

RURAL HEALTH SERIES

Number 3

Rural, regional and remote health

A study on mortality

Summary of findings

October 2003

Australian Institute of Health and Welfare
Canberra

AIHW cat. no. PHE 49

© Australian Institute of Health and Welfare 2003

This work is copyright. Apart from any use as permitted under the *Copyright Act 1968*, no part may be reproduced without prior written permission from the Australian Institute of Health and Welfare. Requests and enquiries concerning reproduction and rights should be directed to the Head, Media and Publishing, Australian Institute of Health and Welfare, GPO Box 570, Canberra ACT 2601.

This publication is part of the Australian Institute of Health and Welfare's Rural Health Series. A complete list of the Institute's publications is available from the Publications Unit, Australian Institute of Health and Welfare, GPO Box 570, Canberra ACT 2601, or via the Institute's web site (<http://www.aihw.gov.au>).

ISSN 1448-9775

ISBN 1 74024 320 X

Suggested citation

AIHW (Australian Institute of Health and Welfare) 2003. Rural, regional and remote health: a study on mortality (summary of findings). AIHW cat. no. PHE 49. Canberra: AIHW (Rural Health Series no. 3).

Australian Institute of Health and Welfare

Board Chair
Dr Sandra Hacker

Director
Dr Richard Madden

Any enquiries about or comments on this publication should be directed to:

Andrew Phillips
Australian Institute of Health and Welfare
GPO Box 570
Canberra ACT 2601
Phone: (02) 6244 1027
Email: andrew.phillips@aihw.gov.au

Published by Australian Institute of Health and Welfare

Printed by Pirion

Contents

List of tables	v
List of figures	vi
Acknowledgments	vii
Abbreviations	ix
Background and introduction	1
Data quality and analytical methods	1
Context	2
Key points	5
Demography	5
Overall death rates.....	5
Life expectancy.....	7
Changes in death rates, 1992–1999	7
Broad causes of death.....	8
Specific causes of death.....	8
Technical notes	11
Measures of mortality	11
Data presentation.....	12
Indigenous and non-Indigenous data: data quality issues.....	12
Geographic classification.....	13
Cause of deaths	13
Mortality	18
Overall death rates.....	18
Life expectancy.....	20
Trends in death rates	21
Broad causes of mortality	23
Mortality due to specific causes	26
Circulatory disease	26
Trends in mortality due to circulatory disease	26
Specific circulatory diseases	26
Neoplasms	29

Trends in mortality due to neoplasms	29
Specific neoplasms	29
Respiratory disease.....	32
Trends in mortality due to respiratory diseases.....	32
Specific respiratory diseases.....	32
Injury	35
Trends in mortality due to injury and poisoning.....	35
Specific injuries.....	35
'All other causes'	38
Specific 'other' causes.....	38
Comments on the findings	41
References	43

List of tables

Table 1:	Leading specific causes of ‘excess’ deaths, 1997–1999	10
Table 2:	Distribution of the Indigenous and total populations within each ABS Remoteness area, 2001	15
Table 3:	Variation in the SMR in Statistical Local Areas (SLAs) within each ASGC Remoteness area, 1993–1999	16
Table 4:	The ratio of observed deaths to those expected if Major Cities rates applied to the relevant population in each of the four ASGC Remoteness areas outside Major Cities, 1997–1999	18
Table 5:	Annual numbers of deaths and ‘excess’ deaths, 1997–1999	19
Table 6:	Life expectancy for persons, Australia, 1997–1999	20
Table 7:	Percentage of the decrease in the total number of ‘excess’ deaths that result from changes in mortality of each broad cause, 1992–1999	22
Table 8:	Summary table of deaths due to broad causes for all persons, 1997–1999	24
Table 9:	The ratio of observed deaths to those expected if Major Cities rates applied in each ASGC Remoteness area, 1997–1999	25
Table 10:	Summary table of deaths due to circulatory diseases for all persons, 1997–1999	26
Table 11:	The ratio of observed deaths from circulatory diseases to those expected if Major Cities rates applied in each ASGC Remoteness area, 1997–1999	27
Table 12:	Summary table of deaths due to neoplasms for all persons, 1997–1999	29
Table 13:	The ratio of observed deaths from neoplasms to those expected if Major Cities rates applied in each ASGC Remoteness area, 1997–1999	31
Table 14:	Summary table of deaths due to respiratory disease for all persons, 1997–1999	32
Table 15:	The ratio of observed deaths from respiratory diseases to those expected if Major Cities rates applied in each ASGC Remoteness area, 1997–1999	33
Table 16:	Summary table of deaths due to injury and poisoning for all persons, 1997–1999	35
Table 17:	The ratio of observed deaths from injury and poisoning to those expected if Major Cities rates applied in each ASGC Remoteness area, 1997–1999	37
Table 18:	Summary table of deaths due to all other causes for all persons, 1997–1999	38
Table 19:	The ratio of observed deaths from all other causes to those expected if Major Cities rates applied in each ASGC Remoteness area, 1997–1999	39

List of figures

Figure 1: Remoteness areas of Australia14

Figure 2: Age distribution for persons living in Major Cities, Inner Regional and Very Remote areas, 2001.....15

Figure 3: 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, 1993-199917

Figure 4: Annual percentage change in the ratio of observed to expected deaths, males and females, 1992-199921

Acknowledgments

This report was commissioned by the Office of Rural Health (ORH) in the Department of Health and Ageing.

This work has been guided by the members of the Rural Health Information Advisory Committee (RHIAC):

Richard Eccles, previous Chair, RHIAC and National Manager, ORH, DoHA

Joanna Davidson, previous Chair, RHIAC and National Manager, ORH, DoHA

Andrew Benson, Director, Research and Data Section, OATSIH, DoHA

Kim Boyer, National Health and Medical Research Council

Norma Briscoe, Health Section, ABS

Alan Browne, previous Assistant Director, Information and Communication Section, ORH, DoHA

Gemma Duffy, previous Director, Information and Communication Section, ORH, DoHA

Joy Eshpeter, Director, Public Health Information Development Section, National Population Health Planning Branch, Population Health Division, DoHA

Lyn Fragar, Director, Australian Centre for Agricultural Health and Safety, University of Sydney

Bob Gibberd, Health Services Research Group, The University of Newcastle

Gordon Gregory, Executive Director, National Rural Health Alliance

John Humphreys, Monash University

Jill Kurr, Director, Information and Communication Section, Rural Health and Palliative Care Branch, DoHA

Rochelle Lenane, Health Capacity Development Branch, Workforce, Education and Training Section, Health Industry and Investment Division, DoHA

Joanne Llewellyn, Assistant Director, Information and Communications Section, Rural Health and Palliative Care Branch, DoHA

Marelle Rawson, Director, Health Section, ABS

Janis Shaw, Director, National Centre for Aboriginal and Torres Strait Islander Statistics, ABS

Ross Spark, Manager, Tropical Public Health Unit Network, Queensland Health

Laga Van Beek, previous Assistant Director, Information and Communication Section, ORH, DoHA

David Wilkinson, Director, South Australian Centre for Rural and Remote Health, University of South Australia (Whyalla Campus)

Jonathan Wraith, Director, Workforce Development Section, General Practice Branch, Health Services Division, DoHA

Other people who contributed to the work include:

Barbara Gray (National Centre for Aboriginal and Torres Strait Islander Statistics, ABS)

Kirrily Harrison (OATSIH, DoHA)

Phil Trickett (AIHW)

Terry Neeman (AIHW)

Richard Franklin, Australian Centre for Agricultural Health and Safety

David Lyle, Sydney University, Department of Rural Health

Michael Roden and John Paice, Demography Section, ABS

Frank Blanchfield, Geography Section, ABS

AIHW National Injury Surveillance Unit

This document was developed and written by Andrew Phillips. In developing this third in a series of AIHW rural health reports, he was assisted by Brendan Brady and Toni O'Brien. The work was conducted under the editorial guidance of Glenice Taylor and the stewardship of Dr Anny Stuer.

Abbreviations

ABS	Australian Bureau of Statistics
AIHW	Australian Institute of Health and Welfare
ARIA	Accessibility/Remoteness Index of Australia
ASGC	Australian Standard Geographical Classification
COPD	chronic obstructive pulmonary disease
DoHA	Department of Health and Ageing
DPIE	Department of Primary Industries and Energy
ICD10	International Classification of Diseases, 10th revision
OATSIH	Office of Aboriginal and Torres Strait Islander Health
ORH	Office of Rural Health
RHIAC	Rural Health Information Advisory Committee
SLA	Statistical Local Area
SMR	standardised mortality ratio

ASGC Remoteness structure

MC	Major Cities
IR	Inner Regional
OR	Outer Regional
R	Remote
VR	Very Remote

Symbols used in the tables and figures

–	nil or rounded to zero
n.a.	not available
n.p.	not published in this report
n.e.d.	not elsewhere described

Background and introduction

This is a summary of the report *Rural, Regional and Remote Health: A Study on Mortality* (AIHW 2003a). This report is the second in a series of reports on the health status of Australians who live in regional and remote areas. The principal aim of the report is to answer the question 'do mortality rates vary with remoteness?'

Data quality and analytical methods

Previous descriptions of mortality, and other measures of health, have shown poorer outcomes in more remote areas, but it is possible that a lot of this difference is a result of poor Indigenous health. To assess whether the poorer health in more remote areas reflects the influence of remoteness or Indigenous health, ideally mortality for the Indigenous and non-Indigenous populations should be reported alongside mortality for the total population. However two issues affect the reporting of data for Indigenous people:

- Concerns about the inter-regional differences in the accuracy of the recording of Indigenous deaths prevent reporting on Indigenous mortality separately for the five regions used in this report. Reporting of differences between areas may reflect accuracy of the records rather than real differences in mortality. Consequently overall, rather than regional, mortality rates for Indigenous people are presented.
- Identification of Indigenous mortality was considered to be most reliable in the Northern Territory, South Australia, Western Australia and Queensland during the study period. Overall mortality rates for Indigenous people have been calculated using data from these jurisdictions only.

Because a 'non-Indigenous' person has been defined in this report as someone who is not identified as Indigenous, under-identification of Indigenous people will necessarily mean over-reporting of non-Indigenous people in the mortality data. However the effect on reporting by area will be much less than for Indigenous people (minimal in Major Cities and in regional areas), because non-Indigenous people comprise the vast majority of the population.

Frequently, death rates for elderly non-Indigenous people from remote areas appear substantially lower than for their Major Cities counterparts, while rates for younger people are higher. It is possible that this effect is due to elderly people in poorer health migrating to less remote areas where they can access services, leaving the healthier individuals, who have lower death rates. To control for this apparent effect, death rates for some populations younger than 65 years have been presented alongside those for the total population.

Several analytical concepts have been used to compare mortality rates across the regions. There are two in particular that are crucial to understanding the discussion that follows. While these and other concepts are explained more fully in 'Technical notes' on page 11 they are, briefly:

- **standardised mortality ratio (SMR)** – the ratio of the actual number of deaths in an area to the number expected if Major Cities death rates for the relevant group (see page 11) had applied in that area;

- **‘excess’ deaths** – the difference between the actual number of deaths in an area and the number that would have occurred if Major Cities death rates had applied. The term does not imply in any way that these deaths are flippantly regarded, nor that deaths in Major Cities are less important, nor that death rates anywhere are not subject to reduction.

Indirect age standardisation involves the use of:

- age-specific death rates for people living in Major Cities as the standard for calculating the expected numbers of deaths in each area; and
- age-specific death rates for non-Indigenous people living in Major Cities as the standard for calculating the expected numbers of deaths of non-Indigenous people in each area and of Indigenous people in South Australia, Western Australia, the Northern Territory and Queensland.

This report is structured as follows:

- The main findings are outlined on page 5, ‘Key points’. They are grouped under six headings: Demography; Overall death rates; Life expectancy; Changes in death rate, 1992–1999; Broad causes of death; and Specific causes of death. These introduce and distil the findings of the main report, to which readers are encouraged to refer.
- Technical issues are discussed in more detail on page 11. These are also important to the interpretation of the results, and it is for this reason that this section is given prominence by placing it before the main body of text, rather than at the back of the report.
- Findings on mortality overall are presented from page 18. Then follow sections on causes of death, in broad groupings (from page 23) and in more specific categories (from page 25).
- ‘Comments on the findings’ (page 41) briefly describes areas for data development or improvement and the importance of Indigenous mortality data and of other data on health outcomes apart from death. It also suggests areas for further research.

Readers are referred to the main report, *Rural, Regional and Remote Health: A Study on Mortality* (AIHW 2003a), for expanded discussion of those issues briefly mentioned in this summary report. The main report is available through the Institute’s web site (www.aihw.gov.au)

Context

In comparing death rates in regional and remote areas with those in metropolitan areas, two questions are of interest:

- Are death rates amongst people who live outside Major Cities higher than for those who live in Major Cities?
- For any individual, whether old or young, rich or poor, more educated or less educated, male or female, Indigenous or non-Indigenous, smoker or non-smoker: is their chance of death higher if they live outside a Major City?

This report answers only the first question, and it is important that readers understand this.

Higher death rates in more remote areas may reflect higher prevalence of smoking, inactivity and poor diet as well as any impact of the rural environment (for example, different patterns of access to health services). For example, even though drinking undoubtedly increases the risk of fatal motor vehicle accidents, and people who live outside Major Cities are more

likely to drink heavily, higher death rates outside Major Cities could also result from higher speeds, poorer road conditions, animals on the road and longer retrieval times for the injured.

A number of broad issues potentially affect death rates:

- the personal characteristics of the population;
- risk imposed by the environment; and
- access to health services to reduce the chances of becoming ill, to sustain the patient while ill or to help the patient make a full recovery afterwards.

Health services are meant here to include services provided by the full range of health workers (medical practitioners, Aboriginal health workers, allied health workers, and facilities or services such as hospitals and ambulance).

It is not possible for this report to differentiate between the contribution of each of these three factors to overall higher rates of death outside Major Cities.

Personal characteristics

Compared to those who live in Major Cities, individuals who live in regional and remote areas are more likely to be smokers, are more likely to drink alcohol in hazardous quantities, are more likely to be overweight or obese and are more likely to be physically inactive (AIHW 2002a). They are also more likely to have poorer access to work, particularly to work requiring skilled or professional labour. Household incomes and educational levels are also lower (Garnaut et al. 2001). All of these characteristics increase the risk of poor health and of death. On a positive note, people from rural areas are less likely to report unhappiness (AIHW: Mathers 1994) and women from rural and remote areas report lower levels of stress than women from metropolitan areas (Brown et al. 1999).

Also, people living outside Major Cities, particularly those living in remote areas, are more likely to be Indigenous.

Environment

The environment outside Major Cities is frequently stereotyped as 'outback', sparsely populated, hot, dry, populated by farmers, and isolated from population centres. In reality it is extremely diverse.

Non-metropolitan populations can live in coastal or inland areas, within commuting distance of Major Cities, in mixed farming or extensive grazing areas, or in areas dominated by forestry, fishing or mining. One in ten people in the workforce are engaged in agriculture (BRS 1999). Many areas outside Major Cities, predominantly on the coast, attract older people in retirement.

Many of the occupations in regional and remote areas (for example, mining, transport forestry, commercial fishing and farming) entail higher levels of risk than other occupations (AIHW: Strong et al. 1998).

Health services

Those who live away from Major Cities and for whom access to health services is restricted may be disadvantaged because of different access to:

- preventive services such as immunisation and information allowing healthy life choices;

- health management and monitoring;
- specialist surgery and medical care;
- emergency care, for example, ambulance;
- rehabilitation services after medical or surgical intervention;
- aged care services.

These could reflect different patterns of access to health workers and health facilities (for example, hospitals). The lower numbers of doctors in rural areas is frequently mentioned (AIHW 2003c), but supply of other workers such as nurses and allied health workers, pharmacists and dentists can also be, and frequently are, an issue (AIHW 2003d).

A substantial challenge in providing equitable access to people living in regional and remote areas is that, unlike Major Cities, non-metropolitan populations are dispersed and clustered. Towns exactly the right size to support one, two or three doctors, nurses or allied health workers are very rare – more usually they would support a fraction of a health worker, or, for example, more than one but less than two. In these situations, a single worker may practise in one town and also service one or more others. Either way, someone has to travel, with routine and emergency access potentially compromised and/or the health worker spending substantial amounts of time travelling rather than consulting with patients.

Key points

Demography

- Two-thirds (66%) of the population live in Major Cities, with 21%, 11%, 2% and 1% living in Inner Regional, Outer Regional, Remote and Very Remote areas respectively.
- Whereas only 1% of the population of Major Cities are Indigenous, this increases to 2% and 5% in Inner and Outer Regional areas, 12% in Remote areas and 45% in Very Remote areas.
- Males outnumber females in almost all age groups in the more remote areas. This is largely influenced by the non-Indigenous population; the number of Indigenous males in each area is similar to the number of females.
- Remote area populations tend to have proportionally more children and working-age males, and fewer elderly people than other areas.
- Regional areas have proportionally lower numbers of people aged 25–44 years, higher numbers of people aged 45–74 years and similar or slightly lower numbers of people older than 75 years than other areas. In regional areas, children make up a higher proportion than in Major Cities, but lower than in remote areas.

Overall death rates

- There was an annual average of 128,200 deaths between 1997 and 1999. Of these, 64% were in Major Cities, and 22%, 11%, 1% and 1% were in Inner and Outer Regional, Remote and Very Remote areas respectively.
- Death rates increased with remoteness, and were 10% (1.1 times) higher in regional and Remote areas compared with Major Cities, and 50% (1.5 times) higher in Very Remote areas.
- Outside Major Cities, there were 3,303 more deaths each year than would have been expected ('excess' deaths) if Major Cities death rates had applied in these areas. Of these, 46%, 37%, 6% and 10% were in Inner and Outer Regional, Remote and Very Remote areas, respectively.
- On average there were 1,459 deaths each year of Indigenous people in the four jurisdictions (South Australia, Western Australia, the Northern Territory and Queensland) for which identification is considered more reliable. This was 993 more than would be expected if age-specific death rates for non-Indigenous people from Major Cities had applied for Indigenous people in those jurisdictions.
- Death rates for Indigenous people across South Australia, Western Australia, the Northern Territory and Queensland (jurisdictions in which identification is considered more reliable in 1997–1999) were 3.1 times those for non-Indigenous people who lived in Major Cities of Australia. Indigenous deaths are thought to be more under-reported than

census counts of the Indigenous population. Consequently, it is likely that the overall Indigenous death rates reported here are lower than actual death rates.

- The high death rate for the total population in Very Remote areas is likely to reflect the high proportion of the population in these areas who are Indigenous and the higher rate of mortality for Indigenous people overall in Australia.
- Inter-regional comparisons of the death rate for Indigenous people cannot be presented because of the strong likelihood of differences by remoteness in the accuracy of identification of deaths of Indigenous people. This means that calculated differences in death rates between regions could be an artefact of variations in identification, rather than a portrayal of real differences.
- Annually, there were 2,414 more deaths of non-Indigenous people outside Major Cities than expected if death rates for non-Indigenous people from Major Cities had applied in those areas. 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.
- Death rates for the non-Indigenous population were up to 10% higher in areas outside Major Cities (but not clearly higher in Very Remote areas).
 - Some degree of over-estimation of non-Indigenous death rates is a consequence of the under-identification of Indigenous deaths (with some Indigenous deaths being counted amongst the non-Indigenous). Reported death rates for non-Indigenous people are likely to be affected by between -2% and +2% for Major Cities and regional areas, but may be inflated in remote areas by up to 10% (AIHW 2003a). The exact magnitude of the effect within this range is unclear.
- Death rates for non-Indigenous people who were younger than 65 years were about 10% higher in regional and Remote areas, and about 20% higher in Very Remote areas than they were in Major Cities. For males, rates were 10% higher in Inner Regional areas and 20% higher in the other areas. For females, rates were 10% higher in regional areas, but not significantly higher in remote areas.
 - Conversely, death rates for those over 65 years were frequently lower than in Major Cities. It is possible that in order to access health and other services (including aged care), the frail aged migrate to larger, less remote centres leaving behind the healthier individuals, who live longer.
- Within the broad geographic zones utilised in this report, there is substantial variation in mortality from community to community.
 - The average death rate in Very Remote areas was substantially elevated by a relatively small number of Statistical Local Areas (SLAs) with very high death rates – some SLAs had relatively low death rates. This was also true to a lesser extent in Remote areas, but not for Major Cities and regional areas, where death rates were more likely to cluster around an average value.
- Poor identification of Indigenous people in data collections generally, and specifically in the mortality data collection, hampers the ability to report on health not only of Indigenous people overall, but also of both Indigenous and non-Indigenous people who live in regional and remote Australia.
- This report shows higher death rates in regional and remote areas. These higher rates are evident after taking into account inter-regional differences in age, sex, Indigenous status and, to some extent, the possible migration of the frail elderly. The remaining differences

in mortality could be due to a range of different influences including lower socioeconomic status and poorer risk factors (for example, higher smoking rates), different access to services, and other aspects of living outside Major Cities (for example, possible greater hazards associated with occupations such as farming and with driving in rural areas). It is not within the scope of this report to explain why these remaining differences occur.

Life expectancy

- Life expectancy generally declined with increasing remoteness, but was lower for males in each area than for females. Life expectancy for males was 77.9, 76.7, 76.0, 75.3 and 72.2 years in Major Cities, Inner and Outer Regional, Remote and Very Remote areas respectively, and for females was 83.9, 83.3, 82.6, 82.7 and 78.5 years.
- These figures may be strongly affected by two factors: Indigenous mortality and potential migration of the frail aged:
 - Life expectancy for Indigenous people has been reported as 56 years for males and 63 years for females, compared to 76 and 82 years for Australian males and females generally (ABS 2001c). A relatively large proportion of the remote area population is Indigenous, acting to lower average life expectancy there.
 - Possible migration of the frail aged towards less remote areas is likely to increase calculated average life expectancy in remote areas.
- The effect of remoteness on life expectancy is best illustrated as the probability of non-Indigenous people reaching 65 years of age in each area.
- The probability of non-Indigenous males and females living to 65 years of age is highest in Major Cities (85% and 91%), decreasing gradually with remoteness (to 82% and 89% in Very Remote areas respectively).

Changes in death rates, 1992–1999

- Since 1992, death rates in all except Very Remote areas have decreased by about 3% per year for males and by about 2% for females. In Very Remote areas, death rates have decreased more rapidly – by about 10% for males and females per year over the same period.
- The major contributor to the overall decrease in all areas was a reduction in circulatory disease mortality. While responsible for between 67% and 80% of the overall reduction in most areas, decreases in circulatory disease mortality were responsible for a smaller proportion (45%) of the substantial overall reduction in Very Remote areas.
- Reductions in respiratory disease mortality were responsible for 9% of the overall mortality decrease in Major Cities, increasing with remoteness to 25% of the overall decrease in Very Remote areas.
- Reductions in cancer death rates were generally responsible for about 15% of the overall decline in each of the areas.
- Injury death rates changed very little, and in some areas increased over the study period.
- ‘Other’ causes (see page 38) contributed little to the decline in most areas, but to 13% of the decrease in Very Remote areas.

Broad causes of death

- The major causes of death for the Australian population are circulatory diseases (41%), neoplasms (28% – mainly cancers), respiratory diseases (8%) and injury (6%). This pattern holds across most areas, but in Very Remote areas neoplasms are relatively less important causes of death, and injury and ‘other’ causes are relatively more important.
- Those major causes most responsible for the 3,303 ‘excess’ deaths outside Major Cities were circulatory diseases (42%), injury (24%), ‘other’ causes (13%), neoplasms (11%) and respiratory diseases (10%). This pattern changed with remoteness, circulatory diseases and neoplasms becoming relatively less important, and ‘other’ causes becoming relatively more important.
- In regional areas, most ‘excess’ deaths occurred in people (mainly males) older than 50 years, although there were also appreciable numbers of extra deaths of males from younger age groups. In remote areas, the ‘excess’ deaths were mainly of males from a broad range of age groups.
- For Indigenous people, 60–70% of the ‘excess’ deaths occurred in those aged 25–64 years. Circulatory diseases (30%), injury (17%) and ‘other’ causes (36%) were responsible for most of this excess (while respiratory diseases accounted for 9% and neoplasms for 7%).
- For non-Indigenous people in regional areas, the ‘excess’ deaths were mainly in the older age groups, and were mainly male. For non-Indigenous people from remote areas, there were small numbers of ‘excess’ deaths in each age group up to age 70, but fewer than expected for people older than this.
- For non-Indigenous people, injury was either the only, or by far the major, cause of the ‘excess’ deaths outside Major Cities for people aged less than 45 years. For those older than this, circulatory disease and neoplasms (and to an extent respiratory disease) contributed the great majority of extra deaths. In remote areas, while circulatory diseases and neoplasms were important for those aged over 45 years, injury was also important as a cause of extra deaths for older age groups.

Specific causes of death

Outlined below are the ten major specific causes of death, which together were responsible for 88% of the ‘excess’ deaths outside Major Cities (that is, those in excess of what would be expected if Major Cities rates had applied in each area). With a few exceptions, death rates were higher outside the Major Cities and increased with increasing remoteness.

- **Ischaemic heart disease** was responsible for 755 ‘excess’ deaths each year outside Major Cities. Rates were 10% higher in all areas outside Major Cities except Very Remote areas, where they were 30% higher. There were 3.3 times as many deaths of Indigenous people as expected (9.3 times as many for 0–64-year-olds). For younger non-Indigenous people (aged 0–64 years), rates were 10%, 20%, 20% and 30% higher in Inner Regional, Outer Regional, Remote and Very Remote areas.
- **‘Other’ circulatory diseases** (circulatory disease excluding ischaemic heart disease, stroke and rheumatic heart disease) were responsible for 518 ‘excess’ deaths each year outside Major Cities. Rates ranged from 10% higher than in Major Cities in Inner Regional areas, to 30% higher in Very Remote areas. There were 3.0 times as many deaths of Indigenous people as expected (6.6 times as many for 0–64-year-olds). For non-

- Indigenous people aged 0–64 years, rates were 10% and 30% higher in Inner and Outer Regional areas (with rates elevated, but not significantly higher, in remote areas).
- There were about 374 ‘excess’ deaths (mainly male) due to **chronic obstructive pulmonary disease** each year; overall rates in Inner Regional, Outer Regional, Remote and Very Remote areas were 1.2, 1.3, 1.3 and 1.9 times those in Major Cities. Rates for Indigenous people were 3.4 times higher than expected (and 8.8 times higher for 0–64-year-olds). Death rates for non-Indigenous people aged 0–64 years were 1.3, 1.6, 1.8 and 2.8 times higher in the four areas outside Major Cities.
 - There were 368 ‘excess’ deaths due to **motor vehicle accidents** annually, of which 70% were male. Rates were substantially elevated outside Major Cities for all groups examined. Indigenous death rates due to this cause were 4.1 times higher than expected. Rates for non-Indigenous people aged 0–64 years were 1.8, 2.0, 2.1 and 2.4 times higher in the four areas outside the Major Cities.
 - **Diabetes** was responsible for 191 ‘excess’ deaths outside Major Cities annually where it was reported as the underlying cause of death*. However, there were another 169 ‘excess’ deaths of people outside Major Cities where diabetes was mentioned on the death certificate as an associated cause of death (making up 360 altogether). Although most of the 191 deaths were of people older than 75 years, about one-third were aged between 35 and 74 years, and about 60–70% were of females. Death rates in the four areas were 1.1, 1.3, 1.7 and 3.8 times higher than in Major Cities. There were 13.3 times as many deaths of Indigenous people as expected (and 28.2 times as many for 0–64-year-olds). For non-Indigenous people, there were 1.05, 1.2 and 1.2 times as many deaths as expected in Inner Regional, Outer Regional and Remote areas, while rates in Very Remote areas were not significantly different from those in Major Cities. For non-Indigenous people aged 0–64 years rates were lower (in Inner Regional areas), or not significantly higher (in the other areas).
 - There were 184 ‘excess’ deaths due to **suicide** annually, and practically all were male. Rates in the four areas were 1.2, 1.2, 1.4 and 1.6 times the rate in Major Cities. Indigenous death rates due to this cause were 2.9 times higher than expected. Rates for non-Indigenous people were 1.2 times higher in Inner Regional, Outer Regional and Remote areas than in Major Cities, with all age groups between 15 and 64 years contributing, but similar in Very Remote areas to those in Major Cities. Rates for non-Indigenous people aged 0–64 years from Inner and Outer Regional areas were 1.3 and 1.2 times higher than in Major Cities.
 - There were 214 ‘excess’ deaths annually due to ‘other’ injuries. This is a broad group of causes including **non-traffic motor vehicle accidents, drownings and falls**. The main population groups affected were young children, men in age groups between 15 and 64 years and elderly women, but 70% of this group were male. Rates increased with remoteness: in the four areas, rates were 1.1, 1.3, 1.6 and 2.1 times those in Major Cities. There were 3.3 times as many deaths of Indigenous people as expected. Rates for non-Indigenous people (including those aged 0–64 years) also increased with remoteness.
 - There were 131 ‘excess’ deaths annually due to **prostate cancer**. There were about as many deaths of Indigenous men as expected due to this cause. Rates for non-Indigenous

*The underlying cause of death is the main disease or injury initiating the sequence of events leading directly to death. Associated causes of death are the other diseases or injuries recorded on the death certificate that contributed to the death. Details of deaths where diabetes was recorded as an associated cause of death are included in Appendix A of the main report.

men were 10% and 20% higher in Inner and Outer Regional areas, and were 40% higher for men aged 0–64 years in these areas.

- **Colorectal cancer** was responsible for 117 ‘excess’ deaths annually. Rates were 10% higher in regional areas, but lower in remote areas than in Major Cities. There were about half as many deaths of Indigenous people as expected. There were about 20% more deaths of non-Indigenous people aged 0–64 years as expected in regional areas.
- **Lung cancer** was responsible for 52 ‘excess’ deaths annually outside Major Cities (60 fewer deaths than expected for those older than 70 years, but 112 more than expected for those younger than 70 years). Rates were 10% and 30% higher in Remote and Very Remote areas than in Major Cities, and there were 2.1 times as many deaths of Indigenous people as expected (3.2 times as many for 0–64-year-olds). Rates for non-Indigenous people aged 0–64 years were 10% higher in regional areas and 80% higher in Very Remote areas than in Major Cities.

Specific causes of death responsible for the higher death rates outside Major Cities are described in Table 1. Other specific causes of death are also addressed in the main report.

Table 1: Leading specific causes of ‘excess’ deaths, 1997–1999

Specific cause of death	Annual ‘excess’ deaths	Per cent of total ‘excess’
Ischaemic heart disease	755	23
‘Other’ circulatory diseases (but not stroke or rheumatic heart disease)	518	16
Chronic obstructive pulmonary disease	374	11
Motor vehicle accidents	368	11
Diabetes	191 (360 ^(a))	6 (11 ^(a))
Suicide	184	6
‘Other’ injuries ^(b)	214	6
Prostate cancer	131	4
Colorectal cancer	117	4
Lung cancer	52 (112 ^(c))	2 (6 ^(c))
All other causes	399	12
All causes	3,303	100

(a) There were 360 ‘excess’ deaths for which diabetes was a contributing factor (associated cause). In 191 of these, diabetes was recorded as the principal cause of death. The principal causes of the remaining 169 are distributed among the remaining categories in the table. In 11% of all ‘excess’ deaths, diabetes was implicated as an associated cause of death.

(b) ‘Other’ injuries include all injuries except motor vehicle accidents, suicide, homicide, and accidental shooting.

(c) There were 52 excess deaths due to lung cancer overall (this was made up of 112 ‘excess’ deaths of those younger than 70 years outside Major Cities and 60 fewer than expected for those who were 70 years and older). While it accounted for 2% of all ‘excess’ deaths, lung cancer accounted for 6% of ‘excess’ deaths of people younger than 65 years.

Source: AIHW National Mortality Database.

Technical notes

Measures of mortality

This report uses four measures of mortality:

- standardised mortality ratio (SMR) – the number of deaths observed in a rural or remote area divided by the number of deaths expected in that area if the age-specific death rates observed in Major Cities were applied to that area;
- ‘excess’ deaths – the difference between the actual, or observed, number of deaths in each of these regions and the number that would have occurred if the age-specific death rates in those regions had been the same as in Major Cities;
- life expectancy – the average number of years a newborn can expect to live, if current age-specific death rates continue to apply throughout that person’s lifetime; and
- probability of living to 65 years of age – the probability that a newborn will live to age 65 years, assuming current age-specific death rates apply.

Death rates have been standardised to account for differences in the age structure of populations in each area. Comparison of crude death rates (that is, the total number of deaths divided by the total population) may simply reflect the different age structures of populations rather than any difference in the likelihood of death.

Indirect rather than direct age standardisation (standardised mortality ratios rather than direct age-standardised rates) has been used because some of the populations are small and some of the causes of death are relatively uncommon. Under these circumstances, the indirect method is more robust.

Age-specific death rates from two standard populations were used to calculate the expected number of deaths. Age-specific death rates for:

- males and females who live in Major Cities have been used as the standard for calculating expected deaths for the total population in each of the areas;
- non-Indigenous males and females who live in Major Cities have been used as the standard for calculating expected deaths for the non-Indigenous population in each of the areas and also for the Indigenous population.

These two standards are very similar, but not identical.

Use of Major Cities rates for non-Indigenous people as the standard for reporting Indigenous death rates allows easier comparison of the higher death rates for non-Indigenous people in regional and remote areas with the particularly high overall death rates for Indigenous people, and a clear comparison between death rates in the overall Indigenous and non-Indigenous populations.

Data presentation

1. Percentages or numbers in tables may not add to 100 or the total due to rounding.
2. All standardisation of death rates has been indirect using Major Cities rates for males and for females for the period 1997–1999, or Major Cities rates for non-Indigenous males and females for the period 1997–1999. The former have been used to standardise rates for the total (Indigenous plus non-Indigenous) population, while the latter have been used to standardise rates for Indigenous and non-Indigenous populations separately.
3. In this report, names of specific areas defined by the Australian Standard Geographical Classification have been capitalised (for example, Inner Regional, Remote, Very Remote). Where reference has been made to generic ‘regional’ or ‘remote’ areas, the terms have been left un-capitalised (for example, regional, remote).
4. All statements about rates of death in this report are based on the ratio of observed to expected deaths. If there are twice as many deaths as expected, then the rate of death can be assumed to be twice that of the comparison population.
5. Where rates are statistically significantly different from one another, they are referred to in the text as significantly different; if rates are not statistically significantly different they are not said to be significantly different. Statistical significance is at the 95% level.
6. Graphs are presented as bar charts with error bars (for example, Figure 4). These error bars indicate the values of the lower and upper 95% confidence levels. There is one chance in 20 that the true value lies outside the error bars. Error bars do not provide any indication of the level of uncertainty due to bias in the data (for example, potential bias as a result of different accuracy in the identification of Indigenous deaths in each area).
7. Statistically significant figures are indicated in tables as bold and with an asterisk.
8. Data referred to in the text but not presented in tables in this summary are presented in tables in the main report (AIHW 2003a).

Indigenous and non-Indigenous data: data quality issues

Indigenous health is one of the most critical issues to consider when describing health outside Major Cities, both in its own right and because of its effect on overall statistics outside Major Cities, especially in remote areas where Indigenous people are well represented. However, identification of Indigenous deaths in Australia is estimated to be no better than 60% overall (ABS 1999; ABS 2001b) and, in addition, it is probable that identification is better in remote areas than in regional areas or Major Cities, invalidating inter-regional comparisons of Indigenous mortality.

Identification of Indigenous people in the National Mortality Database for the period 1997–1999 is estimated to be more reliable in South Australia, Western Australian, the Northern Territory and Queensland than in the other jurisdictions; identification is estimated at between 60% and almost 100% (ABS 2001c; ABS 2000). In this report death rates for Indigenous people are for these jurisdictions only.

As a corollary, the under-identification of Indigenous deaths results in an over-identification of non-Indigenous deaths. Sensitivity analysis (AIHW 2003a) has indicated that this is

unlikely to have a significant impact on the calculated death rates for non-Indigenous people in Major Cities and regional areas. However, in remote areas this could result in rates for non-Indigenous people being inflated by up to 10%. Results for non-Indigenous persons from remote areas should therefore be treated with caution.

Geographic classification

Until recently, rurality had been described almost exclusively by the Rural, Remote and Metropolitan Areas classification. This classification is based on the size of the local population centre as well as a measure of remoteness (DPIE & DSHS 1994).

Work by the National Key Centre for the Social Applications of Geographical Information Systems from 1996 saw the development of improved measures of remoteness: the Accessibility/Remoteness Index of Australia (ARIA), a continuous variable with a remoteness score of 0–12; and its successor, ARIA+ (with a remoteness score of 0–15).

From ARIA, DoHA developed its five-level classification (also called ARIA), and from ARIA+, ABS developed its six-level classification, the Australian Standard Geographical Classification (ASGC) Remoteness Structure (DHAC & GISCA 1999; ABS 2001a).

Remoteness in this report has been defined using the ASGC Remoteness Structure recently released by ABS. In figures and tables throughout this report, Major Cities, Inner Regional, Outer Regional, Remote and Very Remote categories have been abbreviated as MC, IR, OR, R and VR. Figure 1 is a map of Australia based on the ASGC remoteness structure.

Remoteness category was allocated on the basis of the postcode of the residential address of the deceased on the death certificate. As the boundaries of remoteness categories and postcodes do not match exactly, deaths from postcodes straddling the boundaries of remoteness categories were allocated proportionally to remoteness categories on the basis of population concordances.

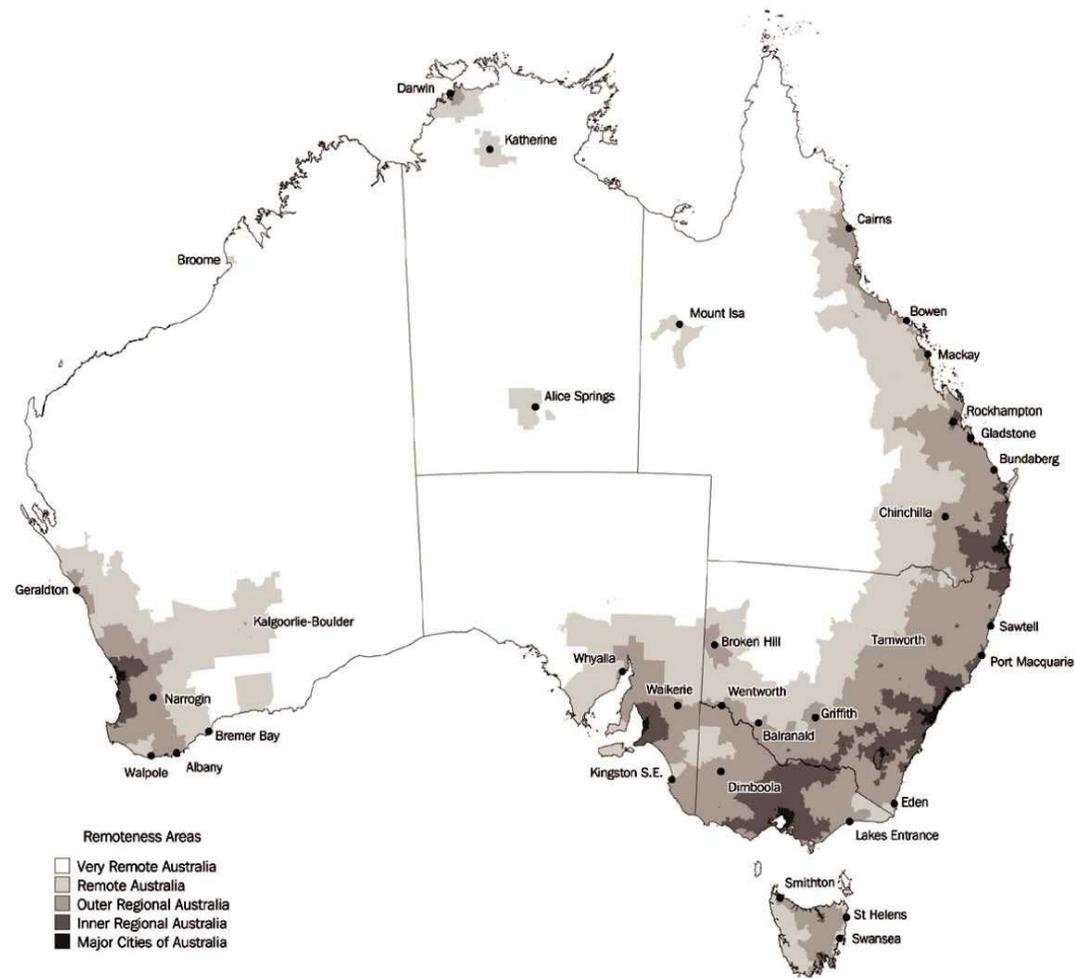
For more information on the various remoteness classifications please refer to the AIHW publication *Rural, Regional and Remote Health: A Guide to Remoteness Classifications based on 2001 Statistical Local Area Boundaries* (AIHW 2003b).

Table 2 summarises the main aspects of the populations in each of the five broad geographic zones used in this report; Figure 2 illustrates the differences in the age structure of these populations.

Cause of deaths

Unless otherwise stated, the cause of death reported is the underlying cause of death. Causes of death were classified using ICD10, and the ICD10 categories used to present the data are defined in Appendix D in the main report (AIHW 2003a).

For deaths described as due to injury or poisoning, the cause reported is the external cause (such as suicide or motor vehicle accident), rather than the nature of the injury, although the term 'injury' has been often used.



Source: Australian Bureau of Statistics.

Figure 1: Remoteness areas of Australia

Table 2: Distribution of the Indigenous and total populations within each ASGC Remoteness area, 2001

Population		MC	IR	OR	R	VR	Total
		('000)					
Indigenous	Male	68	46	52	20	41	225
	Female	71	46	54	20	40	229
	Persons	138	93	106	40	81	456
Total	Male	6,344	1,995	1,025	172	95	9,631
	Female	6,527	2,030	989	153	83	9,783
	Persons	12,871	4,026	2,014	324	179	19,413
		(per cent)					
Indigenous							
% of regional population		1	2	5	12	45	2
% of national Indigenous population		30	20	23	9	18	100
Total population							
% of national population		66	21	10	2	1	100

Source: AIHW population database, based on SLA resident population estimates compiled by ABS.



Variation within areas

This report shows that there is considerable variation in mortality between the five areas (Major Cities, Inner and Outer Regional areas, Remote and Very Remote areas). However, it should be noted that there is also considerable variation between communities within each of these five areas. For example, although mortality on average is lower in Major Cities than it is in Very Remote areas, there are some areas within Major Cities where mortality is relatively high and some in Very Remote areas where mortality is relatively low.

To illustrate this, the number of observed and expected deaths in each SLA for the period 1993–1999 have been calculated and the results summarised in Table 3 and Figure 3. 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 method is necessarily different from the method used for the other analyses in this report.

Table 3: Variation in the SMR in Statistical Local Areas (SLAs) within each ASGC Remoteness area, 1993–1999

Quantile	MC	IR	OR	R	VR
	(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.

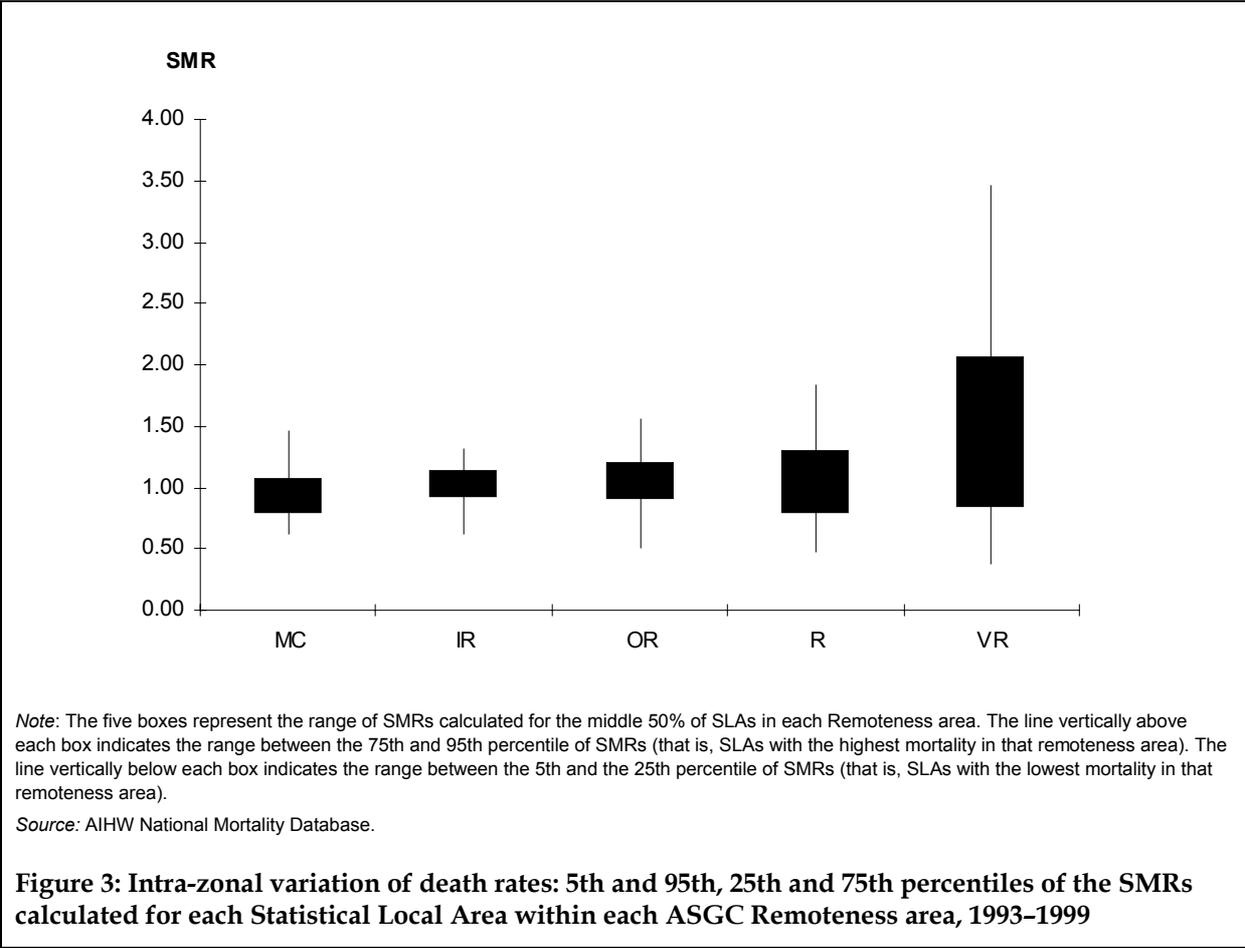
(d) The number of SLAs with an SMR greater than three-quarters of all those SLAs in Major Cities.

(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 of this analysis, including the difficulties of allocating SLAs to remoteness categories, the fact that SLAs can have markedly different sized populations, and that some of the SMRs are based on small numbers of deaths (although the bulk are based on substantial numbers of deaths). However it does indicate that:

- there is substantial variation in mortality within broad zones of remoteness, particularly in Very Remote areas; and
- 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.



Mortality

Overall death rates

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 4).

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, contributed to 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.

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 (see the main report) 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 4: 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 1.00 (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 5). 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.

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 (see page 17).

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 4 and 5).

Table 5: Annual numbers of deaths and 'excess' deaths, 1997–1999

	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.

Rates of death for Indigenous people overall, are substantially higher than for non-Indigenous people from any of the five areas considered in this report. 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 (AIHW 2002a). 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.

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 2002a). Analyses in this report have not taken socioeconomic issues into account.

Life expectancy

Life expectancy is the average number of years a newborn can expect to live, if current age-specific death rates continue to apply throughout their lifetime.

Life expectancy for males was 1.1, 1.9, 2.5 and 5.6 years less in Inner Regional, Outer Regional, Remote and Very Remote areas than in Major Cities, and 0.6, 1.3, 1.2 and 5.4 years less for females in those four areas respectively (Table 6).

Life expectancy for Indigenous males and females in South Australia, Western Australia, the Northern Territory and Queensland was 56 and 63 years compared to 76 and 82 years for Australian males and females generally (ABS 2001c). For the reasons described earlier, comparison across geographic regions is not possible for the Indigenous population. Lower overall life expectancies for Indigenous people tend to lower the overall life expectancies in regional and remote areas (especially in remote areas), because Indigenous people comprise a greater proportion of the population in those areas.

Table 6: 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
Non-Indigenous males	84.9	83.3	82.5	82.6	81.7
Non-Indigenous females	91.1	90.4	90.3	90.4	88.6

Note: Life expectancy for non-Indigenous people has not been shown, because it is strongly affected by potential migration of the frail aged, and may be misleading. Inter-regional comparisons of Indigenous life expectancy and the likelihood of reaching 65 years of age are not possible because of concerns about regional differences in the accuracy of identification.

Source: AIHW National Mortality Database.

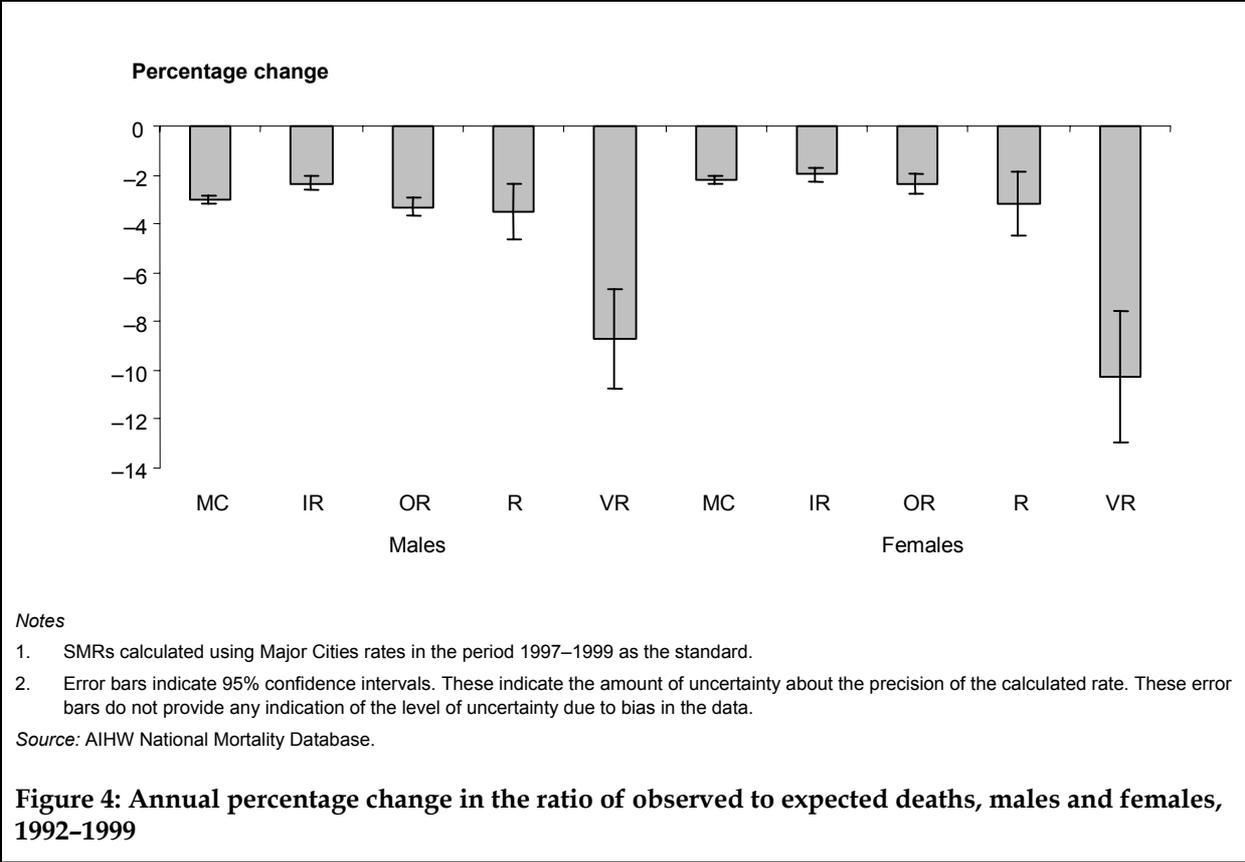
Lower death rates for the elderly in remote areas, possibly due to migration to less remote areas so as to access medical services, tend to increase life expectancy for non-Indigenous people in remote areas.

The probability that a newborn will live to 65 years of age was 1.6%, 3.2%, 5.4% and 15.5% less for males and 0.7%, 1.5%, 3.7% and 14.0% less for females in the four areas than in Major Cities.

The probability that a newborn non-Indigenous baby will live to 65 years of age was 1.6%, 2.4%, 2.3% and 3.2% less for males and 0.7%, 0.8%, 0.7% and 2.5% less for females in the four areas respectively than in Major Cities.

Trends in death rates

Death rates decreased in all areas over the period 1992 to 1999, but particularly in Very Remote areas. In Very Remote areas, they decreased by 9% for males and 10% for females per annum, while in all other areas they decreased by about 3–3.5% for males and 2–3% for females per annum (Figure 4).



These decreases (Table 7) have been driven primarily by decreases in death rates due to circulatory diseases (65–80% of the reduction in most areas was due to decreases in circulatory diseases death rates, 45% in Very Remote areas). Injury death rates changed very little over the period, and in fact were inclined 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.

Table 7: Percentage of the decrease in the total number of 'excess' deaths that result from changes in mortality of each broad cause, 1992–1999

Broad cause of death	MC	IR	OR	R	VR
	(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.

Source: AIHW National Mortality Database.

Broad causes of mortality

The four broad groupings of causes of mortality described in this report – circulatory diseases, respiratory diseases – neoplasms and injury are responsible for 83% of all deaths, and 41%, 8%, 28% and 6% respectively of all deaths nationally in the period 1997–1999 (Table 8). In areas outside Major Cities, these broad causes respectively were responsible for 87% of all ‘excess’ deaths, and 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, with injury, although less important nationally, responsible for almost a quarter of ‘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. Injury death rates, however (which contribute the bulk of the ‘excess’ mortality in those younger than 45 years), remained unchanged in some areas, or increased slightly in other areas over the same period.

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 aged under 65 years (Table 9).

- For circulatory diseases, death rates for the total population were 1.1 times Major Cities rates in regional and Remote areas, and 1.3 times these rates in Very Remote areas. For the non-Indigenous population younger than 65 years, rates were 1.1, 1.2 and 1.3 times higher in Inner Regional, Outer Regional/Remote and Very Remote areas.
- For respiratory diseases, death rates for all persons ranged from slightly higher than expected in Inner Regional areas, to 1.9 times higher in Very Remote areas. For the non-Indigenous population younger than 65 years rates were 1.2, 1.4, 1.5 and 1.9 times higher in the four areas than in Major Cities.
- For injury, death rates for all persons ranged from 1.2 times Major Cities rates in Inner Regional areas to 2.4 times in Very Remote areas. For the non-Indigenous population younger than 65 years, rates were 1.3, 1.4, 1.5 and 1.7 times higher in the four areas than in Major Cities.
- For neoplasms, death rates were 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 up to 1.1 times higher in regional areas than in Major Cities, and in remote areas were 1.2–2.0 times higher. 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.

Table 8: Summary table of deaths due to broad causes for all persons, 1997–1999

Broad cause	Average annual deaths outside Major Cities			Average annual 'excess' deaths outside Major Cities		
	No.	%	% male	No.	%	% male
Circulatory diseases	18,639	41%	51%	1,378	42%	60%
Neoplasms	12,549	27%	59%	373	11%	>100%
Respiratory diseases	3,591	8%	59%	330	10%	84%
Injury	3,213	7%	71%	788	24%	76%
'Other' causes	7,874	17%	49%	434	13%	17%
All causes	45,867	100%	55%	3,303	100%	65%

Source: AIHW National Mortality Database.

In remote areas, there were substantially fewer deaths than expected of elderly non-Indigenous people due to circulatory diseases, neoplasms and 'other' causes. This was possibly as a result of migration of the frail aged to areas where services are more accessible. For Indigenous people who lived in Queensland, South Australia, Western Australia and the Northern Territory 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. High rates of death for Indigenous people would probably have a marked effect in raising overall death rates in remote areas because Indigenous people comprise a greater proportion of the population in those areas.

Table 9: 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 (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
Neoplasms	All persons	*1.0+	*1.0+	1.0	1.0	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
Respiratory diseases	All persons	*1.0+	*1.2	*1.3	*1.9	n.p.
	Non-Indigenous (aged 0–64 years)	*1.2	*1.4	*1.5	*1.9	n.p.
	Indigenous	n.p.	n.p.	n.p.	n.p.	*4.4
Injury	All persons	*1.2	*1.4	*1.7	*2.4	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
'Other' causes	All persons	1.0	*1.1	*1.2	*2.0	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
All causes	All persons	*1.1	*1.1	*1.1	*1.5	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

* Significantly different from 1.0 (that is, rates are significantly different from those in Major Cities). Caution should be used when making inferences about ratios that are not significantly different from 1.

- (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.
- (b) Ratios calculated for non-Indigenous persons from Remote and Very Remote areas should be treated with caution (see page 12).
- (c) The ratios for Indigenous persons are for SA, WA, NT and Qld (see page 12). 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. 1.0+ indicates that there were slightly (but significantly) more deaths than expected (but less than 1.05 times more).
2. 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.

Mortality due to specific causes

Circulatory disease

Trends in mortality due to circulatory disease

Death rates from circulatory disease fell for both males and females in all areas between 1992 and 1999. For males, annual percentage decreases were 5–6% in Major Cities, regional and Remote areas, and 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.

Specific circulatory diseases

Ischaemic heart disease was responsible for 55% of all circulatory disease deaths (10,208 per year) as well as 55% of the 'excess' deaths (755 per year) due to circulatory disease (Table 10). 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 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 (102) and for 1% (18) of the 'excess' deaths due to circulatory disease annually.

Table 10: Summary table of deaths due to circulatory diseases for all persons, 1997–1999

Cause	Average annual deaths outside Major Cities			Average annual 'excess' deaths outside Major Cities		
	No.	%	% male	No.	%	% male
Ischaemic heart disease	10,208	55%	57%	755	55%	69%
Stroke	4,215	23%	43%	85	6%	75%
Rheumatic heart disease	102	<1%	35%	18	1%	44%
'Other' circulatory diseases	4,128	22%	47%	518	38%	46%
Total circulatory diseases	18,639	100%	51%	1,378	100%	60%

Source: AIHW National Mortality Database.

There were 1.1–1.3 times as many deaths due to ischaemic heart disease and 'other' circulatory diseases as expected (Table 11), and about the same number of deaths due to stroke as expected in the four areas outside Major Cities (that is, death rates increased with remoteness for the most part). Although rheumatic heart disease was responsible for many fewer deaths than the other causes (102 per year) and with relatively few (18 per year) 'excess' deaths, the death rate due to rheumatic heart disease increased with remoteness to 6.8 times as many deaths as expected in Very Remote areas.

Mortality of Indigenous people as a result of circulatory disease was 3.2 times higher, and for those younger than 65 years of age it was 8.6 times higher than for non-Indigenous people

from Major Cities. 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 higher than for their non-Indigenous counterparts from Major Cities (responsible for 18 'excess' deaths each year).

Table 11: The ratio of observed deaths from circulatory diseases to those expected if Major Cities^(a) rates applied in each ASGC Remoteness area, 1997–1999

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 (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	All persons	*1.0+	1.0	0.9	1.2	n.p.
	Non-Indigenous (aged 0–64 years)	1.0	1.1	1.0	1.4	n.p.
	Indigenous	n.p.	n.p.	n.p.	n.p.	*2.6
Rheumatic heart disease	All persons	1.0	*1.4	*2.5	*6.8	n.p.
	Non-Indigenous (aged 0–64 years)	0.9	1.3	2.0	0.3	n.p.
	Indigenous	n.p.	n.p.	n.p.	n.p.	*23.9
'Other' circulatory diseases	All persons	*1.1	*1.2	*1.2	*1.3	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
Total circulatory diseases	All persons	*1.1	*1.1	*1.1	*1.3	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

* Significantly different from 1.0 (that is, rates are significantly different from those in Major Cities). Caution should be used when making inferences about ratios that are not significantly different from 1.

- (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.
- (b) Ratios calculated for non-Indigenous persons from Remote and Very Remote areas should be treated with caution (see page 12).
- (c) The ratios for Indigenous persons are for Queensland, SA, WA and the NT (see page 12). 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. 1.0+ indicates that there were slightly (but significantly) more deaths than expected (but less than 1.05 times more).
2. 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 nearly all specific causes of circulatory disease, the high mortality of Indigenous people is probably influential in elevating death rates in remote areas because the proportion of the population that is Indigenous is higher in those 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, but about as many as expected in remote areas (affected by lower death rates for older persons in remote areas).

For non-Indigenous people younger than 65 years of age, death rates due to ischaemic heart disease increased from 1.1 times in Inner Regional areas, through 1.2 times in Outer Regional/Remote 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 diseases, for which rates were 1.1 and 1.3 times higher in Inner and Outer Regional areas than they were in Major Cities, 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.

Neoplasms

Trends in mortality due to neoplasms

Death rates from this cause for both males and females decreased in all areas between 1992 and 1999, however, the decrease was statistically significant for males only in Major Cities, Inner Regional and Outer Regional areas; and for females only in Major Cities, Outer Regional and Very Remote areas.

For males, annual percentage decreases were generally of the order of 1–2% in each area; for females annual percentage decreases were of similar magnitude. In Very Remote areas, this annual decrease for females was larger at 6% (such that the ratio of observed to expected deaths decreased from approximately 1.5 to less than 1.0 over the period 1992–1999).

For both sexes, the rate of decrease in Inner Regional areas was less than in the other areas (significantly less for Inner Regional males than for Major Cities males).

Specific neoplasms

Of the annual average of 12,549 deaths of people outside Major Cities due to neoplasms, almost 50% (6,218) were due to 'other' neoplasms, while a lower proportion (11%) of the total 373 'excess' neoplasm deaths each year were due to this broad cause (Table 12).

In other words, about 90% of 'excess' deaths resulted from the six specific neoplasms studied. It is possible that there may be more or fewer deaths than expected in regional and remote areas due to some other cancers not specifically dealt with here, but as a group, their combined net effect is for there to be about as many deaths as expected.

Table 12: Summary table of deaths due to neoplasms for all persons, 1997–1999

Cause	Average annual deaths outside Major Cities			Average annual 'excess' deaths outside Major Cities		
	No.	%	% male	No.	%	% male ^(a)
Lung cancer	2,386	19%	72%	52	14%	>100%
Colorectal cancer	1,675	13%	55%	117	31%	44%
Breast cancer	845	7%	0%	–11	–3%	0%
Cervical cancer	92	<1%	0%	9	2%	0%
Prostate cancer	973	8%	100%	131	35%	100%
Melanoma	353	3%	68%	36	10%	96%
Other neoplasms	6,218	50%	57%	40	11%	>100%
Total neoplasms	12,549	100%	59%	373	100%	>100%

(a) In some cases there were fewer deaths of females than expected, with the result that there were more 'excess' deaths of males than for the total population.

Note: Ratios for breast, cervical and prostate cancer have been calculated for females and for males (as appropriate).

Source: AIHW National Mortality Database.

Lung and colorectal cancer were responsible for 19% (2,386) and 13% (1,675) of all neoplasm deaths respectively. Lung cancer was responsible for 14% (52) of the 'excess' neoplasm deaths and colorectal cancer accounted for 31% (117).

Prostate cancer and melanoma were responsible for 8% (973) and 3% (353) of all neoplasm deaths, but were responsible for 35% (131) and 10% (36) of the 'excess' neoplasm deaths respectively. Breast cancer was responsible for 7% (845) of all neoplasm deaths (slightly fewer than expected), and cervical cancer for less than 1% (92) of all neoplasm deaths (slightly more than expected).

It is difficult to identify a consistent pattern in neoplasm death rates across the four areas (Table 13). Lung cancer death rates were elevated in remote areas and death rates for Indigenous people were about double those for non-Indigenous people from Major Cities. Lower death rates for the elderly reduced the number of deaths of non-Indigenous people generally, such that there were about as many as expected in each area. Death rates for non-Indigenous males younger than 65 years old were about 1.1–1.3 times higher in regional areas and 1.9 times higher in Very Remote areas, with rates for similar aged females not significantly different in any area from those for their counterparts from Major Cities.

Colorectal cancer death rates were 1.1 times in regional areas and 0.7 times (that is, lower) in Very Remote areas those for their counterparts from Major Cities. For non-Indigenous people younger than 65 years, death rates in regional areas were 1.2 times those for similar-aged people from Major Cities. Rates in remote areas were not significantly different to those in Major Cities. There were fewer deaths of Indigenous people due to this cause than expected.

Breast cancer death rates in regional and remote areas were not significantly different from those for females from Major Cities, and there were about as many deaths of Indigenous women due to this cause as expected.

Cervical cancer death rates were elevated in Outer Regional and Very Remote areas, possibly as a result of higher mortality amongst Indigenous women, for whom rates were 6.5 times those for non-Indigenous women from Major Cities. For non-Indigenous women, there was essentially no difference in mortality due to cervical cancer across the areas.

Prostate cancer death rates were 1.1 and 1.2 times higher in Inner and Outer Regional areas. For non-Indigenous males younger than 65 years, rates in these areas were 1.4 times those for their counterparts from Major Cities. Rates in remote areas were not significantly higher than in Major Cities, and there were about as many deaths of Indigenous males due to this cause as expected.

Compared with melanoma death rates in Major Cities, rates were 1.3 times higher for males in Inner Regional areas, and not significantly different for males in the other areas, or for females in any area. This pattern also applies to non-Indigenous people. For non-Indigenous males younger than 65 years, rates in Inner and Outer Regional areas were 1.5 and 1.3 times those for their counterparts in Major Cities respectively; rates for similar aged females were not significantly different from those in Major Cities. The very low rates in Indigenous populations had a negligible effect in lowering death rates in remote areas.

Death rates due to 'other' neoplasms were similar in all areas. Rates for elderly non-Indigenous people in remote areas were lower than for their Major Cities counterparts; for non-Indigenous males younger than 65 years, rates were 10% (1.1 times) higher in Inner Regional areas. The death rate for Indigenous people due to 'other' neoplasms was about twice that for non-Indigenous people from Major Cities.

Table 13: The ratio of observed deaths from neoplasms to those expected if Major Cities^(a) rates applied in each ASGC Remoteness area, 1997–1999

Cause	Population	IR	OR	R ^(b)	VR ^(b)	National ^(c)
Lung cancer	All persons	1.0	1.0	*1.1	*1.3	n.p.
	Non-Indigenous (aged 0–64 years)	*1.1	*1.1	1.1	*1.8	n.p.
	Indigenous	n.p.	n.p.	n.p.	n.p.	*2.1
Colorectal cancer	All persons	*1.1	*1.1	1.0	*0.7	n.p.
	Non-Indigenous (aged 0–64 years)	*1.2	*1.2	1.0	0.8	n.p.
	Indigenous	n.p.	n.p.	n.p.	n.p.	*0.6
Breast cancer	All persons	1.0	1.0	0.9	0.8	n.p.
	Non-Indigenous (aged 0–64 years)	1.0	1.0	0.8	0.8	n.p.
	Indigenous	n.p.	n.p.	n.p.	n.p.	1.1
Cervical cancer	All persons	1.0	*1.3	1.5	*3.3	n.p.
	Non-Indigenous (aged 0–64 years)	1.0	1.1	0.9	0.7	n.p.
	Indigenous	n.p.	n.p.	n.p.	n.p.	*6.5
Prostate cancer	All persons	*1.1	*1.2	1.2	1.0	n.p.
	Non-Indigenous (aged 0–64 years)	*1.4	*1.4	1.6	1.2	n.p.
	Indigenous	n.p.	n.p.	n.p.	n.p.	0.8
Melanoma	All persons	*1.2	1.0	0.9	0.6	n.p.
	Non-Indigenous (aged 0–64 years)	*1.3	*1.2	1.0	0.8	n.p.
	Indigenous	n.p.	n.p.	n.p.	n.p.	*0.1
Other neoplasms	All persons	1.0	1.0	1.0	1.0	n.p.
	Non-Indigenous (aged 0–64 years)	*1.1	1.0	0.9	0.9	n.p.
	Indigenous	n.p.	n.p.	n.p.	n.p.	*1.7
Total neoplasms	All persons	*1.0+	*1.0+	1.0	1.0	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

* Significantly different from 1.0 (that is, rates are significantly different from those in Major Cities). Caution should be used when making inferences about ratios that are not significantly different from 1.

- (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.
- (b) Ratios calculated for non-Indigenous persons from Remote and Very Remote areas should be treated with caution (see page 12).
- (c) The ratios for Indigenous persons are for SA, WA, NT and Qld (see page 12). 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. 1.0+ indicates that there were slightly (but significantly) more deaths than expected (but less than 1.05 times more).
2. 1.0– indicates that there were slightly (but significantly) fewer deaths than expected (but more than 0.95 times as many).
3. Ratios for breast, cervical and prostate cancer have been calculated for females and for males (as appropriate).

Source: AIHW National Mortality Database.

Respiratory disease

Trends in mortality due to respiratory diseases

Death rates from this cause for both males and females decreased in all areas between 1992 and 1999 (although the decrease for females in Remote areas was not significant).

For males, annual percentage decreases were generally of the order of 5–6% in Major Cities and regional areas, but 11% and 30% in Remote and Very Remote areas. For females annual percentage decreases were smaller at 1–2% in Major Cities and regional areas, but reached 30% in Very Remote areas (such that the ratio of observed to expected deaths for males and females in Very Remote areas decreased from approximately 4 to less than 2 over the period 1992–1999).

Specific respiratory diseases

Chronic obstructive pulmonary disease (COPD) is the most common cause of death in this broad group, responsible for 61% of respiratory deaths. Other important causes were pneumonia (18%) and 'other' respiratory diseases (15%). Asthma (5%) and influenza (2%) were responsible for a small proportion of respiratory deaths (Table 14). COPD was responsible for over 100% of the 'excess' deaths (there being fewer than expected outside Major Cities due to 'other' respiratory diseases and pneumonia). Asthma and influenza contributed 6% and 8% of 'excess' respiratory disease deaths.

Table 14: Summary table of deaths due to respiratory disease for all persons, 1997–1999

Cause	Average annual deaths outside Major Cities			Average annual 'excess' deaths outside Major Cities		
	No.	%	% male	No.	%	% male
COPD	2,173	61%	66%	374	113%	83%
Pneumonia	635	18%	42%	-14	-4%	—
Asthma	172	5%	42%	21	6%	57%
Influenza	63	2%	48%	27	8%	56%
Other respiratory diseases	548	15%	56%	-78	-24%	51%
Total respiratory diseases	3,591	100%	59%	330	100%	84%

Source: AIHW National Mortality Database.

For COPD, rates were 1.2 and 1.3 times higher in Inner and Outer Regional and Remote areas and 1.9 times higher in Very Remote areas (Table 15). A substantial proportion (over 80%) was due to higher death rates amongst males. In Very Remote areas particularly, higher rates were largely influenced by the high rate of death for Indigenous people (3.4 times higher) due to this cause. In regional and remote areas, rates for non-Indigenous people were between 1.2 and 1.4 times higher for males, and similar for females (or 1.1 times higher for females in Outer Regional areas).

Death rates due to COPD for both non-Indigenous males and females younger than 65 years increased with remoteness from 1.3, through 1.6 and 1.8, to 2.8 times rates for similar people from Major Cities.

There were 7 times as many deaths of Indigenous people as a result of pneumonia as expected, the higher rates for Indigenous people elevating overall death rates for the total populations in Remote and Very Remote areas. Pneumonia death rates for the total population ranged from 0.9 times (that is, lower) in Inner Regional areas to 2.3 times Major Cities rates in Very Remote areas. However, for the non-Indigenous population younger than 65 years, there was no significant difference between rates in any of the areas and those in Major Cities.

Table 15: The ratio of observed deaths from respiratory diseases to those expected if Major Cities^(a) rates applied in each ASGC Remoteness area, 1997–1999

Cause	Population	IR	OR	R ^(b)	VR ^(b)	National ^(c)
COPD	All persons	*1.2	*1.3	*1.3	*1.9	n.p.
	Non-Indigenous (aged 0–64 years)	*1.3	*1.6	*1.8	*2.8	n.p.
	Indigenous	n.p.	n.p.	n.p.	n.p.	*3.4
Pneumonia	All persons	*0.9	1.0	*1.3	*2.3	n.p.
	Non-Indigenous (aged 0–64 years)	1.2	1.2	0.8	1.8	n.p.
	Indigenous	n.p.	n.p.	n.p.	n.p.	*7.2
Asthma	All persons	1.1	*1.2	*1.5	1.4	n.p.
	Non-Indigenous (aged 0–64 years)	1.2	*1.3	1.8	0.8	n.p.
	Indigenous	n.p.	n.p.	n.p.	n.p.	*3.0
Influenza	All persons	*1.6	*1.9	*3.2	2.1	n.p.
	Non-Indigenous (aged 0–64 years)	*2.3	1.1	3.9	5.7	n.p.
	Indigenous	n.p.	n.p.	n.p.	n.p.	3.0
Other respiratory diseases	All persons	*0.8	*0.9	1.0	*1.6	n.p.
	Non-Indigenous (aged 0–64 years)	0.8	1.1	1.1	0.7	n.p.
	Indigenous	n.p.	n.p.	n.p.	n.p.	*5.2
Total respiratory diseases	All persons	*1.0+	*1.2	*1.3	*1.9	n.p.
	Non-Indigenous (aged 0–64 years)	*1.2	*1.4	*1.5	*1.9	n.p.
	Indigenous	n.p.	n.p.	n.p.	n.p.	*4.4

* Significantly different from 1.0 (that is, rates are significantly different from those in Major Cities). Caution should be used when making inferences about ratios that are not significantly different from 1.

- (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.
- (b) Ratios calculated for non-Indigenous persons from Remote and Very Remote areas should be treated with caution (see page 12).
- (c) The ratios for Indigenous persons are for SA, WA, NT and Qld (see page 12). 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. 1.0+ indicates that there were slightly (but significantly) more deaths than expected (but less than 1.05 times more).
2. 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.

Asthma death rates were 1.2 and 1.5 times higher in Outer Regional and Remote areas. There were 3 times as many deaths of Indigenous people as expected. For non-Indigenous people and for those younger than 65 years, there were slightly, but not significantly, more deaths than expected (except in Outer Regional areas where there were 1.3 times as many asthma deaths as expected).

The numbers of Indigenous deaths due to influenza were not significantly different from the numbers expected. For the total population and for the non-Indigenous population, there were 1.6 and 1.9 times as many deaths as expected, and in Remote areas there were 3.2–3.4 times as many deaths as expected (the number in Very Remote areas was very small). There were few deaths of people younger than 65 years due to this cause.

There were fewer deaths than expected due to 'other' respiratory diseases in regional areas, primarily because of the lower death rates of elderly people. For the total population in Very Remote areas there were 1.6 times as many deaths as expected from this cause, a consequence of higher death rates for Indigenous people (5 times those for non-Indigenous people from Major Cities). There were about as many deaths of non-Indigenous people in remote areas due to this cause as expected.

Injury

A death due to injury (or poisoning) is defined here as one for which an 'external cause' code was reported as the underlying cause of death. The type of injury described here is based on the recorded external cause code.

Trends in mortality due to injury and poisoning

Death rates due to injury and poisoning have fluctuated from year to year, but overall, have either not changed significantly or have tended to increase very slightly between 1992 and 1999.

Only for males and females living in Inner Regional areas, and males living in Major Cities did rates of death due to injury clearly change (increasing by slightly less than 2% and less than 1% per annum respectively over the period 1992 to 1999).

Specific injuries

Motor vehicle accidents, suicide and 'other' injuries were the most common causes of injury death outside Major Cities, responsible for 25% (815), 31% (984) and 40% (1,287) of all injury deaths respectively in these areas annually. Interpersonal violence accounted for another 3% of injury deaths (Table 16).

Even though motor vehicle accidents were not responsible for the greatest number of deaths amongst these causes, they were responsible for the greatest number of 'excess' deaths (368 more deaths of people who lived outside Major Cities than expected each year, 47% of the total injury 'excess'). There were also substantially more deaths than expected annually due to 'other' injuries (214) and suicide (184).

Table 16: Summary table of deaths due to injury and poisoning for all persons, 1997-1999

Cause	Average annual deaths outside Major Cities			Average annual 'excess' deaths outside Major Cities		
	No.	%	% male	No.	%	% male
Motor vehicle accidents	815	25%	70%	368	47%	71%
Suicide	984	31%	83%	184	23%	100%
Inter-personal violence	112	3%	64%	9	1%	10%
Accidental shooting	16	<1%	88%	12	2%	100%
Other injuries or poisonings	1,287	40%	63%	214	27%	70%
Total injury	3,213	100%	71%	788	100%	76%

Source: AIHW National Mortality Database.

For most causes, there were more deaths of males than females; on average 71% of deaths and 76% of 'excess' deaths were of males.

Much, but not all, of the 'excess' death occurred amongst the young. For example, 70% of the 'excess' deaths due to motor vehicle accidents occurred amongst people aged 15–44 years. However, the 'excess' deaths due to suicide (almost all of whom were male) were relatively evenly distributed amongst all age groups between 15 and 64 years (with slightly higher representation amongst younger people).

Interpersonal violence appears to be more of a problem in remote areas (see main report), where there were 20 more deaths than expected annually, than in regional areas, where there were 12 fewer than expected. For accidental shooting, the 'excess' is almost entirely in regional areas, with non-Indigenous people as those killed.

For the total population death rates from injuries increased with remoteness (from 1.2 times higher than Major Cities rates in Inner Regional areas to 2.4 times in Very Remote areas). Death rates from motor vehicle accidents, suicide and 'other' injuries also increased with remoteness (Table 17). For motor vehicle accidents, rates for those from Inner Regional, Outer Regional, Remote and Very Remote areas ranged from 1.7, through 1.9 and 2.4, to 3.6 times higher than expected. Death rates from suicide were 1.2 times higher in regional areas, 1.4 times higher in Remote areas and 1.6 times higher in Very Remote areas. Death rates from 'other' injuries were 1.1 times higher in Inner Regional areas, 1.3 and 1.6 times higher in Outer Regional and Remote areas, to 2.1 times higher in Very Remote areas.

Indigenous population

Mortality of Indigenous people as a result of injury was 3.5 times higher than for non-Indigenous people from Major Cities. For the main causes of injury death, namely motor vehicle accidents, suicide and 'other' injuries, the rates for Indigenous people were respectively 4.1, 2.9 and 3.3 times those for non-Indigenous people who lived in Major Cities.

There were no reported Indigenous deaths due to accidental shooting during the study period. Death rates for Indigenous people due to interpersonal violence were over 7 times as high as that for their non-Indigenous counterparts from Major Cities.

Annually there were 61, 68, 79 and 26 deaths of Indigenous people due to motor vehicle accidents, suicide, 'other' injuries and interpersonal violence. Of these, 46, 44, 55 and 23 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). The numbers for Australia would be greater.

Non-Indigenous population

For all injury causes investigated, rates for non-Indigenous people were elevated outside Major Cities, and tended to increase with increasing remoteness. These data need to be interpreted with caution, due to potential over-identification of non-Indigenous persons in remote areas as discussed on page 12.

Death rates for non-Indigenous people due to motor vehicle accidents were high throughout regional and remote areas, ranging from 1.7 to 2.2 times those in Major Cities; those due to suicide were 20% (1.2 times) higher outside Major Cities; and those due to 'other' injuries ranged from 1.1 to 1.6 times those in Major Cities.

For the two other causes of death responsible for relatively few deaths, rates for non-Indigenous people due to interpersonal violence were lower (0.8 times) in regional areas but double in Very Remote areas; and those due to accidental shooting were 4 times higher in regional areas and over 20 times higher in Very Remote areas.

Whereas overall death rates due to chronic diseases (such as ischaemic heart disease) can be affected by relatively low death rates of the elderly in remote areas, this doesn't appear to be an issue for injury deaths. In other words, the ratio of observed to expected deaths is much the same for the total non-Indigenous population as it is for those non-Indigenous people younger than 65 years.

Table 17: The ratio of observed deaths from injury and poisoning to those expected if Major Cities^(a) rates applied in each ASGC Remoteness area, 1997–1999

Cause	Population	IR	OR	R ^(b)	VR ^(b)	National ^(c)
Motor vehicle accidents	All persons	*1.7	*1.9	*2.4	*3.6	n.p.
	Non-Indigenous (aged 0–64 years)	*1.8	*2.0	*2.1	*2.4	n.p.
	Indigenous	n.p.	n.p.	n.p.	n.p.	*4.1
Suicide	All persons	*1.2	*1.2	*1.4	*1.6	n.p.
	Non-Indigenous (aged 0–64 years)	*1.3	*1.2	1.2	1.0	n.p.
	Indigenous	n.p.	n.p.	n.p.	n.p.	*2.9
Inter-personal violence	All persons	*0.8	1.0	*2.0	*5.4	n.p.
	Non-Indigenous (aged 0–64 years)	*0.8	0.8	1.2	*2.3	n.p.
	Indigenous	n.p.	n.p.	n.p.	n.p.	*7.4
Accidental shooting	All persons	*3.7	*4.6	*7.7	*15.5	n.p.
	Non-Indigenous (aged 0–64 years)	*4.1	*4.3	*8.9	*19.0	n.p.
	Indigenous	n.p.	n.p.	n.p.	n.p.	*0.0
Other injuries	All persons	*1.1	*1.3	*1.6	*2.1	n.p.
	Non-Indigenous (aged 0–64 years)	*1.1	*1.3	*1.5	*1.9	n.p.
	Indigenous	n.p.	n.p.	n.p.	n.p.	*3.3
Total injury	All persons	*1.2	*1.4	*1.7	*2.4	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

* Significantly different from 1.0 (that is, rates are significantly different from those in Major Cities). Caution should be used when making inferences about ratios that are not significantly different from 1.

- (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.
- (b) Ratios calculated for non-Indigenous persons from Remote and Very Remote areas should be treated with caution (see page 12).
- (c) The ratios for Indigenous persons are for Queensland, SA, WA and the NT (see page 1). 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. 1.0+ indicates that there were slightly (but significantly) more deaths than expected (but less than 1.05 times more).
2. 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.

‘All other causes’

‘All other causes of death’ includes all causes except circulatory and respiratory diseases, neoplasms and injuries and poisonings. There are many other causes of death, but, apart from diabetes, they tend to be less common than the causes already described. The specific causes of death described below are diabetes, renal disease, and ‘other’ causes not elsewhere described (n.e.d., which include infectious diseases, diseases of the digestive system and the endocrine system, conditions originating in the perinatal period, and many others).

Specific ‘other’ causes

Diabetes and renal disease were responsible for 14% and 8% of the 7,874 deaths outside Major Cities due to ‘all other causes’ respectively (Table 18). Diabetes was responsible for 44%, and renal diseases for another 8% of ‘excess’ deaths due to ‘all other causes’.

While the number of deaths was fairly evenly split between males and females, the ‘excess’ deaths were predominantly female.

Table 18: Summary table of deaths due to all other causes for all persons, 1997–1999

Cause	Average annual deaths outside Major Cities			Average annual ‘excess’ deaths outside Major Cities		
	No.	%	% male	No.	%	% male
Diabetes	1,137	14%	50%	191	44%	35%
Renal disease	653	8%	47%	33	8%	29%
‘Other causes n.e.d.’	6,084	77%	49%	210	48%	0%
Total ‘other’ causes of death	7,874	100%	49%	434	100%	17%

Source: AIHW National Mortality Database.

Substantial numbers of ‘excess’ deaths due to ‘other causes n.e.d.’ occurred among male children younger than 5 years (48 per year), and to a lesser extent female children of the same age (14 per year). However the bulk of the ‘excess’ for ‘other causes n.e.d.’ was amongst females roughly 45 years and older, with the ‘excess’ becoming greater with age (180 per year in total for women 45 years and older).

Of the 191 ‘excess’ deaths due to diabetes annually, 80–90% were amongst those aged 55 years and older; the majority were females. However, there were another 169 ‘excess’ deaths of people outside Major Cities where diabetes was recorded as an associated cause of death (making up 360 altogether). Details of deaths where diabetes was recorded as an associated cause of death are included in Appendix A of the main report.

For the total population, death rates from ‘all other causes’ increased with remoteness (from not being significantly different in Inner Regional areas to 2.0 times higher in Very Remote areas – compared to Major Cities rates). Death rates from diabetes and ‘other causes n.e.d.’ also increased with remoteness (Table 19).

There were 4.4 times as many deaths of Indigenous people due to ‘all other causes’ as expected. For the three causes, diabetes, renal disease and ‘other causes n.e.d.’, there were 13, 7 and 3.5 times as many deaths as expected.

Table 19: The ratio of observed deaths from all other causes to those expected if Major Cities^(a) rates applied in each ASGC Remoteness area, 1997–1999

Cause	Population	IR	OR	R ^(b)	VR ^(b)	National ^(c)
Diabetes	All persons	*1.1	*1.3	*1.7	*3.8	n.p.
	Non-Indigenous (aged 0–64 years)	*0.9	1.2	1.4	1.5	n.p.
	Indigenous	n.p.	n.p.	n.p.	n.p.	*13.3
Renal disease	All persons	1.0	1.1	1.2	*2.6	n.p.
	Non-Indigenous (aged 0–64 years)	1.1	1.1	1.0	1.1	n.p.
	Indigenous	n.p.	n.p.	n.p.	n.p.	*7.1
'Other causes n.e.d.'	All persons	1.0	*1.0+	*1.1	*1.7	n.p.
	Non-Indigenous (aged 0–64 years)	*1.0–	*1.0–	*0.9	*0.8	n.p.
	Indigenous	n.p.	n.p.	n.p.	n.p.	*3.5
Total 'other' causes of death	All persons	1.0	*1.1	*1.2	*2.0	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

* Significantly different from 1.0 (that is, rates are significantly different from those in Major Cities). Caution should be used when making inferences about ratios that are not significantly different from 1.

- (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.
- (b) Ratios calculated for non-Indigenous persons from Remote and Very Remote areas should be treated with caution (see page 12).
- (c) The ratios for Indigenous persons are for SA, WA, NT and Qld (see page 12). 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. 1.0+ indicates that there were slightly (but significantly) more deaths than expected (but less than 1.05 times more).
2. 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 Indigenous people living in South Australia, Western Australia, the Northern Territory and Queensland, annually there were 327 deaths due to 'other causes n.e.d.', 233 of these being in 'excess' of what would be expected if non-Indigenous Major Cities rates applied to the Indigenous population. There would have been more in the other jurisdictions where identification is less complete. In contrast to the total population, more than half (57%) of these deaths and 'excess' deaths were male. For both sexes, 26% of the 'excess' were younger than 5 years, 30% were aged 25–44 years and 26% were 45–64 years.

There were also 109 deaths of Indigenous people with an underlying diagnosis of diabetes in these jurisdictions annually (there were also another 142 deaths where diabetes was not the underlying cause, but was recorded as an associated cause), and 32 due to renal disease. There were 101 and 28 more deaths than expected for each of these causes respectively. Of these 'excess' deaths, males were responsible for about half of the deaths due to diabetes and one-third of the deaths due to renal disease. About 50% of the 'excess' diabetes deaths were amongst those aged 45–64 years; 50% of the 'excess' due to renal disease occurred in those younger than 65 years.

The high mortality of Indigenous people would have a strong influence in elevating death rates in remote areas because of the relatively large proportion of the population in those areas that is Indigenous. For renal disease and 'other causes n.e.d.', rates of death for non-Indigenous people were not higher in regional and remote areas.

There were slightly more deaths of non-Indigenous people due to diabetes than expected in Inner Regional areas, and 1.2 times as many in Outer Regional and Remote areas. Rates for non-Indigenous people younger than 65 years were lower in Inner Regional areas and not significantly different in the other areas to rates in Major Cities.

There were about as many deaths of non-Indigenous people as expected due to renal disease in each of the four areas outside Major Cities.

There were about as many deaths as expected due to 'other causes n.e.d.' in regional areas, and 0.8–0.9 times as many as expected in remote areas.

Comments on the findings

- Improvement in the identification of Indigenous people in the mortality data collection is crucial to being able to describe differences in mortality across remoteness in the future.
- Estimates of the accuracy of Indigenous identification in each area are critical for the utilisation of current and historical mortality data to assess differences in mortality for Indigenous people in each area.
- Descriptions of regional mortality rely on relatively clumsy allocation of regional category on the basis of Statistical Local Area, because the boundaries of SLAs and Remoteness categories seldom coincide exactly. Geocoding of residential location would allow more precise allocation, and would also facilitate more powerful epidemiological work (for example, identification of disease clusters), however, a move to geocoding would need to incorporate substantial confidentiality safeguards.
- While all of the causes of death described in this report are significant, two broad causes stand out as being of particular importance – circulatory disease and injury. Circulatory disease is important because of the large number of deaths involved, while injury is important because of the large number of ‘excess’ deaths outside Major Cities, the young age of many of the people affected and the trend for rates to remain unchanged or to increase over time. These two broad causes are responsible for 66% of all the ‘excess’ deaths that occur outside Major Cities.
- For many of the causes of death examined, rates for Indigenous people are much higher than for non-Indigenous people from any area. Elevated death rates in remote areas may be a consequence of the proportionally large number of Indigenous people in those areas, and high overall Indigenous mortality. Because of the proportionally lower numbers of Indigenous people in regional areas, the impact of high overall Indigenous mortality on death rates in these areas is probably relatively small.
- While access to health services, the higher risks associated with some occupations and with country driving likely to contribute to higher death rates outside Major Cities, other issues are also likely to be relevant. Strong influences on health outcomes are also likely to result from higher rates of smoking, physical inactivity, risky alcohol consumption and poorer nutrition, and lower rates of employment, income and education. At least for Indigenous people, disadvantages with regard to these issues, and issues around the social environment and lack of control over aspects of one’s life, potentially leading to a sense of hopelessness, have been cited as possible reasons for poorer health outcomes (ABS 2001c).

- Although comparison of death rates tells us something about gross health conditions, it tells little about other important issues. There may be substantial differences between areas, for example:
 - accessing speech therapy services for a young child;
 - getting an elderly person to rehabilitation services on a regular basis;
 - logistic and financial difficulties when a family member needs specialist care in a Major Cities hospital; and
 - whether people are living happy and fulfilling lives.
- The lower death rates of the aged in remote areas is assumed, in this report, to be due to the migration of the frail aged to less remote areas where they can access services. There is much anecdote, but little that has been published to support this hypothesis.
- This report does not include information on deaths due to occupational accidents. This is an important issue that requires further investigation.
- This report touches briefly on intra-regional variation in rates of death, that is, differences in mortality between areas within broad geographic zones. Further investigation of small area mortality patterns may be useful in better targeting interventions.
- The effect of income and education on regional differences in mortality has not been explored in this report. It is possible that these factors would explain some of the regional differences in mortality.
- Although this report describes, amongst others, high death rates due to ischaemic heart disease, 'other' circulatory disease, and motor vehicle accidents, it is not clear whether these differences are due to higher overall risk, or due to lower levels of access to health services or both. Further work to identify the contribution of risk and access would be useful.

References

- ABS 1999. The health and welfare of Australia's Aboriginal and Torres Strait Islander Peoples. ABS cat. no. 4704.0. Canberra: ABS.
- ABS 2000. Deaths, Australia. ABS cat. no. 3302. Canberra: ABS.
- ABS 2001a. Australian social trends. ABS cat. no. 4102.0. Canberra: ABS.
- ABS 2001b. Outcomes of ABS views on remoteness consultation, Australia. Information Paper. ABS cat. no. 1244.0.00.001. Canberra: ABS.
- ABS 2001c. The health and welfare of Australia's Aboriginal and Torres Strait Islander Peoples. ABS cat. no. 4704.0. Canberra: ABS.
- AIHW 2002a. Australia's health 2002. Canberra: AIHW.
- AIHW 2003a. Rural, regional and remote health: a study on mortality. AIHW cat. no. PHE 45. Canberra: AIHW.
- AIHW 2003b. Rural, regional and remote health: a guide to remoteness classifications and their application to 2001 Statistical Local Area boundaries. Canberra: AIHW.
- AIHW 2003c. Medical labour force, 2000. Bulletin no. 5. AIHW cat. no. AUS 33. Canberra: AIHW.
- AIHW 2003d. Health and community services labour force 2001. Canberra: AIHW.
- AIHW: Mathers C 1994. Health differentials among adult Australians aged 25-64 years. AIHW Health Monitoring Series No. 1. Canberra: AGPS.
- AIHW: Strong et al. 1998. Health in rural and remote Australia. AIHW cat. no. PHE 6. AIHW: Canberra.
- Brown WJ, Young AF & Byles JE 1999. Tyranny of distance? The health of mid-age women living in five geographical areas of Australia. *Australian Journal of Rural Health* 7(3):148-154.
- BRS (Bureau of Rural Sciences): Haberkorn G, Hugo G, Fisher M & Aylward R 1999. Country matters: social atlas of rural and regional Australia. Canberra: BRS.
- Department of Health and Aged Care (DHAC) and the National Key Centre for Social Applications of Geographical Information Systems (GISCA) 1999. Accessibility/Remoteness Index of Australia (ARIA). Occasional Papers Series no 6. Canberra: DHAC.
- DPIE (Department of Primary Industries and Energy) & DSHS (Department of Human Services and Health) 1994. Rural, remote and metropolitan areas classification. 1991 Census edition. Canberra: AGPS.
- Garnaut J, Connell P, Lindsay R & Rodriguez V 2001. Country Australia: influences on employment and population growth, ABARE Research Report 2001. Canberra: ABARE.