

4 Circulatory disease

This chapter discusses mortality due to the broad category of circulatory disease (ICD-10 chapter 9, codes I00–I99). It then provides further analysis of specific diseases within this broad category. The specific circulatory diseases included are:

1. ischaemic heart disease (coronary heart disease);
2. cerebrovascular disease (stroke);
3. rheumatic heart disease; and
4. other circulatory diseases.

These specific diseases were chosen because ischaemic heart disease and cerebrovascular disease are the most frequent causes of death resulting from circulatory disease; and rheumatic heart disease is much more frequent as a cause of death in Australia's Aboriginal and Torres Strait Islander populations.

Summary of findings

The overall mortality of Australians due to circulatory diseases increased with increasing remoteness (Table 4.2). Compared to those in Major Cities, death rates from circulatory diseases are:

- 1.05–1.1 times as high in regional areas; and
- 1.1–1.4 times as high in remote areas.

This broad observation does not take into account two factors previously stated on page 33, namely the likely effect on rates of high Indigenous mortality coupled with their greater representation outside Major Cities, and the possible effect of the migration of the frail aged. When analysis is restricted to non-Indigenous Australians under the age of 65 years, there is still a relationship between remoteness and mortality for circulatory diseases as described below.

Indigenous mortality from circulatory diseases is about 3 times as high as that for non-Indigenous people from Major Cities, which is likely to influence rates for the total population in remote areas. Deaths rates are higher in most age groups younger than 75 years, with rates for 25–44-year-olds and 45–64-year-olds about 14 and 6–10 times respectively the rates for their non-Indigenous counterparts from Major Cities.

Compared to death rates in Major Cities, death rates for non-Indigenous people due to circulatory disease were, respectively:

- 1.1 times as high for males in regional areas but not significantly different in remote areas; and
- 1.05 times as high for females in regional areas, not significantly different in Remote areas and lower (0.8 times) in Very Remote areas.

Death rates for both the total and non-Indigenous populations aged 75 years and older were lower (towards 0.9 and 0.7 times the Major Cities rates) in Remote and Very Remote areas.

When analysis is restricted to those who are younger than 65 years of age, death rates for non-Indigenous:

- males were 1.1, 1.2 and 1.2 times as high in Inner and Outer Regional and Remote areas and not significantly higher in Very Remote areas compared to Major Cities; and
- females were 1.2 and 1.3 times as high in Inner and Outer Regional areas, and not significantly higher in Remote or Very Remote areas compared to Major Cities.

Death rates for Indigenous males and females younger than 65 years of age were 8 and 10 times as high respectively than for their non-Indigenous counterparts from Major Cities.

Between 1992 and 1999, the rate of death due to circulatory diseases decreased in nearly all areas (including Major Cities) by about 5.5% for males and 4.5% for females each year. In Very Remote areas, the decrease was larger at about 11% per year for both sexes.

Annually, there were 1,378 'excess' deaths due to circulatory disease outside Major Cities (784, 477, 47 and 70 in each of the four areas). Of these people, 20% were aged 45–59 years, 20% were aged 60–69 years, and 50% were aged 70–84 years. About 60% were male. For non-Indigenous people, the percentages in the older age groups were higher, while for Indigenous people, 27% were aged 25–44 years, 50% were aged 45–64 years and 22% were 65 years or older.

Circulatory disease accounts for 41% of all deaths (and 42% of 'excess' deaths) and about 30% of Indigenous deaths (and 30% of the 'excess' Indigenous deaths). Because of this substantial contribution they make to the higher rates of death in regional and remote areas, circulatory diseases are an important target for intervention.

Summary/discussion of individual causes of death reviewed in this chapter

Total population

Ischaemic heart disease was responsible for 55% of the deaths (10,208 per year) as well as 55% of the 'excess' deaths (755 per year) due to circulatory disease (Table 4.1). Stroke and 'other' circulatory diseases were responsible for 23% and 22% of deaths (4,215 and 4,128 per year) from circulatory disease respectively, however while stroke was responsible for only 6% of the 'excess' deaths (85 per year), 'other' circulatory diseases were responsible for 38% of the 'excess' deaths (518 per year) from circulatory disease. Rheumatic heart disease accounted for less than 1% of deaths and for 1% of the 'excess' deaths due to this broad cause.

There were 1.1–1.3 times as many deaths due to ischaemic heart disease and 'other' circulatory diseases as expected, and about the same number of deaths due to stroke as expected in the four areas outside Major Cities (that is, except for stroke, death rates increased with remoteness). The death rate due to rheumatic heart disease increased rapidly with remoteness, with about as many deaths as expected in Inner Regional areas, rising to 6.8 times as many as expected in Very Remote areas.

Table 4.1: Summary table of deaths due to circulatory diseases for all persons, 1997–1999

Cause	Annual deaths outside Major Cities			Annual 'excess' deaths outside Major Cities			Age groups in which the 'excess' occurs
	No.	%	% male	No.	%	% male	
Ischaemic heart disease	10,208	55%	57%	755	55%	69%	21%: 45–59 72%: 60–84
Stroke	4,215	23%	43%	85	6%	75%	80%: 60–84
Rheumatic heart disease	102	<1%	35%	18	1%	44%	50%: 20–49 50%: 60–79
'Other' circulatory diseases	4,128	22%	47%	518	38%	46%	50%: 60–84 33%: 85+
Total circulatory diseases	18,639	100%	51%	1,378	100%	60%	20%: 45–59 74%: 60+

Note: Descriptions of the age groups within which the 'excess' occurs apply only to the total population.

Source: AIHW National Mortality Database.

The bulk of the deaths and 'excess' deaths occur in the elderly, however a substantial proportion of the 'excess' was also found amongst the middle aged (in the case of ischaemic and rheumatic heart disease). Of note is that there were fewer deaths than expected as a result of ischaemic heart disease and stroke for elderly people from Outer Regional and remote areas.

More than half of the 'excess' deaths due to rheumatic heart disease occurred in remote areas, the rest of the 'excess' occurred in Outer Regional areas.

Indigenous population

Mortality of Indigenous people as a result of circulatory disease was 3.2 times as high, and for those younger than 65 years of age 8.6 times as high as for non-Indigenous people from Major Cities (Table 4.2). For the main causes of circulatory disease death, namely ischaemic heart disease, stroke and 'other' circulatory diseases, the rates for Indigenous people were respectively 3.3, 2.6 and 3.0 times those for non-Indigenous people who lived in Major Cities.

Death rates for Indigenous people due to rheumatic heart disease were 24 times as high as for their non-Indigenous counterparts from Major Cities, with the differential greater for younger age groups.

Annually there were 250, 81, 89 and 19 deaths of Indigenous people due to ischaemic heart disease, stroke, 'other' circulatory diseases and rheumatic heart disease. Of these, 175, 50, 59 and 18 respectively were in 'excess' of the number expected. These deaths were of Indigenous people from South Australia, Western Australia, the Northern Territory and Queensland only (where identification during this period was more reliable).

Table 4.2: The ratio of observed deaths from circulatory diseases to those expected if Major Cities^(a) rates applied in each ASGC Remoteness area, 1997–1999

Broad cause	Population	IR	OR	R ^(b)	VR ^(b)	National ^(c)
Ischaemic heart disease	All persons	*1.1	*1.1	*1.1	*1.3	n.p.
	Non-Indigenous	*1.1	*1.1	1.0	0.9	n.p.
	Non-Indigenous (aged 0–64 years)	*1.1	*1.2	*1.2	*1.3	n.p.
	Indigenous	n.p.	n.p.	n.p.	n.p.	*3.3
Stroke	Indigenous (aged 0–64 years)	n.p.	n.p.	n.p.	n.p.	*9.3
	All persons	*1.0+	1.0	0.9	1.2	n.p.
	Non-Indigenous	1.0	1.0	*0.9	0.8	n.p.
	Non-Indigenous (aged 0–64 years)	1.0	1.1	1.0	1.4	n.p.
Rheumatic heart disease	Indigenous	n.p.	n.p.	n.p.	n.p.	*2.6
	Indigenous (aged 0–64 years)	n.p.	n.p.	n.p.	n.p.	*6.5
	All persons	1.0	*1.4	*2.5	*6.8	n.p.
	Non-Indigenous	1.0	1.2	1.2	0.9	n.p.
'Other' circulatory diseases	Non-Indigenous 0–64	0.9	1.3	2.0	0.3	n.p.
	Indigenous	n.p.	n.p.	n.p.	n.p.	*23.9
	Indigenous 0–64	n.p.	n.p.	n.p.	n.p.	*50.2
	All persons	*1.1	*1.2	*1.2	*1.3	n.p.
Total circulatory diseases	Non-Indigenous	*1.1	*1.2	*1.1	0.8	n.p.
	Non-Indigenous (aged 0–64 years)	*1.1	*1.3	1.3	1.1	n.p.
	Indigenous	n.p.	n.p.	n.p.	n.p.	*3.0
	Indigenous (aged 0–64 years)	n.p.	n.p.	n.p.	n.p.	*6.6
Total circulatory diseases	All persons	*1.1	*1.1	*1.1	*1.3	n.p.
	Non-Indigenous	*1.1	*1.1	1.0	*0.9	n.p.
	Non-Indigenous (aged 0–64 years)	*1.1	*1.2	*1.2	*1.3	n.p.
	Indigenous	n.p.	n.p.	n.p.	n.p.	*3.2
	Indigenous (aged 0–64 years)	n.p.	n.p.	n.p.	n.p.	*8.6

(a) While the number of expected deaths for the total population is based on the death rates of the total population from Major Cities, the expected number of deaths for the non-Indigenous population is based on the death rates of the non-Indigenous population from Major Cities. Because non-Indigenous people comprise the overwhelming majority (99%) of the population in Major Cities, these two standards are very similar, but not identical. This means that the ratios for the five population groups are not strictly comparable.

(b) Ratios calculated for non-Indigenous persons from Remote and Very Remote areas should be treated with caution (see page 22).

(c) The ratios for Indigenous persons are for SA, WA, NT and Qld combined. Data for the total and non-Indigenous populations for this (SA, WA, NT & Qld) area adds little relevant information and have not been published (n.p.). Because of concerns about the quality of the data, ratios for Indigenous people have not been published (n.p.) for each area.

Notes

1. Bold text and asterisk indicates that ratios are significantly different from 1 at the 95% level.
2. 1.0+ indicates that there were slightly (but significantly) more deaths than expected (but less than 1.05 times more).
3. 1.0– indicates that there were slightly (but significantly) fewer deaths than expected (but more than 0.95 times as many).

Source: AIHW National Mortality Database.

Non-Indigenous population

For nearly all specific causes of circulatory disease, the high mortality of Indigenous people, coupled with their greater representation outside Major Cities, is influential in elevating death rates in remote areas.

For the two main causes of death (ischaemic heart disease and 'other' circulatory diseases) there were 1.1–1.2 times more deaths of non-Indigenous people than expected in regional areas (Table 4.2), but about as many as expected in remote areas (although this pattern is affected by lower death rates for the aged in remote areas).

Death rates due to ischaemic heart disease for non-Indigenous people younger than 65 years of age showed an increase from 1.1 times in Inner Regional areas to 1.3 times in Very Remote areas the rate for their non-Indigenous counterparts from Major Cities. This pattern was similar for 'other' circulatory disease, for which rates were 1.1 and 1.3 times the Major Cities rates in Inner and Outer Regional areas, but were not significantly different in remote areas. There was no such clear increase with remoteness for death rates due to stroke or rheumatic heart disease in non-Indigenous people younger than 65 years.

4.1 Overview—circulatory diseases

Between 1997 and 1999, an annual average of 52,229 Australians died as a result of a disease of the circulatory system, comprising 25,360 males and 26,869 females (Table 4.3). Most of these (33,590) occurred in Major Cities, with a further 17,661 in Inner and Outer Regional areas, and the remaining 978 in Remote and Very Remote areas.

Circulatory diseases were responsible for 41% of all deaths nationally, and 42% of the 'excess' deaths in areas outside Major Cities.

Table 4.3: Average annual deaths due to circulatory diseases, 1997–1999

	MC	IR	OR	R	VR	Total
Males (no.)	15,820	6,010	2,950	370	200	25,360
Females (no.)	17,770	5,950	2,750	290	120	26,870
Persons (no.)	33,590	11,960	5,700	660	310	52,230
Non-Indigenous males ^(a) (per cent)	99	99	97	86	50	99
Non-Indigenous females ^(a) (per cent)	99	99	97	88	47	99
Non-Indigenous persons^(a) (per cent)	99	99	97	87	49	99
Non-Indigenous males (0–64 yrs) (no.)	2,464	880	500	79	30	3,953
Non-Indigenous females (0–64 yrs) (no.)	882	330	180	23	8	1,423
Non-Indigenous persons (0–64 yrs) (no.)	3,346	1,210	680	103	38	5,377
Indigenous persons^(b) (no.)	n.p.	n.p.	n.p.	n.p.	n.p.	439

(a) Percentages and counts are rounded to the nearest whole number.

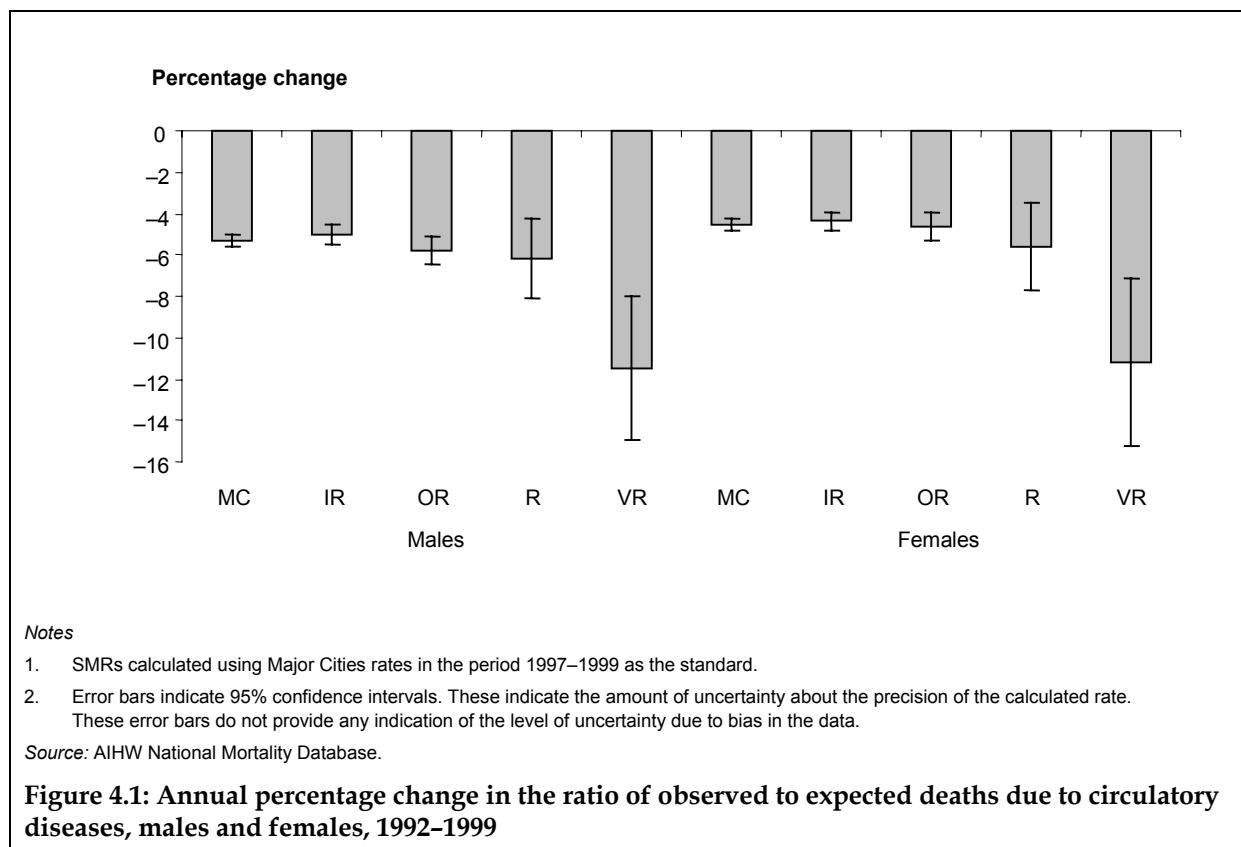
(b) The number of Indigenous deaths is the average annual number registered in SA, WA, NT and Qld in the period 1997–1999. An average of a further 149 were registered annually in the other jurisdictions. Counts of deaths have not been reported for Indigenous people by area because of concerns about data accuracy.

Source: AIHW National Mortality Database.

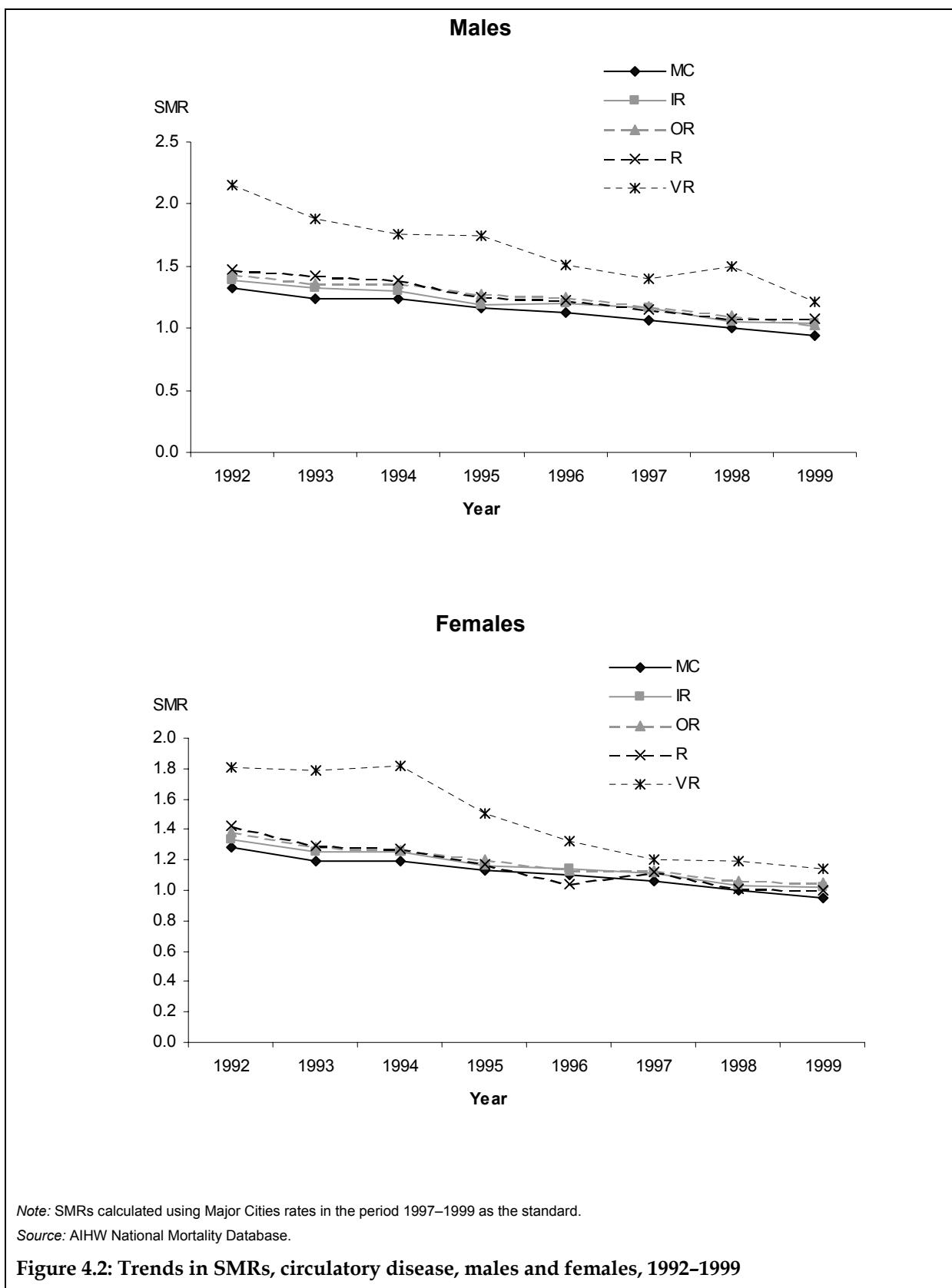
Trends in mortality due to diseases of the circulatory system

Death rates from this cause for both males and females fell in all areas between 1992 and 1999.

For males, annual percentage decreases were 5–6% in Major Cities, regional and Remote areas, but 11% in Very Remote areas. For females annual percentage decreases were slightly lower at 4.5–5% in Major Cities, regional and Remote areas, and 11% in Very Remote areas (Figures 4.1 and 4.2).



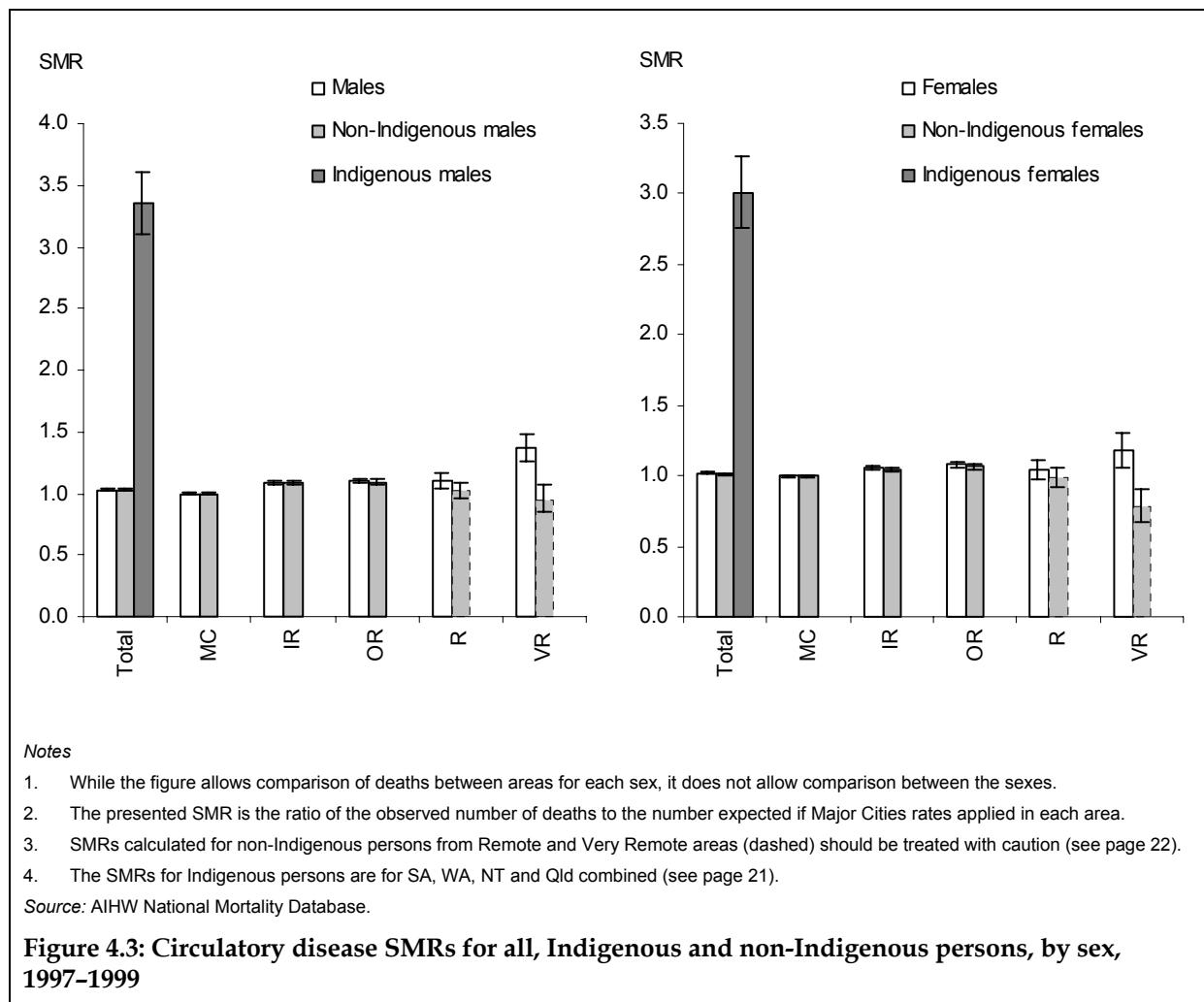
The lower rates of death due to circulatory disease in each of the areas have made major contributions to the overall decrease in death rates in these areas. In Major Cities, regional and Remote areas, decreases in death rates due to circulatory disease were responsible for between almost 70% and 80% of the overall reduction in 'excess' deaths. In Very Remote areas, the figure is lower at 45% of the overall reduction.



Death rates due to circulatory diseases

Mortality due to circulatory diseases was higher for people living outside Major Cities. Figure 4.3 and Tables 4.4 and 4.5 show that:

- For males in regional and Remote areas, rates were 1.1 times those in Major Cities.
- For females in regional areas, rates were 1.05 times those in Major Cities, however rates in Remote areas were not significantly different from those in Major Cities.
- For males in Very Remote areas, rates were 1.4 times rates in Major Cities and higher than in any of the other areas.
- For females in Very Remote areas, rates were 1.15 times rates in Major Cities, but not significantly different from rates in any of the other areas.
- Mortality for Indigenous people was substantially higher than for the 'total' population and for non-Indigenous people in any of the areas; this higher mortality raises the average death rate, particularly in the more remote areas.



These figures would appear, on the surface, to show that mortality increases with increasing remoteness.

These rates, however, are influenced by the number of Indigenous people living outside Major Cities and the high overall mortality of Indigenous people (about three times the non-Indigenous mortality rate for circulatory disease). Without examining the mortality of the Indigenous and non-Indigenous populations separately, therefore, it is premature to draw the conclusion that remoteness is a factor influencing this aspect of the health of Australians.

Mortality of Indigenous people

Based on 1997–1999 death registrations, the leading cause of death for Indigenous people living in Queensland, South Australia, Western Australia and the Northern Territory was circulatory diseases. These diseases accounted for 30% of Indigenous deaths in these jurisdictions. Circulatory diseases were also the leading cause of death among the Australian population as a whole, accounting for 41% of all deaths. However, Indigenous males and females had higher death rates from this cause than the total population (Figure 4.3).

In 1997–1999, there were approximately three times as many deaths in the Indigenous population than expected (3.4 times more deaths for Indigenous males and 3.0 times more deaths for Indigenous females). Over half (57%) of these deaths were attributable to ischaemic heart disease (heart attack, angina), a further 18% were due to cerebrovascular disease (stroke), 4% were due to rheumatic heart disease and 20% were due to 'other' diseases of the circulatory system. According to an ABS report, 'Risk factors contributing to the comparatively high incidence of cardiovascular disease among Aboriginal and Torres Strait Islander peoples include their high rates of smoking, obesity and diabetes. In addition, it has been argued that low infant birth weight predisposes a person to cardiovascular disease in later life. Thus the high rate of heart disease in Indigenous adults may be due in part to the relatively high proportion of Indigenous babies with low birth weight' (ABS 2002).

As discussed on page 21, uncertainty about the accuracy of identification of Indigenous deaths prevents reporting of Indigenous mortality in rural and remote areas.

Mortality of non-Indigenous people

In contrast to the total population, mortality from circulatory diseases did not rise consistently with increasing remoteness for the non-Indigenous population.

Death rates for non-Indigenous males and females from Inner and Outer Regional areas resulting from circulatory diseases were higher than for those from Major Cities (Figure 4.3 and Table 4.5). For non-Indigenous males, however, death rates from this cause in Remote and Very Remote areas were similar to rates in Major Cities. For non-Indigenous females, death rates in Remote areas were similar to those in Major Cities, but in Very Remote areas were lower (0.8 times the Major Cities rate).

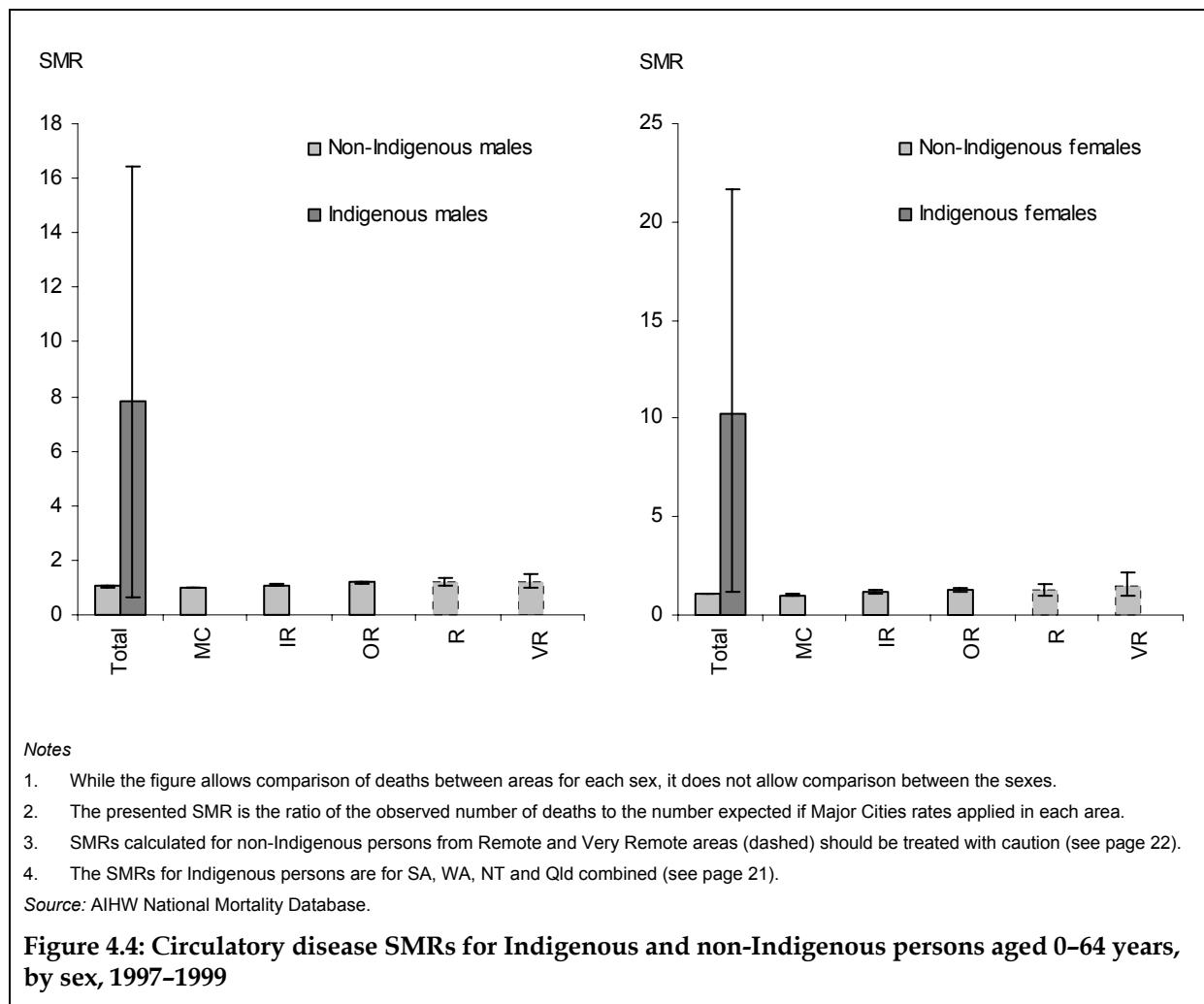
Mortality of people aged 0–64 years

Frequently, death rates of older non-Indigenous people from Remote and Very Remote areas are found to be substantially lower than those of similar aged people living in other areas, possibly reflecting a movement of older people with known health conditions into more populated areas to receive treatment, and eventually dying there.

These lower rates can substantially affect the summary statistic described for non-Indigenous people above. For this reason, rates for 0–64-year-old people are also presented here.

Death rates due to circulatory disease for Indigenous males and females who were younger than 65 years were 8 and 10 times as high respectively as rates for non-Indigenous males and females of the same age from Major Cities (Figure 4.4).

Death rates due to circulatory diseases for non-Indigenous males younger than 65 years were 1.1, 1.2 and 1.2 times as high in Inner Regional, Outer Regional and Remote areas respectively, as for similar males in Major Cities and, although elevated, were not significantly higher in Very Remote areas than in Major Cities. For non-Indigenous females in this age group, the rates were 1.15 and 1.3 times as high in Inner and Outer Regional areas, but, although elevated, not significantly higher in Remote and Very Remote areas than in Major Cities.



Variation by age group: circulatory diseases

An analysis of age-specific death rates gives more detailed information about each age group to confirm and supplement findings resulting from the broad analysis using ratios of observed to expected deaths alone.

Death rates in 1997–1999 from circulatory disease for both sexes were higher for most age groups in most regional and remote areas than in Major Cities. For both males and females,

death rates were negligible until age 25 years. For males the rates then rose to reach 200 deaths per 100,000 per year at age 55–59 years and 8,500 deaths per 100,000 per year for those 85 years and older. For females the pattern was similar: rates rose to 8,100 deaths per 100,000 per year for those 85 years and older.

Table 4.4: The ratio of observed deaths to those expected if Major Cities rates applied in each ASGC Remoteness area, circulatory disease, males and females, 1997–1999

Age group (years)	Male				Female							
			IR	OR	R	VR			IR	OR	R	VR
	MC rate		(ratio)		MC rate		(ratio)					
0–4	2	1.64	1.98	1.03	4.71		2	0.92	0.67	1.08	0.00	
5–14	1	0.61	0.36	0.00	*13.55		1	0.31	0.85	0.68	3.44	
15–24	3	1.10	1.37	2.26	*3.99		2	0.97	*2.17	2.21	*6.65	
25–44	17	*1.13	*1.21	*2.32	*5.36		7	1.06	*1.38	*2.54	*6.52	
45–64	159	*1.11	*1.27	*1.48	*2.48		55	*1.20	*1.49	*1.85	*4.42	
65–74	934	*1.08	*1.15	*1.13	*1.53		467	1.02	*1.18	*1.32	*1.58	
75+	3,918	*1.08	*1.04	*0.90	*0.65		3,614	*1.06	*1.04	*0.92	*0.70	
Total	..	*1.08	*1.10	*1.10	*1.36		..	*1.06	*1.08	1.04	*1.18	

* Significantly different from 1 (that is, rates are significantly different from those for people in Major Cities).

Notes

1. Caution should be used when making inferences about ratios that are not significantly different from 1.
2. MC rates are expressed as deaths per 100,000 population per year. Total (crude) MC rate is largely meaningless and is not included.
3. While the table allows comparison of deaths between areas for each sex, it does not allow comparison between the sexes or age groups.

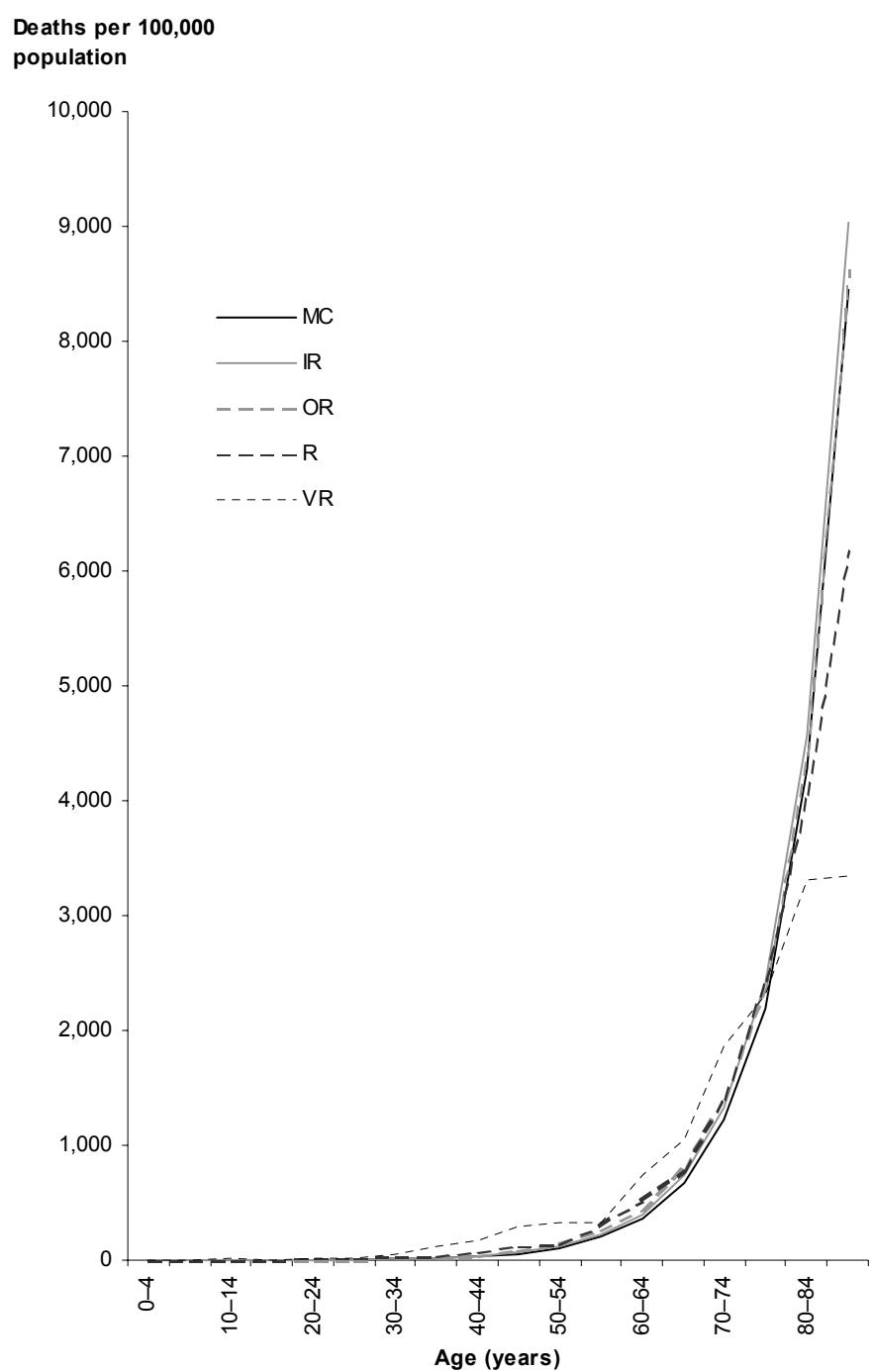
Source: AIHW National Mortality Database.

Death rates as a result of circulatory disease were higher in regional and remote areas at practically every age, except for those aged 75 years and over (Figures 4.5 and 4.6). In this age group, death rates in Remote and Very Remote areas were lower than those in Major Cities.

For males aged 25–74 years, death rates were substantially higher outside Major Cities, such that rates in Inner Regional areas were about 1.1 times as high, and those in Outer Regional areas 1.15–1.3 times as high. In remote areas, rates were higher again, particularly amongst 25–44-year-olds (up to 5 times as high) and 45–64-year-olds (up to 2.5 times as high).

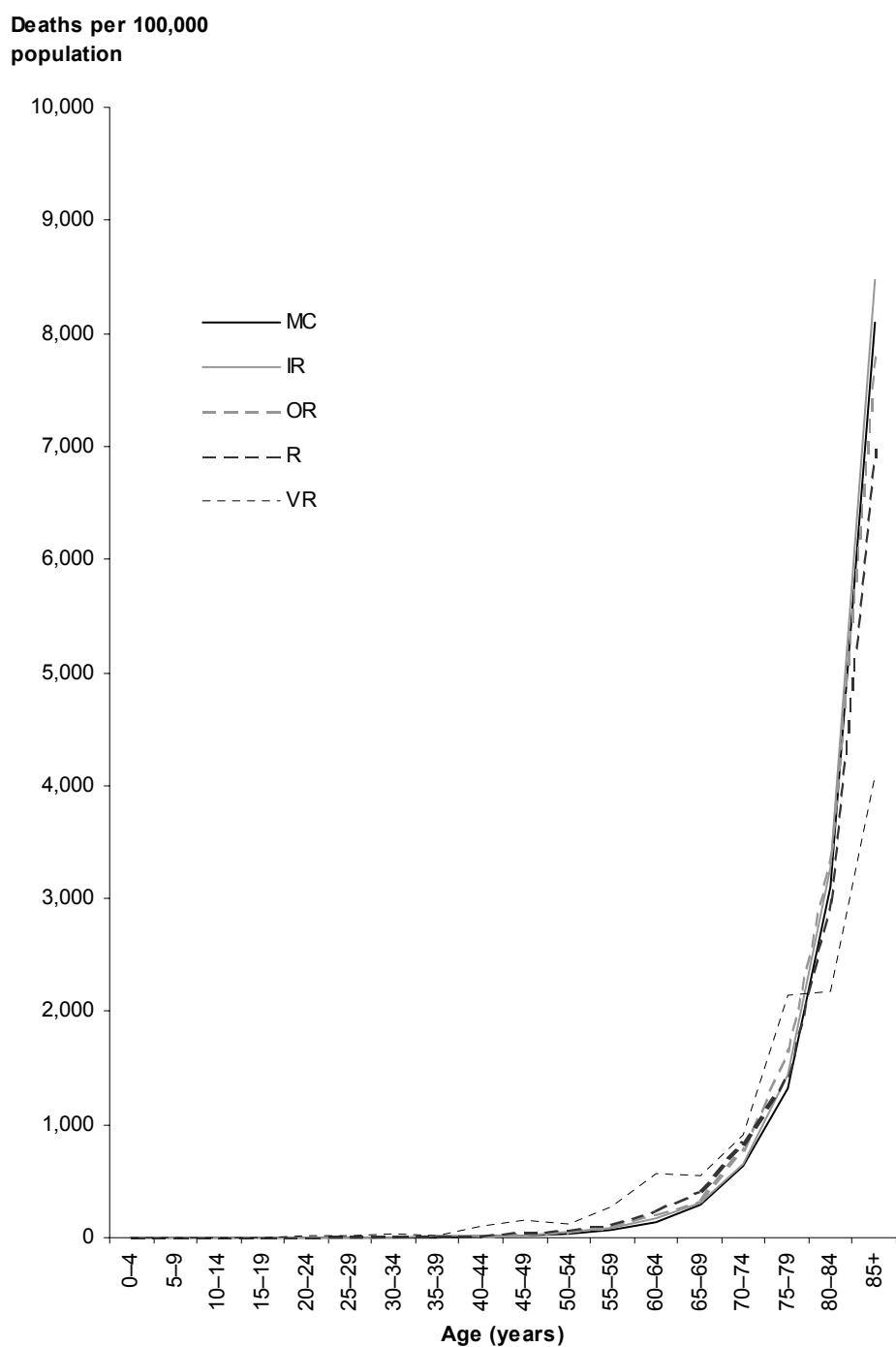
For females aged 25–74 years, the pattern was similar to that for males, except the differential was a little greater.

For males and females 75 years and older, death rates in regional areas were 1.05–1.1 as high as in Major Cities, while in remote areas rates were 0.65–0.9 times (that is, lower than) those in Major Cities.



Source: AIHW National Mortality Database.

Figure 4.5: Age-specific death rates due to circulatory diseases, by ASGC Remoteness area, for males, 1997-1999



Source: AIHW National Mortality Database.

Figure 4.6: Age-specific death rates due to circulatory diseases, by ASGC Remoteness area, for females, 1997-1999

Age-specific rates for Indigenous people

Death rates of Indigenous people are much greater than for non-Indigenous people, irrespective of where the latter live. Indigenous males and females were more likely to die at younger ages from circulatory diseases than the total population (Table 4.5 and Figures 4.7 and 4.8). According to the ABS, the 'median age for deaths of Indigenous males from cardiovascular disease was 58 years, compared with 78 years for the total male population. For Indigenous females, the median age of death from this cause was 65 years, compared with 84 years for all females' (ABS 2002).

Age-specific death rates were clearly higher for Indigenous males and females than for non-Indigenous males and females in every age group except the youngest and oldest. The greatest relative differences occurred in the 25–44 year age group. In this age group, the death rate for Indigenous males was 13.6 times the rate for non-Indigenous males in Major Cities, and for Indigenous females the rate was 13.9 times as high as for non-Indigenous females in Major Cities. In the 45–64 year age group, the mortality rate for Indigenous males was 6.4 times that for non-Indigenous males in Major Cities, and the corresponding rate for Indigenous females was 9.9 times as high (Table 4.5).

Table 4.5: The ratio of observed deaths to those expected as a result of circulatory disease if Major Cities non-Indigenous rates applied to the non-Indigenous population in each ASGC Remoteness area and to the Indigenous population, 1997–1999

Age group (years)	Male				Female				Indigenous			
	Non-Indigenous				Indigenous	Non-Indigenous						
	IR	OR	R	VR		IR	OR	R				
0–4	2	1.53	1.60	0.95	5.19	2.3	2	0.85	0.75	1.34	0.00	0.9
5–14	1	0.62	0.39	0.00	0.00	*7.1	1	0.32	0.53	0.80	0.00	1.8
15–24	3	1.02	1.24	1.64	2.02	*8.0	2	0.86	1.64	0.69	0.62	*7.2
25–44	16	1.12	1.00	1.10	1.27	*13.6	7	1.05	1.03	0.99	0.90	*13.9
45–64	158	*1.10	*1.20	*1.22	1.21	*6.4	54	*1.19	*1.34	1.31	*1.66	*9.9
65–74	932	*1.08	*1.14	1.08	*1.31	*2.6	466	1.02	*1.14	1.13	0.95	*4.4
75+	3,918	*1.08	*1.05	0.93	*0.68	1.0	3,614	*1.04	*1.04	0.94	*0.69	1.1
Total	..	*1.08	*1.09	1.02	0.95	*3.4	..	*1.04	*1.07	0.98	*0.78	*3.0
0–64	..	*1.10	*1.18	*1.21	1.23	*7.9	..	*1.16	*1.29	1.24	1.46	*10.2

* Significantly different from 1 (that is, rates are significantly different from those in Major Cities).

Notes

1. Caution should be used when making inferences about ratios that are not significantly different from 1.
2. MC rates for non-Indigenous persons are expressed as deaths per 100,000 population per year. Total (crude) MC rate is largely meaningless and is not included.
3. Ratios for Indigenous people are for SA, WA, NT and Qld.
4. While the table allows comparison of deaths between areas for each sex, it does not allow comparison between the sexes or age groups.
5. SMRs calculated for non-Indigenous persons from Remote and Very Remote areas should be treated with caution (see page 22).

Source: AIHW National Mortality Database.

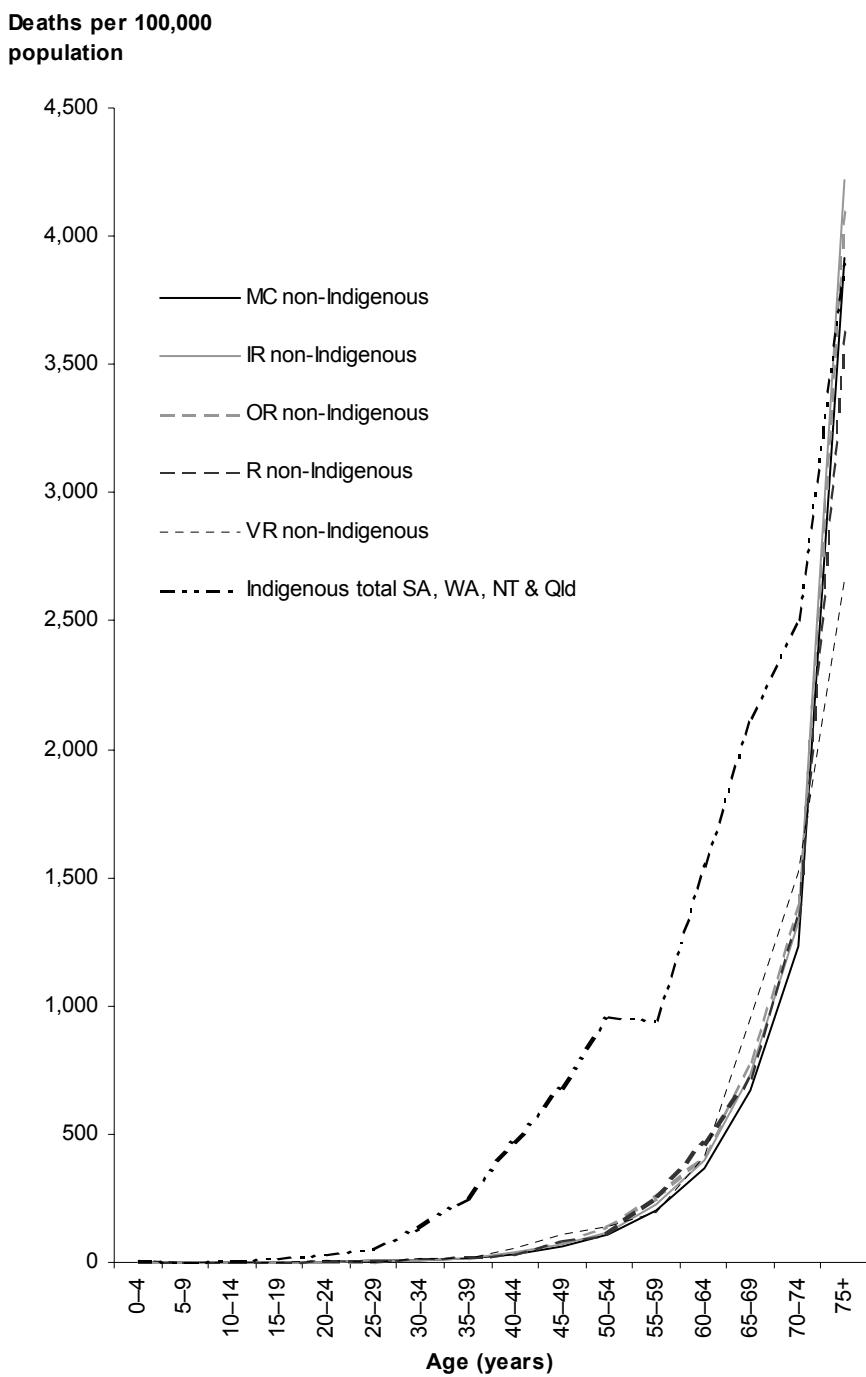
Age-specific rates for non-Indigenous people

For non-Indigenous people, death rates due to circulatory disease, although higher outside Major Cities (Table 4.5 and Figures 4.7 and 4.8), show less variation from Major Cities rates than the total population (Table 4.4).

This implies that the large differentials for the total population are influenced by the high death rates for Indigenous people, which were substantially and significantly higher in most age groups than those of non-Indigenous people in Major Cities (and indeed in other areas). For non-Indigenous people, death rates were significantly higher than for those who live inside Major Cities in older age groups. For example, for those aged 45–74 years, death rates were about 1.1–1.2 times as high in Inner Regional areas, 1.15–1.35 times as high in Outer Regional areas, up to 1.30 times as high in Remote areas, and higher (perhaps to 1.3–1.7 times as high) in Very Remote areas.

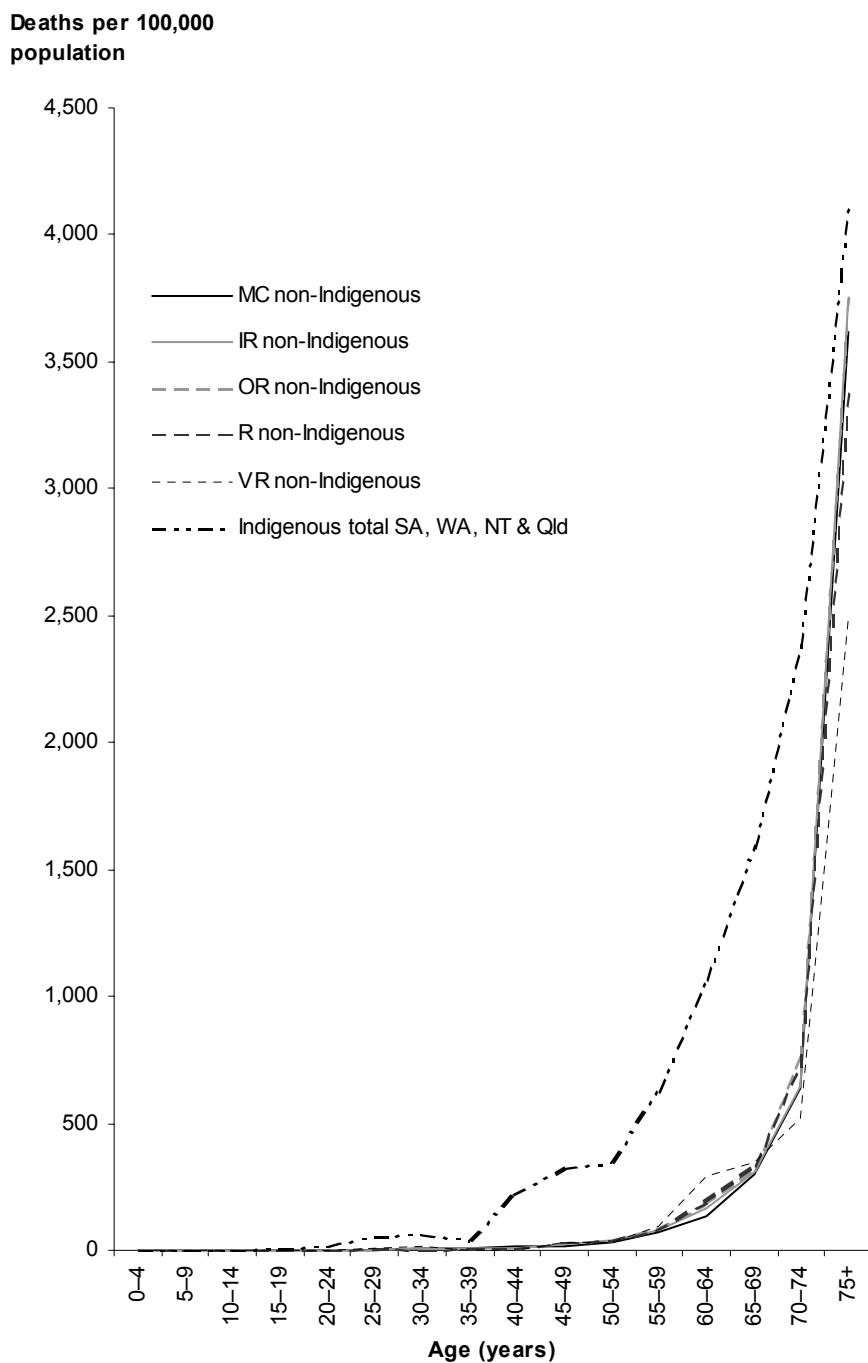
For those aged 75 years or older, death rates were 1.05–1.1 times as high for males and 1.05 times as high for females in regional areas; and in Remote and Very Remote areas 0.9 and 0.7 times the rate for those in Major Cities (that is, lower).

This confirms the previous conclusion that death rates in the non-Indigenous population tend to be higher outside Major Cities, except for those in the oldest age groups in remote areas. When the effects of the possible movement of the frail aged to more populated areas and the mortality of Indigenous people are taken into account, death rates due to circulatory disease are higher outside Major Cities and appeared to increase with remoteness.



Source: AIHW National Mortality Database.

Figure 4.7: Age-specific death rates due to circulatory diseases, by ASGC Remoteness area, for non-Indigenous males and for SA, WA, NT and Qld Indigenous males, 1997-1999



Source: AIHW National Mortality Database.

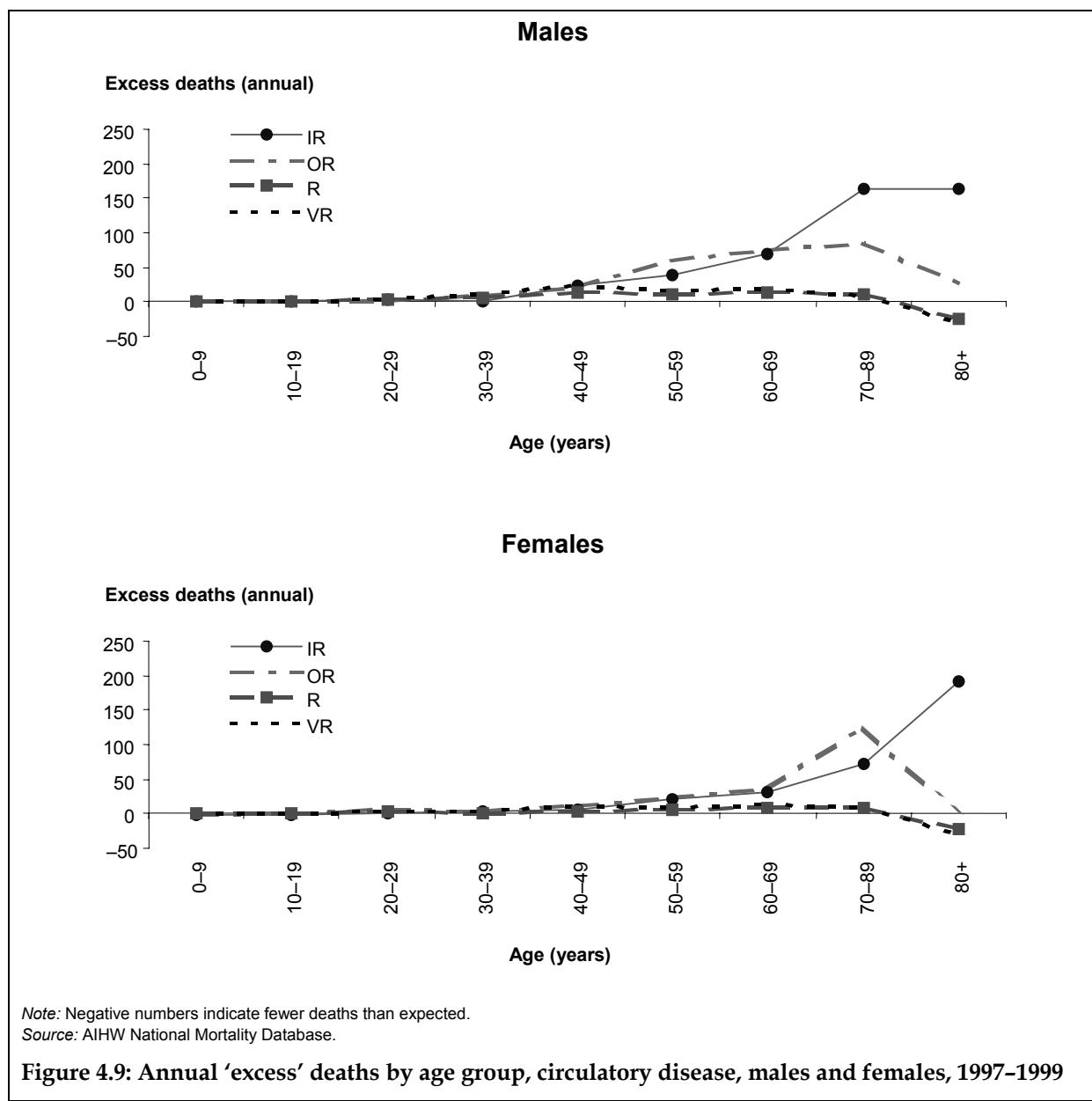
Figure 4.8: Age-specific death rates due to circulatory diseases, by ASGC Remoteness area, for non-Indigenous females and for SA, WA, NT and Qld Indigenous females, 1997-1999

'Excess' deaths due to circulatory disease

This measure is the difference between the number of observed deaths and the number expected. Whereas ratios provide a measure of inequity, a measure of the 'excess' provides a measure of the burden of the disease.

Annual 'excess' deaths

Annually between 1997 and 1999, there were 825 'excess' deaths of males and 552 'excess' deaths of females from circulatory disease across all areas outside Major Cities.



Deaths resulting from circulatory disease occur more frequently in older age groups, and it is only in the population older than 40 years that appreciable numbers of 'excess' deaths across areas outside Major Cities start to become apparent (Figure 4.9 and Appendix B).

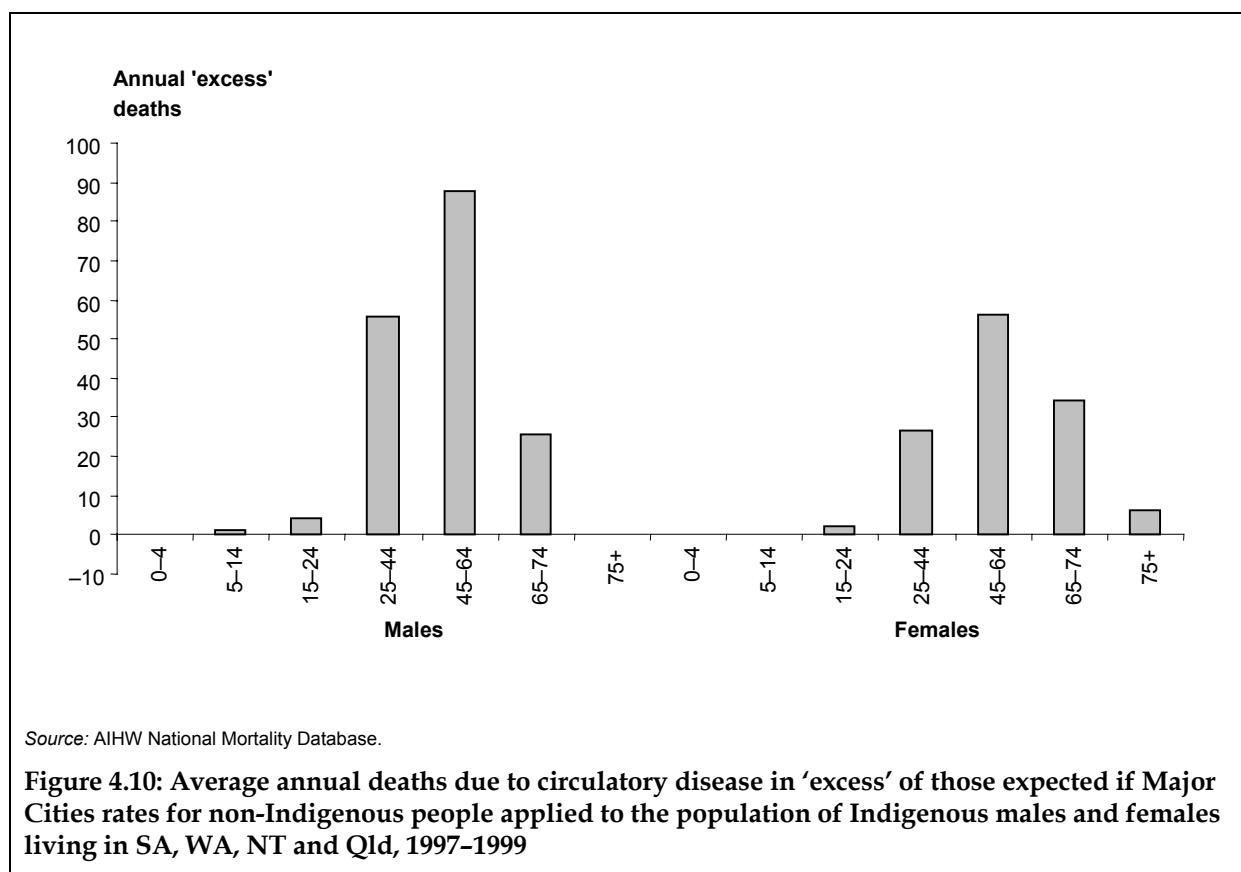
There were 294, 240, 50 and 67 'excess' deaths of males aged between 40 and 79 years in the four areas outside Major Cities and 129, 197, 29 and 41 'excess' deaths of similarly aged

females of that age group in those areas, respectively. For both males and females, the 70–79 year age group contributed the highest number of 'excess' deaths (163, 85, 12 and 10 for males, and 71, 125, 9 and 9 for females).

For those aged 80 years and over, however, the total numbers of 'excess' deaths (135 males and 138 females) were lower than for those aged 70–79 years. Most 'excess' deaths in this age group (164 males and 191 females) occurred in Inner Regional areas, however there were fewer deaths of females than expected in all other areas, and fewer deaths of males in Remote and Very Remote areas. As suggested previously, this may be a result of older people with known circulatory disease moving into more populated areas to receive treatment, and eventually dying there.

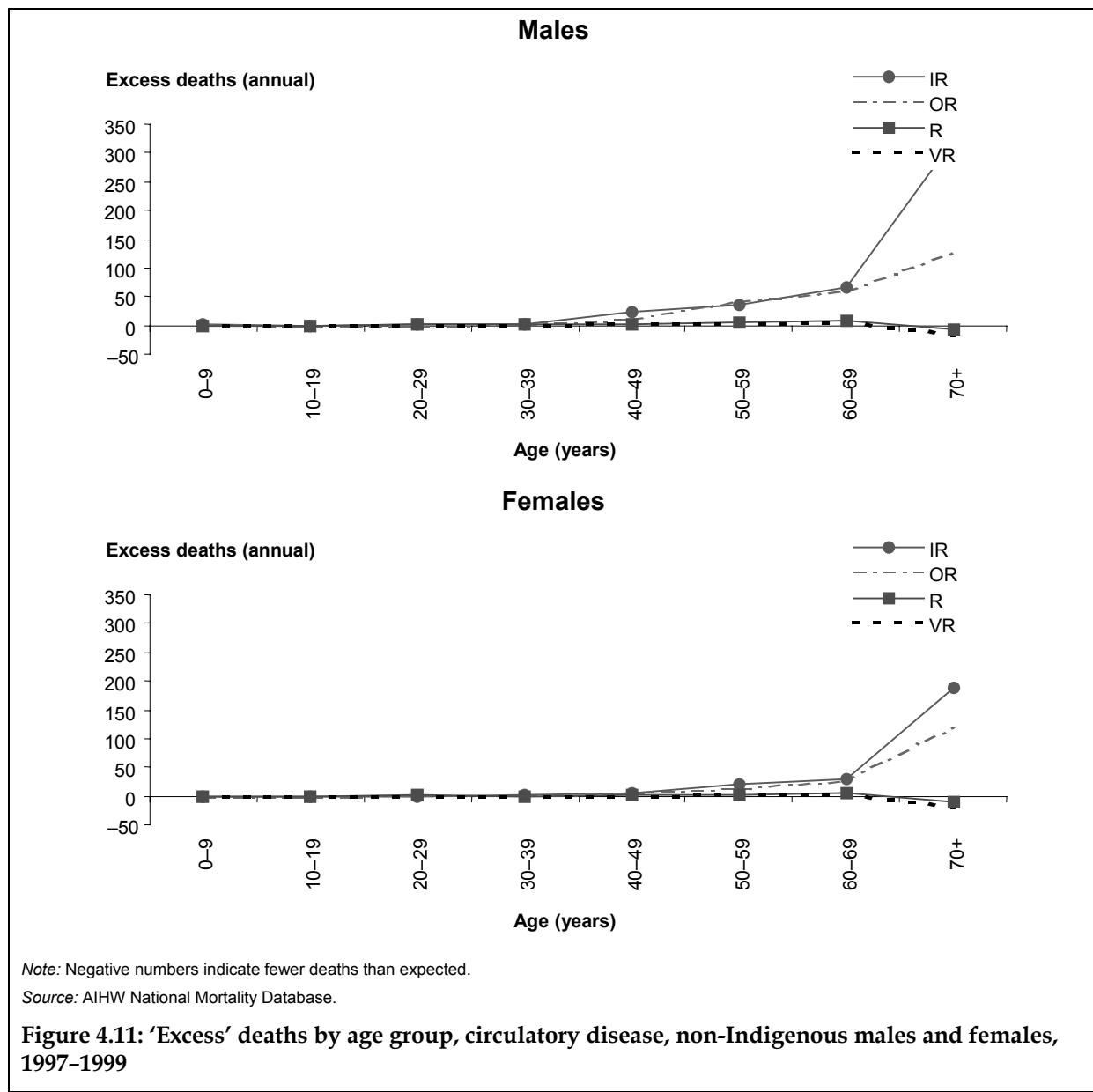
Annual 'excess' deaths of Indigenous people

In the Indigenous population there were 175 'excess' deaths of males and 126 'excess' deaths of females annually that resulted from circulatory diseases. These were calculated on the basis that Major Cities rates for non-Indigenous people had applied to the Indigenous population living in South Australia, Western Australia, the Northern Territory and Queensland. It is most likely that there were also 'excess' deaths of Indigenous people from these diseases in the other jurisdictions for which identification is considered less accurate (New South Wales, Victoria, Tasmania and the Australian Capital Territory).



The majority of these 'excess' deaths occurred in relatively young age groups (Figure 4.10 and Appendix B). For Indigenous males, 32%, 50% and 15% of the 'excess' deaths occurred in those who were aged 25–44, 45–64 and 65–74 years. For Indigenous females, the pattern was

similar with 21%, 44% and 28% of the 'excess' deaths occurring in those who were aged 25–44, 45–64 and 65–74 years.



Annual 'excess' deaths of non-Indigenous people

For the non-Indigenous population, there were 695 'excess' deaths of males and 391 'excess' deaths of females, annually, from circulatory diseases in the four areas outside Major Cities. The pattern of 'excess' deaths was different from the total population with most occurring in Inner and Outer Regional areas, demonstrating the effect of Indigenous mortality in remote areas (Figure 4.11 and Appendix B). Nearly all of the 'excess' deaths of non-Indigenous people were for those aged 70 years and over (323 and 127 male deaths in Inner and Outer Regional areas, respectively, and 189 and 120 female deaths in these areas). This is in marked contrast to the Indigenous population (in which most such deaths outside Major Cities occurred in those younger than 75 years).

4.2 Ischaemic heart disease

Ischaemic heart disease (coronary heart disease, ICD-10 codes I20–I25) is the single largest cause of premature death in Australia (AIHW 2002a). Risk factors include tobacco smoking, physical inactivity, alcohol misuse and poor nutrition. People with a family history of heart disease are often at greater risk, as are those with high blood pressure, high blood cholesterol and who have excess body weight.

Summary of findings

Annually, ischaemic heart disease was responsible for the deaths of 28,445 people (15,297 males and 13,148 females); 10,208 of these people came from areas outside Major Cities. Of these 28,445 deaths, 250 were of Indigenous people living in South Australia, Western Australia, the Northern Territory and Queensland.

In regional areas, death rates for males and females were 1.1 and 1.05 times the Major Cities rate. In Remote and Very Remote areas, rates for males were 1.1 and 1.4 times the Major Cities rate respectively, while those for females in these areas were not significantly different to Major Cities rates.

There were over three times as many deaths of Indigenous people as expected from ischaemic heart disease.

For non-Indigenous males and females, there were 1.1 and 1.05 times as many deaths as expected in regional areas respectively, and about as many as expected in remote areas.

There were 0.6 and 0.7 times as many deaths of elderly (75 years and older) non-Indigenous males and females as expected in Very Remote areas.

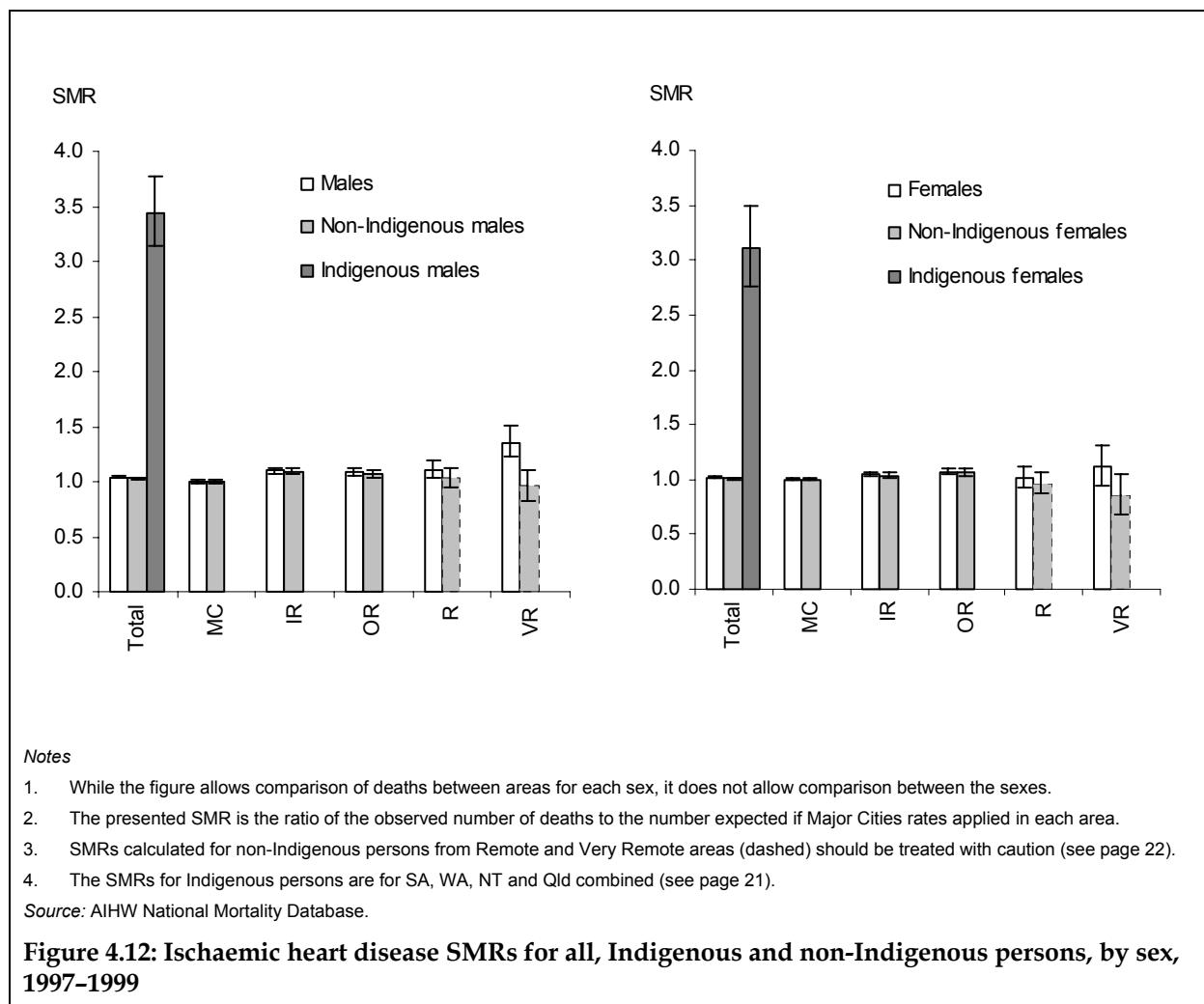
For the non-Indigenous population younger than 65 years, death rates increased with remoteness, in each of the four areas 1.1–1.2, 1.1–1.4, 1.2 and 1.9 times the rates for their counterparts in Major Cities.

Annually, there were 755 ‘excess’ deaths due to ischaemic heart disease outside Major Cities (465, 228, 25 and 37 in each of the four areas). Approximately 20% of these were ‘excess’ deaths of Indigenous people. While 80% of the ‘excess’ for the non-Indigenous population occurred in those who were 60 years and older, over 80% of the ‘excess’ for Indigenous people occurred in those who were 25–64 years old (that is, at a younger age).

There were 109 fewer deaths than expected of people who were 85 years and older in Outer Regional and remote areas.

Overall mortality due to ischaemic heart disease

Annually, there were 9,525, 3,670, 1,755, 229 and 118 deaths of males and 8,712, 2,903, 1,342, 138 and 53 deaths of females in Major Cities, Inner and Outer Regional, Remote and Very Remote areas as a result of ischaemic heart disease.



The death rate due to ischaemic heart disease tended to be higher outside Major Cities (Figure 4.12).

- There were 1.1 times as many deaths of males as expected in Inner and Outer Regional and Remote areas, and 1.4 times as many in Very Remote areas.
- There were 1.05 and 1.1 times as many deaths of females as expected in Inner and Outer Regional areas, while in remote areas, the number of observed deaths was not significantly different from the number expected.
- There were about 3 times as many deaths of Indigenous people due to ischaemic heart disease as expected.

In Major Cities, death rates due to ischaemic heart disease for males were close to 0 per 100,000 per year at age 20 years, rising gradually to 80 per 100,000 per year by age 50–54 years then more rapidly to 460 per 100,000 per year at age 65–69 years and 4,400 per 100,000 per year for those 85 years and older. The pattern was similar for females, with rates eventually to 3,800 per 100,000 per year for those who were 85 years and older.

Table 4.6: The ratio of observed deaths to those expected if Major Cities rates applied in each ASGC Remoteness area, ischaemic heart disease, males and females, 1997–1999

Age group (years)	Male				Female					
	MC rate	IR	OR	R	VR	MC rate	IR	OR	R	VR
0–4	0	..	..	..	..	<1	0.00	0.00	0.10	0.00
5–14	0	..	..	..	..	<1	0.04	0.00	0.00	0.00
15–24	<1	2.11	0.41	6.19	9.30	<1	1.84	4.12	1.87	18.04
25–44	10	*1.22	*1.25	*2.21	*6.07	2	1.12	*1.90	2.39	*9.28
45–64	113	*1.11	*1.24	*1.45	*2.43	28	*1.26	*1.65	*1.88	*4.83
65–74	613	*1.11	*1.14	1.16	*1.48	260	1.02	*1.20	*1.35	1.29
75+	2,196	*1.08	1.01	*0.89	*0.54	1,746	*1.04	1.01	*0.88	*0.64
Total	..	*1.10	*1.08	*1.11	*1.36	..	*1.05	*1.07	1.01	1.12

* Significantly different from 1 (that is, rates are significantly different from those in Major Cities).

Notes

1. Caution should be used when making inferences about ratios that are not significantly different from 1.
2. MC rates are expressed as deaths per 100,000 population per year. Total (crude) MC rate is largely meaningless and is not included.
3. While the table allows comparison of deaths between areas for each sex, it does not allow comparison between the sexes or age groups.

Source: AIHW National Mortality Database.

Age-specific death rates for males and females living outside Major Cities were higher than for their counterparts living inside Major Cities (Table 4.6).

For 25–74-year-old males there were 1.1–1.2, 1.15–1.25, 1.5–2.2 and 1.5–6 times as many deaths as expected due to this cause in the four areas outside Major Cities. The differences between Major Cities and regional/remote rates appear to be largest in the younger age groups.

The pattern was similar for females; that is, more deaths than expected in regional and remote areas (although fewer differences were statistically significant).

For males and females older than 75 years, there were 1.05–1.1 times as many deaths as expected due to this cause in Inner Regional areas, about as many as expected in Outer Regional areas, and 0.9 and 0.6 times as many as expected (that is, fewer) in Remote and Very Remote areas respectively.

As a result of ischaemic heart disease, there were 328, 137, 23 and 31 'excess' deaths of males annually, and 137, 91, 2 and 6 'excess' deaths of females annually in the four areas outside Major Cities. Almost all of the 'excess' deaths occurred among those older than 50 years. In Outer Regional, Remote and Very Remote areas, there were substantially fewer deaths than expected in those older than 80 years.

Indigenous population

Annually in the period 1997–1999, there were 250 deaths of Indigenous people (156 males and 95 females) in South Australia, Western Australia, the Northern Territory and Queensland. There would also have been a number of deaths due to this cause in the other jurisdictions where identification is less reliable. Of these 250 deaths, there were 175 (110 males and 64 females) more than expected.

There were 3.4 and 3.1 times as many deaths of Indigenous males and females as expected (Table 4.7). For males, 90% of the 'excess' was in 25–64-year-olds, while for females, about 80% was amongst 45–74-year-olds, with a further 20% among 25–44-year-olds.

Non-Indigenous population

Annually, there were 9,481, 3,643, 1,699, 200 and 61 deaths of non-Indigenous males and 8,678, 2,885, 1,305, 123 and 29 deaths of non-Indigenous females in the five areas as a result of ischaemic heart disease.

Death rates due to ischaemic heart disease were higher in regional areas and not significantly different in remote areas, compared with Major Cities (Table 4.7).

- There were 1.1 times as many deaths of non-Indigenous males as expected in regional areas. There were about as many deaths of non-Indigenous males as expected in remote areas.
- There were 1.05 times as many deaths of non-Indigenous females as expected in regional areas. There were about as many deaths of non-Indigenous females as expected in remote areas.

Table 4.7: The ratio of observed deaths to those expected as a result of ischaemic heart disease if Major Cities non-Indigenous rates applied to the non-Indigenous population in each ASGC Remoteness area and to the Indigenous population, 1997–1999

Age group (years)	Male				Indigenous	Female				Indigenous		
	Non-Indigenous					Non-Indigenous						
	IR	OR	R	VR		IR	OR	R	VR			
0–4	0	..	..	..	..	<1	0.00	0.00	0.00	23.9
5–14	0	..	..	..	..	<1	0.04	0.00	0.00	0.0
15–24	<1	1.67	0.49	8.16	0.00	*20.5	<1	1.87	2.50	0.31		
25–44	9	*1.20	0.96	1.21	1.37	*17.0	2	1.06	1.19	0.88		
45–64	112	*1.10	*1.16	*1.21	1.21	*6.3	27	*1.23	*1.45	1.36		
65–74	612	*1.11	*1.13	1.11	*1.39	*2.3	258	1.02	*1.17	1.20		
75+	2,197	*1.08	1.02	0.92	*0.61	0.8	1,745	*1.03	1.01	0.90		
Total	..	*1.10	*1.07	1.04	0.96	*3.4	..	*1.04	*1.06	0.97		
0–64	..	*1.11	*1.14	*1.21	1.23	*8.2	..	*1.22	*1.42	1.30		
										*13.2		

* Significantly different from 1 (that is, rates are significantly different from those in Major Cities).

Notes

1. Caution should be used when making inferences about ratios that are not significantly different from 1.
2. MC rates for non-Indigenous persons are expressed as deaths per 100,000 population per year. Total (crude) MC rate is largely meaningless and is not included.
3. Ratios for Indigenous people are for SA, WA, NT and Qld.
4. While the table allows comparison of deaths between areas for each sex, it does not allow comparison between the sexes or age groups.
5. SMRs calculated for non-Indigenous persons from Remote and Very Remote areas should be treated with caution (see page 22).

Source: AIHW National Mortality Database.

Age-specific rates for non-Indigenous people living in Major Cities were similar to those for the total population living in Major Cities.

There were 0.6–0.7 times as many (that is, fewer) deaths of non-Indigenous people aged 75 years and older from Very Remote areas.

As a result of ischaemic heart disease, there were 317, 112, 7 and -3 'excess' deaths of non-Indigenous males annually, and 100, 72, -4 and -5 'excess' deaths of non-Indigenous females annually in the four areas outside Major Cities. The bulk of the 'excess' deaths occurred in those older than 70 years, with those otherwise older than 50 years also contributing. There were fewer deaths than expected in Remote and Very Remote areas amongst those older than 70 years.

Mortality for those aged 0–64 years

Indigenous population

Annually there were 165 (115 male, 50 female) deaths of Indigenous people younger than 65 years in South Australia, Western Australia, the Northern Territory and Queensland as a result of ischaemic heart disease. There would also have been a number of deaths due to this cause in the other jurisdictions. Of these 165 deaths, there were 148 (101 males and 46 females) more than expected.

For Indigenous males and females who were younger than 65 years old, there were 8 and 13 times as many deaths as expected as a result of ischaemic heart disease (Table 4.7).

Non-Indigenous population

Annually, there were 1,678, 607, 333, 54 and 20 deaths of non-Indigenous males younger than 65 years and 401, 160, 92, 11 and 5 deaths of non-Indigenous females younger than 65 years in the five areas as a result of ischaemic heart disease.

Death rates due to ischaemic heart disease tended to be higher outside Major Cities (Table 4.7).

- There were 1.1, 1.1 and 1.2 times as many deaths of 0–64-year-old non-Indigenous males as expected in Inner Regional, Outer Regional and Remote areas. In Very Remote areas, although elevated, the numbers of deaths were not significantly greater than expected.
- There were 1.2, 1.4 and 1.9 times as many deaths of 0–64-year-old non-Indigenous females as expected in Inner Regional, Outer Regional and Very Remote areas. In Remote areas, although elevated, the numbers of deaths were not significantly greater than expected.

As a result of ischaemic heart disease, there were 61, 42, 10 and 4 'excess' deaths of non-Indigenous males younger than 65 years annually, and 28, 27, 3 and 2 'excess' deaths of non-Indigenous females younger than 65 years annually in the four areas outside Major Cities. The bulk of the deaths were contributed by people older than 45 years, with older ages contributing more.

4.3 Stroke

Stroke (cerebrovascular disease, ICD-10 codes G45, G46 and I60-I69) 'includes a group of diseases that affect the arteries supplying blood to the brain. Stroke is the second leading cause of death in Australia, a large contributor to disability, and places a heavy burden on family members and care providers' (AIHW 2002a). Risk factors are similar to those for ischaemic heart disease, and people who have experienced atrial fibrillation or transient ischaemic attack are at greater risk. Risk of stroke can be reduced by actions such as reducing blood pressure through medication, smoking cessation, or reducing other risk factors.

Summary of findings

Annually, stroke was responsible for the deaths of 12,364 people (4,946 males and 7,418 females); 4,215 of these people came from areas outside Major Cities. Of these 12,364 deaths, 81 were of Indigenous people living in South Australia, Western Australia, the Northern Territory and Queensland.

In almost all areas, death rates were not significantly different to those in Major Cities, however, in Very Remote areas there were 1.4 times as many deaths of males as expected due to this cause.

There were about 3 and 2 times as many deaths of Indigenous males and females as expected from stroke.

For non-Indigenous males and females, there were about as many deaths as expected in regional and remote areas, except in Very Remote areas where there were 0.6 times as many deaths of females as expected.

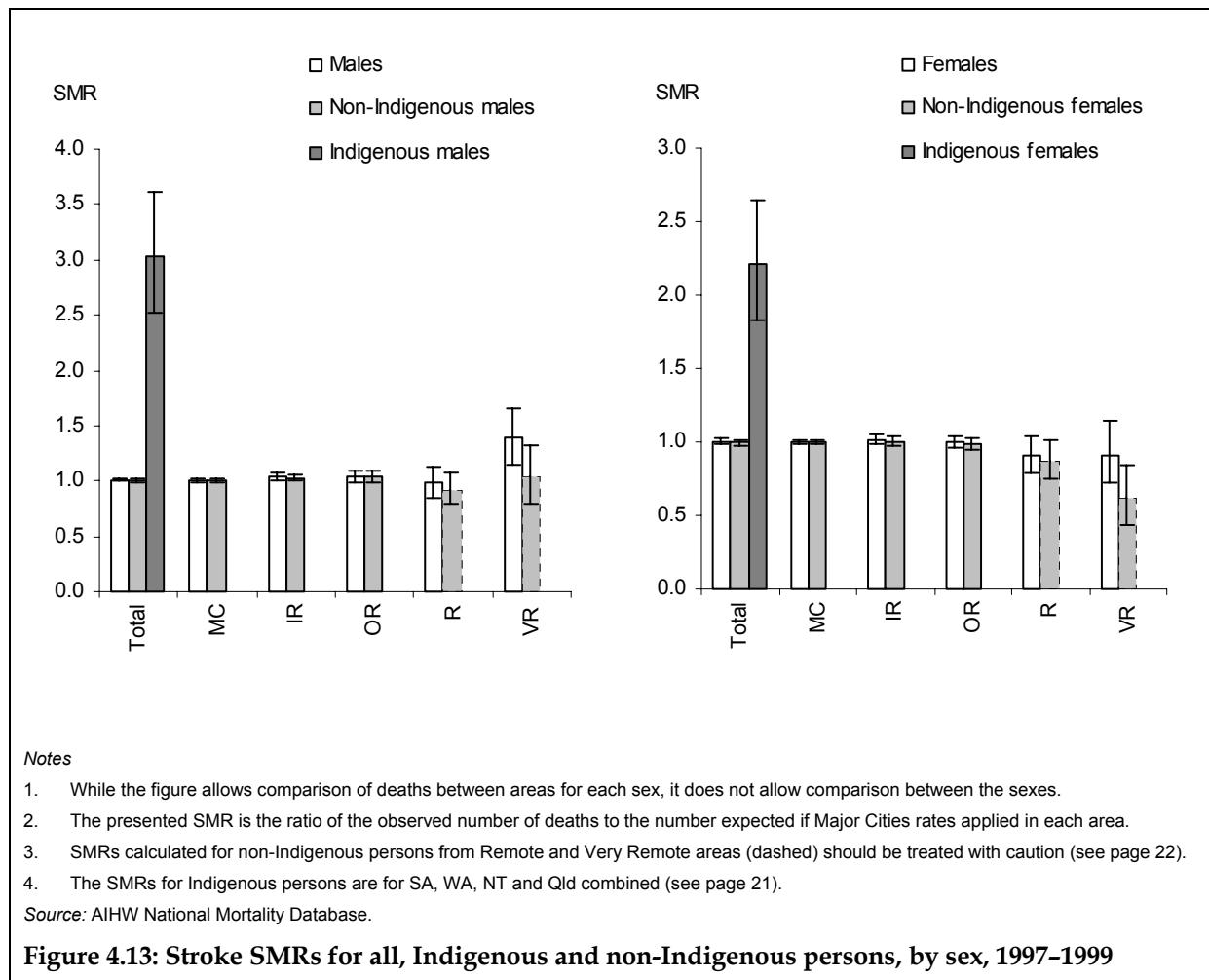
There were 0.8 and 0.5 times as many deaths of non-Indigenous females aged 75 years and older as expected in Remote and Very Remote areas which lowered the overall death rate for non-Indigenous females.

For the non-Indigenous population younger than 65 years, there were as many deaths of males as expected and more deaths of females than expected (1.2 times as many in regional areas, but the difference in remote areas was not significant).

Annually, there were 85 'excess' deaths due to stroke outside Major Cities (65, 20, -8 and 8 in each of the four areas), however for those who were younger than 85 years, there were 124 'excess' deaths (27, 69, 6 and 22 in each of the four areas).

Overall mortality due to stroke

Annually, there were 3,151, 1,141, 550, 65 and 39 deaths of males and 4,998, 1,609, 715, 71 and 25 deaths of females in the five areas as a result of stroke.



Death rates due to stroke were generally similar inside and outside Major Cities (Figure 4.13 and Table 4.8).

- Death rates for males in Inner and Outer Regional, as well as Remote areas were similar to rates in Major Cities. In Very Remote areas, there were 1.4 times as many deaths of males as expected.
- Death rates for females were not significantly different across the areas, although they tended to be lower in remote areas.
- There were about 2–3 times as many deaths of Indigenous people due to stroke as expected.

Table 4.8: The ratio of observed deaths to those expected if Major Cities rates applied in each ASGC Remoteness area, stroke, males and females, 1997–1999

Age group (years)	Male				Female					
	MC rate	IR	OR	R	VR	MC rate	IR	OR	R	VR
		(ratio)					(ratio)			
0–4	<1	2.35	0.10	0.00	0.00	<1	0.00	5.59	0.00	0.00
5–14	<1	1.34	0.04	0.00	0.00	<1	0.20	1.06	0.00	0.00
15–24	<1	0.76	1.86	0.00	0.00	<1	0.86	1.54	0.95	0.78
25–44	3	*0.71	0.82	1.72	*3.79	2	1.09	*1.61	1.30	*4.43
45–64	21	1.03	1.16	1.20	*2.83	13	*1.16	*1.27	*2.04	*3.48
65–74	156	0.97	*1.17	0.85	*2.13	111	0.99	1.12	1.08	1.28
75+	893	*1.05	0.98	0.96	0.82	1,046	1.02	0.97	*0.81	*0.60
Total	..	1.03	1.04	0.98	*4.38	..	1.02	1.00	0.91	0.91

* Significantly different from 1 (that is, rates are significantly different from those in Major Cities).

Notes

1. Caution should be used when making inferences about ratios that are not significantly different from 1.
2. MC rates are expressed as deaths per 100,000 population per year. Total (crude) MC rate is largely meaningless and is not included.
3. While the table allows comparison of deaths between areas for each sex, it does not allow comparison between the sexes or age groups.

Source: AIHW National Mortality Database.

In Major Cities, death rates due to stroke for males were close to 0 per 100,000 per year at age 20 years, rising gradually at first, then more rapidly with age to about 2,100 per 100,000 per year for those 85 years and older. The pattern and rates were similar for females.

Age-specific death rates for people 25–74 years were frequently higher than for those in Major Cities (with the exception of rates for 25–44-year-old males from Inner Regional and Outer Regional areas). Where statistically significant, there were 1.2–1.6, 2 and 2.1–4.4 times as many deaths as expected in Outer Regional, Remote and Very Remote areas.

For males and females who were 75 years and older, there were slightly more deaths of males and about the same number of deaths of females as expected in Inner Regional areas, about as many as expected in Outer Regional areas and fewer deaths of females than expected (0.8 and 0.6 times as many as expected) in Remote and Very Remote areas. There were fewer deaths of males from remote areas than expected but not significantly fewer.

As a result of stroke, there were 34, 20, -1 and 11 'excess' deaths of males annually, and 31, 0, -7 and -2 'excess' deaths of females annually in the four areas outside Major Cities. Almost all of the 'excess' deaths occurred among those older than 60 years. In Outer Regional, Remote and Very Remote areas, there were substantially fewer deaths than expected in those older than 80 years.

Indigenous population

Annually in the period 1997–1999, there were 81 deaths of Indigenous people (43 males and 38 females) in South Australia, Western Australia, the Northern Territory and Queensland. There would also have been a number of deaths due to this cause in the other jurisdictions where identification is less reliable. Of these 81 deaths, there were 50 (29 males and 21 females) more than expected.

There were 3.0 and 2.2 times as many deaths of Indigenous males and females as expected (Table 4.9).

- There were between 4 and 9 times as many deaths of 25–74-year-old Indigenous people as expected.
- For males, 65% of the ‘excess’ occurred in 45–74-year-olds, and for females, 65% of the ‘excess’ occurred in 25–64-year-olds (a further 30% occurring in females 65–74 years old).
- There were 1.5 times as many, or similar numbers of deaths as expected of Indigenous males and females 75 years and older.

Table 4.9: The ratio of observed deaths to those expected as a result of stroke if Major Cities non-Indigenous rates applied to the non-Indigenous population in each ASGC Remoteness area and to the Indigenous population, 1997–1999

Age group (years)	MC rate	Male				Indigenous	Female				Indigenous		
		Non-Indigenous					Non-Indigenous						
		IR	OR	R	VR		IR	OR	R	VR			
0–4	<1	2.40	0.11	1.63	0.00	0.0	<1	0.00	6.01	0.00	0.00		
5–14	<1	1.37	0.04	0.00	0.00	0.0	<1	0.21	1.13	0.00	0.00		
15–24	<1	0.50	1.96	0.00	0.00	2.9	<1	0.87	1.01	1.14	1.86		
25–44	3	*0.66	0.70	0.73	1.06	*8.5	2	1.13	1.40	1.20	2.73		
45–64	20	1.03	1.12	0.94	1.55	*5.7	13	*1.17	1.16	1.37	1.10		
65–74	155	0.97	*1.16	0.83	1.43	*4.2	111	0.99	1.07	1.00	0.70		
75+	893	*1.05	1.00	0.96	0.81	*1.5	1,046	1.00	0.97	*0.82	*0.53		
Total	n.p.	1.03	1.04	0.92	1.03	*3.0	n.p.	1.00	0.99	0.87	*0.61		
0–64	n.p.	0.98	1.06	0.88	1.43	*6.2	n.p.	*1.15	*1.21	1.31	1.48		
											*6.9		

* Significantly different from 1 (that is, rates are significantly different from those for non-Indigenous people in Major Cities).

Notes

1. Caution should be used when making inferences about ratios that are not significantly different from 1.
2. MC rates for non-Indigenous persons are expressed as deaths per 100,000 population per year. Total (crude) MC rate is largely meaningless and is not included.
3. Ratios for Indigenous people are for SA, WA, NT and Qld.
4. While the table allows comparison of deaths between areas for each sex, it does not allow comparison between the sexes or age groups.
5. SMRs calculated for non-Indigenous persons from Remote and Very Remote areas should be treated with caution (see page 22).

Source: AIHW National Mortality Database.

Non-Indigenous population

Annually, there were 3,140, 1,136, 539, 56 and 21 deaths of non-Indigenous males and 4,988, 1,603, 698, 64 and 12 deaths of non-Indigenous females in the five areas as a result of stroke.

There were generally as many deaths as expected outside Major Cities, except in Very Remote areas where there were 0.6 times as many deaths of females as expected (Table 4.9).

Age-specific death rates for non-Indigenous people living in Major Cities were similar to those for the total population living in Major Cities.

The pattern exhibited by age-specific death rates is similar for non-Indigenous people to that for the total population. However, rates for non-Indigenous people in Remote and Very Remote areas were lower than for the total population in these areas. Consequently, in Remote and Very Remote areas, although age-specific rates for people 25–64 years were elevated, they were less elevated than for the total population (and did not reach statistical significance). Rates for those older than 75 years follow the same pattern as for the total population.

As a result of stroke, there were 33, 20, -5 and 1 'excess' deaths of non-Indigenous males annually, and 8, -8, -9 and -8 'excess' deaths of non-Indigenous females annually in the four areas outside Major Cities. Almost all of the 'excess' deaths occurred among those older than 70 years. In Outer Regional, Remote and Very Remote areas, there were substantially fewer deaths of females than expected in those older than 70 years.

Mortality for those aged 0–64 years

Indigenous population

Annually there were 35 (19 male, 16 female) deaths of Indigenous people younger than 65 years in South Australia, Western Australia, the Northern Territory and Queensland as a result of stroke. There would also have been a number of deaths due to this cause in the other jurisdictions. Of these 35 deaths, there were 30 (16 males and 14 females) more than expected.

For Indigenous males and females who were younger than 65 years old, there were 6 and 7 times as many deaths as expected as a result of stroke (Table 4.9).

Non-Indigenous population

Annually, there were 334, 106, 61, 8 and 5 deaths of non-Indigenous males younger than 65 years and 220, 81, 42, 6 and 2 deaths of non-Indigenous females younger than 65 years in the five areas as a result of stroke.

There were about as many deaths of 0–64-year-old non-Indigenous males as expected due to stroke in the areas outside Major Cities (Table 4.9). However, there were 1.2 times as many deaths of 0–64-year-old non-Indigenous females as expected due to stroke in Inner and Outer Regional areas. In remote areas, the numbers of deaths of females were greater (but not significantly greater) than expected.

As a result of stroke, there were -2, 4, -1 and 1 'excess' deaths of non-Indigenous males younger than 65 years annually, and 11, 7, 1 and 1 'excess' deaths of non-Indigenous females younger than 65 years annually in the four areas outside Major Cities.

4.4 Rheumatic heart disease

Rheumatic heart disease (ICD-10 codes I00–I02 and I05–I09) results from recurrent bouts of rheumatic fever (which is caused by group A streptococcus bacteria associated with infections of the throat and skin). Rheumatic fever damages heart valves and muscles as well as the brain and joints. Rheumatic heart disease can be prevented by treatment of rheumatic fever with strict follow up and monthly injections of penicillin (AIHW 2002b).

Summary of findings

Annually, rheumatic heart disease was responsible for the deaths of 267 people (87 males and 180 females); 102 of these people came from areas outside Major Cities. Of these 267 deaths, 19 were of Indigenous people living in South Australia, Western Australia, the Northern Territory and Queensland.

Rheumatic heart disease death rates were similar in Inner Regional areas, 1.3–1.4, 2.6 and 6–8 times as high in Outer Regional, Remote and Very Remote areas.

There were about 30 and 20 times as many deaths of Indigenous males and females due to rheumatic heart disease as expected.

For non-Indigenous males and females, there were about as many deaths as expected in regional and remote areas. This pattern was also true for non-Indigenous people younger than 65 years.

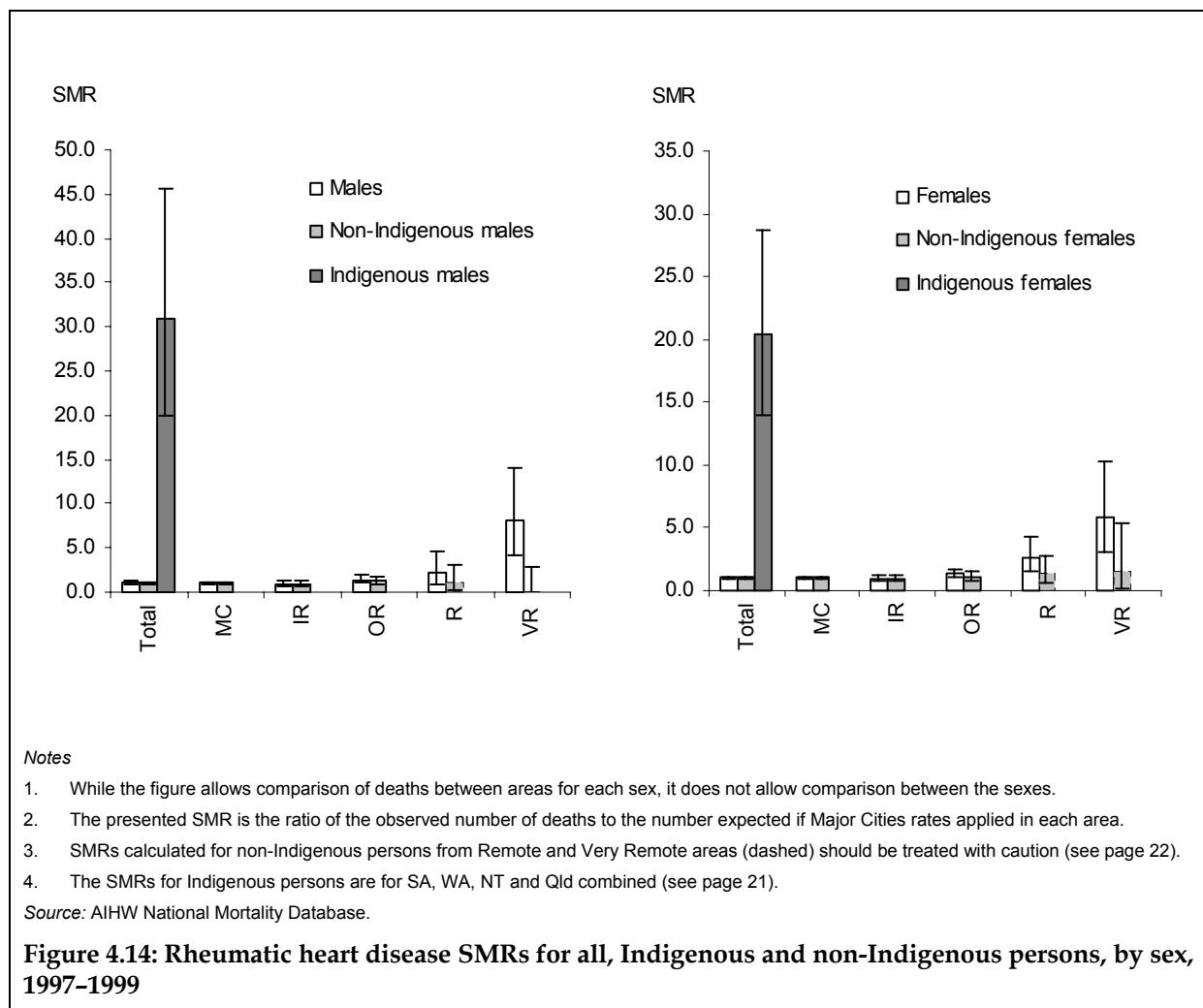
Annually, there were 18 ‘excess’ deaths due to rheumatic heart disease outside Major Cities (–3, 9, 5 and 7 in each of the four areas). A very large proportion of this ‘excess’ was of Indigenous people. Over 80% of the ‘excess’ for Indigenous people occurred in those who were 15–64 years old.

Overall mortality due to rheumatic heart disease

Annually, there were 51, 17, 12, 3 and 4 deaths of males and 114, 35, 22, 5 and 4 deaths of females in the five areas as a result of rheumatic heart disease.

Death rates due to rheumatic heart disease were higher in Remote and Very Remote areas (Figure 4.14 and Table 4.10).

- Death rates for males in Inner Regional areas were not significantly different from those in Major Cities, however, in Outer Regional and Very Remote areas, there were 1.4 and 8.1 times as many deaths of males as expected.
- As for males, death rates for females in Inner Regional areas were not significantly different from those in Major Cities. However, in Outer Regional, Remote and Very Remote areas there were 1.3, 2.6 and 5.9 times as many deaths of females as expected.
- There were about 20–30 times as many deaths of Indigenous people due to rheumatic heart disease than expected.



In Major Cities, death as a result of rheumatic heart disease is very rare, rising to about 20 per 100,000 per year in those 85 years and older.

There tend to be greater numbers of deaths than expected due to this cause outside Major Cities, particularly in remote areas. For example, there were 10 deaths of 25–44-year-olds in Very Remote areas (compared to less than one expected).

As a result of rheumatic heart disease, there were -1, 4, 1 and 4 'excess' deaths of males annually, and -2, 6, 3 and 3 'excess' deaths of females annually in the four areas outside Major Cities.

Indigenous population

Annually in the period 1997–1999, there were 19 deaths of Indigenous people (8 males and 11 females) in South Australia, Western Australia, the Northern Territory and Queensland.

There would also have been a number of deaths due to this cause in the other jurisdictions where identification is less reliable. Of these 19 deaths, there were 18 (8 males and 10 females) more than expected.

There were 31 and 20 times as many deaths of Indigenous males and females as expected (Table 4.11). Most of the deaths, and most of the 'excess' deaths occurred amongst those aged 15–64 years.

Table 4.10: The ratio of observed deaths to those expected if Major Cities rates applied in each ASGC Remoteness area, rheumatic heart disease, males and females, 1997–1999

Age group (years)	Male				Female			
	IR	OR	R	VR	IR	OR	R	VR
MC rate	(ratio)			MC rate	(ratio)			
0–4	0	..	..	..	0	..	..	..
5–14	0	..	..	..	0	..	..	..
15–24	<1	0.00	2.13	8.36	66.12	<1	0.00	0.00
25–44	<1	0.98	2.19	*14.16	*45.58	<1	0.30	2.90
45–64	1	0.79	1.13	2.78	2.65	1	1.03	*23.59
65–74	3	0.96	1.17	0.55	6.36	6	0.86	1.02
75+	9	1.03	1.66	0.59	0.00	16	1.02	1.12
Total	..	0.94	*1.42	2.28	*8.06	..	0.96	*1.34
								*2.64
								*5.85

* Significantly different from 1 (that is, rates are significantly different from those in Major Cities).

Notes

1. Caution should be used when making inferences about ratios that are not significantly different from 1.
2. MC rates are expressed as deaths per 100,000 population per year. Total (crude) MC rate is largely meaningless and is not included.
3. While the table allows comparison of deaths between areas for each sex, it does not allow comparison between the sexes or age groups.

Source: AIHW National Mortality Database.

Non-Indigenous population

Annually, there were 49, 16, 10, 1 and 0 deaths of non-Indigenous males and 112, 35, 18, 2 and 1 deaths of non-Indigenous females in the five areas as a result of rheumatic heart disease.

There were about as many deaths of non-Indigenous people as expected due to this cause (Table 4.11).

Age-specific rates for non-Indigenous people living in Major Cities were similar to those for the total population living in Major Cities.

Age-specific death rates for non-Indigenous people were substantially lower in Outer Regional, Remote and especially Very Remote areas than they were for the total population.

As a result of rheumatic heart disease, there were -1, 2, 0 and 0 'excess' deaths of non-Indigenous males annually, and -1, 2, 0 and 0 'excess' deaths of non-Indigenous females annually in the four areas outside Major Cities.

Mortality for those aged 0–64 years

Indigenous population

Annually there were 16 (7 male, 9 female) deaths of Indigenous people younger than 65 years in South Australia, Western Australia, the Northern Territory and Queensland as a result of rheumatic heart disease. There would also have been a number of deaths due to this cause in the other jurisdictions. Of these 16 deaths, there were 15 (7 males and 8 females) more than expected.

For Indigenous males and females who were younger than 65 years old, there were 58 and 45 times as many deaths as expected (Table 4.11).

Table 4.11: The ratio of observed deaths to those expected as a result of rheumatic heart disease if Major Cities non-Indigenous rates applied to the non-Indigenous population in each ASGC Remoteness area and to the Indigenous population, 1997–1999

Age group (years)	MC rate	Male				Indigenous	Female				Indigenous		
		Non-Indigenous					Non-Indigenous						
		IR	OR	R	VR		IR	OR	R	VR			
0–4	0	..	..	..	..	..	0	..	..	..	..
5–14	0	..	..	..	..	..	0	..	..	..	..
15–24	0	..	..	..	..	**	<1	0.00	0.00	0.00	*72.0
25–44	<1	1.11	1.00	0.00	0.00	*98.8	<1	0.33	0.01	4.05	0.50		
45–64	1	0.76	1.10	2.20	0.12	*18.6	1	1.08	1.80	1.75	0.51		
65–74	3	0.95	0.88	0.57	0.00	11.5	6	0.88	0.93	1.57	0.07		
75+	9	1.03	1.60	0.64	0.00	3.9	16	1.02	1.10	0.89	2.75		
Total	..	0.95	1.26	1.05	0.04	*30.9	..	0.97	1.12	1.35	1.56		
0–64	..	0.81	1.08	1.83	0.10	*57.9	..	0.93	1.47	2.18	0.50		

* Significantly different from 1 (that is, rates are significantly different from those for non-Indigenous people in Major Cities).

** For 15–24 year old Indigenous males, the ratio is very high (there were 5 deaths in this period but none expected).

Notes

1. Caution should be used when making inferences about ratios that are not significantly different from 1.
2. MC rates for non-Indigenous persons are expressed as deaths per 100,000 population per year. Total (crude) MC rate is largely meaningless and is not included.
3. Ratios for Indigenous people are for SA, WA, NT and Qld.
4. While the table allows comparison of deaths between areas for each sex, it does not allow comparison between the sexes or age groups.
5. SMRs calculated for non-Indigenous persons from Remote and Very Remote areas should be treated with caution (see page 22).

Source: AIHW National Mortality Database.

Non-Indigenous population

Annually, there were 14, 4, 3, 1 and 0 deaths of non-Indigenous males younger than 65 years and 19, 6, 4, 1 and 0 deaths of non-Indigenous females younger than 65 years in the five areas as a result of rheumatic heart disease.

There were about as many deaths of 0–64-year-old non-Indigenous people due to rheumatic heart disease as expected (Table 4.11).

As a result of rheumatic heart disease, there were -1, 0, 0 and 0 'excess' deaths of non-Indigenous males younger than 65 years annually, and 0, 1, 0 and 0 'excess' deaths of non-Indigenous females younger than 65 years annually in the four areas outside Major Cities.

4.5 ‘Other’ diseases of the circulatory system

Other circulatory diseases (ICD-10 codes I00–I99, excluding the circulatory diseases described in this report) are included because as a group they are responsible for a large number of deaths. Differences in death rates across areas for this range of diseases may suggest further work to identify potential targets for intervention. Specific causes of death included in this diverse group includes hypertensive heart disease and hypertensive renal disease, pulmonary heart disease, pericarditis, valve disorders, endocarditis and myocarditis, cardiomyopathy, heart failure, atherosclerosis, aneurysms and other diseases of blood vessels.

Summary of findings

Annually, ‘other’ circulatory diseases were responsible for the deaths of 11,203 people (5,048 males and 6,155 females); 4,128 of these people came from areas outside Major Cities. Of these 11,203 deaths, 89 were of Indigenous people living in South Australia, Western Australia, the Northern Territory and Queensland.

Death rates due to ‘other’ circulatory diseases rose steadily with remoteness; there were 1.1, 1.2, 1.2 and 1.2–1.5 times as many deaths of males and females as expected in the four areas outside Major Cities.

There were about three times as many deaths of Indigenous people as expected from ‘other’ circulatory diseases.

For non-Indigenous people, there were 1.1 and 1.2 times as many deaths as expected in Inner and Outer Regional areas, and about as many as expected in remote areas.

There were 0.75 times as many deaths of elderly (75 years and older) non-Indigenous people as expected in Very Remote areas due to ‘other’ circulatory diseases.

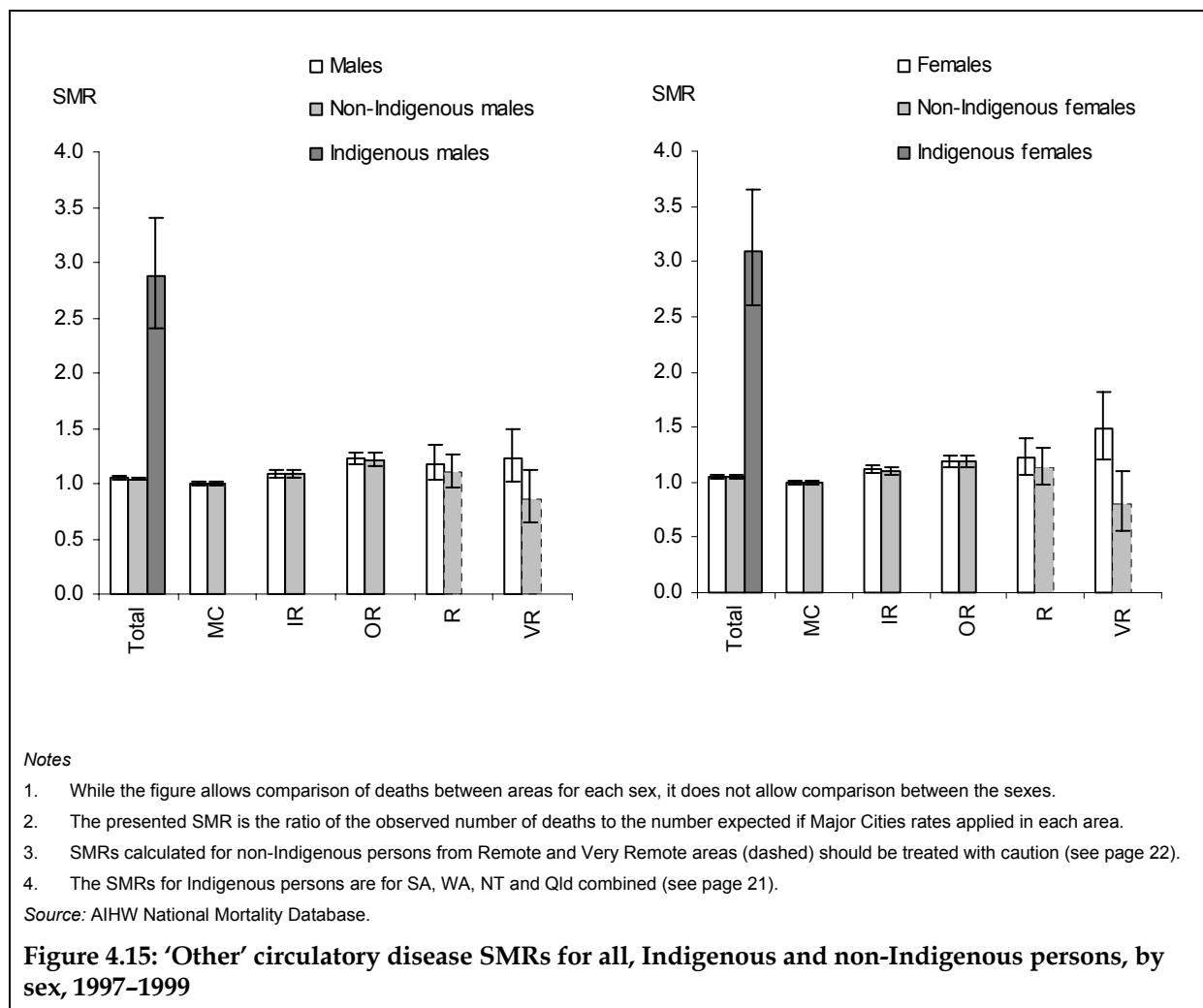
For the non-Indigenous population younger than 65 years, there were 1.2, 1.4 and 1.4 times as many deaths of males as expected in Inner and Outer Regional and Remote areas and about as many deaths of females as expected in the four areas outside Major Cities.

Annually, there were 518 ‘excess’ deaths due to ‘other’ circulatory diseases outside Major Cities (254, 220, 26 and 18 in each of the four areas). About 70% of the ‘excess’ deaths occurred in those who were 75 years and older, although for Indigenous males and females almost all the ‘excess’ was in those younger than 65 and 75 years respectively.

Overall mortality due to ‘other’ circulatory diseases

‘Other’ circulatory diseases are those other specific circulatory diseases (for example, peripheral vascular disease and so on) that have not been described individually in previous sections.

Annually, there were 3,107, 1,189, 639, 78 and 35 deaths of males and 3,968, 1,403, 674, 77 and 33 deaths of females in the five areas as a result of ‘other’ circulatory diseases.



- For males from Inner Regional areas, there were 1.1 times as many deaths as expected, while for males from the other areas outside Major Cities, there were 1.2 times as many deaths as expected (Figure 4.15 and Table 4.12).
- For females, the differentials were similar, however, rates in Very Remote areas were even higher with 1.5 times as many deaths of females as expected.
- There were about 3 times as many deaths of Indigenous people due to 'other' circulatory disease as expected.

Table 4.12: The ratio of observed deaths to those expected if Major Cities rates applied in each ASGC Remoteness area, 'other' circulatory disease, males and females, 1997–1999

Age group (years)	Male				Female					
	MC rate	IR	OR	R	VR	MC rate	IR	OR	R	VR
		(ratio)					(ratio)			
0–4	1	1.55	2.21	1.15	5.27	2	1.03	0.52	1.21	0.00
5–14	<1	0.35	0.48	0.00	13.81	<1	0.46	1.04	1.22	0.00
15–24	2	1.10	1.33	2.11	2.13	1	0.95	2.30	3.01	2.09
25–44	4	1.22	*1.36	*2.62	*3.45	3	1.04	0.73	2.16	*4.53
45–64	25	*1.17	*1.52	*1.81	*2.40	13	1.14	*1.29	1.63	*4.65
65–74	162	1.06	*1.18	*1.34	1.06	90	1.08	*1.18	1.47	*2.73
75+	823	*1.09	*1.17	0.89	0.75	812	*1.13	*1.19	1.13	0.92
Total	..	*1.09	*1.22	*1.18	*1.24	..	*1.12	*1.18	*1.22	*1.49

* Significantly different from 1 (that is, rates are significantly different from those in Major Cities).

Notes

1. Caution should be used when making inferences about ratios that are not significantly different from 1.
2. MC rates are expressed as deaths per 100,000 population per year. Total (crude) MC rate is largely meaningless and is not included.
3. While the table allows comparison of deaths between areas for each sex, it does not allow comparison between the sexes or age groups.

Source: AIHW National Mortality Database.

The pattern for age-specific death rates was similar to that for ischaemic heart disease, with rates to approximately 2,000 per 100,000 per year in both sexes for those 85 years and older.

There were usually significantly more deaths than expected due to this cause in all age groups older than 24 years, for whom there were 1.1–1.2, 1.2–1.5, 1.3–2.6 and 2.4–4.7 times as many deaths as expected in the four areas outside Major Cities.

As a result of 'other' circulatory diseases, there were 102, 116, 12 and 7 'excess' deaths of males annually, and 151, 105, 14 and 11 'excess' deaths of females annually in the four areas outside Major Cities. The bulk of the 'excess' deaths occurred in those older than 40 years, with the greatest contribution from the older age groups.

Indigenous population

Annually in the period 1997–1999, there were 89 deaths of Indigenous people (43 males and 46 females) in South Australia, Western Australia, the Northern Territory and Queensland. There would also have been a number of deaths due to this cause in the other jurisdictions where identification is less reliable. Of these 89 deaths, there were 59 (28 males and 31 females) more than expected.

There were 2.9 and 3.1 times as many deaths of Indigenous males and females as expected (Table 4.13). For males, 80% of the 'excess' occurred in 25–64-year-old males, and for females, 70% occurred among 45–74-year-olds.

Non-Indigenous population

Annually, there were 3,098, 1,184, 623, 68 and 17 deaths of non-Indigenous males and 3,957, 1,398, 662, 67 and 13 deaths of non-Indigenous females in the five areas as a result of 'other' circulatory diseases.

There were 1.1 and 1.2 times as many deaths of non-Indigenous males and females as expected in regional areas due to 'other' circulatory diseases. There were about as many deaths due to this cause as expected in remote areas (Table 4.13).

Table 4.13: The ratio of observed deaths to those expected as a result of 'other' circulatory disease if Major Cities non-Indigenous rates applied to the non-Indigenous population in each ASGC Remoteness area, and to the Indigenous population, 1997–1999

Age group (years)	Male					Female					Indigenous	
	Non-Indigenous				Indigenous	Non-Indigenous						
	IR	OR	R	VR		IR	OR	R	VR			
0–4	1	1.42	1.78	1.06	5.82	2.6	2	0.92	0.56	1.45	0.00	0.0
5–14	<1	0.36	0.51	0.00	0.00	*7.2	<1	0.47	0.44	1.44	0.00	0.0
15–24	2	1.08	1.14	1.34	2.72	*4.3	1	0.76	1.92	0.55	0.09	4.7
25–44	4	1.23	1.32	1.14	1.25	*7.2	3	1.04	0.69	0.73	0.16	*7.8
45–64	25	*1.17	*1.43	*1.51	0.95	*6.8	13	1.13	*1.23	1.08	1.34	*8.5
65–74	162	1.05	*1.17	1.27	0.93	*2.0	90	1.08	1.14	1.05	1.04	*6.1
75+	823	*1.09	*1.19	0.94	0.74	1.0	812	*1.11	*1.19	1.16	0.76	1.4
Total	..	*1.09	*1.22	1.10	0.86	*2.9	..	*1.10	*1.18	1.14	0.80	*3.1
0–64	..	*1.17	*1.40	*1.41	1.13	*6.4	..	1.09	1.11	1.00	0.89	*6.8

* Significantly different from 1 (that is, rates are significantly different from those for non-Indigenous people in Major Cities).

Notes

1. Caution should be used when making inferences about ratios that are not significantly different from 1.
2. MC rates for non-Indigenous persons are expressed as deaths per 100,000 population per year. Total (crude) MC rate is largely meaningless and is not included.
3. Ratios for Indigenous people are for SA, WA, NT and Qld.
4. While the table allows comparison of deaths between areas for each sex, it does not allow comparison between the sexes or age groups.
5. SMRs calculated for non-Indigenous persons from Remote and Very Remote areas should be treated with caution (see page 22).

Source: AIHW National Mortality Database.

Age-specific rates for non-Indigenous people living in Major Cities were similar to those for the total population living in Major Cities.

The pattern exhibited by age-specific death rates in regional areas is similar for non-Indigenous people to that for the total population. However, in remote areas, age-specific death rates were lower and tended not to be significantly higher (as was the case in the total population).

As a result of 'other' circulatory diseases, there were 100, 111, 6 and -3 'excess' deaths of non-Indigenous males annually, and 133, 101, 8 and -3 'excess' deaths of non-Indigenous females annually in the four areas outside Major Cities. The bulk (60–70%) of the 'excess' deaths

occurred in those older than 70 years, with younger age groups also making contributions, while for females, almost all of the 'excess' deaths were amongst those older than 70 years.

Mortality for those aged 0–64 years

Indigenous population

Annually there were 50 (30 male, 20 female) deaths of Indigenous people younger than 65 years in South Australia, Western Australia, the Northern Territory and Queensland as a result of 'other' circulatory diseases. There would also have been a number of deaths due to this cause in the other jurisdictions. Of these 50 deaths, there were 42 (25 males and 17 females) more than expected.

For Indigenous males and females who were younger than 65 years old, there were 6 and 7 times as many deaths as expected (Table 4.13).

Non-Indigenous population

Annually, there were 437, 163, 104, 16 and 5 deaths of non-Indigenous males younger than 65 years and 242, 84, 42, 5 and 1 deaths of non-Indigenous females younger than 65 years in the five areas as a result of 'other' circulatory diseases.

There were 1.2, 1.4 and 1.4 times as many deaths of 0–64-year-old non-Indigenous males as expected due to this cause in Inner Regional, Outer Regional and Remote areas. There were about as many deaths as expected in Very Remote areas (Table 4.13).

There were about as many deaths of 0–64-year-old non-Indigenous females in areas outside Major Cities as expected due to this cause.

As a result of 'other' circulatory diseases, there were 24, 30, 5 and 1 'excess' deaths of non-Indigenous males younger than 65 years annually, and 7, 4, 0 and 0 'excess' deaths of non-Indigenous females younger than 65 years annually in the four areas outside Major Cities. The bulk of the 'excess' deaths are contributed by those older than about 40 years.