3 All cause mortality

There is a common perception that health decreases and mortality increases with increasing remoteness; in other words, that people who live in more remote locations have poorer health and higher death rates. However, this view may be an over-simplification of the true situation. A number of factors, such as the effect of Indigenous health, differences in the socioeconomic status of remote area and metropolitan residents, different age structures, access to health services and the rural environment may all have an effect on health in general and on mortality in particular.

The primary data source used for this work is the AIHW National Mortality Database.

This section describes death rates for the total (Indigenous plus non-Indigenous) population, the Indigenous and non-Indigenous populations, and the Indigenous and non-Indigenous populations younger than 65 years of age. As previously discussed on page 21, there are concerns that comparisons of Indigenous mortality across the different levels of remoteness may lead to invalid conclusions, and consequently details for Indigenous populations have not been described by remoteness.

Death rates of the population who are younger than 65 years have been reported. It is possible that death rates for people 65 years and older may be substantially lowered by the migration to less remote areas of people requiring access to health facilities (that is, people in poorer health leaving remote areas, the healthier older people remaining). It should be stressed that, while it is clear that death rates for older people in remote areas are lower than for people in other areas, pending further work, it is unclear why this is so.

Summary of findings

This report shows that death rates are about 10% (1.1 times) higher in Inner and Outer Regional and Remote areas than in Major Cities, but 50% (1.5 times) higher in Very Remote areas (Table 3.1).

The death rate for Indigenous people is 3 times the rate for non-Indigenous people. There is a substantial difference in remote areas between the death rate for the total population and that for the non-Indigenous population. It is likely that the large proportion of the remote area population who are Indigenous, coupled with high overall Indigenous death rates, are the main causes of the higher overall death rate in these areas. In regional areas, these high Indigenous death rates would be less likely to influence the overall death rate for the total population because the proportion of the population who are Indigenous is relatively small.

Rates of death for Indigenous people are substantially higher than for non-Indigenous people, and indicate much greater inequity for Indigenous people compared to non-Indigenous people, than for non-Indigenous people who live outside Major Cities compared to non-Indigenous people who live inside Major Cities.

Concerns about likely differences in the accuracy of identification of Indigenous deaths in Major Cities, regional and remote areas, have prevented reporting of regional differences in Indigenous mortality. A sensitivity analysis (page 22) has shown that these problems are likely to have a substantially smaller effect on the reporting of inter-regional differences for non-Indigenous people.

For non-Indigenous people, death rates are about 10% higher in Inner and Outer Regional areas and not significantly different in remote areas from those in Major Cities. These overall death rates in remote areas are strongly affected by relatively low death rates amongst the elderly in these areas, rates that are at odds with the relatively high death rates in younger age groups in these areas. For those younger than 65 years of age however, rates for non-Indigenous males are over 10% higher in Inner Regional areas and around 20% higher in other areas; rates for non-Indigenous females are almost 10% higher in regional areas, but not significantly higher in remote areas.

Table 3.1: The ratio of observed deaths to those expected if Major Cities[(a)] rates applied to the relevant population in each of the four ASGC Remoteness areas outside Major Cities, 1997–1999

	Male ratio				Female ratio			
	IR	OR	R	VR	IR	OR	R	VR
Total population	***1.07**	***1.11**	***1.17**	***1.49**	***1.04**	***1.07**	***1.09**	***1.51**
Non-Indigenous population	***1.07**	***1.10**	***1.07**	1.00	***1.03**	***1.06**	0.98	***0.87**
Non-Indigenous population aged 0–64 years	***1.12**	***1.17**	***1.17**	***1.22**	***1.09**	***1.09**	1.06	1.16

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

(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 three population groups are not strictly comparable.

Notes

1. Caution should be used when making inferences about ratios that are not significantly different from 1.
2. While the table allows comparison of deaths between areas for each sex, it does not allow comparison between the sexes.

Source: AIHW National Mortality Database.

It is possible that the movement of older people in poor health to areas where they can better access health care results in a concentration of the healthier individuals from amongst the elderly in these areas (who consequently have lower death rates).

One-third (34%) of the population live outside Major Cities, while 36% of deaths are of people who reside outside Major Cities: of these, nearly all (94%) occur in regional areas (where the population is), the rest in remote areas (Table 3.2). Of the 3,303 'excess' deaths that occur annually outside Major Cities, 83% occur in regional areas, and 17% in remote areas. On average, these deaths are of younger people than in Major Cities.

Because the five areas differ so much in the size of their populations, both rates of death and numbers of deaths are compared. This shows that rates of death are generally higher in regional and remote areas, but the numbers of people affected are smaller in remote areas than in either regional areas or Major Cities (Tables 3.1 and 3.2).

Table 3.2: Annual numbers of deaths and 'excess' deaths, 1997–1999

Annual	MC	IR	OR	R	VR	Total
Deaths	82,321	28,836	14,201	1,830	1,000	128,188
'Excess' deaths	0	1,524	1,233	214	333	3,303
% of deaths that are non-Indigenous	100[(a)]	99	97	85	45	99

(a) Less than 0.5% of Major Cities deaths are Indigenous (that is, more than 99.5% are non-Indigenous).

Note: 'Excess' deaths are based on comparison of the number of observed deaths with the number expected if age-specific rates for people from Major Cities were to apply in each area.

Source: AIHW National Mortality Database.

In South Australia, Western Australia, the Northern Territory and Queensland alone there were 1,459 deaths of Indigenous people on average each year; this is 993 more deaths of Indigenous people than there would have been if their death rates had been the same as those for non-Indigenous people from Major Cities.

In comparison, there were 2,414 more deaths of non-Indigenous people from rural, regional and remote areas than expected if these same (Major Cities non-Indigenous) death rates had applied. Of these, 57%, 42% and 2% were in Inner and Outer Regional and Remote areas, respectively, but there were 23 fewer deaths than expected annually in Very Remote areas.

There is substantial variation, within broad areas, of the death rates in individual communities, particularly in Very Remote areas where the average death rate was substantially elevated by a relatively small number of Statistical Local Areas with very high death rates. This is true to a lesser extent in Remote areas, but not for the other areas, where death rates were more likely to cluster around an average value (page 46).

Death rates decreased in all areas over the period 1992–1999, particularly in Very Remote areas. In Very Remote areas, death rates decreased annually by 9% for males and 10% for females, while in all other areas rates decreased annually by about 3–3.5% for males and 2–3% for females.

These decreases have been driven primarily by decreases in death rates due to circulatory diseases (65–80% of the decrease was due to decreases in circulatory diseases death rates), but in Very Remote areas circulatory diseases explained only 45% of the decrease. Injury death rates changed very little over the period, and in fact tended to rise slightly in most areas. Decreases in cancer death rates contributed to 15% of the overall decrease in most areas. The contribution of decreases in rates of respiratory related death to the overall decrease varied from just under 10% in Major Cities to 25% in Very Remote areas. Changes in the rate of death due to 'other causes' contributed little in most areas, but 13% in Very Remote areas.

The main specific causes of higher death rates outside Major Cities are listed in Table 1: ischaemic heart disease and 'other circulatory diseases', chronic obstructive pulmonary disease, motor vehicle accidents, diabetes, suicide, 'other injuries', and prostate, colorectal and lung cancer. Many of these causes are largely preventable.

It is known that death rates are linked to socioeconomic status (that is, to income and educational level), itself associated with the prevalence of risk factors such as smoking and overweight (AIHW 2002b). The high death rates for Indigenous people are likely to be a reflection of lower socioeconomic status, higher levels of risk behaviour (for example, smoking), poorer housing and the social environment, including levels of control over their

own lives (ABS 2001c). Socioeconomic issues are likely to influence inter-regional comparisons of mortality for non-Indigenous people as well.

Analyses in this report have not taken socioeconomic issues into account.

Broad causes of death

The four broad groupings of causes of death described in this report—circulatory and respiratory diseases, neoplasms and injury—are responsible for 41%, 8%, 28% and 6% of all deaths nationally (Table 3.3). However, in areas outside Major Cities, these broad causes were responsible for 42%, 10%, 11% and 24% of the 'excess' deaths respectively that occurred as a result of higher death rates outside Major Cities. Thus circulatory disease is the major cause of death and the major contributor to 'excess' deaths, while injury, although less important nationally, is responsible for a large proportion of the 'excess' deaths outside Major Cities. As mentioned previously, mortality due to circulatory disease (which contributes largely to 'excess' mortality of older people) decreased over the period 1992–1999, while injury death rates (which contribute the bulk of the excess mortality in those younger than 45 years) remained unchanged or increased slightly over the same period.

Table 3.3: Summary table of deaths due to broad cause for all persons, 1997–1999

	Annual deaths outside Major Cities			Annual 'excess' deaths outside Major Cities			
Broad cause	**No.**	**%**	**% male**	**No.**	**%**	**% male**	**Age groups in which the 'excess' occurs**
Circulatory diseases	18,639	41%	51%	1,378	42%	60%	45–59: 20% 60+: 74%
Neoplasms	12,549	27%	59%	373	11%	>100%	50–70: 80%
Respiratory diseases	3,591	8%	59%	330	10%	84%	30–55: 15% 55–65: 20% 65–80: 60%
Injury	3,213	7%	71%	788	24%	76%	15–49: 70%
'Other' causes	7,874	17%	49%	434	13%	17%	0–4: 14% 55+: 80%
All causes	45,867	100%	55%	3,303	100%	65%	25–44: 12% 45–64: 32% 65+: 46%

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

Source: AIHW National Mortality Database.

Table 3.4: The ratio of observed deaths 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]
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**
Neoplasms	All persons	***1.0+**	***1.0+**	1.0	1.0	n.p.
	Non-Indigenous	***1.0+**	***1.0+**	1.0	***0.9**	n.p.
	Non-Indigenous (aged 0–64 years)	***1.1**	***1.1**	1.0	1.0	n.p.
	Indigenous	n.p.	n.p.	n.p.	n.p.	***1.5**
	Indigenous (aged 0–64 years)	n.p.	n.p.	n.p.	n.p.	***1.9**
Respiratory diseases	All persons	***1.0+**	***1.2**	***1.3**	***1.9**	n.p.
	Non-Indigenous	***1.0+**	***1.1**	***1.1**	1.1	n.p.
	Non-Indigenous 0–64	***1.2**	***1.4**	***1.5**	***1.9**	n.p.
	Indigenous	n.p.	n.p.	n.p.	n.p.	***4.4**
	Indigenous 0–64	n.p.	n.p.	n.p.	n.p.	***10.7**
Injury	All persons	***1.2**	***1.4**	***1.7**	***2.4**	n.p.
	Non-Indigenous	***1.2**	***1.3**	***1.5**	***1.5**	n.p.
	Non-Indigenous (aged 0–64 years)	***1.3**	***1.4**	***1.5**	***1.7**	n.p.
	Indigenous	n.p.	n.p.	n.p.	n.p.	***3.5**
	Indigenous (aged 0–64 years)	n.p.	n.p.	n.p.	n.p.	***3.7**
'Other' causes	All persons	1.0	***1.1**	***1.2**	***2.0**	n.p.
	Non-Indigenous	1.0	***1.1**	0.9	***0.9**	n.p.
	Non-Indigenous (aged 0–64 years)	***1.0–**	1.0	0.9	0.9	n.p.
	Indigenous	n.p.	n.p.	n.p.	n.p.	***4.4**
	Indigenous (aged 0–64 years)	n.p.	n.p.	n.p.	n.p.	***5.2**
All causes	All persons	***1.1**	***1.1**	***1.1**	***1.5**	n.p.
	Non-Indigenous	***1.1**	***1.1**	***1.0+**	1.0	n.p.
	Non-Indigenous (aged 0–64 years)	***1.1**	***1.1**	***1.1**	***1.2**	n.p.
	Indigenous	n.p.	n.p.	n.p.	n.p.	***3.1**
	Indigenous (aged 0–64 years)	n.p.	n.p.	n.p.	n.p.	***4.5**

(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 and Qld) area add 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. Ratios that are significantly different to 1.0 are bold and with an asterisk.
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.

For almost all broad causes of death, males contributed more than half of the deaths and two-thirds or more of the 'excess' deaths (in fact three-quarters of the 'excess' injury deaths and about 85% and 100% of the respiratory and neoplasms 'excess' deaths respectively). However, only 17% of 'excess' deaths due to 'other' causes were male.

For circulatory disease, respiratory disease and injury, death rates were higher outside Major Cities and were progressively higher with increasing remoteness, both for the total population and for the non-Indigenous population younger than 65 years (Table 3.4).

- In regional areas, death rates were 1.1, 1.0–1.2 and 1.2–1.4 times those in Major Cities, while for non-Indigenous people younger than 65 years, rates were 1.1–1.2, 1.2–1.4 and 1.3–1.4 times those in Major Cities for these three broad causes respectively.
- In remote areas, death rates were 1.1–1.3, 1.3–1.9 and 1.7–2.4 times those in Major Cities, while for non-Indigenous people younger than 65 years, rates were 1.2–1.3, 1.5–1.9 and 1.5–1.7 times those in Major Cities for these three broad causes respectively.

For neoplasms, death rates were 5% (1.05 times) higher for males and similar for females in regional areas than in Major Cities. In remote areas, rates were similar to those in Major Cities. For non-Indigenous people younger than 65 years, the pattern was similar, with 1.1 times as many deaths as expected in regional areas, and about as many as expected in remote areas.

Death rates due to 'other' causes were 1.0–1.1 times as high in regional areas as in Major Cities, and in remote areas were 1.2–2.0 times as high. For non-Indigenous people younger than 65 years, death rates were slightly lower for males and not significantly different for females in regional areas, and similar or lower in remote areas than in Major Cities.

In remote areas, there were substantially fewer deaths of elderly non-Indigenous people due to circulatory diseases, neoplasms and 'other' causes than expected, possibly as a result of migration of the frail aged to areas where services are more accessible.

While it is not possible at a national level to describe how death rates for Indigenous people vary with different levels of remoteness, it is clear that death rates for Indigenous people overall are much higher than for non-Indigenous people irrespective of the area in which the latter live. For Indigenous people there were 3.2, 1.5, 4.4, 3.5 and 4.4 times as many deaths due to circulatory diseases, neoplasms, respiratory diseases, injury and 'other' causes than expected if rates for non-Indigenous people from Major Cities applied to the Indigenous population. Because of the relatively large numbers of Indigenous people in remote areas, these high rates of death for Indigenous people overall appear to have a marked effect in raising death rates in these remote areas.

Specific causes of death primarily responsible for the higher death rates outside Major Cities are described in Table 1.

3.1 Overview

Between 1997 and 1999, an annual average of 128,188 Australians died, comprising 67,332 males and 60,856 females (Table 3.5). Most of these (82,321) occurred in Major Cities, with a further 43,037 in Inner and Outer Regional areas, and the remaining 2,830 in Remote and Very Remote areas.

There were 1,524, 1,233, 214 and 333 (a total of 3,303) more deaths than expected each year in the Inner and Outer Regional, Remote and Very Remote areas respectively. Between 60% and 75% of the 'excess' were deaths of males.

Table 3.5: Average annual deaths, 1997–1999

	MC	IR	OR	R	VR	Total
Males (no.)	42,161	15,531	7,916	1,103	621	67,332
Females (no.)	40,160	13,305	6,285	727	379	60,856
Persons (no.)	**82,321**	**28,836**	**14,201**	**1,830**	**1,000**	**128,188**
Non-Indigenous males[(a)] (proportion)	99	99	97	85	48	98
Non-Indigenous females[(a)] (proportion)	100	99	97	84	40	99
Non-Indigenous persons[(a)] (proportion)	**100**	**99**	**97**	**85**	**45**	**99**
Non-Indigenous males (0–64 yrs) (no.)	11,105	3,867	2,149	344	136	17,601
Non-Indigenous females (0–64 yrs) (no.)	6,220	2,125	1,051	144	49	9,589
Non-Indigenous persons (0–64 yrs) (no.)	**17,325**	**5,992**	**3,200**	**488**	**185**	**27,190**
Indigenous persons[(b)] (no.)	**n.p.**	**n.p.**	**n.p.**	**n.p.**	**n.p.**	**1,459**

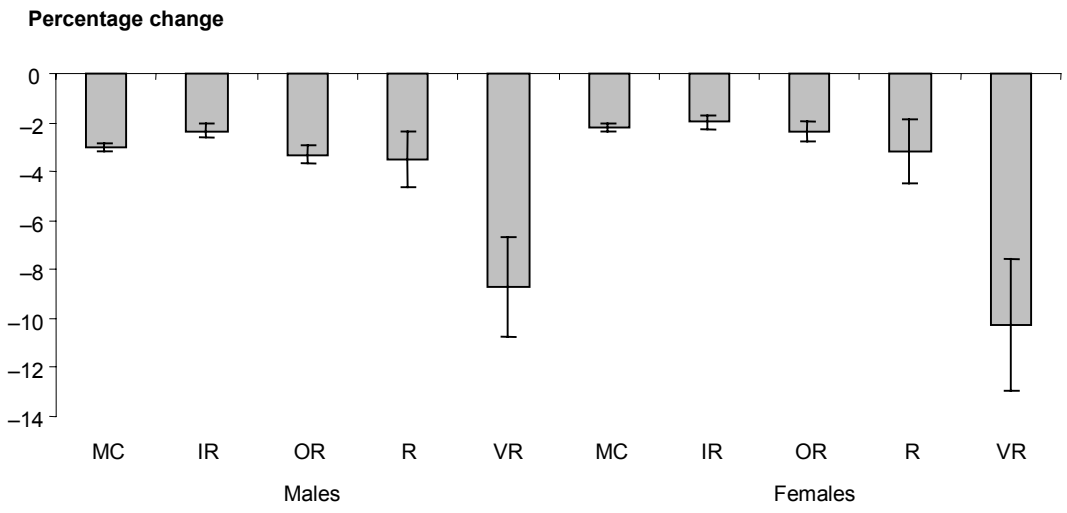
(a) Percentages and counts of deaths are rounded to the nearest whole number.

(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 458 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.

3.2 Trends in mortality

Because of the lack of access to reliable Indigenous population estimates on a yearly basis for 1992–1999, trends for death rates have been calculated for the total population only.



Notes

1. SMRs calculated using Major Cities rates in the period 1997–1999 as the standard.
2. Error bars indicate 95% confidence intervals. These indicate the amount of uncertainty about the precision of the calculated rate. These error bars do not provide any indication of the level of uncertainty due to bias in the data.

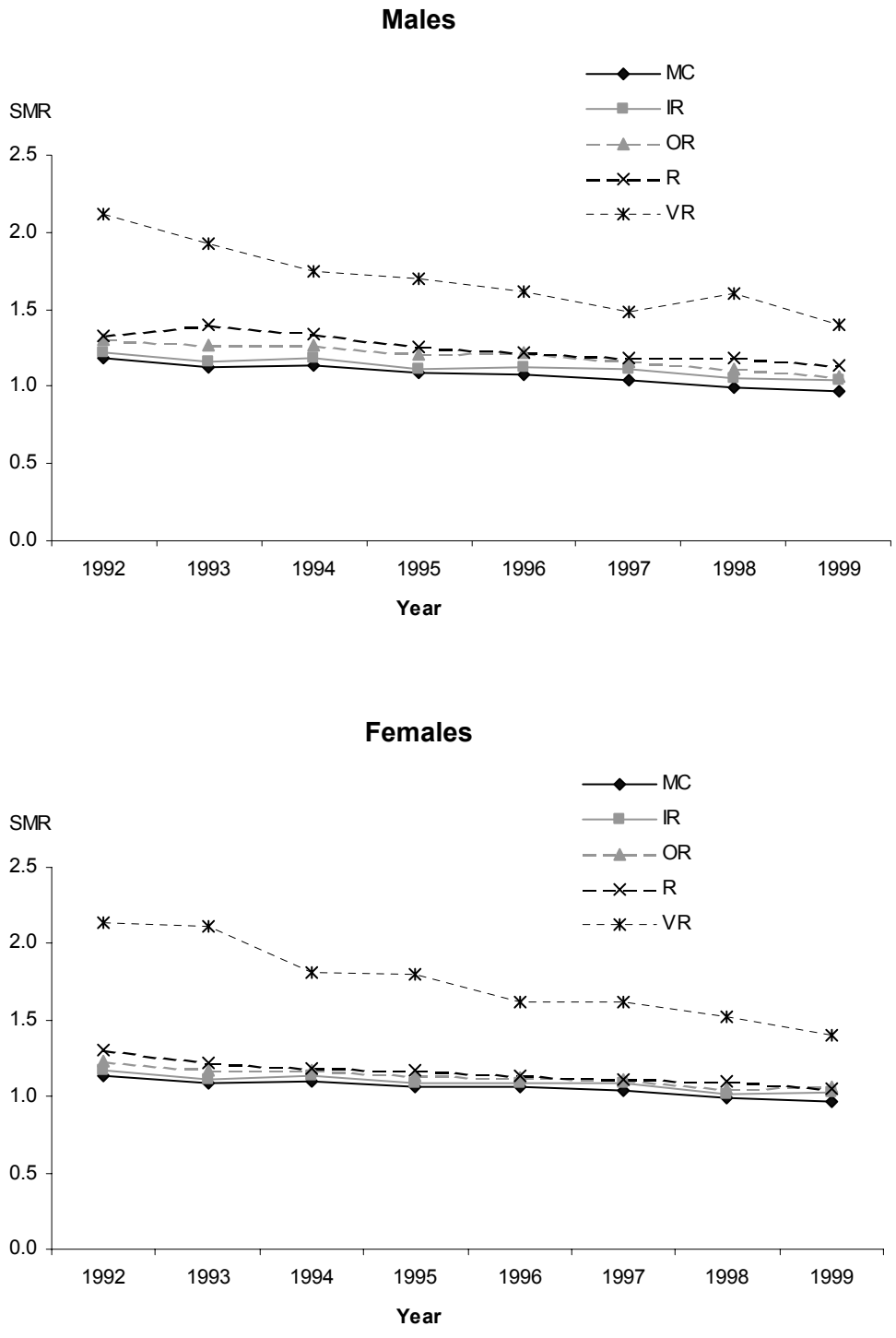
Source: AIHW National Mortality Database.

Figure 3.1: Annual percentage change in the ratio of observed to expected deaths, males and females, 1992–1999

Death rates for both males and females decreased over time in all areas over the period 1992–1999 (Figures 3.1 and 3.2).

Rates of decrease for males in Major Cities, Outer Regional and Remote areas were between 3% and 3.5% per annum (that is, the ratio of observed to expected deaths decreased by 3–3.5% each year). Death rates for males in Inner Regional areas decreased at a lower rate than in Major Cities and Outer Regional areas (by 2.3% per annum). In Very Remote areas, rates decreased for males at almost 9% per annum, significantly faster than in any other area.

Rates of decrease for females in Major Cities, Inner and Outer Regional and Remote areas were similar at between 2% and 3% per annum, although in the less remote areas they tended towards 2%. In Very Remote areas, rates decreased for females at about 10% per annum, significantly faster than in any other area (as for males).



Note: SMRs calculated using Major Cities rates in the period 1997–1999 as the standard.

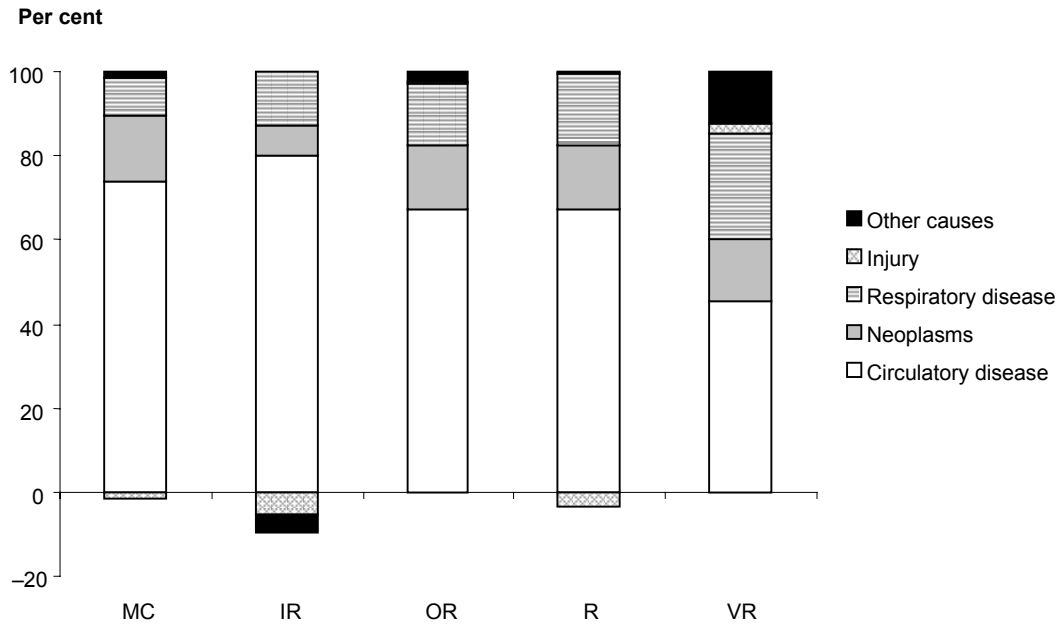
Source: AIHW National Mortality Database.

Figure 3.2: Trends for SMRs, all causes of death, males and females, 1992–1999

Trends in broad causes

Circulatory diseases contributed most to the reduction in the number of 'excess' deaths. In Major Cities and Inner Regional areas, reductions in mortality due to circulatory diseases were responsible for 74% and 80% of the overall reduction in 'excess' deaths (Figure 3.3 and Table 3.6). In Outer Regional and Remote areas, this figure was 67%. In Very Remote areas, where the overall decrease in the rate of death was greatest, the contribution of the other causes of death to reductions in the 'excess' were greater, leaving circulatory disease responsible for only 45% of the overall reduction.

About 15% of the reductions in the number of 'excess' deaths were due to decreases in neoplasm death rates, except in Inner Regional areas where neoplasms contributed 7% to the decrease in the overall 'excess'.



Note: 'Excess' deaths calculated using Major Cities rates in the period 1997–1999 as the standard. The percentage of the decrease attributable to each broad cause was allocated by linear regression of the numbers of 'excess' deaths in each year.

Source: AIHW National Mortality Database.

Figure 3.3: Percentage of the decrease in the total number of 'excess' deaths that result from changes in mortality due to each broad cause, 1992–1999

The contribution of changes in respiratory disease death rates to the reduction in the overall number of 'excess' deaths was greater in more remote areas. Decreases in death rates due to respiratory diseases were responsible for 9%, 13%, 15%, 17% and 25% of the reduction in the overall number of 'excess' deaths in the five areas respectively.

In most areas, death rates as a result of injury increased slightly. In Major Cities, Inner Regional and Remote areas, injury was responsible for a slowing of the overall decrease in death rate. If there had been no overall change in injury death rates in these areas, the number of 'excess' deaths in these areas would have decreased by a further 1%, 5% and 4% respectively. In Outer Regional areas, injury did not contribute to the reduction in the

number of 'excess' deaths, while in Very Remote areas, a reduction in injury mortality was responsible for 2% of the reduction in the overall number of 'excess' deaths.

Table 3.6: Percentage of the decrease in the total number of 'excess' deaths that result from changes in mortality of each broad cause, 1992–1999

	MC	IR	OR	R	VR
Broad cause of death			**(per cent)**		
Circulatory disease	74	80	67	67	45
Neoplasms	16	7	15	15	15
Respiratory disease	9	13	15	17	25
Injury	–1	–5	0	–4	2
Other causes	1	–4	2	1	13

Note: 'Excess' deaths calculated using Major Cities rates in the period 1997–1999 as the standard. The percentage of the decrease attributable to each broad cause was allocated by linear regression of the numbers of 'excess' deaths in each year. Negative numbers indicate increases in the number of excess deaths over time, due to that cause.

Source: AIHW National Mortality Database.

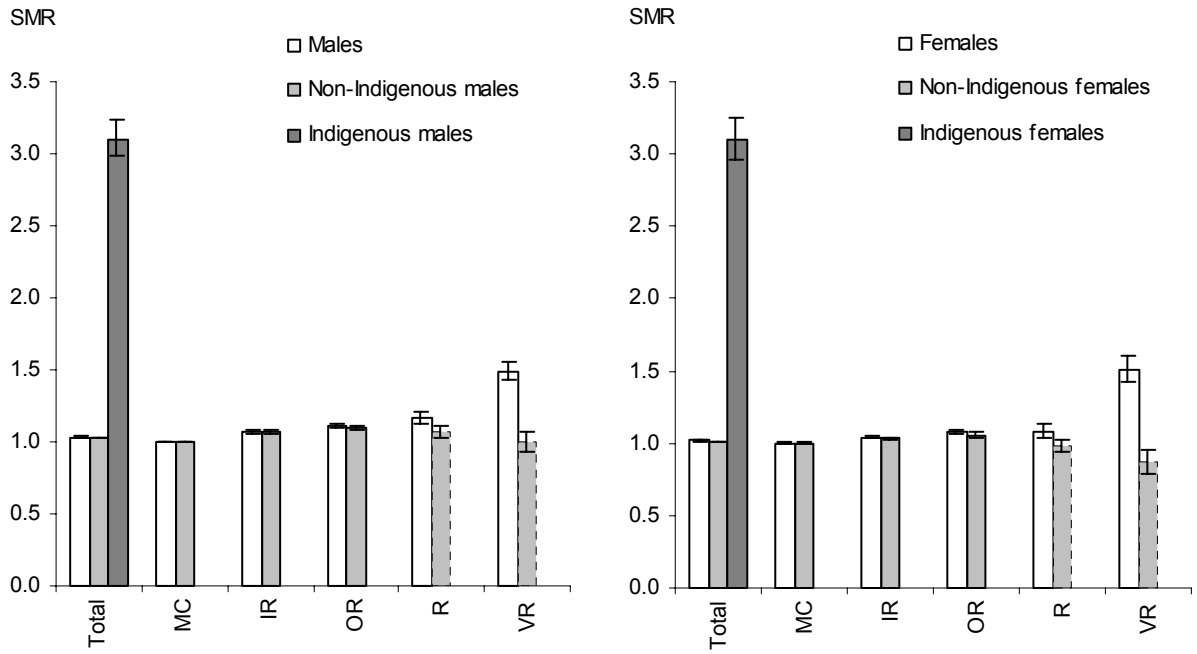
3.3 Death rates

Mortality was higher for people living outside Major Cities.

The death rate for males and females increased with increasing remoteness. Figure 3.4 and Table 3.8 show that for males living outside Major Cities, there were 1.1, 1.1, 1.2 and 1.5 times as many deaths as expected in Inner Regional, Outer Regional, Remote and Very Remote areas than in Major Cities. For females, there were 1.05, 1.05, 1.1 and 1.5 times as many deaths in these areas as expected respectively. Death rates for both sexes were significantly higher in each successive remoteness zone. Age-specific death rates tended to be higher for males than for females: in Major Cities, rates for males were 1.2–1.3, 2.2–2.6 and 1.7–1.8 times the rate for females in the 0–4 and 75+, 15–44 and 45–74 years age groups respectively.

Mortality for Indigenous people overall was substantially higher than for the 'total' population and for non-Indigenous people from any of the five areas. While it is not possible to compare rates of death for Indigenous people from each of the five areas, it is possible that in the more remote areas where they constitute a large proportion of the population, overall high rates of mortality for Indigenous people influence the higher death rates.

These figures would appear, on the surface, to show that all-cause mortality increases with increasing remoteness. As stated, however, these rates are probably 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 Major Cities mortality rate). 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 the health of Australians.



Notes

1. While the figure allows comparison of deaths between areas for each sex, it does not allow comparison between the sexes.
2. The presented SMR is the ratio of the observed number of deaths to the number expected if Major Cities rates applied in each area.
3. SMRs calculated for non-Indigenous persons from Remote and Very Remote areas (dashed) should be treated with caution (see page 22).
4. The SMRs for Indigenous persons are for SA, WA, NT and Qld combined (see page 21).

Source: AIHW National Mortality Database.

Figure 3.4: SMRs for all, Indigenous and non-Indigenous persons, by sex, 1997–1999

Indigenous people

In 1997–1999, there were approximately three times (Table 3.9) as many deaths in the Indigenous population as expected (3.1 times more deaths for both Indigenous males and females). In the four jurisdictions for which data is considered to be more reliable, there was a total of 4,378 deaths (2,515 males and 1,863 females) registered in the three years 1997–1999. Of these, 30% were due to circulatory disease, 13% from neoplasms, 8% from respiratory disease, 16% from injury and 32% from other diseases.

The high death rates for Indigenous people are likely to be affected by lower socioeconomic status, higher levels of risk behaviour (for example, smoking), poorer housing, and the social environment, including levels of control over their own lives (AIHW 2002b).

Data from national surveys in 1994 and 1995 show that Indigenous people were more likely than non-Indigenous people to smoke, consume alcohol at hazardous levels, be exposed to violence, and be categorised as obese, all of which are significant health risk factors (ABS 2001c).

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

Non-Indigenous people

Death rates for non-Indigenous people are higher in regional areas, but tend to be similar or lower in remote areas than for those in Major Cities; that is, although higher in regional areas, mortality does not continue to rise with increasing remoteness (Figure 3.4 and Table 3.9).

For non-Indigenous males, there were 1.1 times as many deaths as expected in Inner and Outer Regional and Remote areas. There were as many deaths as expected for males in Very Remote areas.

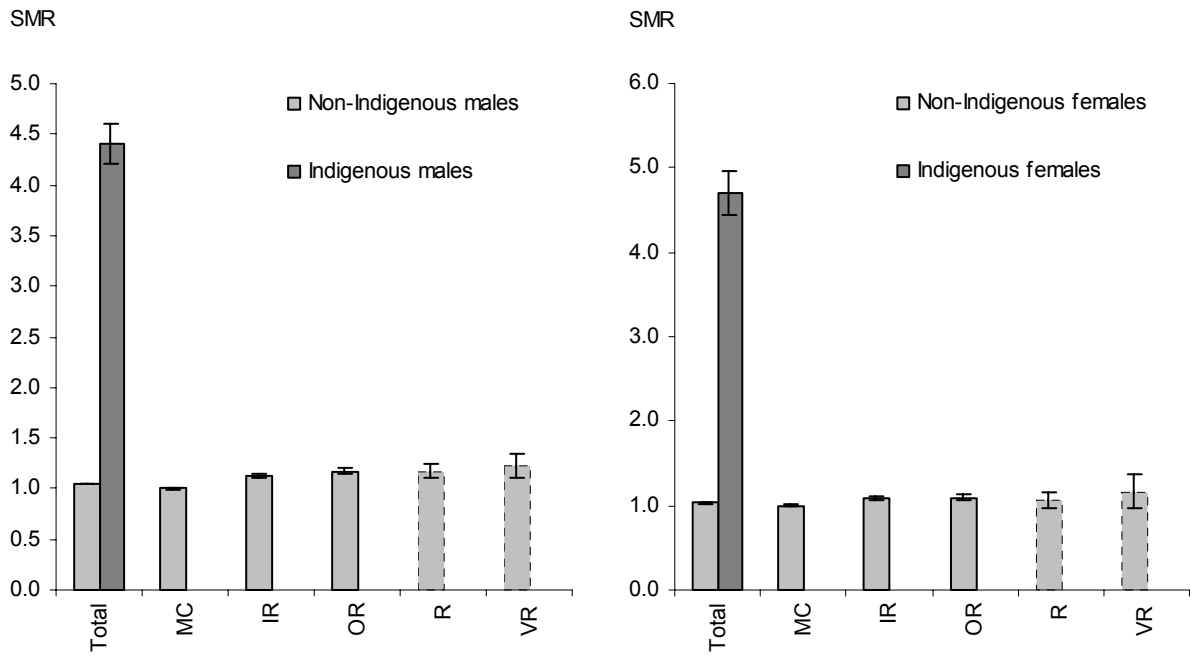
For non-Indigenous females, there were 1.05 times as many deaths as expected in Inner and Outer Regional areas, but 0.85 times as many deaths as expected (that is, fewer than expected) in Very Remote areas. There were about as many deaths of females as expected in Remote areas.

People aged 0–64 years

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 persons younger than 65 years are also presented in this report.

Death rates for Indigenous males and females younger than 65 years were 4.4 and 4.7 times those for non-Indigenous males and females of the same age from Major Cities.

Death rates for non-Indigenous males younger than 65 years in the four areas were 1.1, 1.2, 1.2 and 1.2 times those for similar non-Indigenous males in Major Cities. For non-Indigenous females in this age group, there were 1.1 times as many deaths in Inner and Outer Regional areas as expected, but in remote areas, although there were more deaths than expected, the number was not significantly higher (Figure 3.5 and Table 3.9).



Notes

1. While the figure allows comparison of deaths between areas for each sex, it does not allow comparison between the sexes.
2. The presented SMR is the ratio of the observed number of deaths to the number expected if Major Cities rates applied in each area.
3. SMRs calculated for non-Indigenous persons from Remote and Very Remote areas (dashed) should be treated with caution (see page 22).
4. The SMRs for Indigenous persons are for SA, WA, NT and Qld combined (see page 21).

Source: AIHW National Mortality Database.

Figure 3.5: SMRs for Indigenous and non-Indigenous persons aged 0–64 years, by sex, 1997–1999

3.4 Variation within areas

For the sake of simplicity in this report, average rates and SMRs have been used to describe mortality in each of the five areas (Major Cities, Inner Regional, Outer Regional, Remote and Very Remote) and to answer the question of whether mortality in regional and remote areas is higher than in Major Cities. However, there is, in fact, considerable variation between communities within each of these five areas. For example, mortality in some parts of Major Cities is high, while some Very Remote populations have low mortality.

So as to raise awareness of the differences within the five remoteness zones used in this report (the five areas), the number of observed and expected deaths in each Statistical Local Area (SLA) for the period 1993–1999 have been calculated and the results summarised in (Table 3.7 and Figure 3.6). The longer period (1993–1999) has been used because SLAs are small and estimates of the SMR had to be as robust as possible. Standard rates used were the age-specific death rates for males and females from Major Cities in the period 1993–1999.

In a number of cases, SLAs straddled the boundary between one remoteness area and another. In these cases, the SLA was allocated to the remoteness category in which most of its population fell or, if the population was fairly evenly shared by the two remoteness categories, then the category was randomly allocated. This process was necessary, but different to the method used for the other analyses in this report.

Table 3.7: Variation in the SMR in Statistical Local Areas (SLAs) within each ASGC Remoteness area, 1993–1999

	MC	IR	OR	R	VR
Quantile			**(SMR[a])**		
95th percentile SMR	1.47	1.32	1.56	1.83	3.47
75th percentile SMR	1.07	1.14	1.20	1.30	2.06
Median SMR	0.91	1.03	1.05	0.96	1.16
25th percentile SMR	0.78	0.91	0.90	0.78	0.83
5th percentile SMR	0.61	0.61	0.51	0.47	0.38
Mean SMR	0.96	1.02	1.06	1.03	1.54
SMR for the area[b]	1.00	1.05	1.09	1.15	1.61
			(number)		
No. SLAs with SMR > 75th percentile[c],[e]	138	71	85	23	18
No. SLAs with SMR > 75th percentile of MCs[d],[e]	138	113	152	34	39
Total number of SLAs[e]	**572**	**274**	**333**	**91**	**74**

(a) SMRs (standardised mortality ratios) are calculated as the ratio of observed deaths in each SLA between 1993 and 1999 to the expected number in that period if age-specific Major Cities death rates for that period applied in each SLA.

(b) The ratio of the number of observed deaths to the number expected if age-specific Major Cities death rates for that period applied in each Remoteness area. This is conceptually the same as that reported throughout the rest of this report.

(c) The number of SLAs with an SMR greater than three-quarters of all those SLAs in that Remoteness area.

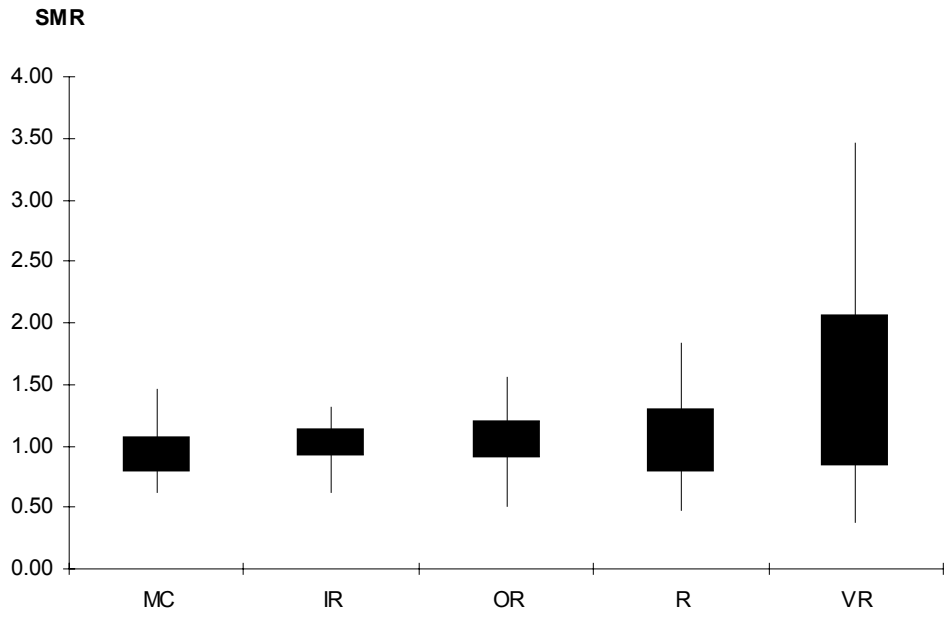
(d) The number of SLAs with an SMR greater than three-quarters of all those SLAs in Major Cities.

(e) The numbers in the last three rows should be treated cautiously and interpreted as indicative only (not actual counts). There have been many SLA boundary changes over the period of analysis and the number of SLAs varies from year to year. Many SLAs do not neatly fit into any one Remoteness category.

Source: AIHW National Mortality Database.

The results of this analysis of intra-regional variation should be interpreted with caution. There are a number of limitations with this analysis, including the difficulties of allocating SLAs to Remoteness categories and the fact that SLAs can have markedly different sized populations. However it is sound enough to draw the following conclusions:

- There is substantial variation in mortality within broad zones of remoteness, particularly in Very Remote areas. Although SLAs are not necessarily 'communities', there are likely to be substantial similarities in the environments experienced by people who live in the same SLA.
- The distribution is substantially skewed in Remote and particularly Very Remote areas, with a number of SLAs dragging the 'average' SMR upwards because of their very high levels of mortality.



Note: The five boxes represent the range of SMRs calculated for the middle 50% of SLAs in each Remoteness area. The line vertically above each box indicates the range between the 75th and 95th percentile of SMRs (that is, SLAs with the highest mortality in that Remoteness area). The line vertically below each box indicates the range between the 5th and the 25th percentile of SMRs (that is, SLAs with the lowest mortality in that Remoteness area).

Source: AIHW National Mortality Database.

Figure 3.6: Intra-zonal variation of death rates: 5th and 95th, 25th and 75th percentiles of the SMRs calculated for each Statistical Local Area within each ASGC Remoteness area, 1993–1999.

3.5 Variation by age group

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 SMRs alone.

Age-specific death rates are important in this analysis for two reasons:

- Summary measures, such as SMRs, can hide differences between areas, while age-specific rates have more power to expose particular differences.
- Age-specific rates provide better information for targeting interventions. Not only is it important to know which conditions are contributing most to mortality, but for which sex and at what age the differential between areas is greatest.

For both sexes, the death rate for each age group tended to be higher in more remote zones, although in older age groups, death rates in the two most remote zones tended to be substantially lower than in any of the other zones (Table 3.8 and Figures 3.7 and 3.8).

In regional areas:

- There were typically 1.1 or 1.2 times as many deaths in each age group as expected in Inner and Outer Regional areas.
- For males aged 15–24 years in the Inner and Outer Regional areas there were 1.3–1.4 times as many deaths as expected. For females of the same age there were 1.2 times as

many deaths as expected. For males and females who were 75 years or older, there were 1.03 to 1.05 times as many deaths as expected in these areas.

Table 3.8: The ratio of observed deaths to those expected if Major Cities rates applied in each area, males and females, 1997–1999

	Male					Female				
		IR	OR	R	VR		IR	OR	R	VR
Age group (years)	MC rate	(ratio)				MC rate	(ratio)			
0–4	132	***1.09**	***1.29**	***1.38**	***2.59**	110	1.01	1.05	***1.35**	***2.94**
5–14	15	1.10	1.17	***1.89**	***3.68**	11	1.06	***1.30**	1.55	***4.28**
15–24	90	***1.34**	***1.45**	***2.09**	***2.66**	35	***1.23**	***1.21**	***2.16**	***2.67**
25–44	142	***1.10**	***1.20**	***1.55**	***2.61**	66	***1.10**	***1.14**	***1.55**	***3.14**
45–64	519	***1.11**	***1.22**	***1.33**	***2.15**	312	***1.09**	***1.19**	***1.40**	***2.65**
65–74	2552	***1.06**	***1.13**	***1.19**	***1.42**	1413	1.02	***1.11**	***1.26**	***1.68**
75+	8470	***1.05**	***1.03**	***0.93**	***0.71**	6734	***1.04**	***1.04**	***0.91**	***0.80**
Total	. .	***1.07**	***1.11**	***1.17**	***1.49**	. .	***1.04**	***1.07**	***1.09**	***1.51**

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

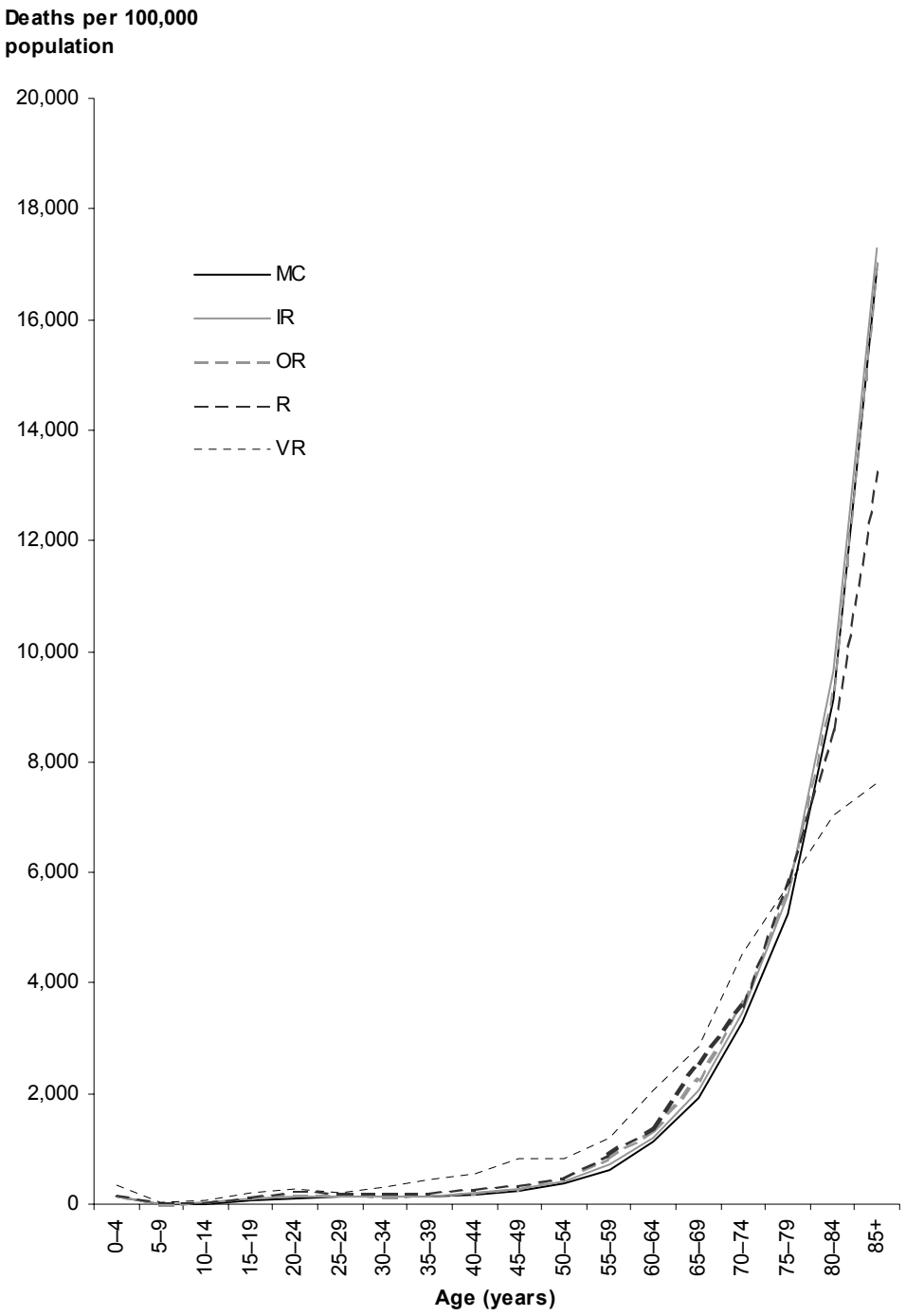
Notes

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.

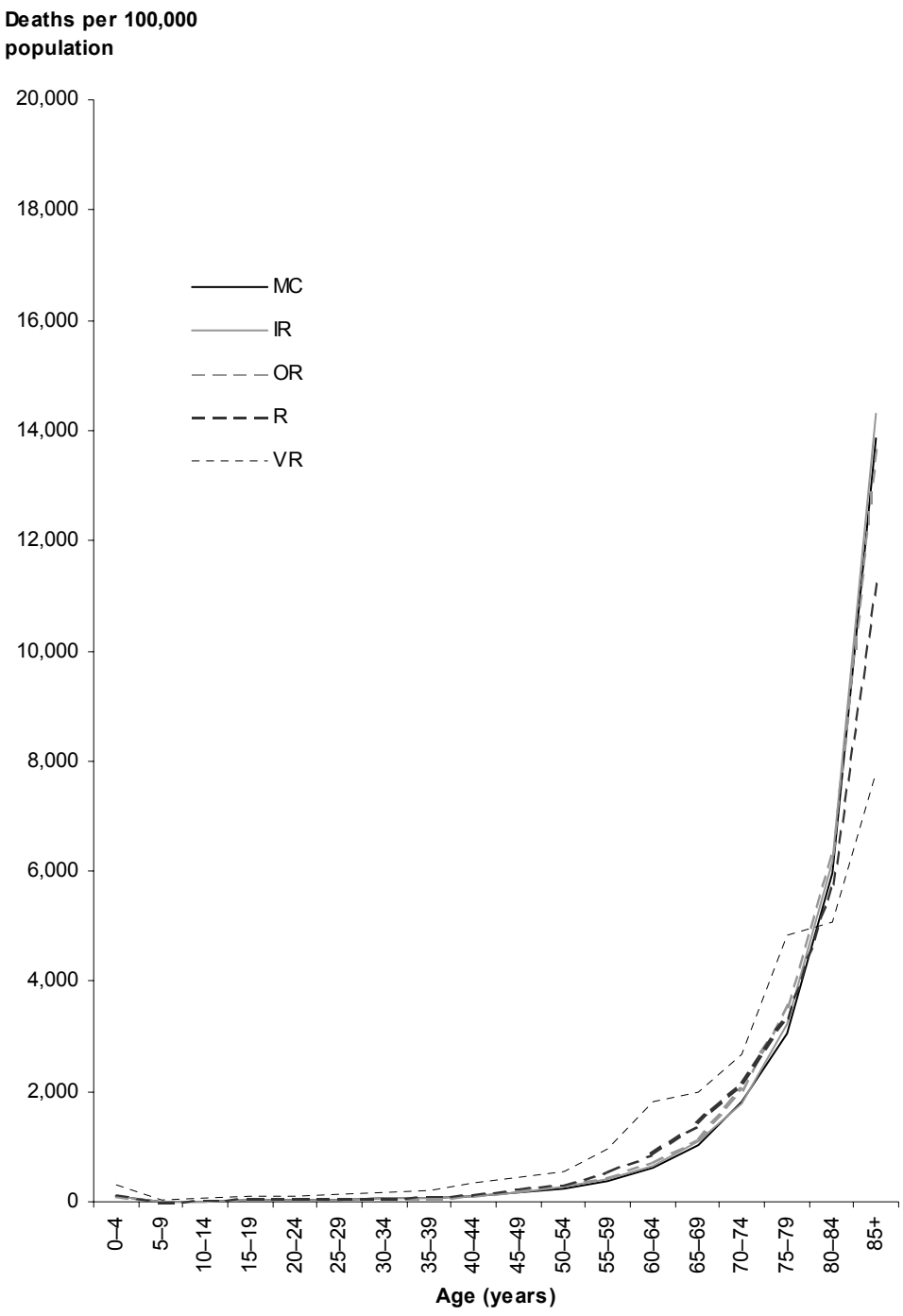
In Remote and Very Remote areas:

- for those younger than 45 years there were (respectively) for males 1.4–2.1 and 2.6–3.7 times, and for females 1.4–2.2 times and 2.7–4.3 times, as many deaths as expected;
- for those 45–74 years there were respectively for males 1.2–1.3 and 1.4–2.2 times, and for females 1.3–1.4 and 1.7–2.7 times, as many deaths as expected; and
- for those 75 years and over, there were fewer deaths than expected (respectively 0.9 and 0.7 times for males and 0.9 and 0.8 times for females).



Source: AIHW National Mortality Database.

Figure 3.7: Age-specific death rates, by ASGC Remoteness area for males, 1997–1999



Source: AIHW National Mortality Database.

Figure 3.8: Age-specific death rates, by ASGC Remoteness area for females, 1997–1999

Indigenous people

It is clear that death rates of Indigenous people are much greater than for non-Indigenous people. Indigenous males and females were more likely to die at younger ages than the total population. The 'majority of deaths among Indigenous males (76%) and Indigenous females (65%) occurred before the age of 65 years. The reverse is true for non-Indigenous deaths…' (ABS 2001c).

There were significantly more deaths of Indigenous males and females than expected in every age group (Table 3.9 and Figures 3.9 and 3.10).

- The greatest relative differences occurred in the 25–64 year age group, where there were, for males and females respectively, 5 and 5–6 times as many deaths as expected.
- For those younger than 25 years, there were 3–3.5 times as many deaths as expected.
- For males and females 65–74 years there were 2 and 3 times as many deaths as expected.
- For males and females who were 75 years and over, there were 1.2 and 1.4 times as many deaths as expected.

Non-Indigenous people

Because of the scale used to show Indigenous rates in Figures 3.9 and 3.10, it is difficult to distinguish the differences between areas for non-Indigenous people. Table 3.9 describes the differences more clearly.

Removal of the Indigenous population from the analysis would be expected to affect the death rates in the younger age groups to a greater extent and rates in the older age groups to a lesser extent. This is a consequence of both the younger general age of the Indigenous population and also the (related) higher mortality, particularly in what would otherwise be considered 'middle age'.

In almost all age groups there were more deaths than expected outside Major Cities. There is some tendency for rates to be a little higher in remote areas than in regional areas.

- Typically, there were more deaths than expected for those younger than 15 years outside Major Cities, although the difference in each area was usually not significant.
- For males 15–24 years, there were 1.3–1.4 and 1.7 times as many deaths as expected in Inner and Outer Regional, and Remote areas. For females of the same age, there were only significantly more deaths than expected in Inner Regional areas (1.25 times as many deaths as expected), although numbers were elevated in the other areas.
- For males 25–74 years, there were typically 1.1–1.2 times as many deaths as expected. For females of this age, numbers were similarly elevated, but statistical significance was infrequent, with rates tending to be closer to 1.1 times as high.
- For elderly (75+) males and females in regional areas, there were 1.02–1.05 times as many deaths as expected. In remote areas, there were fewer deaths than expected; 0.9 times as many for females from Remote areas and 0.7 times as many for males and females from Very Remote areas.

Table 3.9: The ratio of observed deaths to those expected if Major Cities non-Indigenous rates applied to the non-Indigenous population in each area and to the Indigenous population, 1997–1999

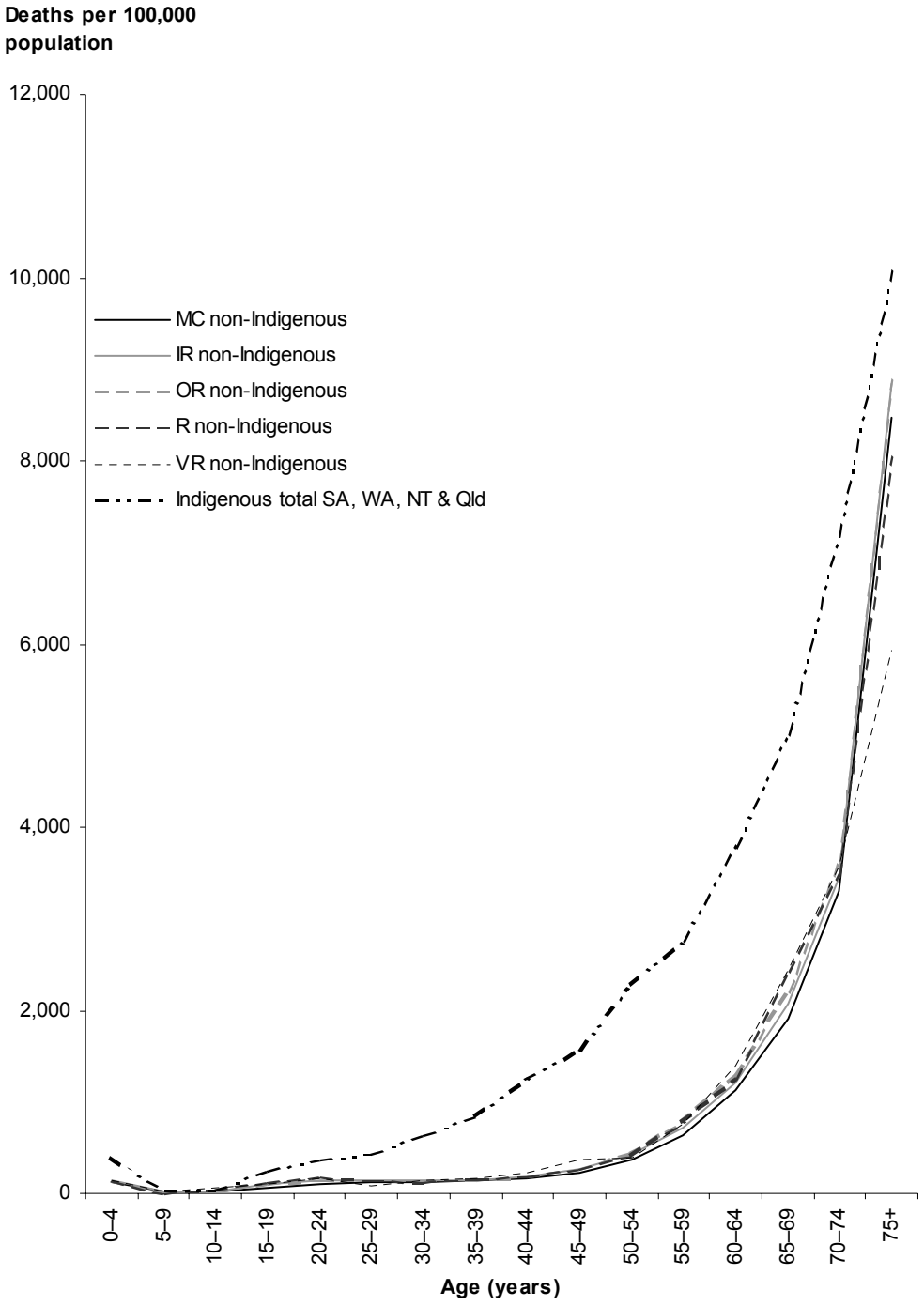
	Male						Female					
	Non-Indigenous					Indig-enous	Non-Indigenous					Indig-enous
		IR	OR	R	VR			IR	OR	R	VR	
Age group (years)	MC rate	(ratio)					MC rate	(ratio)				
0–4	130	1.08	***1.15**	1.14	1.17	***3.0**	109	1.00	0.96	1.01	0.86	***2.8**
5–14	15	1.12	1.13	1.48	***2.62**	***2.9**	11	1.09	1.24	1.20	1.92	***3.6**
15–24	89	***1.34**	***1.39**	***1.74**	1.46	***3.5**	34	***1.25**	1.10	1.39	1.53	***3.3**
25–44	139	***1.10**	***1.12**	1.09	1.11	***5.3**	65	***1.10**	1.03	0.88	0.89	***6.0**
45–64	517	***1.11**	***1.18**	***1.14**	***1.24**	***4.8**	309	***1.08**	***1.12**	1.10	***1.27**	***5.3**
65–74	2,550	***1.06**	***1.12**	***1.15**	***1.17**	***2.4**	1,410	1.02	***1.09**	***1.13**	0.99	***3.3**
75+	8,468	***1.04**	***1.05**	0.95	***0.70**	***1.2**	6,732	***1.02**	***1.04**	***0.91**	***0.72**	***1.4**
Total	. .	***1.07**	***1.10**	***1.07**	1.00	***3.1**	. .	***1.03**	***1.06**	0.98	***0.87**	***3.1**
0–64	. .	***1.12**	***1.17**	***1.17**	***1.22**	***4.4**	. .	***1.09**	***1.09**	1.06	1.16	***4.7**

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

Notes

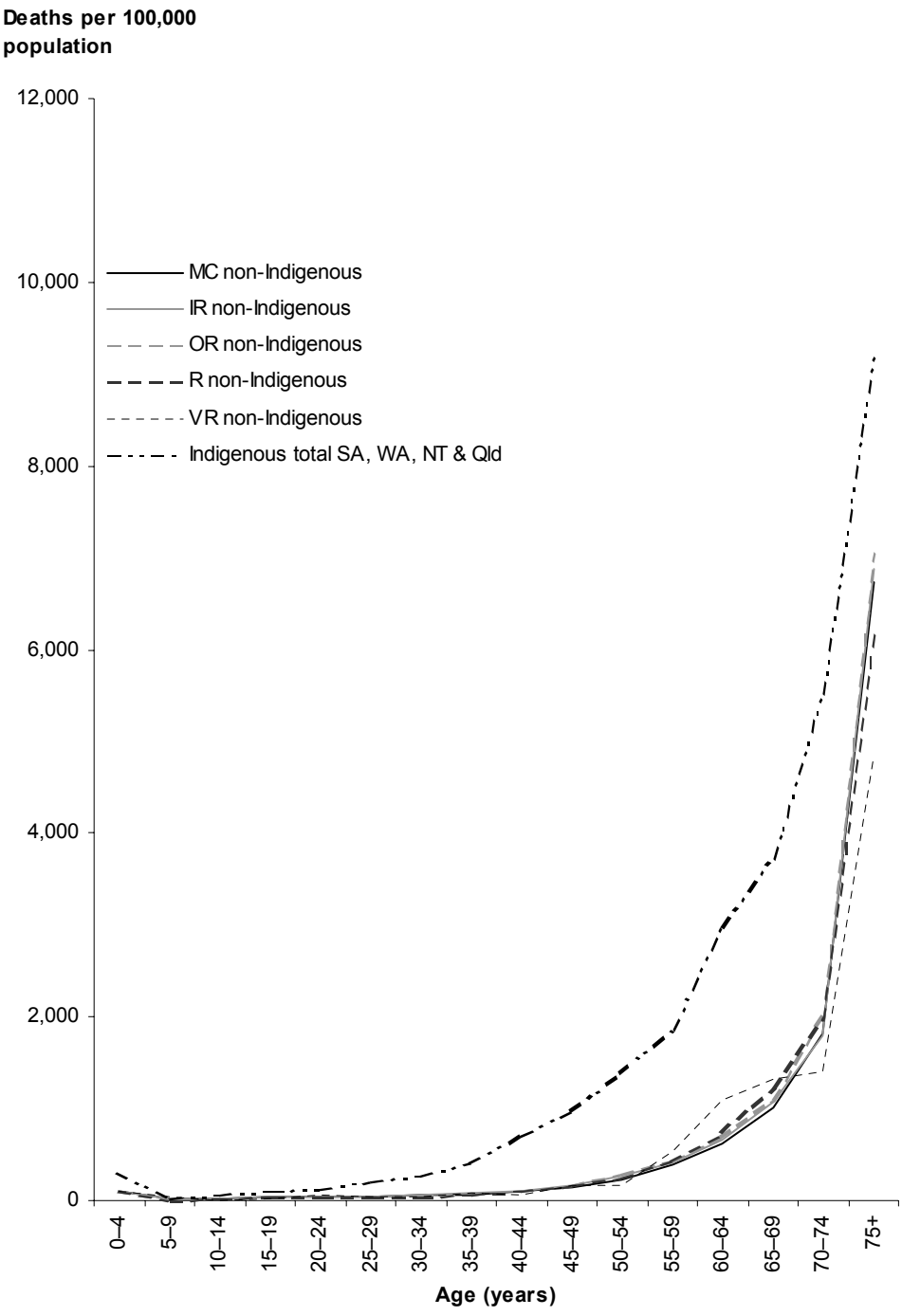
1. Caution should be used when making inferences about ratios that are not significantly different from 1.
2. MC rates for non-Indigenous persons are expressed as deaths per 100,000 population per year. Total (crude) MC rate is largely meaningless and is not included.
3. Ratios for Indigenous people 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.



Source: AIHW National Mortality Database.

Figure 3.9: Age-specific death rates, by ASGC Remoteness area for non-Indigenous males and in SA, WA, NT and Qld for Indigenous males, 1997–1999



Source: AIHW National Mortality Database.

Figure 3.10: Age-specific death rates, by ASGC Remoteness area for non-Indigenous females and in SA, WA, NT and Qld for Indigenous females, 1997–1999

3.6 'Excess' deaths

Another way of reporting the differential between Major Cities and the areas outside them is to subtract the number of deaths that would have occurred in each of those areas if Major Cities rates had applied in all areas, from the number of deaths that did occur (Table 3.6). This also gives a measure of the absolute number of 'extra' people who died outside Major Cities, and places these in perspective against the ratios shown in Tables 3.4 and 3.5. For example, although the ratio of observed deaths to those expected if Major Cities had applied may have been relatively high in a particular area, it may not have involved a large number of people. Conversely, a low ratio in another area may translate into a relatively large number of 'excess' deaths because of a larger base population.

Both statistics—'how many times more deaths were there than expected?' and 'how many more deaths were there than expected?'—are important. The former describes issues of equity; it identifies population groups for whom the risk of death is substantially greater. However, the latter describes the burden (in terms of absolute numbers of deaths) contributed by each area and population group resulting from each of a range of causes.

The number of 'excess' deaths provides an idea of the absolute magnitude of the differential in terms of human lives lost each year.

To display the distribution of 'excess' deaths, ten-year age groups (0–9, 10–19 etc.) have been used. These age groups have not been used in the rest of the report, but are used in Figures 3.11, Table 3.11 and Appendix B. Five-year age groups have not been used because the resultant pattern is difficult to recognise; nor have life stage age groups (for example, 0–4, 5–14, 15–24) been used as these are of unequal duration (distorting the pattern). Life stages have been used to describe 'excess' Indigenous deaths because of the relatively small numbers involved.

On average during the period 1997–1999, there were 3,303 more deaths of people who lived outside Major Cities than expected each year (Table 3.10). Two-thirds of these were males, one-third female.

Of these 3,303 'excess' deaths, 1,524, 1,233, 214 and 333 occurred in Inner Regional, Outer Regional, Remote and Very Remote areas, which is 46%, 37%, 7% and 10% respectively of the 'excess' deaths that occurred in the populations outside Major Cities.

The 'excess' deaths described in these figures show the following pattern (Figure 3.11 and Table 3.11):

- In Inner and Outer Regional areas, while there was some 'excess' death in the younger age groups, the bulk was in the older age groups.
- In the Remote and Very Remote areas, the 'excess' death was more evenly distributed across the age groups, with a higher proportion of deaths in the younger age groups than in Inner and Outer Regional areas. This pattern may be influenced by the higher death rate of younger Indigenous people and may also reflect greater risks of accidental death associated with the rural environment.
- While the number of 'excess' deaths in Inner Regional areas remained high for people 70 years and older, in the other areas outside Major Cities the number of 'excess' deaths decreased; in addition there were fewer deaths than expected for people approximately 80 years and older in the more remote areas. It is possible that this may be due to the migration of the frail aged to facilities in less remote locations (hence boosting the death rate in these areas), leaving healthier aged people to continue residing in the more remote areas (and consequently reducing the death rate for this age group in these areas).

Although this may occur, we have been unable to identify any study that confirms this hypothesis.

Specific points include:

- the approximately 100 'excess' deaths annually of children less than 5 years old outside Major Cities (predominantly in Outer Regional and Very Remote areas);
- the approximately 230 'excess' deaths annually of people aged 15–29 years (of whom 85% were male) in the Inner Regional and Outer Regional areas. There were also approximately 90 'excess' deaths annually of people of the same age in the Remote and Very Remote areas (70% were male); and
- in the Inner Regional and Outer Regional areas, compared to the large number of 'excess' deaths in the 15–29 year age group, there were lower numbers of 'excess' deaths in the 5–14 year and 30–39 year age groups.

While most of the 'excess' deaths in the Inner Regional and Outer Regional zones occurred in the older age groups, in the Remote and Very Remote zones, approximately half of the 'excess' deaths in those younger than 85 years occurred among those younger than 50 years (Figure 3.11).

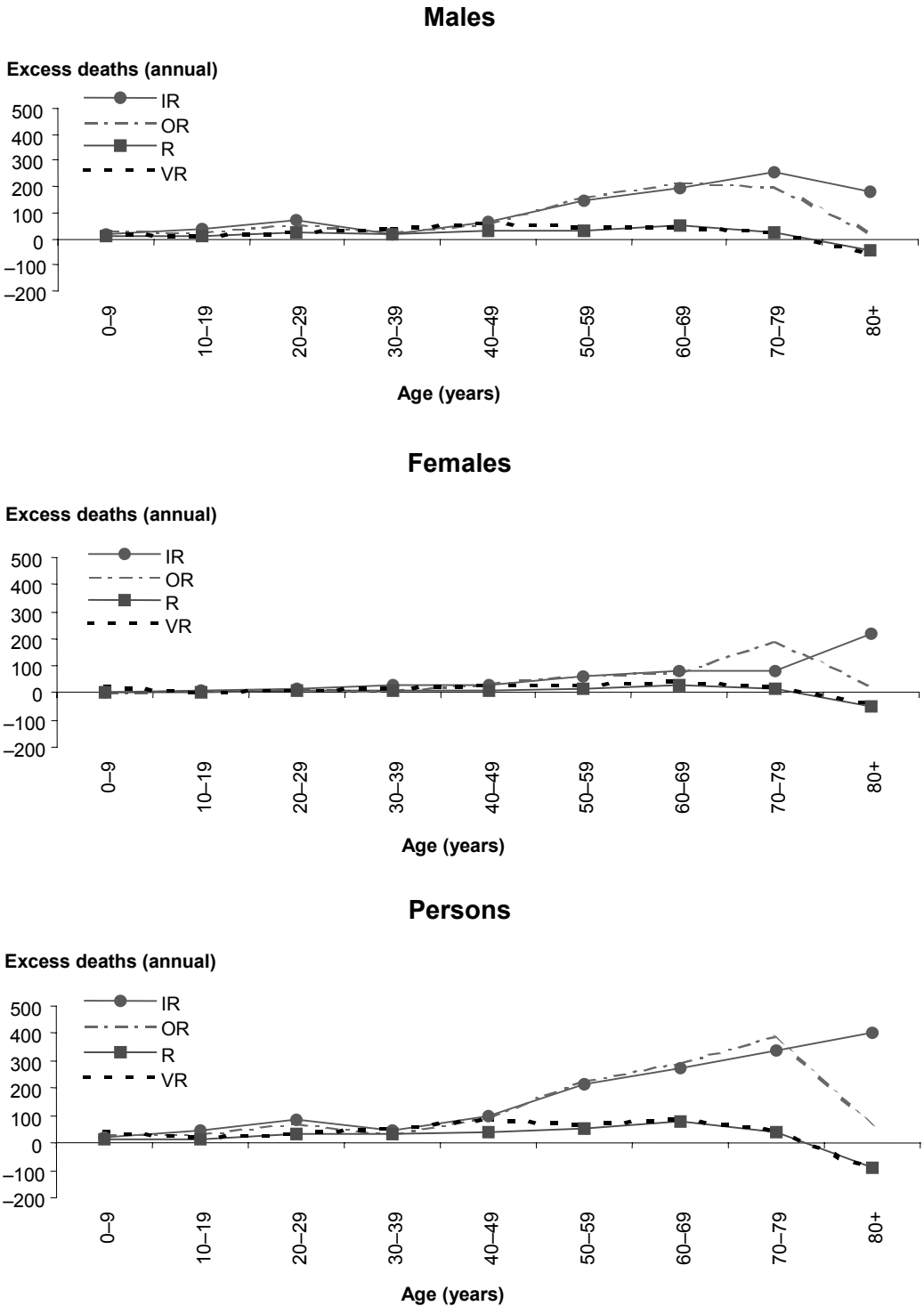
Appendix B details the numbers of 'excess' deaths by region, sex, age and cause.

Table 3.10: The annual number of 'excess' deaths outside Major Cities as a result of each major group of causes, and the percentage of all 'excess' deaths attributable to that cause, 1997–1999

	Annual number of 'excess' deaths			Per cent of 'excess' deaths (%)		
	Males	Females	Persons	Males	Females	Persons
Neoplasms	379	–6	373	18	–1	11
Circulatory disease	825	552	1,377	38	48	42
Respiratory disease	277	53	330	13	5	10
Injury	602	186	788	28	16	24
Other causes	73	362	435	3	32	13
All causes	**2,156**	**1,147**	**3,303**	**100**	**100**	**100**

Note: Negative numbers indicate fewer deaths than expected.

Source: AIHW National Mortality Database.



Note: Negative numbers indicate fewer deaths than expected.

Source: AIHW National Mortality Database.

Figure 3.11: 'Excess' deaths by age group, persons, males and females, 1997–1999

For people who are:

- younger than 30 years (except the very young, for whom a substantial proportion of the 'excess' is a result of other causes), injury was by far the predominant cause of 'excess' death;
- aged 30–39 and 40–49 years, injury remained important (responsible for 70% and 40% of 'excess' deaths respectively), but other causes start to make substantial contributions (circulatory disease 24% and 35% and neoplasms 10% and 15% respectively of 'excess' deaths in these age groups);
- aged 50–69 years, injury was responsible for about 10%, circulatory disease for 35%, neoplasms for about 30% and respiratory disease for 10–20% of the 'excess' deaths;
- aged 70–79 years, circulatory diseases were responsible for 60% of 'excess' deaths and respiratory disease for 20% of 'excess' deaths;
- older than 80 years, circulatory disease (mainly) and injury (to a lesser extent) were responsible for the 'excess', with fewer deaths than expected as a result of neoplasms and respiratory disease.

This pattern holds more or less true for each sex with the exception that for 30–39-year-old males, injury remains by far the largest contributor to 'excess' deaths.

The situation across areas differs in the following ways:

- For males, while neoplasms were more important with age as a contributor to 'excess' deaths in all areas, its importance was greatest in Inner Regional areas (peaking for 50–59-year-olds, where it was responsible for over 50% of 'excess' deaths) and least important in Very Remote areas (at most about 10% of 'excess' deaths). The contribution of neoplasms to 'excess' death in the other areas is intermediate and tends to be inversely proportional to remoteness. The proportional contribution of neoplasms to 'excess' death in the older ages tends to decrease such that neoplasms contribute as many or fewer deaths than expected in those older than 70 or 80 years (although, in Inner Regional areas, neoplasms contribute about 10% of the 'excess' for males in these areas).
- For females, neoplasms are more important as a contributor to 'excess' death in Inner Regional areas, where neoplasms are responsible for over 20% (and up to 40%) of 'excess' deaths for females who were 30–69 years. Neoplasms contributed proportionally less to the overall 'excess' in the other areas, seldom contributing more than 10% of the 'excess' in any age group.
- Diseases of the circulatory system contributed very little to 'excess' death for younger males, with the importance of circulatory disease more proportionally important for those aged 30–39 years, and the most important contributor for those older than 70 years. In those age groups where circulatory disease was important as a cause of death, the proportional contribution of circulatory disease to 'excess' deaths of males was somewhat similar in all areas.
- For females, the contribution of circulatory diseases to 'excess' death followed much the same pattern as for males (although there were fewer deaths of females older than 80 years than expected in Outer Regional areas). In those younger than 50 years, circulatory disease contributed proportionally more in the more remote areas, and in those older than 60 years, proportionally less in the more remote areas.

It is difficult to clearly discern for males or females any major differences across areas in the contribution of respiratory disease to 'excess' death.

For both males and females, the contribution of injury to 'excess' deaths is greatest in younger people (about 75% of the annual 'excess' injury deaths occur in people younger than 50 years). More than 100% of 'excess' deaths of 10–39-year-old males in Inner and Outer Regional areas were a result of injury, the contribution for this age group in Remote and Very Remote areas being 30–80% (typically more than 50%). This pattern is repeated for females. In all ages, the contribution of injury as a proportion of all 'excess' deaths was smaller in the more remote areas, primarily because of the high rate of death due to other causes in remote areas.

Table 3.11: Annual 'excess' deaths by age group, all persons, 1997–1999

	Males				Females				Persons			
	IR	OR	R	VR	IR	OR	R	VR	IR	OR	R	VR
Age group (years)	(number)											
0–9	19	31	9	21	1	5	5	20	20	37	14	41
10–19	39	25	11	12	9	8	5	6	48	33	16	18
20–29	73	59	24	22	14	13	8	12	87	71	31	35
30–39	20	26	21	39	26	9	11	16	46	35	32	55
40–49	68	60	28	59	29	33	12	26	97	92	40	84
50–59	148	159	34	42	64	66	18	26	212	226	52	68
60–69	193	213	49	44	80	76	27	39	274	289	76	82
70–79	254	198	24	21	81	193	19	24	335	391	43	45
80+	182	26	–43	–55	221	32	–47	–41	403	58	–90	–97
Total	**997**	**798**	**156**	**205**	**526**	**435**	**57**	**128**	**1,524**	**1,233**	**214**	**333**

Note: Negative values indicate a lower number of observed deaths compared with expected deaths.

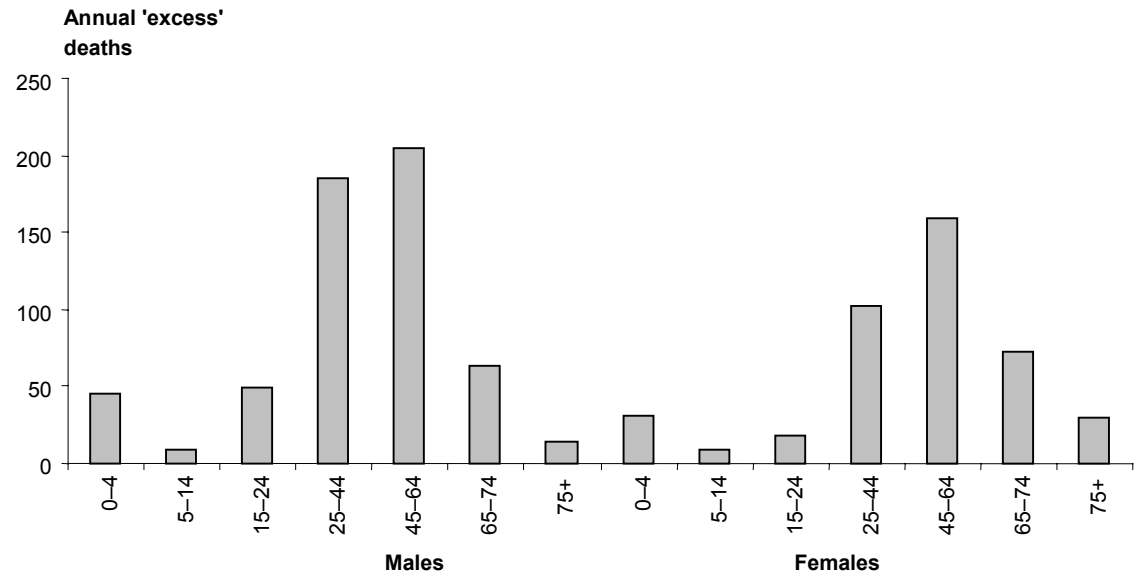
Source: AIHW National Mortality Database.

Indigenous people

In the Indigenous population there were 838 deaths of males and 621 deaths of females annually: of these, 571 were 'excess' deaths of males and 422 were 'excess' deaths of females. 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.

The majority of these deaths occurred in relatively young age groups: for Indigenous males, 32% and 36% occurred in 25–44 and 45–64-year-olds; for Indigenous females the pattern was similar with 24% and 38% in 25–44 and 45–64-year-olds. Almost 10% of the 'excess' were in 0–4-year-old children (Figure 3.12 and Appendix B).

Unlike the situation for the total population, the disease groups responsible for the 'excess' were fairly diverse. Of the total 'excess', 7% was due to neoplasms, 30% to circulatory disease, 9% to respiratory disease, 17% to injury and 36% to other causes.



Source: AIHW National Mortality Database.

Figure 3.12: Average annual deaths in 'excess' of those expected if Major Cities rates for non-Indigenous people applied to the population of Indigenous males and females living in SA, WA, NT and Qld, 1997–1999

Non-Indigenous people

On average during the period 1997–1999, there were 2,414 more deaths of non-Indigenous people who lived outside Major Cities than expected each year. Of these, about 70% were male, 30% female.

Each year, there were 1,374, 1,015 and 49 more deaths than expected in Inner Regional, Outer Regional and Remote areas, which is 57%, 42% and 2% of the 'excess' deaths that occurred in the populations outside Major Cities. There were 23 fewer deaths than expected in Very Remote areas (Table 3.12, Figure 3.13 and Appendix B).

However, for those who were 75 years or older who lived outside Major Cities, there were fewer deaths than expected (53 fewer males, 66 fewer females). Again, the smaller number of deaths may be a consequence of migration of the frail aged to larger population centres. Of the 1,696 'excess' deaths of people younger than 75 years, 853, 698, 102 and 43 (50%, 41%, 6% and 3%) were in Inner and Outer Regional, Remote and Very Remote areas.

The 'excess' deaths described in these figures reveal important regional differences.

In Inner and Outer Regional areas:

- While there was some 'excess' death in the younger age groups, the bulk was in the older age groups, that is, the pattern was very similar to that for the total population.
- 60–70% of the 'excess' deaths occurred in those 60 years or older, about 15% in those aged 50–59 years, and 7–10% in those aged 15–29 years.

In the Remote and Very Remote areas:

- There were very few 'excess' deaths in most age groups, with some 'excess' in those aged 55–69 years. This is quite different to the situation for the total population (that is, including Indigenous people).
- For those people who were 70 years and older, there were substantially fewer deaths (42 fewer males, 66 fewer females) than expected.

Specific points include:

- Although it is not possible to deduce the exact number of 'excess' deaths of Indigenous people who live outside Major Cities from the data provided in this report, it is possible that Indigenous people constitute a large proportion of the 'excess' deaths outside Major Cities, particularly in Remote and Very Remote areas, because of the relatively high proportion in these areas who are Indigenous, and the overall high mortality for Indigenous people.
- There were approximately 30 'excess' deaths annually of non-Indigenous children less than 5 years old outside Major Cities (predominantly in Inner and Outer Regional areas).
- There were approximately 199 'excess' deaths annually of non-Indigenous people aged 15–29 years (of whom 85% were male) in the Inner Regional and Outer Regional areas. There were also approximately 20 'excess' deaths annually of non-Indigenous people of the same age in the Remote and Very Remote areas (again, 85% were male).
- For those 30–44 years old, there were 112 'excess' deaths (70% male), of which 107 were in regional areas.
- For those 45–64 years old, there were 708 'excess' deaths (70% male), of which 650 were in regional areas.
- For those 65–74 years old, there were 611 'excess' deaths (80% male), of which 555 were in regional areas.
- For those 75 years and older, there were 718 'excess' deaths (60% male), of which 837 were in regional areas (there were 119 fewer deaths than expected in remote areas).

Appendix B details the numbers of 'excess' deaths by region, sex, age and cause.

Table 3.12: Annual 'excess' deaths by age group, non-Indigenous persons, 1997–1999

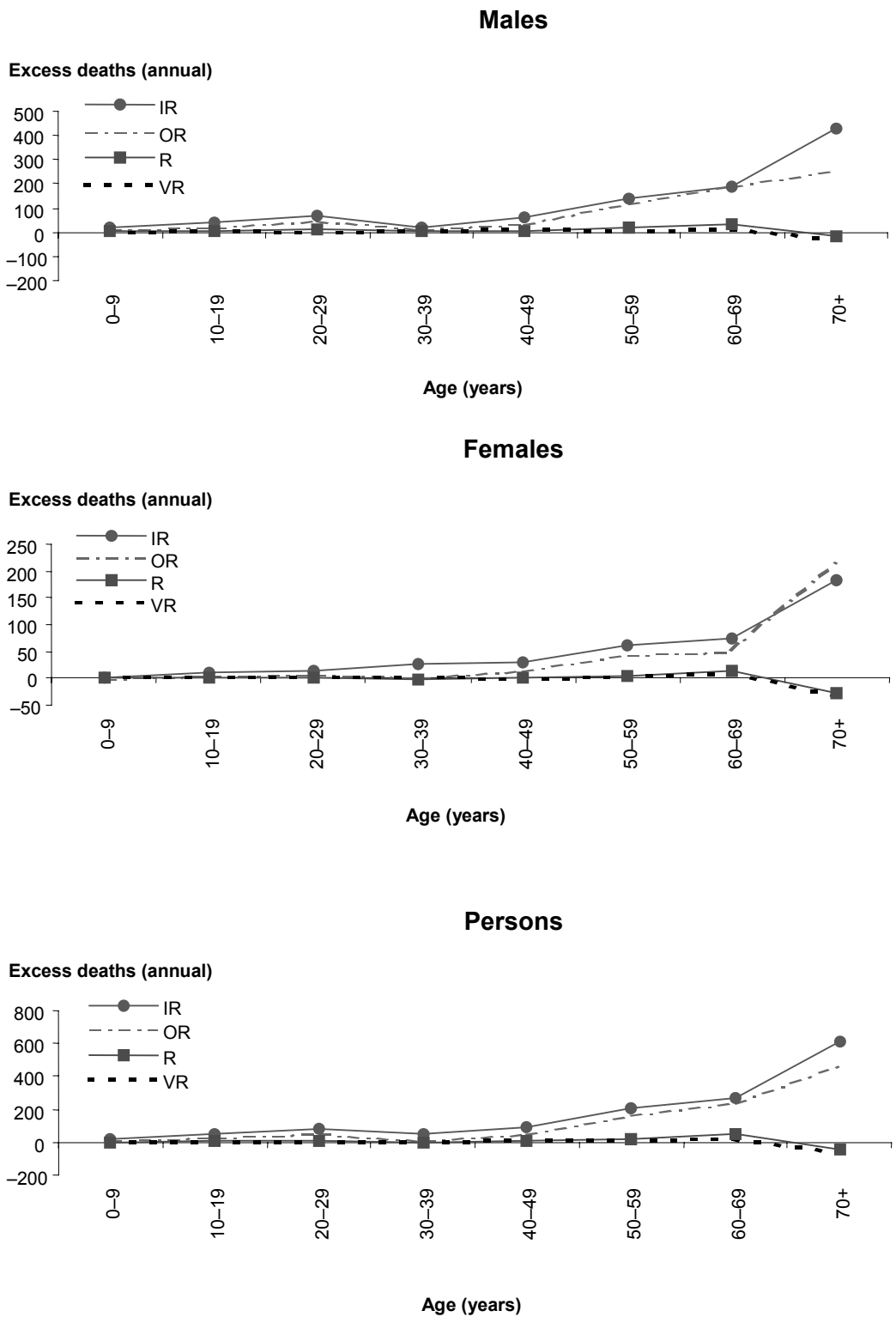
	Males				Females				Persons			
	IR	OR	R	VR	IR	OR	R	VR	IR	OR	R	VR
Age group (years)	(number)											
0–9	17	14	2	1	1	–3	0	0	18	11	1	1
10–19	37	20	7	3	10	5	3	0	48	25	10	2
20–29	71	44	11	0	15	7	0	2	86	51	11	2
30–39	22	10	2	2	26	1	–2	0	48	10	–1	2
40–49	64	34	5	9	30	12	0	–1	95	46	5	8
50–59	142	121	16	5	61	43	3	1	203	164	19	5
60–69	190	189	33	14	74	49	13	9	264	238	46	23
70+	428	252	–14	–34	184	217	–28	–32	612	470	–42	–66
Total	**971**	**683**	**61**	**0**	**402**	**331**	**–12**	**–22**	**1,374**	**1,015**	**49**	**–23**

Note: Negative values indicate a lower number of observed deaths compared with expected deaths.

Source: AIHW National Mortality Database.

For non-Indigenous people, the major contributors to 'excess' death in each life stage are described in the following dot points (Figure 3.14). For people who are:

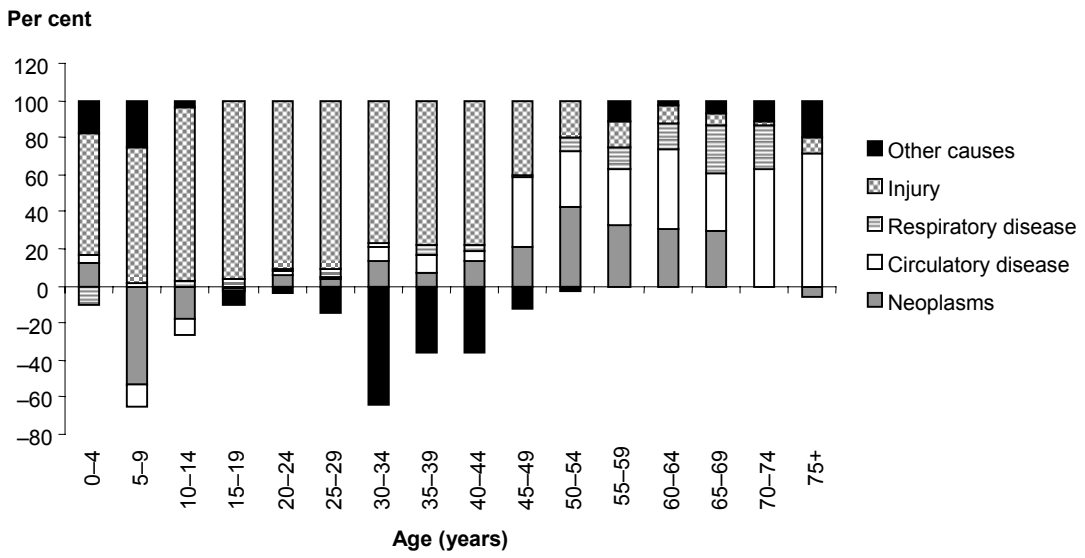
- younger than 45 years (except the very young, for whom a substantial proportion of the 'excess' is a result of 'other' causes), injury was by far the predominant cause of 'excess' death, responsible for most (if not all) of the 'excess' mortality. For this age group, there were also fewer deaths due to neoplasms or 'other' causes;
- aged 45–69 years, circulatory disease and neoplasms were the main contributors to the 'excess', each contributing approximately equally, with injury decreasing in importance and respiratory disease increasing in importance with age;
- aged 70 years and older, circulatory disease is by far the greatest contributor to 'excess' death outside Major Cities.



Note: Negative numbers indicate fewer deaths than expected.

Source: AIHW National Mortality Database.

Figure 3.13: 'Excess' deaths by age group, non-Indigenous males, females and persons, 1997–1999



Note: This graph illustrates the relative contribution of each major cause of death to the 'excess' deaths outside Major Cities. For all those causes for which there were more deaths than expected, the number of 'excess' deaths have been expressed as a percentage of the total number of 'excess' deaths. In situations where there were fewer deaths than expected, these have been expressed as a percentage of the same total. For example, in the 40–44 year age group, there were 29 fewer deaths due to 'other' causes than expected, and 81 more deaths than expected due to injury, neoplasms, and circulatory and respiratory diseases combined; of these 81 'excess' deaths, injury accounted for 63 'excess' deaths (or 78%). In comparison, the 29 fewer deaths due to 'other causes' correspond to –35% on the same scale. The net number of 'excess' deaths for this age group would be 52 (81 minus 29).

Source: AIHW National Mortality Database.

Figure 3.14: Percentage of 'excess' deaths outside Major Cities due to each major cause, non-Indigenous people, 1997–1999

This pattern holds true for non-Indigenous people from Inner and Outer Regional areas, however, in remote areas:

- Injury is the predominant cause of 'excess' deaths for those younger than 45 years, with a tendency for fewer deaths than expected due to neoplasms and 'other' causes. For those aged 45–69 years however, injury, although decreasing in importance, remains a substantial contributor, and neoplasms and circulatory disease, although important contributors, appear to be responsible for a lower proportion of the 'excess' than in regional areas.
- For non-Indigenous people aged 70 years and older, circulatory disease is the main contributor to any 'excess'. For those 75 years and older in remote areas, for whom there are fewer than expected deaths, circulatory disease (and to a lesser extent neoplasms) are the main contributors to the deficit.

3.7 Life expectancy

Life expectancy is simply another way of looking at mortality, and provides a measure which is perhaps more understandable.

Life expectancy refers to the average number of years a person can expect to live, if current age-specific death rates continue to apply throughout that person's lifetime. In this analysis, life expectancy has been calculated for newborn males and females (that is, how long can a newborn expect to live on average), for the total population, the Indigenous population and also for the non-Indigenous population. Life expectancy reported here does not make any implications about the quality of life in those expected years of life.

Because of the substantially lower mortality for older people in more remote areas, compared to those in less remote areas (an issue which could affect the comparison between geographic areas), the probability of reaching 65 years of age has also been calculated. This statistic describes the probability of a newborn living to age 65 years, and thus avoids any problems that could be caused by lower death rates in the older population, potentially a consequence of migration rather than health status.

Summary of findings

Life expectancy for males was 1.1 and 1.9, and 2.5 and 5.6 years less, and for females was 0.6 and 1.3 and 1.2 and 5.4 years less in regional and remote areas respectively than it was in Major Cities. Lower life expectancies for Indigenous people tend to lower the overall life expectancies in these areas (especially remote areas), while the lower death rates for the elderly in remote areas tend to increase life expectancy in these areas.

The probability of living to 65 years of age was less by 2%, 3%, 5% and 15% for males and 1%, 2%, 4% and 14% for females in the four areas outside Major Cities than for those who lived in Major Cities.

Life expectancy for Indigenous males and females was 56 and 63 years compared to 76 and 82 years for Australian males and females generally.

For non-Indigenous people, the probabilities of living to 65 years of age were less by 1.6%, 2.4%, 2.3% and 3.2% for males and less by 0.7%, 0.8%, 0.7% and 2.5% for females in the four areas respectively than for non-Indigenous people from Major Cities.

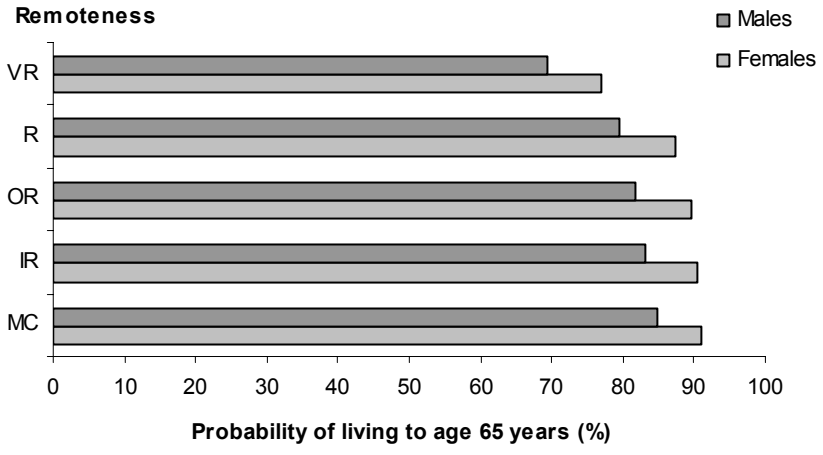
Life expectancy in the total population

Life expectancies for males were 1.1, 1.9, 2.5 and 5.6 years and for females were 0.6, 1.3, 1.2 and 5.4 years less in the four areas outside Major Cities respectively than for males and females from Major Cities (Figure 3.15 and Table 3.13).

The outcome for remote areas is likely to be affected by two substantial issues, their effects working in opposition to each other. On the one hand, high Indigenous mortality, with an effect likely to be strongly felt in the more remote areas because of the large numbers of Indigenous people who live there, would tend to reduce life expectancy there. Working counter to this is the relatively low death rates of older non-Indigenous people (at least lower when compared to the death rates of their counterparts in Major Cities). This phenomenon would tend to increase the apparent life expectancy for people living in more remote areas.

Source: AIHW National Mortality Database.

Figure 3.15: Life expectancy, by sex, Australia, 1997–1999



Source: AIHW National Mortality Database.

Figure 3.16: Probability of living to age 65 years, by sex, Australia, 1997–1999

The probabilities of a newborn living to 65 years were less by 1.6%, 3.2%, 5.4% and 15.5% for males and 0.7%, 1.5%, 3.7% and 14.0% for females in the four areas respectively, than in Major Cities (Figure 3.16 and Table 3.13). The substantially lower probability of people from more remote areas living to 65 years is a consequence of higher death rates for the non-Indigenous people outside Major Cities and potentially the effect of higher Indigenous mortality over all areas.

Table 3.13: Life expectancy for persons, Australia, 1997–1999

	MC	IR	OR	R	VR
	Life expectancy at birth (years)				
Males	77.9	76.7	76.0	75.3	72.2
Females	83.9	83.3	82.6	82.7	78.5
	Probability of living to age 65 years (%)				
Males	84.8	83.2	81.6	79.4	69.3
Females	91.1	90.3	89.6	87.4	77.0

Source: AIHW National Mortality Database.

Indigenous people

Life expectancy for Indigenous people is substantially lower than for non-Indigenous people.

'In the period 1997–99, the life expectancy at birth for the Indigenous population was estimated to be 56 years for males and 63 years for females. In contrast, the life expectancy at birth for all Australians was 76 years for males and 82 years for females. The 1997–99 Indigenous life expectancies are similar to life expectancy for the total male population in 1901–1910, and for the total female population in 1920–22' (ABS 2001c).

The same issues that prevent reporting of Indigenous mortality in each area also prevent reporting of Indigenous life expectancy in each area (see page 21).

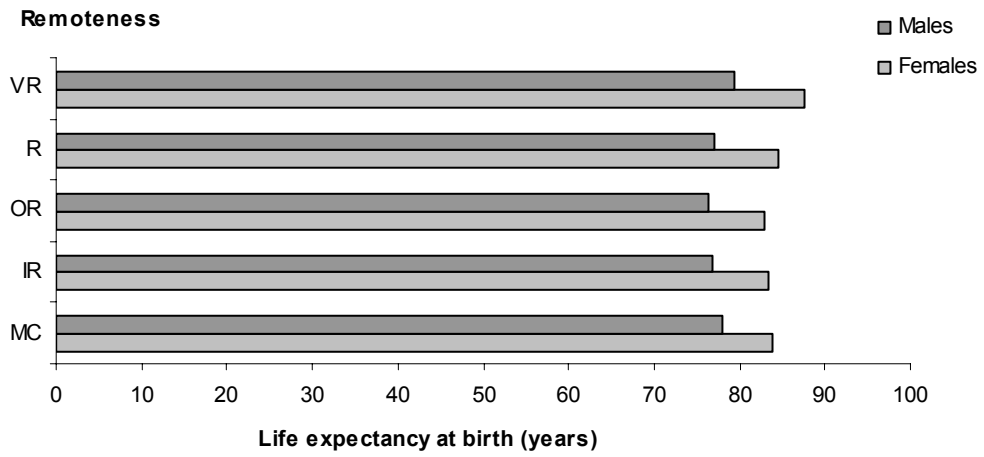
Non-Indigenous people

For non-Indigenous people, the situation is substantially different from that for the total population.

Life expectancies at birth for non-Indigenous males from Inner Regional, Outer Regional and Remote areas were 1.1, 1.5 and 1.0 years less than for males from Major Cities, but life expectancy for non-Indigenous males from Very Remote areas was 1.4 years longer than it was for those from Major Cities (Figure 3.17 and Table 3.14).

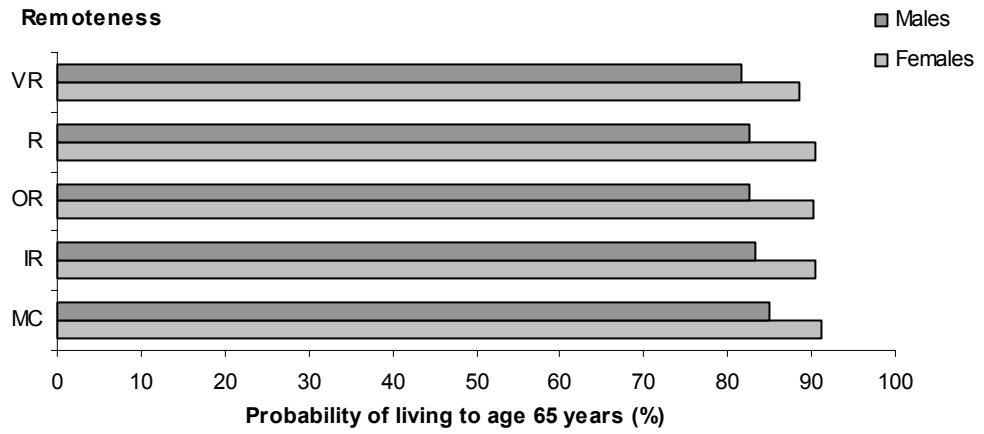
Life expectancies for non-Indigenous females from Inner Regional and Outer Regional areas were 0.6 and 0.9 years less than for females from Major Cities. Life expectancies for non-Indigenous females from Remote and Very Remote areas were 0.5 and 3.8 years longer than for non-Indigenous females from Major Cities.

This tendency for life expectancy to be greater in more remote areas is likely to be largely influenced by the lower death rates in the older age groups.



Source: AIHW National Mortality Database.

Figure 3.17: Life expectancy for non-Indigenous persons, Australia, 1997–1999



Source: AIHW National Mortality Database.

Figure 3.18: Probability of living to age 65 years for non-Indigenous persons, Australia, 1997–1999

The most valid picture of predicted life expectancy and the impact on it of remoteness may be the probability of non-Indigenous people reaching 65 years of age (Figure 3.18 and Table 3.14). The probability of living to 65 years is lower in regional and Remote areas and lower again in Very Remote areas. For non-Indigenous males, the probability was less by 1.6%, 2.4%, 2.3% and 3.2% in the four areas outside Major Cities than it was for non-Indigenous males from Major Cities. For non-Indigenous females the probability of reaching this age was less by 0.7%, 0.8%, 0.7% and 2.5% in the four areas than it was for non-Indigenous females from Major Cities.

Table 3.14: Life expectancy for non-Indigenous persons, Australia, 1997–1999

	MC	IR	OR	R	VR
	Life expectancy at birth (years)				
Males	77.9	76.8	76.4	77.0	79.3
Females	83.9	83.4	83.0	84.5	87.7
	Probability of living to age 65 years (%)				
Males	84.9	83.3	82.5	82.6	81.7
Females	91.1	90.4	90.3	90.4	88.6

Source: AIHW National Mortality Database.

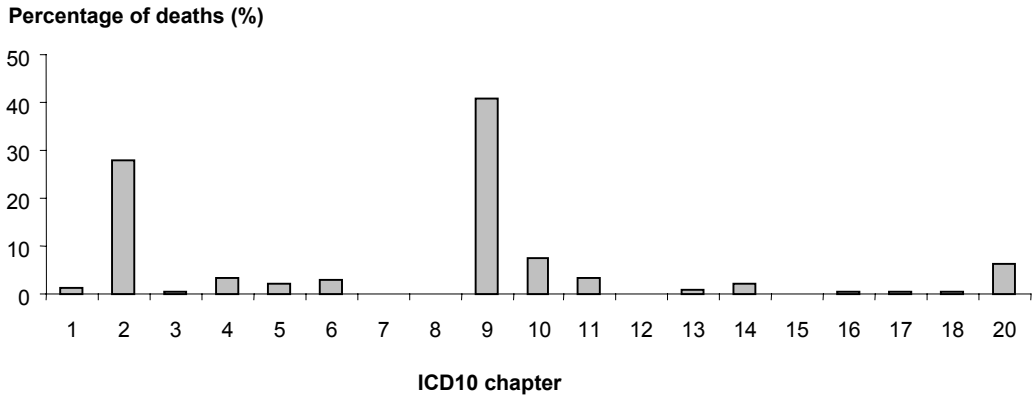
3.8 Mortality due to specific causes

The following chapters discuss the major causes of death at the broad level, followed by a discussion of the more specific causes of death.

For Australia as a whole, four major broad disease groupings account for over 80% of deaths (Figure 3.19):

1. diseases of the circulatory system 41%;
2. neoplasms 28%;
3. diseases of the respiratory system 8%;
4. external causes of injury and poisoning (referred to as injury) 6%.

In addition, 'endocrine, nutritional and metabolic disorders' and 'diseases of the digestive system' together account for another 6% of all deaths. Between them, these six major causes account for approximately 90% of all deaths.



Source: AIHW National Mortality Database.

Figure 3.19: Percentage of deaths attributed to each ICD-10 chapter, 1997–1999

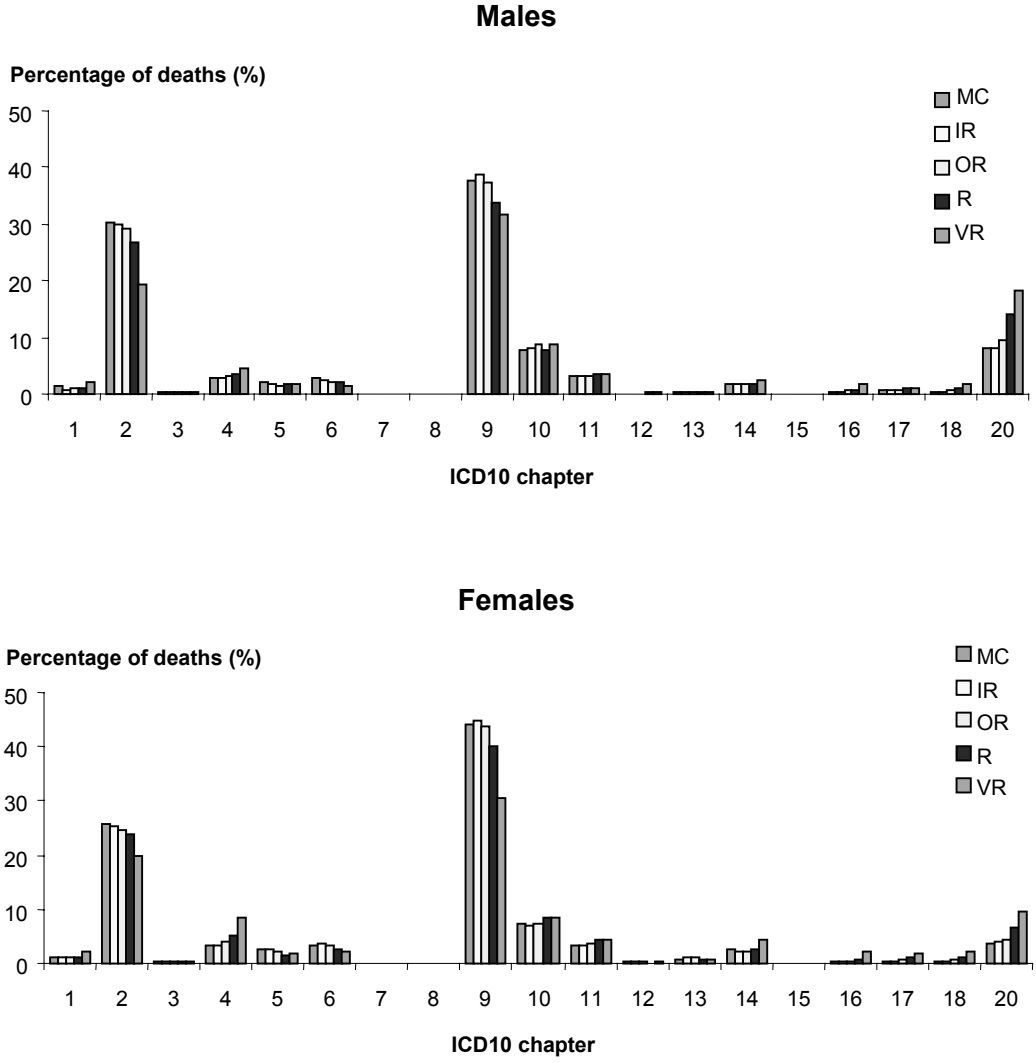
Table 3.15: Key for Figures 3.19 and 3.20

Chapter number	Chapter title	Chapter number	Chapter title
1	Infectious and parasitic diseases	11	Diseases of the digestive system
2	Neoplasms	12	Diseases of the skin and subcutaneous tissue
3	Diseases of the blood	13	Musculoskeletal and connective tissue diseases
4	Endocrine, nutritional, metabolic diseases	14	Genitourinary diseases
5	Mental and behavioural disorders	15	Pregnancy, childbirth, puerperium
6	Diseases of the nervous system	16	Conditions originating in the perinatal period
7	Diseases of the eye and adnexa	17	Congenital, deformations, chromosomal abnormalities
8	Diseases of the ear and mastoid process	18	Diseases and conditions not elsewhere classified
9	Circulatory diseases	20	External causes of injury and poisoning
10	Respiratory diseases		

Note: Chapters refer to those for the WHO International Classification of Diseases, 10th Revision.

Source: WHO 1992.

In more remote areas, the percentage of deaths that are due to injury and 'endocrine, nutritional and metabolic disorders', as well as some of the other causes of death (for example, due to infectious diseases and diseases of the genitourinary system) tend to be greater than in less remote areas. Consequently, the percentage of deaths that are due to neoplasms and circulatory disease tend to decline with remoteness. This is illustrated more clearly in Figure 3.20.

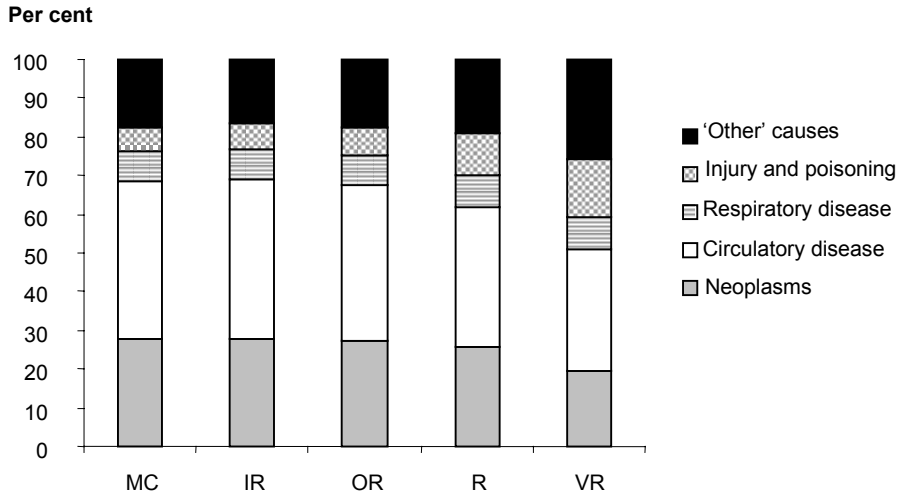


Source: AIHW National Mortality Database.

Figure 3.20: Percentage of deaths attributed to each ICD-10 chapter by ASGC Remoteness area, males and females, 1997–1999

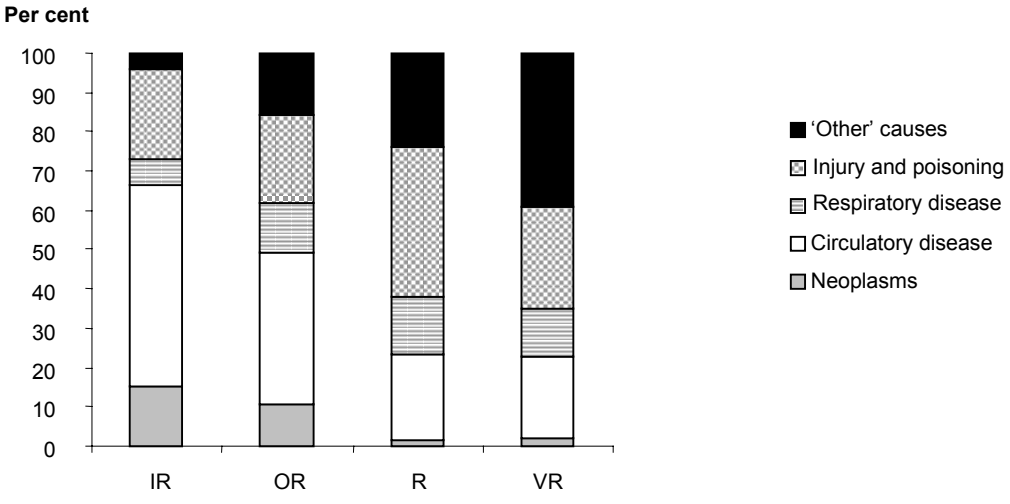
The major difference between the sexes appears to be the greater relative importance of injury as a cause of death for males than is the case for females.

Figure 3.21 describes the percentage of all deaths attributable to the broad causes described in this report. Figure 3.22 describes the percentage of all 'excess' deaths attributable to these broad causes.



Source: AIHW National Mortality Database.

Figure 3.21: Percentage of deaths attributed to the main causes in each ASGC Remoteness area, 1997–1999



Source: AIHW National Mortality Database.

Figure 3.22: Percentage of 'excess' deaths attributed to the main causes in each ASGC Remoteness area, 1997–1999

There are some substantial differences between Figures 3.21 and 3.22.

- While the percentage of deaths due to 'other' causes is similar across all areas, the percentage of 'excess' deaths due to 'other' causes is small in Inner Regional areas, but increases to approximately 40% in Very Remote areas.
- The percentage of all deaths due to circulatory disease is similar in all areas (slightly smaller in Very Remote areas), however, the percentage of 'excess' deaths due to circulatory disease is much smaller in remote areas than in regional areas.
- The percentage of deaths due to injury increases with remoteness, however, the percentage is fairly small in all areas. The percentage of 'excess' deaths due to injury is considerably larger in all areas.