at least one night, the average length of stay was 10.1 days, an increase from 1993–94 when it was 9.4 days.

Infants aged less than one year stayed in hospital nearly twice as long as children aged 5–10 years, 13.0 days compared with 6.8 days respectively (of those hospitalised for at least one night).

### Deaths in hospital

In 2001–02, 1.4% of hospitalisations for congenital heart diseases ended in death, a decline from 3.1% in 1993–94.

### Procedures for congenital heart diseases

In 2001–02 there were 889 procedures for closure of an atrial septal defect, 466 for closure of patent ductus arteriosus and 387 for closure of ventricular septal defect. These include both surgical and catheter-based procedures.

Where procedures were performed for patent ductus arteriosus and ventricular septal defect, most were done on children aged less than 10 years (90.6% and 85.8% respectively).

Procedures for atrial septal defect were spread more evenly over all ages, with only 42.5% of procedures in those aged less than 10 years.

### Deaths

In 2002, congenital heart diseases accounted for 224 deaths (0.17% of all deaths) in Australia.

Perinatal deaths comprise stillbirths (foetal deaths) and deaths of infants within the first 28 days of life (neonatal deaths). In 2002, there were 72 perinatal deaths, of which 29 were foetal deaths and 43 were neonatal deaths.



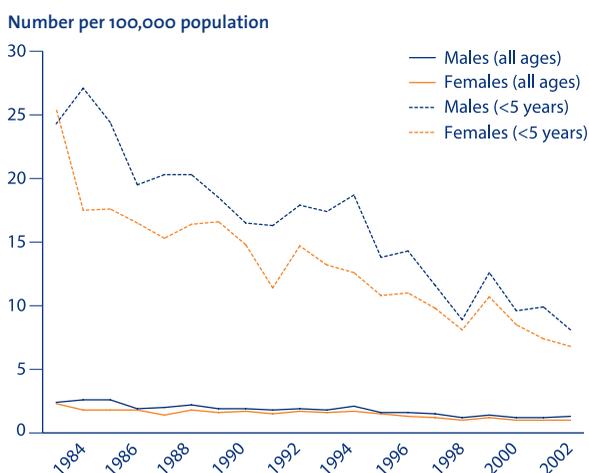
## Trends

Between 1991 and 2002, death rates from congenital heart diseases declined at a rate of 4.8% per year for males and 4.9% per year for females. This produced a total decline of 27.6% for males and 32.2% for females over the 12-year period. Among children aged under five years, declines in death rates have been much steeper, 50.1% for males and 40.4% for females.

As well as improvements in treatments, declines in death rates may also have been influenced by the early diagnosis of complex congenital heart diseases in pregnancy and terminations for these foetal malformations.

The proportion of deaths from congenital heart diseases occurring in young children has declined markedly over the last two decades. In 1983, deaths were most common in children aged under five years, accounting for 73.7% of deaths. By 2002, only 42.4% of deaths from congenital heart diseases occurred in this age group.

### Deaths from congenital heart diseases, for selected ages, 1983–2002



Source: AIHW National Mortality Database.

## Sex and age

Death rates from congenital heart diseases were similar between males and females. Death rates declined with age—over 42% of the deaths from congenital heart diseases occurred in those aged under 5 years.

## Socioeconomic status

In 2000–02, there were no significant differences in death rates from congenital heart diseases between the most and least disadvantaged areas.

## Aboriginal and Torres Strait Islander peoples

In 2000–02, Aboriginal and Torres Strait Islander peoples<sup>20</sup> were 2.6 times as likely to die from congenital heart diseases compared with other Australians.

## Region

In 2000–02, death rates from congenital heart diseases were overall higher in remote areas of Australia than in major cities. The higher death rate in remote areas largely reflects the high proportion of the Indigenous population in these areas and the higher rate of deaths for Indigenous people overall in Australia. Death rates in regional areas were not significantly different to those in major cities.

## State and territory

In 2002, death rates for congenital heart diseases varied between the states, from 17.3% above the national average to 17.4% below the national average. Death rates were highest in New South Wales and lowest in Western Australia. The number of deaths in Tasmania and the territories was too small to draw any reliable conclusions. For more information see the National Cardiovascular Disease Database <<http://www.aihw.gov.au/cvdhtml/cvd-menu.htm>>.

20 Includes data for only Queensland, Western Australia, South Australia and the Northern Territory as these states and territory are considered to have sufficient coverage of Indigenous Australian deaths.

## Health inequalities

### Deaths from congenital heart diseases

Year	Population subgroup	Males	Females	Persons
Number per 100,000 population				
2002	<b>Age group (years)</b>			
	0–4	8.1	6.8	7.5
	5–14	0.5	0.4	0.4
	15–24	0.8	0.4	0.6
	25–34	0.9	0.8	0.9
	35–54	0.7	0.5	0.6
	55–74	0.8	0.7	0.8
	75 and over	1.5	1.4	1.5
	<i>All ages (ASR)</i>	<i>1.3</i>	<i>1.0</i>	<i>1.2</i>
2000–02	<b>Socioeconomic status (IRSD)</b>			
	1st quintile (most disadvantaged)	1.6	1.1	1.4
	2nd quintile	1.3	1.2	1.3
	3rd quintile	1.3	0.9	1.1
	4th quintile	0.9	0.9	0.9
	5th quintile (least disadvantaged)	0.9	0.8	0.8
2000–02	<b>Aboriginal and Torres Strait Islander status</b>			
	Standardised mortality ratio	2.8 <sup>#</sup>	2.3	2.6 <sup>#</sup>
2000–02	<b>Region (ASGC remoteness structure)</b>			
	Major cities	1.1	0.8	1.0
	Regional	1.4	1.2*	1.3*
	Remote	1.9	1.9	1.9*

\* Statistically significant difference when compared with the first row in the population subgroup.

# Statistically significant difference from 1.0 (other Australians).

#### Notes

1. Standardised mortality ratio = observed deaths divided by expected deaths. For further information see Methods and data sources section.
2. Data for all ages.
3. Significance testing was not performed on the age groups.
4. All rates other than age-specific rates and standardised mortality ratio are age-standardised (ASR) to the 2001 Australian population.

Source: AIHW National Mortality Database.



## Further reading

AIHW 2003. Rural, regional and remote health: a study on mortality. AIHW Cat. No. PHE 45. Canberra: AIHW (Rural Health Series No. 2).

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