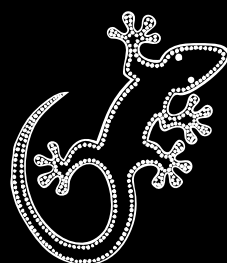


# Overview of Australian Indigenous health, 2009



Australian Indigenous  
HealthInfoNet

# **Overview of Australian Indigenous health status December 2009**

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*December 2009*

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# Overview of Australian Indigenous health status, December 2009

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## Australian Indigenous HealthInfoNet

The Australian Indigenous HealthInfoNet's mission is to contribute to improvements in Indigenous health by making relevant, high quality knowledge and information easily accessible to policy makers, health service providers, program managers, clinicians, researchers and the general community.

The HealthInfoNet addresses this mission by undertaking research into various aspects of Indigenous health and disseminating the results (and other relevant knowledge and information) mainly via its Internet site ([www.healthinfonet.ecu.edu.au](http://www.healthinfonet.ecu.edu.au)). The HealthInfoNet's research mainly involves analysis and synthesis of data and other information obtained from academic, professional, government and other sources, but it also undertakes some primary data collection and analysis.

The HealthInfoNet is a world leader in knowledge/research translation/transfer, the area of research which aims at transferring the results of pure and applied research into practice. In this research, the HealthInfoNet addresses the knowledge needs of its wide range of potential users.

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## Preface

This overview has been prepared by the Australian Indigenous Health*InfoNet* as a part of our efforts to contribute to improvements in Australian Indigenous health by making relevant, high quality knowledge and information easily accessible to policy makers, health service providers, program managers, clinicians, researchers and the general community.<sup>1</sup>

The main purpose of the overview is to provide a comprehensive summary of the most recent indicators of the health of Indigenous people. It is beyond the scope of the overview to analyse trends in the various indicators, so it tends to draw attention to the persisting poor health status of Australia's Indigenous peoples. It is important to acknowledge that some improvements have occurred in Indigenous health status – a brief summary of improvements is provided in the section entitled 'Concluding comments'.

Research for the overview involved the collection, collation, and analysis of a wide range of relevant information, including both published and unpublished material. Sources included government reports, articles in journals and other periodicals, books and book chapters, and reports from specific studies and projects.

The overview draws on information from the main administrative data collections (such as the birth and death registration systems and the hospital inpatient collections) and national surveys. Information from these sources has been published mainly in government reports, particularly those produced by the Australian Bureau of Statistics (ABS) and the Australian Institute of Health and Welfare (AIHW).

Importantly, the overview draws also on a wide variety of other information sources, including registers for specific diseases and other conditions, regional and local surveys, and numerous epidemiological and other studies examining particular diseases, conditions, and health determinants. Information from these sources is disseminated mainly through journals and similar periodicals, or in special reports (such as the annual reports of the Australia and New Zealand Dialysis and Transplant Registry (ANZDATA)).

A number of sections include the results of our own analyses of data obtained from a variety of sources. For example, estimates of the age-adjusted incidence of end-stage renal disease were made using notification data published by ANZDATA. Similarly, information about a number of communicable diseases was derived from data published by the National Centre for HIV Epidemiology and Clinical Research.

The initial sections provide information about the Indigenous population and various measures of population health status. Most sections about specific health conditions comprise an introduction about the condition and evidence of the current burden of the condition among Indigenous people.

Further information about the aspects summarised in this overview are included in the corresponding sections of the Health*InfoNet*'s website ([www.healthinfonet.ecu.edu.au](http://www.healthinfonet.ecu.edu.au)), on which updated versions of this overview will be made available.

We welcome your comments and feedback about the overview.

Neil Thomson, Director, on behalf of the Health*InfoNet* team

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<sup>1</sup> The term 'Indigenous' is used in this overview to refer generally to the two Indigenous populations of Australia – Australian Aboriginal people and Torres Strait Islanders.

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## Acknowledgements

Particular thanks are extended to:

- staff of the Australian Indigenous Health*InfoNet* for their assistance, support and encouragement in the preparation of this overview; and
- the Office for Aboriginal and Torres Strait Islander Health (OATSIH) within the Australian Department of Health and Ageing for their ongoing support of the work of the Health*InfoNet*.



# Overview of Australian Indigenous health status, December 2009

## Introduction

This overview of Australian Indigenous health draws largely on previously published information, some of which has been re-analysed to provide clearer comparisons between Indigenous and non-Indigenous people (for more details of statistics and methods, readers should refer to the original sources). Very little information is available separately for Australian Aboriginal people and Torres Strait Islanders, so no attempt has been made to provide separate summaries for these two sub-groups of the Indigenous population.

## Limitations of the sources of Indigenous health information

The assessment of Indigenous health status requires accurate information about the size of the population and the numbers of specific health conditions/occurrences. This information is required at national, regional, and local level (for more information about the assessment of population health status, see [2]).

There have been some improvements in recent years – both in estimates of the Indigenous population (the denominator for calculation of rates) and in the availability of data for a number of health conditions/occurrences (the numerators) – but there is still some uncertainty in most areas.

The Australian Bureau of Statistics (ABS) and the Australian Institute of Health and Welfare (AIHW) have been working with State and Territory authorities in recent years to improve the accuracy of Indigenous status in a number of health-related collections, including birth and death registrations, hospital administrative data, and the maternal/perinatal collection. Attention has been directed also to the data collections related to communicable diseases, cancer and to a number of other disease-specific collections. Indigenous people are not accurately identified in many of these collections, however, because of differences in the definitions used for Indigenous identification, and the failure, in many cases, to record a client's Indigenous status.

As a result, even for something as basic as mortality information, only 57% of projected Indigenous deaths were identified in 2000-2004 [3]. The level of identification was so low for most jurisdictions that the ABS's estimates of age-specific death rates in 2000-2004 were based only on the combined data from Qld (53% identification of projected deaths), WA (72%), SA (66%), and the NT (94%).

At 94%, the implied identification of Indigenous births was much better in 2000-2004 [4], but the level of identification in hospital admissions is very variable, with the overall level unlikely to be better than for deaths [5].

With these uncertainties, there must be some doubt about the precision of the various estimates of Indigenous health status. The differences between Indigenous and non-Indigenous people in the levels of most of these estimates are so great, however, that the slight imprecision in some estimates is of little importance.

## The context of Indigenous health

### Indigenous population

Estimates of the numbers of Aboriginal and Torres Strait Islander people for 2009 from the ABS indicate that there were 550,818 Indigenous people living in Australia at 30 June 2009 [6].<sup>2</sup> NSW had the largest Indigenous population with 161,910, followed by Qld (156,454), WA (74,859), and the NT (67,441) (Table 1). The NT had the highest proportion of Indigenous people among its population (30.2%) and Vic the lowest (0.7%).

---

<sup>2</sup> These figures are preliminary estimates of the Indigenous estimated resident populations based on the 2006 census counts.



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**Table 1** Estimated Indigenous population, Australia, by jurisdiction, 30 June 2009

Jurisdiction	Indigenous population	Proportion of Australian Indigenous population (%)	Proportion of jurisdiction population (%)
NSW	161,910	29.4	2.3
Vic	35,894	6.5	0.7
Qld	156,454	28.4	3.6
WA	74,859	13.6	3.4
SA	29,775	5.4	1.8
Tas	19,641	3.6	3.9
ACT	4,599	0.8	1.3
NT	67,441	12.3	30.2
Australia	550,818	100.0	2.5

Source: ABS, 2009 [6], ABS, 2009 [7]

- Notes:
- 1 The estimates of the resident Indigenous population, based on the 2006 Census counts make allowances for unknown Indigenous status and for net under-enumeration
  - 2 Australian population includes Jervis Bay Territory, the Cocos (Keeling) Islands, and Christmas Island
  - 3 Indigenous population figures based on June projections, total population figures based on demographic information from March 2009

The estimated Indigenous population increased by around 58,700 (13) between 2001 and 2006, with the largest increases documented for WA (18%), the NT (17%) and Qld (16%) [8].

The majority of Indigenous people live in cities and towns, but the Indigenous population is much more widely dispersed across Australia than is the non-Indigenous population. Slightly more than one-half of the Indigenous population lives in areas classified as 'major cities' or 'inner regional' areas, compared with almost nine-tenths of the non-Indigenous population [8]. (As well as these two classifications of 'remoteness' in terms of access to goods and services and opportunities for social interaction, the Australian Standard Geographical Classification (ASGC) has four other categories: 'outer regional', 'remote', 'very remote' and 'migratory' [9].) Almost one-quarter of Indigenous people live in areas classified as 'remote' or 'very remote' in relation to having 'very little or very restricted access to goods and services and opportunities for social interaction'. Only 2% of non-Indigenous people live in 'remote' or 'very remote' areas.

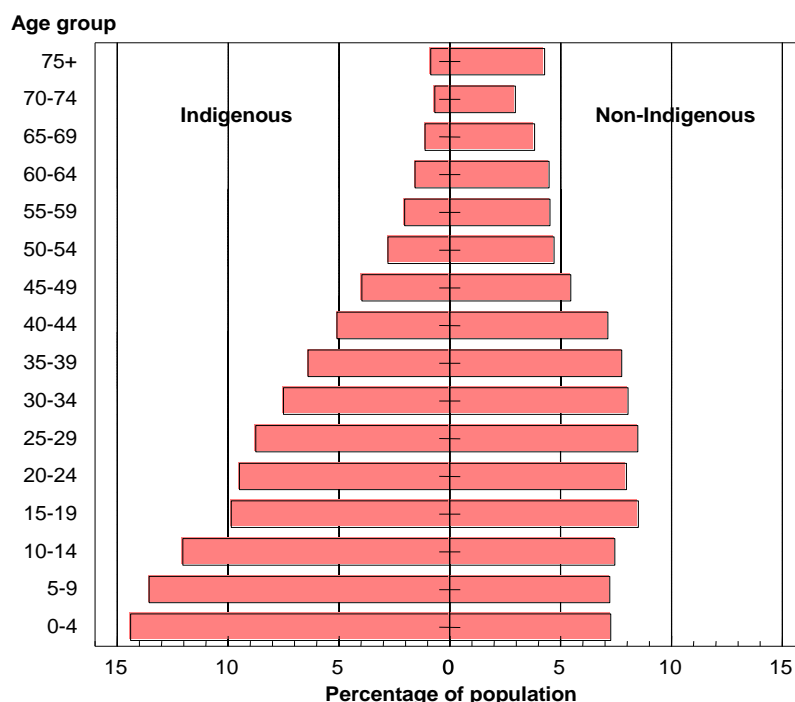
In terms of specific geographical areas, more than one-half of all Indigenous people live in nine of the 37 Indigenous Regions (based largely on the former Aboriginal and Torres Strait Islander Commission (ATSIC) regions): Sydney; Brisbane; Coffs Harbour; Perth; Townsville, Cairns; Adelaide; Tasmania; and Wagga Wagga [8].

Detailed population information is not available for 2009, but in 2006 there were around 463,900 were Aboriginal, 33,100 Torres Strait Islander, and 20,200 people of both Aboriginal and Torres Strait Islander descent [8]. Most Torres Strait Islander people live in Qld, with NSW the only other state with a large number of Torres Strait Islanders.

The Indigenous population is much younger overall than the non-Indigenous population [8]. According to the 2006 Australian census, about 37% Indigenous people were aged less than 15 years, compared with 19% of non-Indigenous people (Figure 1). About 3% of Indigenous people were aged 65 years or over, compared with 13% of non-Indigenous people.

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**Figure 1 Population pyramid of Indigenous and non-Indigenous populations, 2009**



Source: Derived from ABS, 2009 [6]

## The socioeconomic context

There is an irrefutable relationship between the social inequalities experienced by Indigenous people and their current health status [10]. This social disadvantage, directly related to dispossession and characterised by poverty and powerlessness, is reflected in measures of their education, employment, and income. Thus, prior to presenting the key indicators of Indigenous health status, it is important to provide a brief summary of the context within which these indicators should be considered.

The key measures in these areas for Indigenous people nationally include:

### Education

According to the 2006 Australian census:

- 88% of five year old Indigenous children and 95% of five year old non-Indigenous children were attending an educational institution;
- 2.5% of the Indigenous population had not attended school compared with 0.9% of the non-Indigenous population;
- one-third (32%) of Indigenous people reported year 10 as their highest year of school completion and less than one-quarter (22%) completed year 12 compared with almost one-half (47%) of non-Indigenous people;
- one-quarter (25%) of Indigenous people reported having a post school qualification, compared with almost one-half (47%) of non-Indigenous people; and
- 4.1% of non-Indigenous people reported attending a university, compared with 1.7% of Indigenous people [11].

An ABS school report revealed:

- in 2008 the apparent retention rate for Indigenous students from year 7/8 to year 10 was 89% and from year 7/8 to year 12 was 46%; and
- for non-Indigenous students, the apparent retention rate from year 7/8 to year 10 was 100% compared with 76% for non-Indigenous students from year 7/8 to year 12 [12].

The 2008 national report on schooling in Australia showed:

- 68% of Indigenous students in year three and 63% in year five achieved the national reading benchmark, compared with 94% and 93% respectively of all Australian students;

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- 65% of year three Indigenous students and 64% of year five Indigenous students achieved the national benchmark for grammar and punctuation compared with 93% of all year three students and 94% of year five students; and
- 79% of Indigenous students in year three and 69% in year five achieved the national numeracy benchmark, compared with 96% and 94% respectively of all Australian students [13].

### Employment

According to the 2006 Australian census:

- 46% of Indigenous people aged 15 years or older were employed, 8.5% were unemployed, and 46% were not in the labour force. In comparison, 62% of non-Indigenous people aged 15 years or older were employed, 3.3% were unemployed, and 35% were not in the labour force;
- excluding people employed under the Community Development Employment Project (CDEP) scheme increases the unemployment rate for Indigenous people to approximately 25% - five times the rate of 5% for non-Indigenous people; and
- the most common occupation classification of employed Indigenous people was 'labourer' (24%). The most common occupation classification of employed non-Indigenous people was 'professional' (20%) [11].

### Income

According to the 2006 Australian census:

- the mean equivalised gross household income for Indigenous persons was \$460 per week – approximately 62% of that for non-Indigenous people (\$740);
- 45% of the Indigenous population were in the lowest income quintile (mean equivalised gross household income of less than \$315 per week). The non-Indigenous population was almost evenly distributed among the five income quintiles;
- the median gross individual income for Indigenous people was \$278 per week compared with \$473 for non-Indigenous people; and
- professionals' were the highest median gross weekly income earners and 'labourers' were the lowest but Indigenous people earned 28% less and 16% less than non-Indigenous people in these occupations [11].

## Births and pregnancy outcome

In 2008, there were 15,011 births registered in Australia with one or both parents identified as Indigenous (5% of all births registered) [14], but this figure probably underestimates the true number slightly as Indigenous status is not always identified, and there may be a lag in birth registrations as it has been estimated that only 96% of Indigenous births in 2002-2006 were correctly identified as such. Completeness of identification varies across the country, with only Qld, Vic, WA, SA and the NT having levels above 90%.

Both parents were identified as Indigenous in 32% of these births occurring in 2008, only the mother in 41% (including births where paternity was not acknowledged and those where the father's Indigenous status was unknown), and only the father in 27% [14].

### Age of mothers

In 2008, Indigenous women tended to have more babies and to have them at younger ages than did non-Indigenous women – teenagers had one-fifth of the babies born to Indigenous women, compared with only 4% of those born to non-Indigenous mothers [14]. The median age of Indigenous mothers was 24.7 years, compared with 30.7 years for all women. The highest birth rates (known technically as fertility rates) were for the 20-24 years age group for Indigenous women and in the 30-34 years age group for non-Indigenous women (Table 2). Fertility of teenage Indigenous women (75 babies per 1,000 women) was more than four times the fertility rate for all teenage women (17 babies per 1,000).

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## Total fertility rates

In 2008, total fertility rates were 2,515 births per 1,000 Indigenous women and 1,969 per 1,000 for all mothers (Table 3) [14]. The highest Indigenous total fertility rate for Indigenous women was for the WA (3,160 babies per 1,000), followed by SA (2,936 per 1,000), Qld (2,728 per 1,000), the NT (2,419 per 1,000), Vic (2,373 per 1,000) and NSW (2,146 per 1,000).

## Birthweights

The average birthweight of babies born to Indigenous mothers in 2007 was 3,182 grams, 200 grams less than the average for babies born to non-Indigenous mothers (3,382 grams) [15]. Babies born to Indigenous women in 2007 were twice as likely to be of low birthweight (LBW) (12.5%) than were those born to non-Indigenous women (5.9%). (LBW, defined as a birthweight of less than 2,500 grams, increases the risk of death in infancy and other health problems.) The low-birthweight proportions for babies born to Indigenous women were highest for WA and SA (both 16.2%).

**Table 2 Age-specific fertility rates, by Indigenous status of mother, selected jurisdictions, Australia, 2008**

Status of mother / age group (years)	Jurisdiction						
	NSW	Vic	Qld	WA	SA	NT	Aust
Indigenous							
15-19	57	51	77	117	94	91	75
20-24	121	127	166	180	155	156	147
25-29	117	111	141	173	148	116	132
30-34	84	112	106	98	117	75	93
35-39	40	59	46	53	55	36	45
40-44	10	15	10	12	18	11	11
All mothers							
15-19	14	11	25	23	18	52	17
20-24	53	42	74	67	58	105	57
25-29	102	93	120	117	111	111	106
30-34	127	132	125	132	127	105	128
35-39	73	78	64	71	62	58	71
40-44	15	16	12	13	12	13	14

Source: ABS, 2009 [14]

- Notes:
- 1 Rates per 1,000 women in each age group
  - 2 Figures in this table are restricted to those jurisdictions with estimated identification of Indigenous births of around 90% or higher

**Table 3 Total fertility rates, by Indigenous status of mother, selected jurisdictions, Australia, 2008**

Status of mother	Jurisdiction						
	NSW	Vic	Qld	WA	SA	NT	Aust
Indigenous	2,146	2,373	2,728	3,160	2,936	2,419	2,515
All mothers	1,917	1,861	2,100	2,120	1,952	2,224	1,969

Source: ABS, 2009 [14]

- Notes:
- 1 Total fertility rate is the number of children born to 1,000 women at the current level and age pattern of fertility
  - 2 Figures in this table are restricted to those jurisdictions with estimated identification of Indigenous births of around 90% or higher

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**Table 4 Mean birthweights and percentage of low birthweight for babies born to Indigenous and non-Indigenous mothers, selected jurisdictions, Australia, 2007**

	NSW	Vic	Qld	WA	SA	NT	Aust
<b>Indigenous mothers</b>							
Mean birthweight	3,217	3,216	3,214	3,107	3,067	3,133	3,182
% low birthweight	11.2	12.0	11.2	16.2	16.2	12.5	12.5
<b>Non-Indigenous mothers</b>							
Mean birthweight	3,382	3,370	3,385	3,357	3,359	3,290	3,374
% low birthweight	5.7	6.3	6.3	6.4	6.4	7.9	6.2

Source: Derived from Laws and Sullivan, 2009 [15]

- Notes:
- 1 Low birthweight is defined as less than 2,500 grams
  - 2 Mean birthweights and low birthweight proportions for babies born to non-Indigenous mothers have been estimated from published figures for Indigenous and all mothers

Risk factors for LBW include socioeconomic disadvantage, the size and age of the mother, the number of babies previously born, the mother's nutritional status, illness during pregnancy and the duration of the pregnancy [16]. A mother's alcohol consumption and use of tobacco and other drugs during pregnancy can also impact on the size of her baby.

Tobacco, in particular, has a major impact on birthweight. The mean birthweight of live babies born in 2001-2004 to Indigenous women who smoked was 3,037 grams, more than 250 grams lighter than those born to Indigenous women who did not smoke (3,290 grams) [17]. The comparable figures for live babies born to non-Indigenous women were 3,210 and 3,416 grams respectively. The impact of tobacco smoking during pregnancy was seen also in the proportions of low birthweight liveborn babies – 16% and 10% respectively for Indigenous and non-Indigenous women who smoked during pregnancy, and 10% and 5% for those who didn't.

The 2000-2001 Western Australian Aboriginal Child Health Survey (WAACHS) reported slightly higher average birthweights – 3,100 grams for babies born to mothers who used tobacco in pregnancy and 3,310 grams for those whose mothers did not [18]. The lowest average birthweights reported in the WAACHS were for babies whose mothers used marijuana with tobacco (3,000 grams) or marijuana with both tobacco and alcohol (2,940 grams).

## Mortality

Major impediments to producing a complete picture of Indigenous mortality in Australia are the incomplete identification of Indigenous status in death records, and the experimental nature of the recently adopted population estimates [19]. As a result, the 2,472 deaths registered in 2008 where the deceased person was identified as Indigenous is certainly an underestimate of the actual number of Indigenous deaths.

Assessment by the ABS of the completeness of recording of Indigenous deaths is based on a comparison of registered Indigenous deaths with the 2006 census [20]. The estimated completeness of identification of Indigenous people in death registrations has improved since the 1990s, mostly because of improvements in Qld and NSW. The Australia-wide Indigenous deaths notification rate in 2006-2007 was 0.92. There is a considerable variation in rates from each state and territory; WA (rate 1.11) and the NT (rate 1.09) had rates more than 1.0, indicating an over-representation of Indigenous deaths (the number of persons identified as Indigenous in death registration was greater than those identified as Indigenous in the 2006 census). NSW had a rate of 0.87 and Qld had a rate of 0.94. Vic, SA, Tas, and the ACT had small numbers of Indigenous deaths and had a group rate of 0.65. Reflecting the various levels of under-identification of Indigenous status in death registrations, caution needs to be exercised in interpretation of the figures presented in this report. It is possible that the true figures could be up to 30% higher than those presented here.

The poor coverage, coupled with the need to update the procedures for estimating coverage based on population figures derived from the 2006 census, has meant that the recent ABS publications do not include detailed tables of Indigenous deaths, nor information about overall death rates. As a result, there is no consistency about the extent of information available for recent years. Reflecting this, readers should be aware that the following sections vary in terms of the years to which they relate.

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## Standardised death rates

After adjusting for the differences in the age structures of the Indigenous and non-Indigenous populations and for the incomplete identification of Indigenous status in death registrations, the numbers of deaths of Indigenous people in 2000-2004 were around four times higher than the numbers expected from the age-sex-specific death rates for the total Australian populations (Table 5) [3, 21-24]. (The ABS warns that the projected numbers of deaths should be interpreted with caution [21]. It is possible that the standardised mortality ratios (SMRs) based on the projected numbers of deaths may over-estimate the differences between Indigenous and total population mortality, but it is likely that the true ratios will be closer to these estimates than to those based solely on death registrations.)

### Box 1

Comparison of overall death rates needs to adjust for differences in the age structures of the Indigenous and non-Indigenous populations in a process known as standardisation. The lack of detailed information about Indigenous deaths in terms of sex and age means that it is not possible to estimate standardised death rates, but it is possible to compare the numbers of registered and projected Indigenous deaths with the numbers expected from the corresponding age-sex-specific death rates for the total populations. This comparison produces what are called standardised mortality ratios (SMRs). The comparisons reported here are based on the 2002 age-specific death rates for the corresponding total Australian populations.

**Table 5 Registered and projected Indigenous deaths and standardised mortality ratios (SMRs), by sex and jurisdiction, Australia, 2000-2004**

	Registered deaths					
	Number			SMR		
	Persons	Males	Females	Persons	Males	Females
Australia	10,550	6,037	4,513	2.3	2.2	2.5
NSW	2,445	1,412	1,033	1.9	1.8	2.0
Vic	477	---	---	1.4	---	---
Qld	2,838	1,601	1,237	2.3	2.2	2.5
WA	1,861	1,068	793	2.7	2.5	2.8
SA	644	359	285	2.6	1.9	2.8
NT	2,225	1,285	940	3.9	3.7	4.1
	Projected deaths					
	Number			SMR		
	Persons	Males	Females	Persons	Males	Females
Australia	18,495	10,584	7,911	4.0	3.9	4.4
NSW	5,371	3,102	2,269	4.1	3.9	4.4
Vic	1,144	---	---	4.0	---	---
Qld	5,312	2,997	2,315	4.4	4.1	4.7
WA	2,584	1,483	1,101	3.7	3.5	4.0
SA	982	547	435	3.9	3.6	4.3
NT	2,365	1,366	999	4.1	3.9	4.4

Source: Derived from ABS 2000-2005 [3, 21-26]

Notes: 1 Figures for Australia include the Australian Capital Territory, Tasmania and Other Territories (Christmas Island, Cocos (Keeling) Islands and the Jervis Bay Territory)

## Expectation of life

In 2009, the ABS revised its estimates for expectation of life at birth for Indigenous Australians [20]. The revised estimates have significantly increased the life expectancy for Indigenous males and females. Importantly, comparisons

# Overview of Australian Indigenous health status, December 2009

between the original and revised estimates should not be interpreted as a change in Indigenous life expectancy, but should be seen as the result of a revision in statistical methods used to calculate life expectancy.

After adjustment for the underestimate of the number of deaths identified as Indigenous, the ABS estimates that Indigenous males born in 2005-2007 could be expected to live to 67.2 years, about 11.5 years less than the 78.7 years expected for non-Indigenous males (Table 6) [20]. The expectation of life at birth of 72.9 years for Indigenous females in 2005-2007 was almost 10 years less than the expectation of 82.6 years for non-Indigenous females.

**Table 6**      **Expectation of life at birth for Indigenous people and the total population, Australia and selected States, 2005-2007**

Population	Males	Females
<b>Indigenous</b>		
Australia	67.2	72.9
NSW	69.9	75.0
Qld	68.3	73.6
WA	65.0	70.4
NT	61.5	69.2
<b>Total population</b>		
Australia	78.7	82.6

Source: ABS, 2009 [20]

Notes:    1    The Australian Indigenous estimates are based on the adjusted numbers of deaths for NSW, Vic, Qld, WA, SA and the NT, and do not include deaths for the ACT and Tasmania

## Age at death

For those jurisdictions with reasonable information about Indigenous deaths, the median age at death in 2008 for Indigenous males ranged from 49.0 years for those living in SA to 59.9 years for those living in NSW [19]. (The median age at death is the age below which 50% of people die. Because the measure partly reflects the age structures of the respective populations, it is a less precise measure than age-specific death rates, which are summarised below.) These levels are around 20 years less than those for non-Indigenous males, which ranged from 66.3 to 79.2 years. The median age at death for Indigenous females in 2008 ranged from 53.5 years for SA to 63.8 years for NSW. These levels are more than 20 years less than those for non-Indigenous females, which ranged between 75.7 and 84.6 years.

In 2006-2008 the age-specific death rates were higher for Indigenous people than for non-Indigenous people across all age groups, but the rate ratios were particularly high in the young and middle adult years (Table 7) [19]. (These ratios, being based on the numbers of deaths registered, are likely to underestimate the true differences between death rates for Indigenous people and the total population by around 30%.)

## Infant mortality

The infant mortality rate is the number of deaths of children under one year of age in a calendar year per 1,000 live births in the same calendar year. For those jurisdictions with reasonable information about Indigenous deaths in 2006-2008, the highest Indigenous infant mortality rate was in the NT (13.6) and the lowest in SA (6.4) (Table 8) [19]. These rates are considerably higher than those for the total population in these jurisdictions, which range from the NT (7.8) to WA and SA (both 3.5).



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**Table 7** Indigenous and total population age-specific death rates (registered deaths) and Indigenous:non-Indigenous rate ratios, by sex, NSW, Qld, SA, WA, and the NT, 2006-2008

Age group (years)	Indigenous		Non-Indigenous		Rate ratio	
	Males	Females	Males	Females	Males	Females
<b>NSW/Qld</b>						
0	8.5	7.3	5.1	3.8	1.7	1.9
1-4	51.3	33.6	23.9	18.4	2.1	1.8
5-14	20.4	12.5	10.9	8.4	1.9	1.5
15-24	103.8	46.3	56.9	23.0	1.8	2.0
25-34	199.2	114.7	81.1	32.9	2.5	3.5
35-44	398.7	258.1	127.7	66.5	3.1	3.9
45-54	797.6	495.9	281.1	167.9	2.8	3.0
55-64	1,651.6	1,144.0	670.5	396.5	2.5	2.9
65+	5,325.5	4,246.4	4,251.6	3,741.8	1.3	1.1
<b>SA/WA/NT</b>						
0	11.9	9.5	3.2	3.2	3.7	2.9
1-4	55.2	56.9	24.4	13.9	2.3	4.1
5-14	41.2	20.9	8.1	7.3	5.1	2.9
15-24	253.2	134.6	65.3	25.9	3.9	5.2
25-34	503.5	280.4	97.0	36.7	5.2	7.6
35-44	1,005.6	507.7	133.2	72.3	7.6	7.0
45-54	1,632.9	1,048.6	274.2	164.0	6.0	6.4
55-64	2,826.3	2,057.2	644.4	383.2	4.4	5.4
65+	7,278.2	6,256.2	4,185.8	3,689.4	1.7	1.7

Source: ABS, 2009 [19]

- Notes:
- 1 Rates are infant deaths per 1,000 live births for the 0 years age group and deaths per 100,000 population for all other age groups.
  - 2 Rate ratio is the Indigenous rate divided by the non-Indigenous rate

**Table 8** Infant mortality rates, Indigenous and total populations and rate ratios, selected jurisdictions, 2003-2008

Jurisdiction	Indigenous	Total population	Rate ratio
NSW	7.7	4.5	1.7
Qld	7.9	5.1	1.5
WA	10.1	3.5	2.9
SA	6.4	3.5	1.8
NT	13.6	7.8	1.7

Source: Derived from ABS, 2009 [19]

- Notes:
- 1 Infant mortality rate is the number of infant deaths per 1,000 live births
  - 2 The Indigenous rates are likely to be under-estimated, due to the incomplete identification of Indigenous status on births and deaths records

## Causes of death

For deaths identified as Indigenous in 2001-2005, cardiovascular disease (also known as ‘diseases of the circulatory system’, which includes heart disease and stroke) was the leading cause of death for Indigenous males and females living in Qld, WA, SA and the NT (Table 9) [27]. The number of deaths recorded for Indigenous males was 3.2 times the number expected from the age-cause-specific rates for non-Indigenous males, and number recorded for Indigenous females 2.7 times the number expected from the age-cause-specific rates for non-Indigenous females. (See Box 1 for further information about these standardised mortality ratios (SMRs)). The estimates quoted here have not been

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adjusted for the likely under-identification of Indigenous people in death registration systems, so SMRs could be up to 30% higher) [28].

For Indigenous males, the next most frequent causes of death were injuries (including transport accidents, intentional self-harm and assault) (SMR 2.9), malignant neoplasms (cancers) (SMR 1.5), diseases of the respiratory system (SMR 4.3), and endocrine, nutritional and metabolic disorders (mainly diabetes) (SMR 7.5) [27]. For Indigenous females, the most frequent causes of death after cardiovascular disease were malignant neoplasms (SMR 1.6), endocrine, nutritional and metabolic disorders (SMR 10.1, external causes (SMR 3.5), and diseases of the respiratory system (SMR 3.6).

## Maternal mortality

In Australia in 2003-2005 (the most recent period for which detailed data are available), six (10%) of the 60 maternal deaths where Indigenous status was known were of Indigenous women (Indigenous status was not reported in 8% of the deaths) [29].

Reflecting the higher rate of confinements among Indigenous women, the maternal mortality ratio for Indigenous women in 2003-2005 was 21.5 deaths per 100,000 confinements, almost three times higher than the ratio of 7.9 per 100,000 for non-Indigenous women (Table 10) [29]. For direct maternal deaths, the ratio for Indigenous women was 7.2 per 100,000 compared with 3.6 per 100,000 for non-Indigenous women.

**Table 9 Indigenous:non-Indigenous standardised mortality ratios, by cause and sex, Qld, WA, SA and the NT, 2001-2005**

Cause of death	Males	Females
	SMR	SMR
Circulatory	3.2	2.7
Injuries	2.9	3.5
Cancer	1.5	1.6
Endocrine, nutritional and metabolic	7.5	10.1
Respiratory	4.3	3.6
Digestive	5.8	5.1
Genitourinary	4.8	6.0
Nervous system	2.9	1.6
Mental and behavioural disorders	5.8	3.1
Infectious/ parasitic	5.1	5.0
All causes	3.0	2.9

Source: AIHW, 2008 [30]

- Notes:
- 1 The standardised mortality ratio (SMR) is the ratio of the number of Indigenous deaths occurring to the number expected if the age, sex and cause-specific rates of the Australian total population applied to the Indigenous population
  - 2 Due to under-identification of Indigenous deaths, these numbers and SMRs are likely to underestimate the true differences between the Indigenous and non-Indigenous populations by around 30%

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**Table 10 Numbers of confinements, maternal deaths and maternal mortality ratios, by Indigenous status, Australia, 2003-2005**

Indigenous status	Confinements	Maternal deaths	Maternal mortality ratio
<b>Indigenous</b>	27,901		
Direct and indirect maternal deaths		6	21.5
Direct maternal deaths		2	7.2
<b>Non-Indigenous</b>	745,347		
Direct and indirect maternal deaths		59	7.9
Direct maternal deaths		27	3.6

Source: Derived from Sullivan, Hall, King, 2008 [29]

- Notes:
- 1 Maternal mortality ratio is the number of maternal deaths divided by the number of confinements (in 100,000s). Due to some uncertainty about the numbers of Indigenous deaths and confinements, some caution must be exercised in the interpretation of the ratios
  - 2 The non-Indigenous numbers and ratios include deaths for which Indigenous status was not known. This probably results in a slight, unknown over-estimate, and a resultant under-estimate of the differences between Indigenous and non-Indigenous women

## Hospitalisation

Statistics on hospital admissions and procedures provide some insights into ill-health in the population. They are, however, quite a poor reflection of the extent and patterns of treatable illness in the community, because they represent only illness that is serious enough to require hospitalisation and are influenced to some degree by the geographic accessibility of hospitals.

Another limitation of hospital statistics as an indicator of the health of the public is that they relate to episodes of hospitalisation rather than individual patients. Thus, multiple admissions by a relatively small number of patients—as occurs for end-stage renal disease, for example—limit the inferences that can be drawn about overall health patterns from aggregated statistics. These statistics are, of course, useful in assessing the need for health services, but of far less use in assessing health.

As is the case with other major health-related data collections (such as births and deaths), the identification of Indigenous status in the hospital data collection is incomplete. During 2007-2008, the AIHW conducted audits to assess the level of under-identification of Indigenous status in each state and territory and found that NSW, Vic, Qld, WA, SA and the NT had adequate identification, with 20% or less under-identification of Indigenous status [31, 32]

## Separation rates

Of the 7.58 million hospital separations for NSW, Vic, Qld, WA, SA and the NT during 2007-08, 271,290 (3.6%) were identified as Indigenous, with 41% of separations for Indigenous patients being for overnight stays (Table 11) [32].

The overall age-standardised separation rate of 916 per 1,000 for the Indigenous population was 2.6 times that of the non-Indigenous population (357 per 1,000) (Table 11) [32]. The age-standardised separation rate for Indigenous people living in the NT was 1,670 per 1,000, 7.3 times that rate of 228 per 1,000 for non-Indigenous people.

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**Table 11 Hospitalisation: separations and age-standardised separation rates, by Indigenous status, and Indigenous:non-Indigenous rate ratios, NSW, Vic, Qld, WA, SA and the NT, 2007-08**

Jurisdiction	Indigenous		Non-Indigenous		Rate ratio
	Number	Rate	Number	Rate	
NSW	54,189	566	2,242,332	320	1.8
Vic	12,970	684	2,118,578	396	1.7
Qld	69,305	868	1,451,366	374	2.3
WA	54,817	1,185	728,803	354	3.3
SA	18,446	1,000	567,474	350	2.9
NT	61,563	1,671	28,687	228	7.3
All jurisdictions	271,290	916	7,137,240	357	2.6

Source: AIHW, 2009 [32]

- Notes:
- 1 Rates per 1,000 population have been standardised using the population estimates at 30 June 2005
  - 2 Non-Indigenous rates, but not numbers, include separations for which Indigenous status was not stated
  - 3 Rate ratio is the Indigenous rate divided by the non-Indigenous rate
  - 4 Numbers and rates for the NT are for public hospitals only
  - 5 The incomplete identification of Indigenous status means that these figures under-estimate the true difference between Indigenous and non-Indigenous rates, particularly for Qld, WA and SA

## Age-specific separation rates

Separation rates were higher for Indigenous people living in NSW, Vic, Qld, WA, SA and the NT in 2007-08 than for non-Indigenous people for virtually all age groups, with the highest differences in the middle adult years (Table 12) [32].

## Causes of hospitalisation

In 2007-08 the most common reason of hospitalisation for Indigenous people living in NSW, Vic, Qld, WA, SA and the NT was 'care involving dialysis' accounting for 43% of Indigenous separations (115,279 separations) [32]. Many of these separations involved repeat admissions for the same people, some on an almost daily basis. The ICD group 'Injury, poisoning and certain other consequences of external causes' (including motor vehicle accidents, assaults, self-inflicted harm and falls) was the next most common cause of hospitalisation for Indigenous people, being responsible for 19,919 separations (7.3% of all separations, and 12.8% of separations excluding those for dialysis) (Table 13).

Excluding separations for dialysis and pregnancy-related conditions, most of which involved normal deliveries, the next leading causes of hospitalisation for Indigenous people were for respiratory conditions (responsible for more than 16,600 separations – 10.6% of separations excluding those for dialysis) and digestive diseases (more than 14,000 separations – 9.2% of separations excluding those for dialysis) (Table 13) [32].

Separation rates were higher for Indigenous people than for non-Indigenous people for all main ICD groups except for digestive disorders.

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**Table 12 Age-specific hospital separation rates, by Indigenous status and sex, and Indigenous:non-Indigenous rate ratios, NSW, Vic, Qld, WA, SA and the NT, 2007-08**

Age group (years)	Males			Females		
	Indigenous rate	Non-Indigenous rate	Rate ratio	Indigenous rate	Non-Indigenous rate	Rate ratio
0-4	363	273	1.3	183	205	0.9
5-14	117	95	1.2	349	75	4.7
15-24	160	135	1.2	422	226	1.9
25-34	343	151	2.3	666	375	1.8
35-44	728	212	3.4	869	332	2.6
45-54	1,186	317	3.7	1,263	338	3.7
55-64	1,903	561	3.4	1,067	493	2.2
65-74	2,359	952	2.5	2,376	764	3.1
75+	2,388	1,483	1.6	1,693	1,047	1.6

Source: Derived from AIHW, 2009 [32]

- Notes:
- 1 Rates per 1,000 population
  - 2 Rate ratio is the Indigenous rate divided by the non-Indigenous rate
  - 3 Rates for the NT are for public hospitals only
  - 4 Due to the incomplete identification of Indigenous status, these figures probably under-estimate the true difference between Indigenous and non-Indigenous rates by 20-25%

**Table 13 Hospitalisation: leading causes of Indigenous separations (excluding dialysis): numbers, proportions of separations and Indigenous:non-Indigenous ratios, NSW, Vic, Qld, WA, SA and the NT, 2007-08**

Principal diagnosis	Number of separations	Proportion of separations (excl dialysis)	Ratio
Injury/poisoning	19,919	12.8	2.0
Pregnancy-related	19,333	12.4	1.4
Respiratory diseases	16,601	10.6	2.9
Digestive diseases	14,325	9.2	1.0
Symptoms, signs not elsewhere classified	11,875	7.6	1.6
Circulatory diseases	8,552	5.5	1.8
Mental & behavioural disorders	11,283	7.2	1.9
Diseases of the skin & subcutaneous tissue	6,372	4.1	2.6
Genitourinary diseases	6,533	4.2	1.2
Infectious/parasitic diseases	5,418	3.5	2.6
Endocrine (incl diabetes)	5,443	3.5	3.2
Other	30,357	19.4	---
All causes, excluding dialysis	156,011	100.0	1.4

Source: Derived from AIHW, 2009 [32]

- Notes:
- 1 Excludes hospitalisation for dialysis
  - 2 Ratios are the standardised separation rates for Indigenous people divided by the standardised separation rates for non-Indigenous people
  - 3 Due to the incomplete identification of Indigenous status, these figures probably under-estimate the true difference between Indigenous and non-Indigenous rates by 20-25%

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## Selected health conditions

### Cardiovascular disease

Cardiovascular disease (CVD) presents a significant burden for Indigenous people in terms of prevalence, hospitalisation, and mortality [33].

The conventional risk factors for cardiovascular disease can be divided into two main categories: behavioural and biomedical. Behavioural risk factors are based on an individual's behavior, but can be influenced by other underlying social, economic, psychological and cultural factors. Behavioural factors include tobacco smoking, physical inactivity, poor nutrition and risky alcohol consumption. Biomedical risk factors, such as high blood cholesterol, can be influenced by modifications to behaviour, lifestyle or use of medical interventions, and include high blood pressure (hypertension), high blood cholesterol, overweight and obesity, diabetes and chronic kidney disease [33].

Other factors that have also been recognised as important contributors to the development of cardiovascular disease among Indigenous people include:

- cultural and historical factors, such as loss of land, and disruptions to culture, language and identity [33, 34];
- environmental and socioeconomic factors, such as poor housing, low education and income [33];
- psychosocial stressors, such as death of a family member or close friend, serious injury or disability [33]; and
- limited access to health care, both preventive and clinical [35, 36].

#### *Extent of cardiovascular disease among Indigenous people*

The most recent source of information about the extent of CVD among Indigenous people is the National Aboriginal and Torres Strait Islander Health Survey (NATSIHS) undertaken by the ABS in 2004-2005 [37]. Almost one-in-eight Indigenous people reported having a long-term heart or related condition, with the proportion being slightly higher for those living in remote areas (14%) than in non-remote areas (11%).

The proportions represent a slight, but not statistically significant, increase from those reported to the 2001 NHS.

After adjusting for differences in the age structures of the Indigenous and non-Indigenous populations, heart and circulatory problems/diseases were around 1.3 times more common for Indigenous than for non-Indigenous people [37]. Hypertensive disease was 1.5 times more common for Indigenous than for non-Indigenous people, and other diseases of the heart and circulatory system 1.2 times more common.

Overall, a lower proportion of Torres Strait Islander (9%) than Aboriginal people (12%) reported having a heart and circulatory problem/disease, but the proportion was 11% for Torres Strait Islanders living in the Torres Strait area [37].

There were 8,552 hospital separations identified as Indigenous for 'diseases of the circulatory system' in NSW, Vic, Qld, WA, SA and the NT (public hospitals only) in 2007-08 at a rate of 1.8 times that of non-Indigenous people [32, 33].

For coronary heart disease, there were almost 6,000 admissions to hospital of Indigenous people in NSW, Vic, Qld, WA, SA and the NT in the two-year period July 2004 to June 2006 [32]. Of these admissions, almost 2,550 were for ischaemic heart disease. Admission rates for Indigenous males were 1.7 times higher for ischaemic heart disease and 2.7 times higher for acute myocardial infarction than the corresponding rates for non-Indigenous males.

For cerebrovascular disease (including stroke) there were almost 1,150 admissions to hospital of Indigenous people in NSW, Vic, Qld, WA, SA and the NT in the two-year period July 2004 to June 2006 [32]. Admission rates for Indigenous males were 1.6 times higher for cerebrovascular disease and 1.9 times higher for stroke than the corresponding rates for non-Indigenous males. The rates for Indigenous females were 2.1 and 2.2 times higher than those for non-Indigenous females.

Hospitalisation rates for hypertension for Indigenous people living in NSW, Vic, Qld, WA, SA and the NT in the two-year period July 2004 to June 2006 were considerably higher than those for non-Indigenous people; 3.4 times higher for males and 4.0 times higher for females overall [32]. In the age groups 25-34, 35-44 and 45-54 years the rates were between five and seven times higher for males and between eight and 11 times higher for females.

At 31 December 2006, there were almost 1,300 Indigenous people living in the Top End of the NT and the NT part of central Australia registered as having Rheumatic Heart Disease (RHD) [32]. Almost two-thirds (65%) of these people were females. The overall prevalences of RHD were 1.6% for Indigenous males and 3.0% for Indigenous females, 26 times and 27 times higher, respectively, than the prevalences for non-Indigenous males and females.

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CVD was the leading cause of death for Indigenous people living in Qld, WA, SA and the NT in 2000-2004, with the numbers of deaths registered being 3.1 times the number expected from non-Indigenous rates for Indigenous males and 2.6 times for Indigenous females (Table 9) [38]. The number of Indigenous deaths from CVD was more than three times the number expected from the rates for the non-Indigenous population. Ischaemic heart disease (particularly heart attacks) was responsible for 63% of the deaths from cardiovascular disease of Indigenous males and for 50% of those of Indigenous females [39]. Cerebrovascular disease (stroke) was responsible for 15% of the deaths from cardiovascular disease of Indigenous males and for 20% of those of Indigenous females.

The striking difference between Indigenous and non-Indigenous people in CVD mortality is the much greater impact among young and middle-aged Indigenous adults. For all CVD, the death rates for Indigenous people living in Qld, WA, SA and the NT in 2002-2005 were 7 to 12 times higher than those for non-Indigenous people in the 35-44 and 45-54 year age groups [33]. The death rates for Indigenous people in these age groups were similar to those for non-Indigenous people around 20 years older.

### Cancer

The impact of cancer on Indigenous people often attracts much less attention than it deserves, for two main reasons. First, the level of identification of Indigenous people in cancer notifications is known to be poor [40, 41]. There are currently no national data on cancer incidence in Indigenous Australians due to poor data quality in several jurisdictions and for those Indigenous patients who are registered, there is concern that not all are correctly identified as Indigenous [41]. Identification of Aboriginal and Torres Strait Islander people is not yet included on pathology forms and the extent to which Aboriginal and Torres Strait Islander cancer patients are identified in hospital inpatient statistics varies across Australia [30] but Indigenous identification in the registries has been improving [27]. Second, the fact that cancer has often been reported in terms of the proportions of deaths it causes (19% of Indigenous deaths compared with around 30% of non-Indigenous deaths in Australia [42]) rather than by rates, has tended to give the erroneous impression that cancer does not have a great impact among Indigenous people. Alternative analyses, however, suggest that there are around 45% more cancer deaths among Indigenous Australians than expected on the basis of non-Indigenous rates [39, 40].

#### *The extent of cancer among Indigenous people*

Although Aboriginal and Torres Strait Islander Australians are less likely to have some types of cancer than other Australians, Indigenous people are significantly more likely to have cancers that have a poor prognosis, are usually diagnosed with cancer at a later stage, are less likely to receive adequate treatment, and are more likely to die from cancers than other Australians [41]. The patterns of Indigenous cancer incidence and mortality are largely explained by the higher prevalence of risk factors, most notably tobacco use.

#### *Incidence*

In 2000-2004, across Australia, there were 3,083 cancers diagnosed among Aboriginal and Torres Strait Islander people [27]. The most common cancers diagnosed among Indigenous males in this period were of the lung, bronchus and trachea (19% of all male cancer reported), prostate cancer (10%), colorectal cancer (10%), cancer of unknown primary site (6%), and lymphomas (5%). The most common cancers diagnosed among Indigenous females were breast cancer (25% of all female cancer cases reported), cancer of the lung, bronchus and trachea (12%), colorectal cancer (9%), cancer of the cervix (7%) and cancer of unknown primary site (6%). In the same period, more new cases of cancer were reported among Indigenous females (1,598) than Indigenous males (1,485) compared with the non-Indigenous population.

#### *Specific cancers*

In 2000-2004, for NSW, Vic, Qld, WA, SA and the NT, age-standardised incidence, even with under-reporting, was higher among Indigenous males and females for lung cancer, cancers of the mouth and throat and cancer of unknown primary site [27] (see Table 14). High rates of smoking earlier in life are the likely cause of a high incidence of cancers of the lung, mouth and throat, while high incidence of unknown primary site is likely to be associated with late diagnosis. The rates for cervical cancer among Indigenous females were more than double those for non-Indigenous females. Among the less common cancers, age standardised incidence was also higher for the Indigenous population than for the non-Indigenous population, for cancers of the liver and gallbladder, pancreatic cancer, cancer of the oesophagus, and, in males only, thyroid cancer but incidence was lower among Indigenous people for colorectal cancer, prostate cancer and lymphomas.



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**Table 14 Indigenous to non-Indigenous age-standardised incidence rate ratios per 100,000 population for selected cancers, by sex, for NSW, Vic, Qld, WA, SA and the NT combined, 2000-2004**

Cancer	Incidence rate ratio	
	Male	Female
Lung	1.5	1.6
Breast	---	0.7
Unknown primary site	1.7	1.9
Colorectal	0.5	0.7
Cervix	---	2.4
Prostate	0.4	----
Lymphomas	0.7	0.6
Thyroid	1.4	0.7
Pancreas	1.5	1.4
Oesophagus	2.0	1.3
Liver and gallbladder	2.1	2.6
Mouth and throat	2.2	1.1
All cancers	0.8	0.9

Source: Derived from ABS, 2008 [27].

## Mortality

Cancer is a major cause of Indigenous mortality in Australia, exceeded only by circulatory and respiratory diseases [30, 43]. Data show that Indigenous people with cancer are more likely to die from their disease [44]. In 2007, one of the leading causes of death for Aboriginal and Torres Strait Islander peoples resident in Qld, WA, SA and the NT was cancer, accounting for nearly one fifth of all Indigenous deaths (19%) compared with nearly one-third of total non-Indigenous deaths (30%) [42]. Even though neoplasms accounted for a higher proportion of all non-Indigenous deaths than Indigenous deaths, Indigenous people are overrepresented in deaths from cancer compared with non-Indigenous Australians (the SMR<sup>3</sup> for males and females was 1.4 and 1.5 respectively) [30]. This apparent contradiction is the result of a high number of deaths for other causes in the Indigenous population as well as high mortality rates from neoplasms for Indigenous Australians in the middle age groups.

## Issues surrounding Indigenous people's use of cancer services

Information relating specifically to Indigenous people's utilisation of cancer services is limited. Reported barriers to Indigenous people accessing cancer screening and treatment programs include; limited knowledge about cancer and its management, distrust of health services, poor recall and follow-up systems [41, 43], feelings of shame and embarrassment [45], fear of cancer as a death sentence deterring individuals to seek treatment [46, 47], factors relating to disadvantage and the loss of traditional lifestyle post colonisation [47], late responsiveness to symptoms rather than focusing on prevention of ill health [41, 43], having access to appropriate health care workers (i.e. female workers to address 'women's business') [45] and the physical access of services due to Indigenous people being over ten times more likely than non-Indigenous Australians to live in remote areas [11]. Indigenous people not only need better access to locally-relevant services, but also need adequate coverage by mainstream health care services [48]. The health sector must ensure that the high level of cancer prevention, detection, and management that is available in Australia is as accessible to, and appropriate for, Indigenous people as it is for other Australians [49].

## Diabetes

Diabetes, especially type 2 diabetes, is a significant health problem among Indigenous people, but it is not possible to reach a single estimate of the prevalence due to considerable limitations in data collection [50]. Mortality statistics provide an indication of the substantial impact of diabetes, and despite their limitations, hospitalisation data also confirm the much greater impact of the condition among Indigenous people than non-Indigenous people.

## National Diabetes Register

The most recent data on diabetes incidence in Australia was undertaken by the AIHW in 2009 using data from Australia's National Diabetes Register (NDR) which applies to all Australians who began using insulin for diabetes

<sup>3</sup> The SMR (Standardised Mortality Ratio) is the ratio between the observed number of deaths in the Indigenous population and the expected number of deaths that would have occurred if the Indigenous population experienced the same age-specific death rates as the non-Indigenous population.

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since 1999 [51]. It must be noted, however, that only a proportion of those with type 2 diabetes and gestational diabetes require insulin treatment, so the data presented in this report is an underestimate of the total number of Australians with diabetes. In addition, recording of Indigenous status was less accurate prior to 2005 so analysis of the data based on Indigenous status is from 2005-2007 only.

## **Extent of diabetes among Indigenous people**

In 2005-2007, new cases of insulin-treated diabetes occurring in Aboriginal or Torres Strait Islander peoples 15 years or older accounted for 1.9% of new cases of type 1 diabetes, 2.6% of new cases of type 2 diabetes, and 2% of new cases of gestational diabetes [51]. Overall, 2.9% of people on the NDR in 2005-2007 were recorded as Indigenous which is slightly higher than the Indigenous population percentage in 2006 (2.5% of the Australian population).

Self-reported prevalence of diabetes/high sugar levels were reported by 6% of Indigenous people who participated in the 2004-2005 NATSIHS [37, 52, 53]. These problems were reported more frequently by Indigenous people living in remote areas (9%) than by those living in non-remote areas (5%). The proportions represent a slight, but not statistically significant, increase from those reported to the 2001 NHS. Bearing in mind the fact that for every person with identified diabetes there is likely to be another person with diabetes not yet diagnosed, these estimates are similar to those made in a major review of evidence from a variety of epidemiological studies that concluded that the overall prevalence among Indigenous people was between 10% and 30% [54, 55].

After adjusting for differences in the age structures of the two populations, diabetes/high sugar levels were around 3.4 times more common for Indigenous than for non-Indigenous people [37]. The ratio between Indigenous and non-Indigenous females (4.1) was higher than that between Indigenous and non-Indigenous males (2.9).

A lower proportion of Torres Strait Islanders (5%) than Aboriginal people (6%) reported having diabetes/high sugar levels (the difference is not statistically significant), but the proportion was 11% for Torres Strait Islanders living in the Torres Strait area [37].

The prevalence of diabetes increases with age, with the increase occurring at much younger ages among Indigenous people – the prevalence reported by Indigenous people aged 35-44 years was five times that reported by non-Indigenous people (Table 15) [37].

**Table 15 Diabetes: proportions of people reporting diabetes/high sugar levels as a 'long-term health condition', by Indigenous status, and Indigenous:non-Indigenous ratios, Australia, 2004-2005**

Age group (years)	Indigenous	Non-Indigenous	Ratio
15-24	1.0	0.5	2.0
25-34	4.3	0.6	7.2
35-44	10.0	2.0	5.0
45-54	20.7	4.0	5.2
55+	32.1	11.6	2.8

Source: ABS, 2006 [37]

Notes: 1 Ratio is the Indigenous proportion divided by the non-Indigenous proportion.

Few reports have been published about gestational diabetes mellitus (GDM), but information from the Northern Territory Midwives' Collection found that around 6.3% of Indigenous women in the NT developed GDM, compared with 4.1% of non-Indigenous women [56]. After allowance is made for the younger ages generally of the Indigenous women compared with the non-Indigenous women, the level of GDM among Indigenous women was 2.3 times that among non-Indigenous women. Hospitalisation data from July 2004 to June 2006 in NSW, Vic, Qld, WA, SA and the NT showed that Indigenous women were hospitalised for gestational diabetes at twice the rate of other women [53]. By comparison, GP encounters as measured in the BEACH Survey [53] indicate that gestational diabetes was managed with Indigenous females at four times the rate of encounters with other Australian females.

As is the case with most health conditions, hospitalisation rates are not an accurate reflection of the burden of diabetes in the community. This is reflected in the fact that diabetes was recorded as the principal diagnosis in only 1.4% of episodes of hospitalisation for both Indigenous males and females in NSW, Vic, Qld, WA, SA and the NT in July 2004 to June 2006, representing 4.8% of all hospitalisations for diabetes [53].

Other hospitalisation figures of interest show that Indigenous males and females were hospitalised for diabetes at around four and five times the rate of other Australian males and females, respectively [53]. The greatest difference in rates for both males and females occurred in the age range 45-54 years, where Indigenous males were hospitalised at around ten times the rate of non-Indigenous males, and Indigenous females were hospitalised at around 14 times the rate of non-Indigenous females. Type 2 diabetes was the most common form of diabetes, responsible for 85% of

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hospitalisations of Indigenous Australians. Type 1 diabetes accounted for almost 14% of hospitalisations among Indigenous people. As well as admissions for diabetes as a principal diagnosis, type 2 diabetes was also reported frequently as an additional diagnosis in admissions for care involving diseases of the circulatory system (56%), diseases of the genitourinary system (39%), and other endocrine, metabolic and nutritional disorders (29%).

Time series data for 2000-01 to 2005-06 in WA, SA, Qld and the NT indicates an average yearly increase of 28% in the hospitalisation rate for diabetes among Indigenous males and females, compared with a 36% increase in the hospitalisation rate for non-Indigenous Australians [53].

Diabetes is a major contributor to Indigenous mortality, being responsible for almost 8% of deaths of Indigenous people living in Qld, WA, SA and the NT in 2002-2006 [31, 39]. The age-standardised mortality rate due to diabetes per 100,000 persons was 8.8 times higher for Indigenous than non-Indigenous Australians which is statistically significant.

## Social and emotional wellbeing (including mental health)

Despite the importance of mental health to the total wellbeing of the whole Indigenous community [57], 'there are glaring deficiencies in our knowledge' about mental health disorders [58]. The deficiencies in knowledge are complicated by the complexity of the general area of mental health, in which 'diverse views exist and where terms are used in different ways' [59].

In trying to clarify the terms used, *The National Mental Health Plan, 2003-2008* defines mental health as 'a state of emotional and social wellbeing in which the individual can cope with the normal stresses of life and achieve his or her potential' [59]. (The Plan notes that the term 'social and emotional wellbeing' is preferred by some people, including Indigenous people, because of its more positive and holistic connotations.)

The Plan recognises a continuum between mental health (or social and emotional wellbeing) and mental illness – 'a clinically diagnosable disorder that significantly interferes with an individual's cognitive, emotional and social abilities' [59]. Using this terminology, mental illness includes potentially life-threatening conditions like chronic depression and schizophrenia, for which a person needs professional help, often from a psychiatrist. The Plan uses the term 'mental health problems' for those issues that interfere with a person's cognitive, emotional and social abilities to a lesser extent than a clinical mental illness. Trauma and grief – related to 'the history of invasion, the ongoing impact of colonisation, loss of land and culture, high rates of premature mortality, high levels of incarceration, high levels of family separations ... and also Aboriginal deaths in custody' – have been identified as underlying the great burden among Indigenous people of 'mental health problems', which may lead to 'mental illness' [57, 59].

The distinction between 'mental illness' and 'mental health problems' is not well defined [59], but it is an important distinction in ensuring that all aspects of the lack of mental health (or social and emotional wellbeing) are addressed adequately in Indigenous, and other, populations.

The combination of the Plan with the *Social and emotional well being framework: a national strategic framework for Aboriginal and Torres Strait Islander peoples' mental health and social and emotional well being, 2004-2009* [60], provide the foundation for greater coordination of Indigenous-specific initiatives with relevant general developments in the mental health area, and thus enhance the prospects of much more rapid progress than has been achieved to date. Importantly, the policy statements include appropriate monitoring mechanisms involving the high-level committees responsible nationally for monitoring overall progress on the Indigenous health and for mental health.

### **Extent of mental illness and mental health problems among Indigenous people**

The extent of mental illness and mental health problems has been recognised as 'a major difficulty for most [Indigenous] communities' [57], but, as noted above, the precise details have been poorly documented up until the 2004-2005 NATSIHS [37], which included a module capturing eight aspects of social and emotional wellbeing. The NATSIHS social and emotional wellbeing module attempted to capture an Aboriginal and Torres Strait Islander holistic and whole-of-life view of social and emotional wellbeing, which includes mental health, but also the impact of other factors on emotional wellbeing [61].

After adjusting for differences in age structure of the Indigenous and total Australian populations, the 2004-2005 NATSIHS found that Indigenous people aged 18 years or older were twice as likely as their non-Indigenous counterparts to feel high or very high levels of psychological distress (Table 16) [37].

The higher overall levels of psychological distress reported by Indigenous people are consistent with the relative frequencies with which the two populations experienced specific stressors in the previous 12 months. According to the 2004-2005 NATSIHS, 77% of Indigenous people experienced one or more significant stressors in the previous 12 months [37]. In comparison, 59% of the total population reported in the 2006 General Social Survey that they

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experienced one or more significant stressors in the previous 12 months (Table 16) [62]. The proportions reporting specific stressors were generally higher for Indigenous people than for the total population, particularly for the 'death of a family member or friend', 'alcohol or drug related problem', 'trouble with police', and 'witness to violence'. Almost one in five Indigenous people (19%) reported that a member of the family had been sent to jail in the previous 12 months, but that stressor was not reported for the total population.

**Table 16 Proportions (%) of stressors reported in previous 12 months, by Indigenous status, year and stressor type, Australia, 2004-2005 and 2006**

Type of stressor	Indigenous status / year	
	Indigenous	Total population
	2004-2005	2006
Death of a family member or friend	42	23
Serious illness or disability	28	30
Not able to get a job	17	13
Alcohol or drug related problem	25	8.6
Overcrowding at home	17	---
Member of family sent to jail/in jail	19	---
Witness to violence	14	3.9
Trouble with police	16	3.9
Discrimination/racism	12	---
Any stressor	77	59

Source: ABS, 2006 [37] ABS, 2007 [27]

Notes: 1 The total population proportion for 'serious illness or disability' data has been estimated by adding proportions for the two sub-components, so may slightly overstate the true proportion

The Western Australian Aboriginal Child Health Survey (WAACHS) reported that 24% of Indigenous children and young people aged 4-17 years were rated by their parents as being at high risk of clinically significant emotional or behavioural difficulties (compared with 15% in the general Australian population) [63]. Children of Indigenous carers who had been forcibly separated from their families were more than twice as likely to be at high risk of incurring clinically significant emotional and behavioural difficulties, and had twice the rates of alcohol and other drug use. Seven out of 10 Indigenous children were living in families that had experienced three or more major life stress events (such as death in the family, serious illness, family breakdown, financial problems or arrest) in the 12 months prior to the survey, and 22% had experienced seven or more of such events. Reflecting the higher levels of distress, there were 11,283 hospital separations with a principal diagnosis of 'mental and behavioural disorders' identified as Indigenous in Australia in 2007-08 (4.2% of separations identified as Indigenous, excluding those for renal dialysis) [32].<sup>4</sup> The rate for Indigenous people was 1.9 times that for non-Indigenous people.

Information about hospitalisation for the specific sub-categories within this ICD chapter is not available for 2007-08, but the separation rates of Indigenous people for 'mental and behavioural disorders due to psychoactive substance use' in 2005-06 were 4.5 times higher for males and 3.3 times higher for females than those for their non-Indigenous counterparts [27]. Rates for Indigenous males and females for 'schizophrenia, schizotypal and delusional disorders', and for 'organic mental disorders' were more than double those for non-Indigenous males and females. The separation rates for 'disorders of adult personality and behaviour' and 'mood and neurotic disorders' was slightly higher for Indigenous males when compared to non-Indigenous males, though the rates for these sub-categories were similar for Indigenous and non-Indigenous females.

In 2003-2007, 221 Indigenous people living in NSW, Qld, WA, SA, and the NT died as a result of 'mental and behavioural disorders'. There were 2.4 times more Indigenous deaths than expected in NSW, 2.1 times in Qld, 4.1

<sup>4</sup> The ICD chapter 'Mental and behavioural disorders', used for the classification of both hospitalisation and mortality, is very broad. As well as mental illness and mental health problems, it includes mental retardation and a broad sub-category for disorders relating to the use of psychoactive substances (including alcohol, tobacco, other drugs and volatile substances). The chapter doesn't include, however, the results of intentional self-harm, which are classified within the ICD chapter 'External causes of morbidity and mortality'.

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times in WA, 2.4 times in SA, and 6.0 times in the NT (based on total Australian rates) [64]. This does not include deaths due to 'intentional self-harm' (suicide), which accounted for a further 409 Indigenous deaths.

Deaths from intentional self-harm were much higher for Indigenous people than for non-Indigenous people in 2003-2007, particularly for males (Table 17) [64].

**Table 17 Intentional self-harm, age standardised death rates, NSW, Qld, WA, SA and the NT, by Indigenous status and sex, 2003-2007**

	Indigenous	Non-Indigenous	Rate Ratio
Males	37.2	15.3	2.4
Females	7.1	4.2	1.7
Total	21.7	9.6	2.3

Source: Derived from Steering Committee for the Review of Government Service Provision, 2009 [64]

Additionally, intentional self-harm accounted for a higher proportion of causes of death among Indigenous people than non-Indigenous people in each jurisdiction, ranging between 2.4% in NSW to 6.7% in SA for Indigenous people compared to 1.2% in NSW to 4.7% in the NT for non-Indigenous people [64].

The overall numbers of suicide conceal the very high rates of suicide among young Indigenous people. Indigenous people die from suicide at a much younger age than non-Indigenous Australians, particularly among Indigenous people aged 25 years and younger and between 25-34 years (Table 18) [64].

**Table 18 Intentional self-harm deaths per 100,000, NSW, Qld, WA, SA and the NT, by Indigenous status, 2003-2007**

Age group (years)	Indigenous	Non-Indigenous	Rate Ratio
Under 25	11.7	3.7	3.2
25-34	40.7	13.8	2.9
35-44	28.5	14.4	2.0
45 and over	8.1	11.5	0.7

Source: Steering Committee for the Review of Government Service Provision, 2009 [64]

Reflecting the differences between Indigenous and non-Indigenous death rates from suicide, hospital admissions for intentional self-harm were more common for Indigenous people than for non-Indigenous people living in people living in NSW, Qld, WA, SA and the NT in 2005-07. Admission rates were 2.9 times higher for Indigenous males and 2.1 times higher for Indigenous females than for their non-Indigenous counterparts [61].

Research in Qld, NSW, the ACT and the NT has highlighted the increasing impact of suicide among young Indigenous people [65-67]. It may be, as Tatz argues, that suicide and attempted suicide among Indigenous youth (at least in NSW and the ACT) is not the result of mental illness 'in the strict pathological sense' [66], but it is certainly a manifestation of mental health problems. The level of intentional self-harm has certainly been recognised as a key indicator of Indigenous disadvantage [64].

## Renal disease

Renal disease, particularly kidney disease, is more prevalent among Indigenous people than among non-Indigenous people [31]. It has been well-established that the overall incidence rate of ESKD in Indigenous Australians is significantly higher than for non-Indigenous Australians [68].

### Extent of renal disease among Indigenous people

Data from the Australian and New Zealand Dialysis and Transplant Registry (ANZDATA) reveal that a total of 846 Indigenous people were newly identified with ESRD between 2004 and 2007 – the age-standardised notification rate of 860 per 1,000,000 population for Indigenous people was more almost nine times the rate of 100 per 1,000,000 for non-Indigenous people (Table 19) [69]. The highest rates were for Indigenous people living in the NT (2,366 per 1,000,000), WA (1,076), Qld (886) and SA (845).

Almost three-fifths (58%) of Indigenous people newly registered with the ANZDATA between 2004-2007 were aged less than 55 years compared with less than one-third (31%) of non-Indigenous people registered (Table 20) [69].

Age-specific notification rates were higher for Indigenous people across all ages compared with non-Indigenous people. Rate ratios were particularly high for people aged 45-54 years (15.2) and 55-64 years (14.1) [Derived from 69].

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The most common reason for hospitalisation for Indigenous people living in NSW, Vic, Qld, WA, SA and the NT in 2007-08 was for the procedure of Haemodialysis, with the admission rate more than 12 times that of non-Indigenous people [32].

For the period 2001-2005, death rates were especially high after the age of 25 years for both Indigenous males and females compared with non-Indigenous people. The greatest differences occurred in the 45-54 age groups with Indigenous males recording 31 times the rate for non-Indigenous males and Indigenous females 51 times the rate for non-Indigenous females [27]. In 2004-06, death rates for CKD were 7 and 11 times higher for Indigenous males and females than those of non-Indigenous males and females respectively [68]. These figures potentially underestimate the contribution of CKD to death rates as deaths involving CKD can occur in the context of other chronic conditions [70]. For example, deaths from diabetes, where renal failure was reported as an associated cause of death among Indigenous people, occurred at almost twice the rate for Indigenous males and females than for their non-Indigenous counterparts [27].

**Table 19 End-stage renal disease: age-standardised notification rates, by Indigenous status, and rate ratios, selected jurisdictions, Australia, 2004-2007**

Jurisdiction	Indigenous		Non-Indigenous		Rate ratio
	Number	Rate	Number	Rate	
NSW	84	296	2,677	99	3.0
Vic	32	657	2,045	101	6.5
Qld	223	886	1,573	104	8.5
WA	164	1,076	742	99	10.9
SA	50	845	627	107	7.9
NT	270	2,366	32	77	30.7
Australia	828	860	8057	100	8.6

Source: Derived from McDonald S, Excell L, Livingston B, 2008 [69] and ABS low series population projections

Notes: 1 Rates per 1,000,000 population have been standardised using the Australian population at 31 December 2005 as the reference

2 Rate ratio is the Indigenous rate divided by the non-Indigenous rate

3 Figures for Tasmania and the ACT have not been included because of the small numbers of notifications

**Table 20 End-stage renal disease: age-specific notification rates, by Indigenous status, and rate ratios, Australia, 2004-2007**

Age group (years)	Indigenous		Non-Indigenous		Rate ratio
	Number	Rate	Number	Rate	
0-14	5	7	90	6	1.2
15-24	13	32	180	16	2.0
25-34	56	191	395	35	5.4
35-44	154	616	712	60	10.3
45-54	253	1,505	1,107	99	15.2
55-64	235	2,647	1,647	187	14.1
65-74	94	2,393	2,102	378	6.3
75+	18	1,118	1,824	362	3.1
All ages	828	860	8,057	100	8.6

Source: Derived from McDonald S, Excell L, Livingston B, 2008 [69] and ABS low series population projections

Notes: 1 Rates per 1,000,000 population

2 Rate ratio is the Indigenous rate divided by the non-Indigenous rate

3 Figures for Tasmania and the ACT have not been included because of the small numbers of notifications

## Injury

Injury from a variety of sources presents a significant burden of ill-health among Indigenous people. Assessing the total impact of injury is difficult, however. The vast majority of injuries do not result in hospitalisation or death and there are few systematic data on them other than those collected as part of population surveys, such as the ABS

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National Health Surveys. As a result, they may not be brought to the attention of health policy-makers and program managers [71-73].

The classification of injury has generally followed the World Health Organization's International Classification of Diseases (ICD), which includes particular attention to the external cause and intention of the injury [74]. This system is followed in this section, but it has its limitations (for more details, see [75]).

Understanding of the proximal factors contributing to most types of injury among Indigenous people is limited, but the levels and types of injury need to be seen within a broad context including: disruption to cultural, environmental, and lifestyle variables; socioeconomic disadvantage; geographical isolation; increased road usage; exposure to hazardous environment(s); substance abuse; violence; social and familial dysfunction; risky behaviour; risky home environments; and limited access to health and social support services [72, 73, 76-78].

## **Extent of injury among Indigenous people**

Data from the 2004-2005 NATSIHS indicate that self-reported health conditions 'as a result of an injury or accident' were reported more frequently by Indigenous people than by non-Indigenous people across all age groups [37]. Reporting of injury increased substantially in Indigenous adults over the age of 25 years, and was highest in the 34-44 and 45-55 years age groups.

Reporting of injury increased significantly in Indigenous adults over the age of 25 years, and peaked among Indigenous adults between the ages of 35-54 years [37]. Within this age range, 24% of Indigenous and around 16% of non-Indigenous people reported a health condition as a result of an injury or accident. Overall, the reporting of a long-term condition as a result of an injury or accident was 1.4 times higher for Indigenous people than for non-Indigenous people, with the ratio for males (1.5) being slightly higher than that for females (1.3).

By comparison, an analysis by the AIHW of data from the 2004-2005 NATSIHS, on injuries received in the four weeks before the interview, found that injuries were reported less frequently by Indigenous people than by non-Indigenous people across all age groups (15.4 per 100 compared with 18.6 per 100) [53]. Of those who had received injuries in the four weeks preceding the survey, Indigenous Australians were three times as likely as non-Indigenous Australians to report a recent injury which was the result of an attack by another person (rate ratio 2.8) and five times as likely as non-Indigenous Australians to report being under the influence of alcohol or other substances at the time of injury (rate ratio of 4.5).

In 2007-08, injuries were responsible for 19 919 hospital separations for Indigenous people living in Qld, WA, SA and the NT – 7% of all Indigenous separations (excluding those for renal dialysis) [32]. The separation rate of 46 per 1,000 for Indigenous people was almost twice that of 24 per 1,000 for non-Indigenous people.

One-quarter of Indigenous people reported in the 2002 NATSISS that they had been a victim of physical or threatened violence in the previous 12 months. After taking account of the different age structures of the two populations, the level of victimisation among Indigenous people was more than twice the level among non-Indigenous people [79]. Victimisation was mainly among younger Indigenous people, with males aged 15-24 years having the highest reported level (36%).

In the two year period July 2004 to June 2006, in NSW, Vic, Qld, WA, SA and the NT combined, Indigenous males had higher hospitalisation rates for injury and poisoning than other males across all age groups [53]. Indigenous females had higher rates of hospitalisation for injury and poisoning than other females across all age groups, except those aged 65 years and over.

Assault was the most frequent external cause of the hospitalisation of Indigenous people for injury Australia-wide in the two year period July 2004 to June 2006, being responsible for 22% of Indigenous male admissions for injury and for 32% of Indigenous female admissions [53]. The numbers of admissions of Indigenous people for assault were very much higher than the numbers expected from non-Indigenous rates – 8 times higher for males and 35 times higher for females. Over the seven year period 1998-99 to 2005-06, however, there were significant declines in the hospitalisation rate for assault among Indigenous males and females equivalent to a 16% and 9% reduction, respectively.

The next most common external causes of injury hospitalisation for males were falls (18%) and exposure to inanimate mechanical forces (15%). The next most common external causes of injury hospitalisation for females were falls (16%) and complications of medical and surgical care (6%). Transport accidents which were the third most common external cause of injury in 2003-04 [39] were rated fourth for males (11%) and sixth for females (7%) [53]. Injury was the underlying cause of death for 16% of all Indigenous deaths in Australia in the period 2001-2005, compared with 6% of non-Indigenous deaths [27]. The number of deaths of Indigenous males from external causes of injury was 2.7 times the number expected from the rates for non-Indigenous males, and the number for Indigenous females 3.2 times



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the number expected from the rates for non-Indigenous females. Death rates from injury for Indigenous males and females were higher than those for their non-Indigenous counterparts in every age group. In the 35-44 year age group Indigenous females recorded a rate almost five times that of non-Indigenous females.

Intentional self-harm was the leading cause of death from external causes for Indigenous males for the 2001-2005 period, responsible for 35% of the deaths from injury of Indigenous males living in Qld, WA, SA and the NT. Transport accidents were responsible for 27% of deaths and assault for 8% [27, 39]. Transport accidents were responsible for 30% of the deaths of Indigenous females from injury, assault for 16% and intentional self-harm for 18%. The numbers of Indigenous deaths were much higher than expected from non-Indigenous rates – for all injury categories and for both sexes.

**Table 21 Injury: numbers of Indigenous deaths and SMRs, by sex, Qld, WA, SA and the NT, 2001-2003**

Injury type	Males		Females	
	Number	SMR	Number	SMR
<b>Registered deaths</b>				
Land transport accidents (V01-V89)	130	2.7	70	4.4
Intentional self-harm (X60-X84)	180	3.0	44	2.6
Assault (X85-Y09)	37	6.3	18	3.0
Other external causes	130	2.7	51	2.8
All types of injury	498	3.1	206	3.7

Source: Derived from Standing Committee on Aboriginal and Torres Strait Islander Health, Statistical Information Management Committee, 2006 [80]

- Notes: 1 SMRs (standardised mortality ratios) have been calculated by dividing the numbers of Indigenous deaths for each sex by the numbers expected from the rates for non-Indigenous people of the same sex  
2 Numbers are SMRs for assault are for Qld, WA and SA only, as data for the NT are incomplete

## Respiratory disease

Respiratory diseases represent a significant burden of ill-health and hospitalisation among Indigenous people, particularly among very young and older people [81]. The development of respiratory diseases is dependent on a number of contributing factors, including poor environmental conditions, socioeconomic disadvantage, risky behaviour (particularly cigarette smoking), and previous medical condition [82]. Infants and children under 5 years of age are more susceptible to developing respiratory conditions due to factors like low levels of hand and face washing, and of childhood immunisation, parental smoking, poor nutrition (including aspects related to infant-feeding and weaning practices), and poor environmental conditions [83]. Among Indigenous adults, common risk factors for respiratory diseases include tobacco smoking, use of alcohol and other substances, diabetes mellitus and chronic renal disease [82]. Factors that may affect the risk of developing asthma include environmental and other related factors (for example diet and lifestyle), which may also change the course of the disease, or trigger attacks of airway narrowing and symptoms [30]. Factors that can trigger airway narrowing and symptoms in people with asthma include exercise, viral infections, irritants (for example, smoking and air pollutants), specific allergens and some food preservatives.

### *Extent of respiratory disease among Indigenous people*

Disease of the respiratory system was reported by 27% of Indigenous people who participated in the 2004-2005 NATSIHS [37]. These problems were reported more frequently by Indigenous people living in non-remote areas (30%) than by those living in remote areas (17%). The proportions represent a slight decrease from those reported to the 2001 NHS.

With 15% of Indigenous people reporting having asthma, it was the most commonly reported respiratory condition among Indigenous people, and the second most commonly reported health condition [84]. Asthma was reported more frequently by Indigenous people living in non-remote areas (17%) than by those living in remote areas (9%).

After adjusting for differences in the age structures of the two populations, the overall levels of respiratory disease were similar for Indigenous and non-Indigenous people, but the level of asthma among Indigenous people was 1.6 times that among non-Indigenous people [30, 37].

The lower overall proportion of Torres Strait Islander (13%) than Aboriginal people (15%) reporting asthma was largely due to the low level reported by Torres Strait Islanders living in the Torres Strait area (5%) [37].

There were 15,115 hospital separations identified as Indigenous for respiratory disease for people living in Qld, WA, SA, NSW, Vic and from the public hospital of NT in 2006-07, representing 6% of separations identified as Indigenous [85]. Hospitalisation rates for Indigenous people were 3.3 times higher than those for non-Indigenous people (based

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on the under-identification of Indigenous people in the hospital inpatient collections, these ratios could be up to 25% higher). The more detailed information available for 1999-2000 revealed that separation rates were particularly high in infancy and early childhood [27, 86].

Disease of the respiratory system is among the leading causes of death for Indigenous people, being responsible for almost 9% of all deaths of Indigenous people living in Queensland, WA, SA and the NT in 2001-2005[27]. The numbers of deaths from respiratory disease among Indigenous people is around four times higher than the numbers expected from rates for the non-Indigenous population (Table 9). (Bearing in mind the under-identification of Indigenous people in death registration systems, this difference could be up to 30% higher.) Overall, respiratory disease is responsible for around 10% of the excess deaths experienced by Indigenous people.

The more detailed information available for Indigenous people living in WA, SA and the NT combined in 1999-2001 reveals that the leading specific respiratory cause of death for both Indigenous males and females was chronic lower respiratory disease, for which there were around five times more deaths than expected [87]. Pneumonia and influenza were responsible for only small numbers of deaths, but the numbers were 12–15 times more than expected from the rates for the non-Indigenous population.

The differences between Indigenous and non-Indigenous people in death rates from respiratory disease were particularly high among young adults, with rates in the 35-44 years age group being around 22 times higher for males and 20 times higher for females [27].

### Communicable diseases

Communicable diseases of particular importance to Indigenous people include: tuberculosis; hepatitis (A, B, and C); sexually transmitted infections; HIV/AIDS; Haemophilus influenzae type b (Hib); pneumococcal disease, and meningococcal disease [88, 89].

Risk factors for communicable diseases vary according to type of disease. Communicable diseases can be caused by: bacteria (for example, pertussis (whooping cough) and tuberculosis); bacterial toxins (for example, some forms of food poisoning); viruses (for example, measles, influenza and HIV); fungi (for example, tinea); protozoan parasites (for example, malaria) [28]. Communicable diseases also include infestation with larger parasites, such as head lice, as well as diseases which are spread through infectious particles, such as transmissible spongiform encephalopathies.

Information regarding specific communicable diseases comes from a variety of sources, including individual studies and State and Territory based notifiable disease collections. Data from State collections are collected and published by the National Notifiable Disease Surveillance System (NNDSS), but Indigenous status is often not reported for large proportions of notifications.

### Tuberculosis

Tuberculosis is primarily a lung infection caused by the bacterium *Mycobacterium tuberculosis*, which penetrates the lung tissue, causing inflammation and the development of encapsulated bacterial cells (tubercles) [90]. The main risk factors for tuberculosis are poverty, overcrowding, and malnutrition [91, 92], all common among many Indigenous communities. Other risk factors, also common among Indigenous people, are diabetes mellitus, smoking, alcohol abuse, and advanced renal disease [91, 93]. Another risk factor for tuberculosis is HIV [94].

#### **Extent of tuberculosis among Indigenous people**

Of the 885 notifications of tuberculosis among Australian-born people in Australia in 2002-2006, 174 (20%) were identified as being Indigenous [Derived from 95, 96-99]. Almost one-half of the new cases among Indigenous people were reported by the NT (83 cases) and around one-quarter by Qld (45 cases) (Table 22). The Australia-wide crude incidence rate of 7.2 cases per 100,000 population for Indigenous people was almost 10 times the rate of 0.7 per 100,000 for non-Indigenous people. The crude incidence rate was highest for the NT (28 cases per 100,000 population).

This comparison underestimates the true difference between Indigenous and non-Indigenous people because of differences in the age structures of the Indigenous and non-Indigenous populations - after adjusting for these differences, the incidence rate for Indigenous people was 14 times that of non-Indigenous people (Table 23). The incidence of TB is higher for Indigenous people than for non-Indigenous people across all age groups, with rate ratios being highest for the 45-54 years and 55-64 years age groups.

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**Table 22 Tuberculosis: numbers of new cases and crude incidence rates, Indigenous people, by jurisdiction, Australia, 2002-2006**

Jurisdiction	Number	Population	Rate
NSW	22	141,533	3.1
Vic	4	29,683	2.7
Qld	45	134,013	6.7
WA	11	69,665	3.2
SA	7	27,060	5.2
Tas	2	18,317	2.2
ACT	0	4,204	-
NT	83	59,508	27.9
Australia	174	483,992	7.2

Source: Derived from [96-100]

- Notes: 1 Population figures are for 30 June 2004 (the mid-point of the five-year period, 2002-2006)  
 2 Rates are crude incidence rates per 100,000 population

**Table 23 Tuberculosis: numbers of new cases and age-specific incidence rates, by Indigenous status, and rate ratios, Australia, 2002-2006**

Age group (years)	Indigenous		Non-Indigenous		Rate ratio
	Number	Rate	Number	Rate	
0-4	10	3.3	47	0.8	4.2
5-14	10	1.6	44	0.3	4.8
15-24	21	4.4	43	0.3	13.9
25-34	32	8.8	74	0.5	16.6
35-44	28	9.3	60	0.4	22.7
45-54	31	15.6	70	0.5	30.1
55-64	22	21.2	71	0.7	31.1
65+	20	29.8	301	2.3	12.8
All ages	174		711		14.1

Source: Derived from [96-100]

- Notes: 1 Rates are per 100,000 population  
 2 Any discrepancy between the figures shown for 'all ages' and the sum of the number for the specific age groups is due to age not being stated in the notification  
 3 Rate ratio is the Indigenous rate divided by the non-Indigenous rate  
 4 The rate ratio for 'All ages' is the standardised incidence ratio, which is the number of Indigenous cases reported divided by the number expected if the Indigenous population had the same age-specific rates as the non-Indigenous population

## Hepatitis

Hepatitis, an inflammation of the liver, can be caused by viral infections, alcohol or drug abuse, or an attack by the body's immune system on itself. The viruses identified most frequently have been designated hepatitis A, B, and C (hepatitis types D through G have been identified also).

### Hepatitis A

Of the 314 notifications of hepatitis A for people living in WA, SA, and the NT in 2004-2006, 105 (33%) were identified as being Indigenous (Indigenous status was not stated in 1% of cases) [Derived from 101, 102, 103]. The crude notification rate of 22 per 100,000 for Indigenous people was 11.6 times the rate of 1.9 per 100,000 for non-Indigenous people. The most recent data available fails to report any new cases of hepatitis A among Indigenous people residing in NSW, Qld, SA, Tas, Vic, and WA for 2007 but 2006 data reported 28 new cases of hepatitis A for Indigenous people in NSW, NT, WA, and SA [103, 104]. The real incidence of hepatitis A among Indigenous people

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is probably much higher than these figures suggest, however, as the disease is endemic in many rural and remote communities [105].

A detailed study of clinically significant hepatitis A virus (HAV) infections found that the disease was much more common among Indigenous children than non-Indigenous children, particularly those living in the NT, WA, SA, and north Queensland [106]. Children aged 0-4 years are at greatest risk of HAV infection.

## **Hepatitis B**

Data obtained from selected states and territories for 2008 showed the number of hepatitis B diagnoses was more prevalent in the non-Indigenous population (N=213) than the Indigenous population (N=20) but the rate of hepatitis B diagnosis was higher among Indigenous peoples (5 per 100,000 population) than it was for non-Indigenous people (1 per 100,000 population) [107]. For Indigenous peoples in NSW, WA, QLD, SA, VIC, and NT, the rate of hepatitis B diagnoses have shown great variability from the years 2004 to 2008 ranging from 1 to 12 per 100,000. Conversely the rate of diagnosis for the non-Indigenous population for the same period has remained relatively stable ranging from 1 to 5 per 100,000.

For both the Indigenous and non-Indigenous populations, the rate of hepatitis B diagnoses was highest among those aged 20 to 29 years yet Indigenous people had a considerably higher rate of hepatitis B diagnoses in almost every age cohort [108]. Outer regional areas showed the highest rate of newly acquired hepatitis B infection in the Indigenous population whereas for non-Indigenous people, the rate of hepatitis B infection was highest in remote areas of residence.

Transmission of the hepatitis B virus (HBV) is due to contact with blood and other body fluids (semen, vaginal fluids, and saliva) from an infected individual, commonly through sexual contact or use of contaminated injecting equipment [109]. A mother may also transmit HBV to the foetus during pregnancy. Only one-third of people acutely infected with HBV will experience obvious symptoms, including jaundice, loss of appetite and mild flu-like symptoms, but the virus can cause a more prolonged illness in which a person may look and feel well, but slowly develop severe liver damage. The risk of developing cancer of the liver is also increased in people with chronic HBV infection.

A universal vaccination program commencing in the Indigenous community in 1988 has had considerable success [110], but some studies suggest that Indigenous children had a sub-optimal response to the HBV vaccine more often than their non-Indigenous counterparts [111]. Possible explanations for the inefficiency of the vaccine include a failure in the cold-chain, genetic differences (specifically in the major histocompatibility complex, or MHC), or extrinsic environmental factors, such as heavy smoking among pregnant women. HBV vaccination programs are nevertheless cost-effective and relatively successful and help reduce the levels of hepatitis B infection in the Indigenous community.

## **Hepatitis C**

Based on 2008 data acquired from the NT, SA, and WA, the number of hepatitis C diagnoses was significantly greater in the non-Indigenous population (N=1945) than the Indigenous population (N=204) with Indigenous people representing just 9.5% of hepatitis C diagnoses in this period [107]. As with hepatitis B, the rate of newly acquired hepatitis C diagnoses was far greater for Indigenous peoples (130 per 100,000 population) than it was for non-Indigenous people (52 per 100,000 population) – a pattern that has remained consistent for many years. From the years 2004 to 2008, the rate of hepatitis C diagnoses in the Indigenous population decreased by approximately 20% whereas during the same period, the rate of hepatitis C infections increased by approximately 6% in the non-Indigenous population.

In terms of age group prevalence, the rate of hepatitis C infection was greatest among Indigenous persons aged 15 to 19 years whereas non-Indigenous persons in the 40 to 49 year age cohort had the highest rate of hepatitis C diagnoses [108]. Males also typically experienced hepatitis C to a greater degree than females and this was particularly the case for Indigenous males aged 15 to 19 years. Unlike other reported communicable diseases, the rate of hepatitis C infection among Indigenous persons is greatest for those residing in inner regional areas followed by those living in major cities. For non-Indigenous people, remote and very remote areas of residence showed the highest rate of hepatitis C infection.

Transmission of the hepatitis C virus (HCV) typically occurs via blood-to-blood contact [112]. Injecting drug use (IDU) is the most common method of contracting the virus and is responsible for the vast majority of cases.

Many people who are infected with HCV do not have symptoms and in many cases the virus is detected through blood tests for other medical matters [112]. Persistence of HCV in the body, which occurs in about 80% of cases, can cause cirrhosis (permanent scarring of the liver). Chronic HCV infection is generally asymptomatic until cirrhosis has developed. There is no vaccine or cure for HCV, but the virus can be managed with appropriate treatment [112].

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## Haemophilus influenzae type b

*Haemophilus influenzae* type b (Hib) is a bacterium that can cause meningitis, epiglottitis, pneumonia, septicaemia, cellulitis, osteomyelitis, pericarditis and septic arthritis [113]. Babies and children are particularly susceptible to Hib, which is spread by respiratory secretions. The main risk factors for Hib include contact with other children, particularly in large families or day care centres [114].

### Extent of Hib disease among Indigenous people

Hib notifications in Australia declined steeply following the commencement of nationally-funded infant vaccination in 1993, but the disease persists at much lower levels [115]. Hib notifications in Australia declined from 617 cases reported in 1993-1994 to 32 cases in 2004-2005, with no deaths during 2005. While incidence of invasive Hib disease has declined sharply among all Australians, Indigenous populations continue to be at higher risk of contracting Hib than non-Indigenous populations. During 1993-1994, Indigenous people were 2.7 times more likely to be diagnosed with invasive Hib than non-Indigenous people. This rate ratio increased to 7.5 in 2004-2005, with the highest rate ratio of 17.5 in 2002-2003.

## Pneumococcal disease

Pneumococcal disease, which is caused by the bacterium *Streptococcus pneumoniae* (pneumococcus), includes upper respiratory tract infection and lower respiratory tract infection (primarily pneumonia) [116]. Invasive pneumococcal disease (IPD) occurs when the bacterium infects normally sterile sites, such as blood and cerebrospinal fluid, causing life-threatening septicaemia and meningitis. Recognised risk factors for pneumococcal disease include chronic illness (including chronic respiratory, cardiac and renal diseases) and immuno-compromised conditions. Children aged less than five years are particularly susceptible to pneumococcal disease.

Vaccination for IPD was funded from 2001 for Indigenous children 0-2 years (except in central Australia and adjacent areas where the conjugate pneumococcal vaccine program extends to five years of age) [1]. From 2005, vaccination was funded for all Australian infants. Vaccination with the polysaccharide vaccine has been funded since 1999 for Indigenous adults with risk factors for IPD (all Indigenous adults aged 15 years or over are eligible in the NT), and for all Indigenous people aged 50 years or older. From 2005 vaccination was funded for all Australians aged 65 years or more.

### Extent of pneumococcal disease among Indigenous people

Indigenous children and adults have a significantly higher incidence of pneumococcal disease than non-Indigenous people, but detailed data are available only for IPD, which has been notifiable Australia-wide since 2001 (since 1997 in Qld and the NT) [89] [116].

Based on notifications for people living in NSW, SA, WA and the NT in 2003-2006, the incidence of IPD among Indigenous people (41.5 per 100,000) was 4.6 times that among other people (9 per 100,000) [116].<sup>5</sup> For both Indigenous and other people, notification rates were highest in the 0-4 years age group (65.2 per 100,000 for Indigenous people and 35.8 per 100,000 for other people) and in the 50 years and over age group (51.5 per 100,000 compared with 14.5 per 100,000). Importantly, the incidence among Indigenous people aged 25-49 years was also very high, with a rate (50.9 per 100,000) 11.2 times higher than that among other people (4.5 per 100,000). These aggregated data conceal important regional differences, with notification rates for Indigenous people being much higher in the NT (134 per 100,000 in 2004) compared with all jurisdictions combined (36 per 100,000) [117]. Vaccination programs have had a significant impact on the disparity in disease rates between Indigenous and non-Indigenous people. At the start of the national Indigenous childhood pneumococcal vaccination program in 2001, the rate among Indigenous children aged less than 2 years was 219 per 100,000, 2.9 times higher than among non-Indigenous children [117]. By 2006, the rate among Indigenous children had dropped to 73 per 100,000, and 21 per 100,000 in the non-Indigenous counterpart [1]. In Indigenous adults, IPD rates decreased after the introduction of vaccination programs in the Kimberley [118] and in North Queensland [119], but nationally rates remain higher for Indigenous adults than for non-Indigenous adults [1].

The high rates of IPD notifications among Indigenous people are reflected in hospitalisation rates for pneumococcal septicaemia and meningitis [116]. Of the 11 deaths from IPD for people living in the NT, Qld, SA and WA in 2003-2005, two (19%) were identified as Indigenous.

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<sup>5</sup> These jurisdictions are the only ones with reasonable levels of identification of Indigenous people in notifications. Indigenous rates have been compared with those for all other people, including those for whom Indigenous status was not known.

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## Meningococcal disease

Meningococcal disease is caused by the bacterium *Neisseria meningitidis* (also known as meningococcus). Manifestations of meningococcal disease include meningitis, meningococcaemia without meningitis, and septic arthritis [116]. The risk of infection can be increased in crowded housing conditions [80]. The most common groups of meningococcus found in Australia are B (73%) and C (14.5%) [120]. Vaccination against serogroup C has been funded for all infants since 2003, with a catch-up program for all aged up to 19 years of age.

### **Extent of meningococcal disease among Indigenous people**

The rate of meningococcal disease is higher among Indigenous people than other Australians, and children aged less than five years are particularly susceptible [116]. Previously recorded outbreaks among Indigenous children in central Australia and north-west Queensland were due to types A and C [121], but recent data suggests that the disease in young children is now mainly due to serogroup B [122].

In 2003-2006, 8% (106 cases) of the 1,263 cases of meningococcal disease notified in NSW, WA, VIC, SA and the NT were identified as Indigenous [116]. More than 32% of all cases and almost 69% of cases identified as Indigenous occurred among children aged 4 years or younger. The rate of 44.9 per 100,000 for Indigenous children aged 0-4 years was 4.9 times the rate of 9.2 per 100,000 for their non-Indigenous counterparts. Overall, the standardised rate of 5.1 per 100,000 for Indigenous people was more than twice the rate of 1.9 per 100,000 for other Australians. There was a 18.9% decline in the number of nationally notified cases from 2005 to 2006 with 392 notifications reported in 2005 and 318 in 2006 [122]. While no data on Indigenous status have yet been published for this period, decreases would be expected in Indigenous and non-Indigenous cases.

There were 21 deaths from meningococcal disease for people living in QLD, WA, SA and the NT in 2002-2005 [116].<sup>6</sup> One death was of a person identified as Indigenous.

## Sexually transmitted infections

Sexually transmissible infections (STIs) are infections that are spread by heterosexual or homosexual contact with an infected person [88]. STIs are caused by microorganisms which are transmitted from one person to another through semen and fluid from the vagina, blood, or saliva. Most STI cases are found among sexually active teenagers and young adults, and unprotected sex is generally the primary risk factor [30, 88, 107].

The majority of STIs are asymptomatic or produce mild symptoms, and many people affected find out they have an infection through screening and contact tracing [123]. STIs can usually be effectively treated if diagnosed early, but, if left untreated, they may lead to complications. Many factors have been identified as contributing to the development of STIs. Some factors which are unique to, or more prevalent in the Indigenous population include: poor access to health services; high screening rates in some Indigenous communities; lack of clinical staff who have the competence and sensitivity to deal with sexual health issues in the Indigenous population; a younger more mobile population; and socio-economic disadvantage [108].

The National Notifiable Diseases Surveillance System collects data on some STIs, including chlamydia, gonorrhoea, syphilis, donovanosis, HIV/AIDS, and hepatitis B and C [38]. HPV and genital herpes are believed to be the most common STIs in Australia, but they are not notifiable diseases so it is difficult to monitor incidence. Variations in notification rates over time may reflect real changes in incidence, but could also be due to the introduction of easier and more sensitive testing procedures, greater targeted screening, and public awareness campaigns [122].

### **Gonorrhoea**

Gonorrhoea is caused by the bacterium *Neisseria gonorrhoeae* [124]. In women, gonorrhoea can affect the urethra, cervix, and rectum, while in men it can affect the penis and rectum. Gonorrhoea can also infect the throat in women and men. Gonorrhoea is highly contagious and if left untreated the infection can cause pelvic inflammatory disease in women and may cause damage to the testes in men. In some instances, untreated gonorrhoea can lead to infertility in both women and men, and may also lead to infections in the joints and skin [124, 125].

Data from 2008 revealed the number and rate of gonorrhoea diagnoses was higher among Indigenous peoples (N=3439; rate 806 per 100 000) than it was for non-Indigenous people (N=2872; rate 22 per 100 000) in those State and Territory health jurisdictions that reported Aboriginal and Torres Strait Islander status for more than 50% of diagnoses [107]. The NT and WA reported the highest number of gonorrhoea diagnoses for the Indigenous population

<sup>6</sup> Caution needs to be exercised in interpretation of the various death rates presented in this report, most of which are based on the numbers of deaths registered as Indigenous. These numbers underestimate the actual numbers of Indigenous deaths, with the level of underestimation varying by jurisdiction (see 'Limitations of the sources of Indigenous health information'). The 'projected' death rates take into account the estimated incompleteness of Indigenous identification in each jurisdiction. It is likely that the true death rates for Indigenous people will be closer to these rates than to those based solely on death registrations.

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and together accounted for 76% of Indigenous gonorrhoea diagnoses. For the Indigenous population, the number and rate of gonorrhoea diagnoses showed a marginal decrease from 2007 where the reported number of gonorrhoea diagnoses was 3479 and the rate was 811 per 100 000. Conversely gonorrhoea diagnoses had increased slightly in the non-Indigenous population as the number of gonorrhoea diagnoses was 2720 in 2007 and the reported rate was 20 per 100,000.

Gonorrhoea showed greatest prevalence among Indigenous persons aged 15 to 29 years with 73% of Indigenous gonorrhoea diagnoses occurring in this age cohort in 2008 [107]. In the non-Indigenous population, gonorrhoea was most common among 20 to 29 year olds followed by those aged 30 to 39 years. In terms of gender, gonorrhoea diagnoses showed a different pattern of distribution for the Indigenous population and the non-Indigenous population. Indigenous females aged 19 years and younger had the highest number of gonorrhoea diagnoses when compared with Indigenous males but from the age of 20 and onwards, gonorrhoea was more common among Indigenous males. In the non-Indigenous population, gonorrhoea was significantly more prevalent in males aged 15 and older.

Very remote and remote areas of residence showed the highest number of gonorrhoea diagnoses for both the Indigenous and non-Indigenous populations in 2008 [107]. For Indigenous persons residing in very remote areas, the rate of gonorrhoea diagnoses was almost 38 times the rate reported for the non-Indigenous population. In remote areas of residence, the rate of gonorrhoea diagnoses was also far greater among Indigenous persons (2330 per 100,000) than the rate reported for non-Indigenous persons (34 per 100,000). A comparison of this data with the data from 2004 reveals this pattern of distribution has remained consistent.

## **Syphilis**

Syphilis, which is caused by the organism *Treponema pallidum* is a complex infection that has four identified stages: primary, secondary, latent, and tertiary [30, 126]. In the initial stage of the infection, syphilis causes painless ulcers or sores around the mouth or genital area [125, 126]. If detected early, syphilis can be easily treated but if left untreated, the infection can lead to seriously ill health causing damage to the brain, heart, blood vessels, spinal cord, and bones. For pregnant women, untreated syphilis poses further serious health threats as the infection can be passed on to the child and physical deformities and brain damage may result [125].

National notification data from 2008 showed the number of syphilis diagnoses was far higher in the non-Indigenous population (N=1111) than it was for the Indigenous population (N=183) but the rate of syphilis diagnoses was greater in the Indigenous population – nearly six times the rate reported for the non-Indigenous population [107]. Out of the states and territories for which Aboriginal and Torres Strait Islander health status was reported for more than 50% of diagnoses, WA had the highest number of syphilis diagnoses for the Indigenous population, closely followed by the NT. There have been minor decreases in the number and rate of syphilis diagnoses from 2006 onwards in the Indigenous population while the non-Indigenous population shows fluctuations in the number of syphilis diagnoses for the same period.

In accordance with gonorrhoea, the greatest proportion of Indigenous syphilis diagnoses were found in persons aged 15 to 29 years [107]. In the non-Indigenous population, the vast majority of syphilis diagnoses occurred in persons aged 20 to 49 years. In the Indigenous population, there was only a slight difference in the number of syphilis diagnoses when comparing males with females but in the non-Indigenous population, males accounted for a significant number of syphilis diagnosis (95%). Very remote and remote areas of residence continued to report the highest rate of syphilis diagnoses for the Indigenous population but a different pattern emerged for the non-Indigenous population with major cities and very remote areas having the highest rate of syphilis diagnoses.

## **Chlamydia**

Chlamydia is caused by the bacterium *Chlamydia trachomatis* and is one of the most common STIs in Australia [123]. The infection in women can cause cervicitis, endometritis, and pelvic inflammatory disease, which can lead to tubal factor infertility and ectopic pregnancy. In men, it can cause urethritis, epididymo-orchitis, and prostatitis. Due to lack of obvious symptoms of the disease, the incidence of chlamydia is underestimated by notification data.

Data obtained from the health jurisdictions in which Aboriginal and Torres Strait islander status was reported for more than 50% of diagnoses showed Indigenous people represented 11% of chlamydia diagnoses in 2008 but had a significantly higher rate of chlamydia diagnoses (1131 per 100,000) when compared with the non-Indigenous population (273 per 100,000) [107]. As with other reported STIs, the NT and WA had the highest number of Indigenous chlamydia infections and also reported the highest diagnostic rate when considering the Indigenous and non-Indigenous rates. For the period 2004-2008 there has been a 25% increase in the number of chlamydia diagnoses in the Indigenous population.

Among Indigenous peoples, the greatest number of chlamydia diagnoses occurred in the 15 to 29 year age cohort whereas more than half of chlamydia diagnoses in the non-Indigenous population were attributable just to persons



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aged 20 to 29 years [107]. In both the Indigenous and non-Indigenous populations, more females were diagnosed with chlamydia than males and very remote and remote areas had significantly greater rates of chlamydia diagnoses when compared with the other areas of residence.

## HIV / AIDS

The Human Immunodeficiency Virus (HIV) is a retrovirus that destroys cells in the body's immune system [38]. Over time, the virus weakens immune system functioning to the point where minor infections become fatal. This late stage of HIV is referred to as Acquired Immune Deficiency Syndrome (AIDS) [127]. At present there is no vaccine to prevent HIV, nor is there a cure, but the illness can be managed and infected persons can be clinically healthy for many years [30, 38, 127].

The transmission of HIV occurs in one of three ways: unprotected sexual contact with an infected person; infected blood passing into another person's bloodstream; and an infected mother can pass HIV on to her child either during birth or through breast-feeding [127]. A behaviour that presents the greatest risk of exposure to HIV includes unprotected anal sex. Other unsafe behaviours that can put people at high risk of HIV include: unprotected vaginal sex; unprotected oral sex; and sharing injecting equipment such as syringes and needles.

To date Australia has successfully prevented an uncontrolled spread of HIV and the overall rates of HIV and AIDS are low in comparison with other countries [107]. However, great concerns have been expressed about the possible impact of HIV/AIDS among Indigenous people, for whom AIDS has been seen as having the potential 'to further erode the social and economic fabric of Indigenous communities' [128]. Indigenous people were seen as being at particular risk of HIV infection due to high rates of STIs and their lack of access to effective services [129].

### ***HIV/AIDS among Indigenous people***

National surveillance data shows a 12% increase in the number of newly diagnosed HIV infections in the Indigenous population in 2008 compared with 2007 (19 and 17 new cases respectively) [107]. Over the past decade, the number of new HIV diagnoses has increased by 73% (11 new cases in 1999) but an analysis of the data on a year by year basis shows variable increases and decreases in the number of new HIV cases among Indigenous peoples. The greatest proportion of Indigenous HIV diagnoses were attributable to males, 79% in 2008, and the median age of those newly diagnosed with HIV was 35 years.

In comparison, new diagnoses of HIV in the total population decreased by approximately 5% from 2007 to 2008 (1046 cases compared with 995) [107]. Males accounted for 86% of new HIV diagnoses in the total population and the median age of diagnosis among males was 37 years, which indicates Indigenous males are slightly younger at time of HIV diagnosis.

NSW had the highest percentage of new HIV infections (37%) for the Indigenous population in 2008 followed by SA and WA with each accounting for 21% of new HIV diagnoses [107]. In terms of exposure to HIV, men who have sex with men accounted for the largest percentage of new HIV cases among Indigenous peoples (53%). Injecting drug use and to a lesser degree, heterosexual contact, were also identified as common methods of exposure for HIV among Indigenous peoples (32% and 16% respectively). The majority of new Indigenous HIV infections occurred in major cities and the rate of infection showed a general decline as the area of residence became more remote.

As with the Indigenous population, NSW accounted for a larger percentage of new HIV diagnoses (37%) in the total population but unlike the Indigenous population, VIC (29%) and QLD (20%) also accounted for a substantial percentage of newly diagnosed HIV infections in 2008 [107]. In relation to HIV exposure categories, infections were largely acquired through homosexual contact (66%) in the total population but in contrast to the Indigenous population, heterosexual contact featured as the second most frequent mode of transmission accounting for 27% of new HIV diagnoses in 2008. Injecting drug use was a less common mode of transmission in the total population with only 3% of HIV infections acquired in this manner.

Overall in Australia, the cumulative number of HIV diagnoses by the end of 2008 was reported to be 28,330 [107]. For the same period, there were 10,348 AIDS cases and 6,765 deaths following AIDS. In comparison, there were 186 HIV notifications among the Indigenous population in the period 1999-2008 and 100 AIDS diagnoses from 1992-2004 [101, 107].

## **Skin infections and infestations**

Susceptibility to skin infections increases with poor living conditions and overcrowding [130]. Skin infections and infestations in Indigenous communities reflect serious health inequalities, but have attracted much less professional attention than they deserve. Scabies, a disease caused by the mite *Sarcoptes scabiei* resulting in inflammation and itching [131], is endemic in many remote Indigenous communities, with prevalence in children up to 50% [132]. The cycles of scabies transmission can result in pyoderma (also referred to as impetigo), a bacterial infection of the skin

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that can lead to kidney disease and possibly heart disease. Up to 70% of children living in some Indigenous communities have skin sores, with group A streptococcus (GAS) the major pathogen. GAS is responsible for continuing outbreaks of post-streptococcal glomerulonephritis and acute rheumatic fever. Indigenous people, particularly those living in the high-rainfall, humid areas of northern Australia, are also vulnerable to a variety of fungal and related organisms [131].

Skin diseases cause very few deaths directly, but they can be linked with serious complications. Skin diseases accounted for around 2.3% of hospital separations in 2007-08 for patients identified as Indigenous, at a rate more than two-and-a-half times that of non-Indigenous people [32].

## Eye health

Eye health can be affected by genetic factors, ageing, premature birth, diseases (such as diabetes) smoking, injuries, UV exposure and nutrition. There has been progress for Indigenous people in improving eye health but many are still more likely than non-Indigenous people to suffer from preventable conditions, such as trachoma (a bacterial infection) [133, 134]. Of increasing concern for many Indigenous people is diabetic retinopathy, a complication of diabetes that causes damage to the small blood vessels in the retina, can impair vision and may cause blindness [134, 135].

The eye health of many Indigenous people is also limited by difficulty in accessing optometrist or specialist services [134]. For Indigenous people with vision refractive error, for example, the main issues are access to and utilisation of testing, the administrative difficulty of dispensing spectacles, the cost of spectacles and of repairs [136].

### *Extent of eye health problems among Indigenous people*

The National Indigenous Eye Health Survey in 2008 aimed to: determine the prevalence and causes of vision impairment (cataract, macular degeneration, glaucoma, diabetic retinopathy, refractive error and trachoma); evaluate the access to, and utilisation of, health care services in Indigenous communities and in large residential enclaves; and provide the evidence base for the planning of effective eye care programs for Indigenous people [134]. Overall 2,883 Indigenous people had their eyes examined. The blindness rate in Indigenous adults (1.8%) was found to be 6.2 times the rate found in mainstream surveys of adults. The low vision rate in Indigenous adults (8.6 %) was 2.8 times the mainstream rate.

Major causes of blindness in Indigenous adults were: cataract (32%) optic atrophy (14%), refractive error (14%), diabetes eye disease (9%) and trachoma 9%). Overall 3% of Indigenous adults were found to suffer vision loss from cataract, which was found to be 12 times more common than in mainstream adults [134]. Only 65% of people with vision loss from cataract had received surgery. Refractive error was responsible for half of vision loss in both adults and children. Of all participants in the survey, 39% could not read normal size print and 62% reported wearing reading glasses for near work. The National Aboriginal and Torres Strait Islander Social Survey 2008 collected information on Indigenous children's sight issues including: long sightedness; short sightedness; partial or total blindness; glaucoma; and lazy eye [137]. For Indigenous children aged 4-14 years, almost one in ten (9%) were reported to have experienced an eye or sight problem.

In the 2004-2005 National Aboriginal and Torres Strait Islander Health Survey (NATSIHS) eye and/or sight problems were reported by 30% of Indigenous people who participated [37]. These problems were reported slightly less frequently by Indigenous people living in remote areas (25%) than by those living in non-remote areas (32%). The overall proportions of Indigenous people who reported having an eye and/or sight problem were similar for the 2001 NHS and the 2004-2005 NATSIHS.

The National Indigenous Eye Health Survey (2008) reported that Indigenous children had better vision than their mainstream peers especially in remote areas [134]. Vision loss in Indigenous children was found to be 0.22 times less common in Indigenous children than in non-Indigenous children. The major cause of low vision was refractive error (56%). There were similar findings according to the Western Australian Aboriginal Child Health Survey: 8% of Indigenous children aged 4-17 years did not have normal vision in both eyes (a level significantly lower than the 14% of children in the general population found in the 1993 WA Child Health Survey not to have normal vision in both eyes) [18]. Of 4-17 year-old Aboriginal children without normal vision in both eyes, 58% used prescribed glasses or contact lenses.

In Australia, trachoma is found almost exclusively within the Indigenous population, either in its infectious (follicular) form or as scarring (resulting from repeated infections over years) [133, 134]. Until recently, it has been difficult to develop an accurate picture of where infectious trachoma remains endemic because of the lack of systematic screening. The establishment in November 2006 of the National Trachoma Surveillance and Reporting Unit (NTSRU), however, means that good information will now be available for children living in many parts of WA, SA and the NT [138]. The National Indigenous Eye Health Survey reported that the rate of active trachoma in children

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was 3.8%. Trachoma was found to be less common in urban areas, but 50% of very remote communities had endemic trachoma [134].

In the National Indigenous Eye Health Survey 37.4% of Indigenous adults reported having diabetes [134]. Of those people 12% had visual impairment and only 20% reported having an eye examination within the last year. The average age of onset of diabetes was reported to be 44 years with an average duration time of 11 years. For participants with diabetes, 25% had mild/moderate non-proliferative retinopathy, 0.45% had severe non-proliferative retinopathy, 8.6% had clinically significant macular edema and 2.5% proliferative retinopathy with only 39% having received treatment.

## Ear health

The level of ear disease and hearing loss among Indigenous people remains higher than that of the general Australian population, particularly among children and young adults [139, 140]. Ear infection, otitis media (OM), particularly in suppurative forms, is associated with some impairment of hearing, with major implications for language development and learning difficulties [140]. The risk of permanent hearing loss increases if OM is not adequately treated and followed up. The hearing impairment associated with OM is generally conductive in nature and mild to moderate in degree, and may be intermittent or persistent depending on the middle-ear condition present at the time [141]. OM can affect Indigenous babies within weeks of birth and a high proportion of children will continue to suffer from chronic suppurative otitis media (CSOM) throughout their developmental years.

### *Extent of ear disease among Indigenous people*

The National Aboriginal and Torres Strait Islander Social Survey 2008 collected information on the ear and hearing problems of Indigenous children, including: total or partial deafness; ringing in ears (tinnitus); runny ears or glue ear (otitis media); and tropical ear or swimmer's ear (otitis externa). One in ten Indigenous children aged 4-14 years were reported as having experienced an ear or hearing problem [137].

Ear/hearing problems were reported by 12% of Indigenous people who participated in the 2004-2005 NATSIHS [37]. These problems were reported slightly more frequently by Indigenous people living in remote areas (13%) than by those living in non-remote areas (12%), but the difference is not statistically significant. Complete or partial deafness was reported by 9% of Indigenous people living in both remote and non-remote areas, but the level of otitis media was higher for Indigenous people living in remote areas (4%) than for those living in non-remote areas (2%).

After adjusting for differences in the age structures of the two populations, otitis media was around 2.8 times more common for Indigenous people than for non-Indigenous people [37]. An overall comparative figure for complete or partial deafness was not published, but the levels were higher for Indigenous than for non-Indigenous people for all age groups except people aged 55 years or older (for which group the levels were similar – 25% compared with 26%). The levels of complete or partial deafness among Indigenous people were around two times or more those among non-Indigenous people for age groups up to 34 years. The proportions of ear/hearing problems were similar for Torres Strait Islanders (11%) and Aboriginal people (12%) overall, but the proportion for Torres Strait Islanders living in the Torres Strait area was slightly lower (9%). The more detailed information collected by the WAACHS reveals that 18% of Indigenous children aged 0-17 years had recurring ear infections [18]. Children 0-11 years were more likely (20%) to have recurring ear infections than children aged 12-17 years (14%). Abnormal hearing was reported by carers for 7% of the children aged 4-17 years. Of children with recurring ear infections with discharge, 28% had abnormal hearing compared with 1% of those without ear infections.

Hospitalisation rates in 2007-08 for ear diseases were slightly higher for Indigenous people than non-Indigenous people. The age standardised separation rate of 3.3 per 1,000 for the Indigenous population was 1.3 times that of the non-Indigenous population (2.6 per 1000) [32].<sup>7</sup>

Individual studies have documented very high levels of CSOM in some Indigenous communities [140]. The WHO has identified a prevalence of CSOM of greater than 4% as being 'a massive public health problem' requiring 'urgent attention' [142]: some Indigenous communities have a prevalence up to 10 times higher than this [140].

As with many other areas of Indigenous health, this massive public health problem will be solved 'only with urgent attention to improving housing and access to running water, nutrition and quality of care, and giving communities greater control over these improvements' [143].

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<sup>7</sup> As noted in the section entitled 'Hospitalisation', it is likely that the Australia-wide numbers and rates under-estimate Indigenous hospitalisation by as much as 25%.

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## Oral health

Oral health is defined as ‘a standard of health of the oral and related tissues that enables an individual to eat, speak, and socialise without active disease, discomfort, or embarrassment and that contributes to general wellbeing’ [144]. Thus, it is more than simply the absence of disease in the oral cavity: it is a standard of oral functioning that enables comfortable participation in everyday activities.

Two major threats to oral health are dental caries and periodontal diseases. Dental caries is caused by acid-producing bacteria living in the mouth, which proliferate on sweet and sticky food [145]. Caries is reversible in its early stages, but, if untreated, can cause irreversible damage. Periodontal diseases (affecting the gums) are caused by bacterial infection associated with poor oral hygiene, infrequent dental visits, age, smoking, low education and income levels, and certain medical conditions [145], especially diabetes mellitus [146] and osteoporosis [147].

### ***Extent of oral health problems among Indigenous people***

Indigenous Australians experience more caries than non-Indigenous Australians. Indigenous adults aged 15 years and older have 2.3 times more untreated caries, and 57% of Indigenous adults have one or more tooth affected (compared to 25% for non-Indigenous people) [148]. The severity of decay that Indigenous people suffer is also higher. Indigenous adults have more than three times the number of decayed tooth surfaces than non-Indigenous adults. Indigenous people aged 35-54 years had more than five times more decayed tooth surfaces than their non-Indigenous counterparts.

Indigenous children experience more caries than non-Indigenous children in their deciduous and permanent teeth. The mean number of decayed, missing, and filled deciduous teeth (dmft)<sup>8</sup> in Indigenous children 4-10 years was significantly higher than for non-Indigenous children of the same age in NSW, SA and the NT [149]. The highest dmft scores were for Indigenous six year olds who experienced 2.4 times that of non-Indigenous children of the same age. Four year old Indigenous children had more than three times the level of decay of their non-Indigenous counterparts. The highest numbers of missing teeth occurred in five year old Indigenous children with more than five times that of non-Indigenous five year olds, and the highest number of filled teeth occurred in eight-year-old Indigenous children. Taken together, the dmft scores for Indigenous children indicated much poorer oral health in Indigenous children of all ages, with the largest difference observed in the younger age groups.

Poorer oral health for Indigenous children continues when they get their permanent teeth. The mean number of decayed and filled<sup>9</sup> permanent teeth in Indigenous children 6-15 years was higher than of their non-Indigenous counterparts [149]. Indigenous children had higher numbers of decayed teeth across all ages, but were highest in those aged 15 years who experience almost three times the level of decay. The number of filled teeth were also higher for Indigenous children, with six year old Indigenous children experiencing twice the filled component of non-Indigenous counterparts. The DMFT score was 1.5 times greater for Indigenous children aged 6-15 years.

Periodontal diseases, including gingivitis and periodontitis, are also more common among Indigenous adults and children. Almost 27% of Indigenous adults aged 15-74 years have gingivitis and experience approximately 1.3 times the prevalence of moderate and severe periodontitis when compared to non-Indigenous people [148]. Similarly, more Indigenous adults have a slightly higher prevalence of deep (4+mm) periodontal pockets and clinical attachment loss.

Indigenous people are affected by periodontal diseases at a younger age than non-Indigenous people [148, 150]. Indigenous people aged 15-34 years experienced almost twice the prevalence of moderate or severe periodontitis when compared to non-Indigenous people of the same age (13.5% compared to 7.3% respectively) [148]. There is an increased prevalence of both deep periodontal pockets for Indigenous people aged 15-34 years (18% compared to 13%) and clinical attachment loss (24% compared to 17%) when compared to their non-Indigenous counterparts. The prevalence of tooth sites with deep periodontal pockets is more than twice as high for Indigenous people as for non-Indigenous people in this age range (1.3% compared to 0.6% respectively).

While children rarely develop severe periodontal diseases, gingivitis is relatively common in children's deciduous and permanent teeth, especially among older children. Prevalence of gingival bleeding, a common symptom of gingivitis, was higher for Indigenous children in SA and NSW than non-Indigenous children (information is not available for other states and territories) [149]. Rates of gingival bleeding were around three times higher for Indigenous children

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<sup>8</sup> Two indices are used to measure caries: ‘dmft’ is the number of deciduous (baby) teeth (t) that are decayed (d), missing due to caries (m), or filled due to caries (f); and ‘DMFT’ is the corresponding index for permanent (adult) teeth.

<sup>9</sup> The numbers of missing permanent teeth of children aged 6-15 were negligible and were not provided [149]. Jamieson LM, Armfield JM, Roberts-Thomson KF (2007) *Oral health of Aboriginal and Torres Strait Islander children*. (AIHW Catalogue no. DEN 167) Canberra: Australian Research Centre for Population Oral Health (ARCPHO)

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13-14 years in NSW and almost half (49%) of Indigenous 12 year-olds in SA had gingival bleeding (compared to 23% of non-Indigenous children of the same age). Three-in-five Indigenous children in remote communities showed some evidence of gingivitis and approximately one-in-five children were at moderate risk of developing gingivitis. Almost 42% of Indigenous children aged 15-16 years were at moderate risk and 25% were at high risk of developing gingivitis.

## Disability

Disability is recognised as a condition that affects most people in the population, to varying degrees and at different stages of their lives. There is no precise agreement, however, about what constitutes a disability, which results in differences in estimates of prevalence [151].

Disability can be considered in terms of the nature of the impairment (such as sight and hearing impairments, difficulties with mobility or brain damage) or the interaction between the individual's health condition and their environment. In recent years, much greater attention has been directed to how the person with impairment functions rather than the impairment itself [152].

The ABS's Survey of Disability, Ageing and Carers (SDAC) defines disability as a limitation, restriction or impairment which has lasted, or is likely to last, for at least six months and restricts everyday activities. SDAC also collects information about a person's need for assistance with core activities [153].

### *Extent of disability among Indigenous people*

According to information collected as a part of the 2006 Australian census, 19,600 Indigenous people (4%) needed assistance with core activities some or all of the time [27]. After adjusting for differences in the age structures of the two populations, Indigenous people aged 18 years or older were more than twice as likely as their non-Indigenous counterparts to need assistance with core activities some or all of the time (Table \*\*). The proportions of Indigenous people needing assistance with core activities were higher than those of non-Indigenous people for all age groups, particularly for people aged 35-64 years.

The levels of disability were generally higher for Indigenous males than for Indigenous females, across the lifespan.

**Table 24 Proportions (%) of people needing assistance with core activities, by Indigenous status and age, Australia, 2006**

Age group (years)	Indigenous	Non-Indigenous	Ratio
18-24	2.5	1.3	2.0
25-34	2.8	1.2	2.3
35-44	4.9	1.7	2.8
45-54	8.2	2.7	3.1
55-64	13.2	4.8	2.8
65 or older	20.2	13.4	1.5
All ages	8.4	4.1	2.1

Source: ABS, AIHW 2008 [27]

- Notes:
- 1 Ratio is Indigenous rate divided by non-Indigenous rate
  - 2 Rates for all ages have been standardised using the 2001 Australian standard population

Among those in need for assistance, the median age for Indigenous males was 41 years and 49 years for Indigenous females, compared with 61 years and 75 years for their non-Indigenous counterparts [27]. The need for assistance with core activities increased from the 35-44 year age group and above for both Indigenous males and females. The proportion of Indigenous males needing assistance with core activities was higher than that of Indigenous females up to 70 years of age, but the reverse was true beyond that age [27].

The need for assistance with core activities among Indigenous people varied with the remoteness of residence: 5% of the Indigenous population living in non-remote areas needed assistance, 4% living in remote areas, and 3% living in very remote areas [27].

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## Health risk factors

The factors contributing to the poor health status of Indigenous people should be seen within the broad context of the 'social determinants of health' [10, 154]. These 'determinants', which are complex and interrelated, include income, education, employment, stress, social networks and support, social exclusion, working and living conditions, gender and behavioural aspects. Related to these are cultural factors, such as traditions, attitudes, beliefs, and customs. Together, these social and cultural factors also have a major influence on a person's behaviour.

Information about some of these determinants is available (see 'The context of Indigenous health'). As well, the 2002 NATSISS collected information about stressors experienced by Indigenous people in the previous 12 months [155].

The levels of these stressors and the indicators of the social disadvantage experienced by Indigenous people should be borne in mind in the interpretation of the following information about a number of specific health risk factors.

## Nutrition

The nutritional status of Indigenous people is influenced by socio-economic disadvantage, and geographical, environmental and social factors [156]. Poor nutrition is a common risk factor for overweight and obesity, malnutrition, cardiovascular disease, type 2 diabetes, certain cancers, osteoporosis, and tooth decay [157, 158]. The NHMRC has endorsed a number of dietary guidelines for infants, adolescents, adults, older Australians, women of childbearing age, and pregnant women [156]. The NHMRC guidelines recommend that adults consume a minimum of two serves of fruit and five serves of vegetables per day, selected from a wide variety of types and colours [159]. The guidelines also recommend including reduced-fat varieties of milk, yoghurts and cheeses, and choosing foods low in salt.

According to the 2004-2005 NATSIHS, 46% of Indigenous respondents aged 12 years or older living in non-remote areas consumed one serve or less of fruit per day, compared with 39% of non-Indigenous respondents [31]. Similarly, 42% of Indigenous respondents aged 12 years or older living in non-remote areas consumed two or more serves of fruit per day compared with 54% of non-Indigenous respondents. Almost two-thirds of Indigenous and non-Indigenous people aged 12 years or older living in non-remote areas reported consuming two to four serves of vegetables per day, but only 10% of Indigenous respondents and 14% of non-Indigenous respondents consumed five serves or more per day.

In remote areas the questions in the 2004-2005 NATSIHS were amended to whether the respondents usually ate fruit and/or vegetables each day. The proportions of people who did not consume these dietary items daily was substantially higher for Indigenous people aged 12 years and older living in remote areas than for those living in non-remote areas – 15% and 2% respectively for vegetable consumption, and 20% and 12% respectively for fruit consumption [31, 37].

More than three-quarters of Indigenous people aged 12 years or older living in non-remote areas reported that they usually drank whole milk (including full-cream powdered milk), with only 20% drinking reduced fat and/or skim milk [37]. In contrast, 45% of their non-Indigenous counterparts consumed reduced fat and/or skim milk and 45% whole milk. The consumption of reduced fat and/or skim milk was very low (6%) among Indigenous people aged 12 years or older living in remote areas, with 87% reporting that they drank whole milk.

More than four-fifths of Indigenous people aged 12 years or older living in remote areas reported 'sometimes' or 'usually' adding salt after cooking, compared with two-thirds of those living in non-remote areas [37].

The 2004-2005 NATSIHS also addressed the question of food security by asking respondents whether they ran out of food in the 12 months before the survey. Approximately 24% of Indigenous Australians aged 15 years and older reported they ran out of food in the 12 months before the survey, compared with 5% of non-Indigenous Australians [53]. Those in remote areas were more likely to report having run out of food than those in non-remote areas (36% compared with 20%). Approximately 8% of Indigenous people reported they went without food when they couldn't afford to buy more, compared with 2% of non-Indigenous people.

## Physical activity

The *National Physical Activity Guidelines for Australians* currently recommend at least 30 minutes of moderate activity on most, preferably all, days of the week to enhance health and reduce the risk of cardiovascular disease and other chronic conditions [160]. Insufficient levels of physical activity have shown to be a risk factor for cardiovascular disease, type 2 diabetes, certain cancers, depression, and overweight and obesity [161].

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Data on the levels of physical activity of Indigenous people are limited [162]. After adjusting for differences in age structure, approximately 51% of Indigenous respondents in non-remote areas in the 2004-2005 NATSIHS reported their exercise level as sedentary (very low or no exercise), 27% as low and 21% as moderate or high, compared with 33%, 36% and 31% respectively of non-Indigenous Australians [53]. Sedentary or low levels of physical activity were highest among Indigenous people aged 45–54 years and 55 years and older (83% and 85% respectively); moderate or high levels of physical activity were highest among those aged 15–24 and 25–34 years (32% and 27% respectively). A higher proportion of Indigenous females than Indigenous males reported that their level of exercise was sedentary (51% compared with 42%).

## Bodyweight

Body mass index (BMI – weight in kilograms divided by height in metres squared) is the standard measure for classifying a person's weight for height [28]. Being overweight (BMI between 25.0 to 29.9) or obese (BMI  $\geq$  30.0) increases a person's risk for cardiovascular disease, type 2 diabetes, respiratory diseases, renal disease, certain cancers, osteoarthritis, pregnancy complications, and psychosocial problems [162]. A high BMI can be a result of many factors, either alone or in combination, such as poor nutrition, physical inactivity, socioeconomic disadvantage, genetic predisposition, increased age, and alcohol and tobacco use [162, 163]. Being underweight (BMI less than 18.5) can also have adverse health consequences, including decreased immunity (leading to increased susceptibility to some infectious diseases), osteoporosis (bone loss), decreased muscle strength, and hypothermia (lowered body temperature). The 2003 NHMRC dietary guidelines for adults recommend that adults prevent weight gain by being physically active and eating according to their energy needs.

Based on information collected as a part of the 2004-2005 NATSIHS, 57% of Indigenous people aged 15 years or older were overweight or obese, with no real difference according to remoteness of residence [37]. The slightly higher proportion of Indigenous men (58%) than Indigenous women (55%) were overweight or obese. Almost 6% of Indigenous people aged 15 years or older were underweight, with 4% of Indigenous men and 7% of Indigenous women having a BMI of less than 18.5. After adjusting for differences in the age structures of the two populations, the level of being overweight or obese was 1.2 times higher for Indigenous people aged 15 years or older than for their non-Indigenous counterparts.

In 2004-2005, Indigenous Australians over the age of 18 were more likely to be overweight or obese if: their self-reported health status was fair/poor (68%) compared with those whose health was excellent or very good (55%); they had three or more long term health conditions (65% compared with 56% of those who had two or less long term health conditions); they had circulatory problems (72% compared with 57% without circulatory problems); or had diabetes (83% compared with 57% of those without diabetes) [53]. The prevalence of overweight and obesity among Indigenous Australians aged 18 years and over has been steadily increasing in non-remote areas from 51% in 1995 to 56% in 2001 and 60% in 2004-2005.

Overweight and obesity were more common among Torres Strait Islanders aged 15 years or older (61%) than among Aboriginal people in that age range (56%) (the difference is not statistically significant) [37]. The level of overweight and obesity was particularly high among Torres Strait Islanders living in the Torres Strait area, with 86% having a BMI of 25.0 or greater.

## Immunisation

In response to the greater burden of communicable diseases among Indigenous people, the NHMRC has endorsed a series of special guidelines and schedules for immunisation of vaccine-preventable diseases, which include some extra vaccinations [164, 165].

Respondents to the 2004-2005 NATSIHS reported that 88% of Indigenous children aged 0-6 years living in non-remote areas were fully immunised against the vaccine-preventable diseases included in the relevant NHMRC vaccination schedule [37]. Based on available immunisation records, the level fully immunised would be somewhat lower, as the proportions for the separate vaccines were: diphtheria and tetanus (79%), whooping cough (74%), hepatitis B (83%), (79%), Hib (73%), and MMR (measles, mumps, and rubella) (85%).

Three-fifths of Indigenous people aged 50 years or older reported to the 2004-2005 NATSIHS that they had been vaccinated against influenza in the previous 12 months, with vaccination levels higher for people living in remote areas (80%) than for those living in non-remote areas (52%) [37]. All of these levels were higher than that for non-Indigenous people (46%). Similarly, vaccination levels for pneumonia in the previous 5 years were higher for Indigenous adults aged 50 years or older (remote: 56%; non-remote: 26%; all: 34%) than that for their non-Indigenous counterparts (20%).

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## Breastfeeding

Breast milk, which is the natural and optimum food for babies, contains proteins, fats and carbohydrates at levels that are appropriate for an infant's metabolic capacities and growth requirements [156]. It also has anti-infective properties and contains immunoglobulins which provide some immunity against early childhood diseases [166]. The NHMRC recommends that as many infants as possible be exclusively breastfed until six months of age and that mothers then continue breastfeeding until 12 months of age [165].

According to the 2004-2005 NATSIHS, 79% of Indigenous children aged less than four years living in non-remote areas were reported to have been breastfed for at least some period [37]. This level is slightly lower than the 88% of non-Indigenous children aged less than four years who had been breastfed. A similar proportion of Indigenous and non-Indigenous infants had been breastfed for six to 12 months (19% and 22% respectfully) and for 12 months or more (13% and 14% respectfully). On the other hand, mothers of Indigenous children reported in the WAACHS that they were more likely to initiate breastfeeding and breastfeed for longer than mothers in the general population, particularly those living in more isolated areas [18].

The 2009 *Footprints in Time – the Longitudinal study of Aboriginal children* collected data from 11 sites (rural, remote and urban) around Australia in 2008-2009 [167]. Data on breastfeeding from this study showed that 22% of Indigenous infants had been breastfed for at least 12 months and there was a positive correlation between the length of breastfeeding and the relative isolation of the family.

## Tobacco smoking

Smoking tobacco increases the risk of cardiovascular disease, some cancers, lung diseases, and a variety of other health conditions [30]. Smoking is also a risk factor for complications during pregnancy and is associated with preterm birth, small for gestational age babies, low birthweight, and perinatal death [16]. Passive smoking is also of concern to health, with children particularly susceptible to problems including middle ear infections, asthma, respiratory infections, reduced lung function, low birthweight, and sudden infant death syndrome [30].

In 2003, tobacco smoking was the leading cause of the burden of disease and injury among Indigenous Australians, responsible for 12.1% of the total burden and one-fifth of all deaths [168].

Half of Indigenous people (50%) aged 18 years or older reported to the 2004-2005 NATSISS that they smoked daily. Overall, the proportion of Indigenous men who smoke (51%) is slightly higher than the proportion of Indigenous women who smoke (49%) [37]. By remoteness, the level of smoking is slightly higher for people living in remote areas (52%) than for those living in non-remote areas (49%). The level of smoking among Indigenous people has not really changed since at least 1994 (52%) [155].

The proportions of people smoking daily were similar for Torres Strait Islanders (49%) and Aboriginal people (50%) overall, but the proportion of daily smokers among Torres Strait Islanders living in the Torres Strait area was lower (38%) [37].

In 2004-2005, after adjusting for differences in the age structures of the two populations, daily smoking was 2.2 times more common among Indigenous people aged 15 years or older than among their non-Indigenous counterparts [37]. Even greater rates of smoking have been reported among Indigenous mothers. In 2007, in the jurisdictions that provided data (NSW, Qld, WA, SA, Tas, the ACT and the NT), smoking during pregnancy was more than three times more common among Aboriginal and Torres Strait Islander mothers than among non-Indigenous mothers (51.8% compared with 14.8%) [15].

Surveys consistently reveal that the prevalence of smoking is higher among Indigenous people than among non-Indigenous people. The 2007 NDSHS, for example, found that 34% of Indigenous people aged 14 years or older smoked daily – just under twice the proportion of their non-Indigenous counterparts (19%) [169].

## Alcohol use

Binge drinking places both the drinker and others at increased risk of injury and morbidity, while regular drinking at harmful levels leads to a significant increase in risk of chronic ill-health and premature death [27]. Alcohol consumption in pregnancy can result in a spectrum of harms for the unborn child; the risk of birth defects is greatest when there is high and frequent alcohol intake in the first trimester, but alcohol exposure throughout pregnancy can impact on the development of the foetal brain [170].

In 2003, alcohol was the fifth leading cause of the burden of disease and injury among Indigenous Australians, responsible for 6.2% of the total burden of disease (net 5.4%), and 7% of all deaths [168]. Just over one-fifth of burden due to injury and more than one-sixth of burden due to mental disorders was attributable to alcohol.



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Surveys have shown consistently that Indigenous people are less likely to drink alcohol than non-Indigenous people, but those that do drink are more likely to consume it at hazardous levels [27, 169].

The 2007 NDSHS found that 23% of Indigenous people aged 14 years and older were abstainers or ex-drinkers compared with 17% of non-Indigenous people aged 14 years and older [169].

Analysis derived from the 2004-2005 NATSIHS found that the proportions of people aged 18 years or older who had never consumed alcohol or had not done so for more than 12 months was 24% for Indigenous people and 15% for non-Indigenous people [37]. Seventeen per cent of Indigenous men and 11% of non-Indigenous men aged 18 years or older had never consumed alcohol or had not done so in the previous 12 months; the proportions for Indigenous and non-Indigenous females were 30% and 20% respectively.

On the other hand, analysis derived from the 2004-2005 NATSIHS, found that the proportions of people aged 18 years or older who consumed alcohol at a 'high risk' level were 8% for Indigenous people and 6% for non-Indigenous people ('high risk' is defined as daily consumption of six standard drinks or more for males and four standard drinks or more for females) [37]. High risk alcohol consumption was reported for 11% of Indigenous males and 8% of non-Indigenous males, and for 6% of Indigenous females and 3% of non-Indigenous females.

Information about levels of total abstinence or abstinence for greater than 12 months and high risk consumption are not available by remoteness of residence, but consumption at 'risky' and 'high risk' levels (four and six standard drinks or more for males, and two and four standard drinks or more for females respectively) were slightly higher for Indigenous people aged 18 years or older living in remote areas (17%) than for their counterparts living in remote areas (15%) (the difference is not statistically significant) [37]. Compared with results from the 2001 NHS, consumption at 'risky' and 'high risk' levels increased by five percentage points for Indigenous people living in non-remote areas and decreased by two percentage points for those living in non-remote areas.

Alcohol consumption at 'risky' or 'high risk' levels was more common among Aboriginal people aged 18 years or older (17%) than among Torres Strait Islanders in that age range (13%) (the difference is not statistically significant) [37]. The level of 'risky' or 'high risk' alcohol consumption was even lower among Torres Strait Islanders living in the Torres Strait area (9%).

In 2009, the NHMRC introduced revised guidelines that depart from specifying 'risky' and 'high risk' levels of drinking. The guidelines seek to estimate the overall risk of alcohol-related harm over a lifetime and to reduce the level of risk to one death for every 100 people [170]. For men and women, guideline one states that to reduce the risk of alcohol-related harm over a lifetime, no more than two standard drinks should be consumed on any day, and guideline two states that to reduce the risk of injury on a single occasion of drinking, no more than four standard drinks should be consumed. Guideline three recommends avoiding alcohol for those under 15 years, and delaying alcohol for those aged 15 to 17 years. Guideline four recommends pregnant and breast feeding women avoid alcohol.

## Concluding comments

It is clear from this overview of current health status that Indigenous people remain the least healthy sub-population in Australia. Being a 'snapshot' of the most recent indicators of health status – with little attention to trends – the overview, however, doesn't reflect the evidence that the health status of Australia's Indigenous people continues to improve slowly.

For a start, there appear to have been slight reductions in mortality in recent years in a number of jurisdictions. Mortality appears to have declined in the period 1991-2002 for Indigenous people living in WA and SA and the NT [39]. Crude death rates have declined in these three jurisdictions, with the decline for WA being statistically significant. Supporting evidence comes from the increase in age at death for the first quartile of deaths (the age below which 25% of all deaths occur). This aspect is consistent with the continuing slow declines in infant mortality (see below).

A separate analysis of trends in Indigenous mortality in the NT, the jurisdiction with by far the best quality data about Indigenous deaths, provides evidence of declines in death rates for some causes of death and a slowing in the increase in rates for others [171]. In the twelve-year period 1990-2001, the death rate for chronic obstructive pulmonary disease declined significantly. The death rates for stroke and renal failure for people aged less than 50 years also declined, but not significantly. On the other hand, the rates for ischaemic heart disease and diabetes mellitus increased significantly, but at lesser annual rates of change than documented for the period 1977-1989.

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The survival rate of Indigenous infants has continued to improve slowly [39], after the period of sharp declines in infant mortality rates during the 1970s and 1980s [172].

The declines in infant mortality rates have occurred despite the lack of real changes in the birthweights of babies born to Indigenous mothers – the mean weights of babies are still around 200 grams less than the weights of babies born to non-Indigenous mothers. Importantly, the proportions of low birthweight (less than 2,500 grams) babies born to Indigenous mothers are still around twice those of babies born to other mothers.

Considerable improvements in the growth of Indigenous infants and young children appear to have occurred in many parts of the country, but those living in some remote areas (at least in the Kimberley region and the Top End) still experience the faltering pattern of growth documented in the 1960s [173].

In terms of specific health conditions, substantial improvements have occurred in the overall impact of many infectious diseases (partly due to immunisation programs) including:

- reductions in the impact of respiratory infections in childhood [87];
- substantial declines in death rates from pneumococcal pneumonia (mostly due to the introduction of vaccination programs) [89];
- reductions in the incidence and severity of trachoma (though inflammatory trachoma remains endemic in some remote communities of central and northern Australia) [133];
- marked reductions in notifications of donovanosis [88];
- a substantial reduction in the prevalence of hepatitis B virus infection (since the introduction of vaccination programs) [88];
- reductions in rates of hospitalisation for diarrhoeal disease and gastrointestinal infestations among Indigenous children [174];
- a rapid decline in the incidence of invasive *Haemophilus influenzae* type B (Hib) disease in Indigenous children (following the introduction of vaccination) [88]; and
- a reduction in the number of new cases of tuberculosis, from 79 in 1984 [175] to an average of around 40 in the early 2000s [98].

There is no doubt other evidence of improvement in health status, and of deterioration in some areas. But, clearly, the gap between the health status of Indigenous people and that of other Australians is still very, very wide.

A recent analysis of national health data for Indigenous populations in Australia, New Zealand, Canada and the United States of America found that ‘Australia ranks bottom in the league table of first-world nations working to improve the health and life expectancy of Indigenous people’ [176]. The report noted that the poor health status of Indigenous Australians is related to ‘social and economic factors: diseases triggered by poverty; overcrowded housing; poor sanitation; lack of access to education; poor access to medical care for accurate diagnosis and treatment; and poor nutrition’ and called for ‘Federal, State and Territory leaders from all sides of politics to commit to an agreed time frame for achieving health equality’.

Commonwealth, State and Territory leaders have already agreed to redressing Indigenous disadvantage [177]. As part of its responsibility to COAG, the Australian Health Ministers’ Council endorsed in 2003 the National Strategic Framework for Aboriginal and Torres Strait Islander Health [178]. After concluding that ‘the devastating impact of poor health on Aboriginal and Torres Strait Islander peoples and communities cannot go on’, the Commonwealth, State and Territory ministers for health committed themselves to ‘a long-term collaborative approach to addressing the health status of Aboriginal and Torres Strait Islander people as a matter of urgency. It is time ... to work together across governments and across portfolios in a spirit of bi-partisanship and in full collaboration with Aboriginal and Torres Strait Islander health leaders and communities to progress long-term strategies for sustainable outcomes’ [178].

More recently, the Australian Government has made a commitment to ‘closing the gap’ in health between Indigenous and other Australians, which should be expected to flow into a national commitment through the Council of Australian Governments.

These agreements and commitments need to be matched by comprehensive strategies, policies and timeframes – and real commitment by all sectors of government and the Australian people – for Australia to rise from the bottom in the league table of first-world nations working to improve the health of Indigenous people and to ‘close the gap’ in health between Indigenous and other Australians.

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## Glossary

- age-specific death rate number of deaths of persons of a specific age group in one year per 1,000 persons of the same age group
- age-specific fertility rate the number of live births to women in a specified age group in one year per 1,000 women in the same age group
- age-standardisation a procedure for adjusting rates (such as death rates) to minimise the effects of differences in age composition and facilitate valid comparison of rates for populations with different age compositions. See direct standardisation and indirect standardisation
- body mass index (BMI) a measure calculated by dividing weight in kilograms by height in metres squared, and which categorises a person as ranging from underweight to obese: underweight (BMI: <18.5); normal (BMI: 18.5–24.9); overweight (BMI: 25.0–29.9); obese (BMI: 30.0+)
- direct standardisation the procedure for adjusting rates in which the specific rates for a study population are averaged using as weights the distribution of a standard population
- excess deaths the difference between the actual number of deaths occurring and the number expected from rates for the comparable population (the population used for comparison is most often the total Australian population or the total for the specific jurisdictions being considered)
- expectation of life predicted number of years of life remaining to a person if the present pattern of mortality does not change. It is a statistical abstraction based on current age-specific death rates
- fertility rate See age-specific fertility rate and total fertility rate.
- incidence the number of instances of illness commencing, or of persons falling ill, during a given period in a specified population (see incidence rate)
- incidence rate the number of instances of illness commencing, or of persons falling ill, during a given period in a specified population divided by the population at risk
- indirect standardisation the procedure for adjusting rates in which the specific rates in a standard population are averaged using as weights the distribution of the study population
- infant mortality rate number of infant deaths per 1,000 live births
- International Classification of Disease (ICD) World Health Organization's internationally accepted classification of death and disease
- life expectancy See expectation of life
- maternal mortality ratio number of maternal deaths divided by the number of confinements (in 100,000s)
- median age at death the age above and below which 50% of deaths occurred
- morbidity state of being diseased or otherwise unwell
- mortality death
- prevalence the number of instances of a given disease or other condition in a given population at a designated time
- risk factor an attribute or exposure that is associated with an increased probability of a specified outcome, such as the occurrence of a disease. Not necessarily a causal factor
- standardisation the process by which adjustments are made to take account of differences in the age structures of populations
- standardised mortality ratio (SMR) the ratio of the observed number of deaths in a study population to the number expected if the study population had the same age-specific rates as a standard population. (The SMR is expressed sometimes as the ratio multiplied by 100.); see age-standardisation and indirect standardisation
- total fertility rate the number of live births a woman would have if, throughout her reproductive years, she had children at the rates prevailing in the reference calendar year. It is the sum of the age-specific fertility rates for that calendar year

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## Abbreviations

ABS	Australian Bureau of Statistics
ACCHS	Aboriginal community-controlled Health Service; see also AMS
ACEi	Angiotensin-converting enzyme inhibitor
ACT	Australian Capital Territory
AHS	Australian Housing Survey
AIDS	Acquired immune deficiency syndrome
AIHW	Australian Institute of Health and Welfare
AMA	Australian Medical Association
AMS	Aboriginal Medical Service; see also ACCHS
ANCARD	Australian National Council on AIDS and Related Diseases
ANZDATA	Australia and New Zealand Dialysis and Transplant Registry
ASCO	Australian Standard Classification of Occupations
ASGC	Australian Standard Geographical Classification
ATSIC	Aboriginal and Torres Strait Islander Commission
BMI	Body mass index
CDEP	Community Development Employment Projects scheme
CGC	Commonwealth Grants Commission
CHINS	Community Housing and Infrastructure Needs Survey
COAG	Council of Australian Governments
CSOM	Chronic suppurative otitis media
CVD	Cardiovascular disease
dB	Decibel
DMFT	A count of the sum of teeth (T) that are decayed (D), missing due to caries (M), and filled due to caries (F)
dmft	A count of the sum of deciduous (baby) teeth (t) that are decayed (d), missing due to caries (m), and filled due to caries (f)
ERP	Estimated resident population
ESRD	End-stage renal disease
GAS	Group A streptococcus
HAV	Hepatitis A virus
HBsAg	Hepatitis B surface antigen (a serological marker for HBV)
HBV	Hepatitis B virus
HCV	Hepatitis C virus
Hib	<i>H. influenzae</i> type b
HIV	Human immunodeficiency virus
HPV	Human papilloma virus
ICD	International Classification of Diseases - the World Health Organization's internationally accepted classification of death and disease
ICDH	International Classification of Disability and Handicaps
ICF	International Classification of Functioning, Disability and Health

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IDDM	Insulin-dependent diabetes mellitus
IHO	Indigenous Housing Organisations
IPD	Invasive pneumococcal disease
ISDR	Indirectly standardised death rate
IV	Intravenous
LBW	Low birthweight
mmol/L	Millimoles per litre
MMR	Maternal mortality ratio
NACCHO	National Aboriginal Community Controlled Health Organisation
NATSIS	(1994) National Aboriginal and Torres Strait Islander Survey
NATSISS	(2002) National Aboriginal and Torres Strait Islander Social Survey
NHMRC	National Health and Medical Research Council
NHS	National Health Survey
NIDDM	Non insulin-dependent diabetes mellitus
NNDSS	National Notifiable Diseases Surveillance System
NSW	New South Wales
NT	Northern Territory
OATSIH	Office for Aboriginal and Torres Strait Islander Health
OATSIHS	Office for Aboriginal and Torres Strait Islander Health Services – the former name of OATSIH
OM	Otitis media
Qld	Queensland
RR	Rate ratio- usually in this publication the Indigenous rate divided by the non-Indigenous rate
SA	South Australia
SMR	Standardised mortality ratio
STD	Sexually transmitted disease; see STI
STI	Sexually transmitted infection
Tas	Tasmania
UK	United Kingdom
UNICEF	United Nations International Children's Emergency Fund
UV	Ultraviolet
Vic	Victoria
WA	Western Australia
WAACHS	Western Australian Aboriginal Child Health Survey
WHO	World Health Organization