

# 1.19 Infant mortality

**The number of Aboriginal and Torres Strait Islander people who die in the first year of life, expressed as a rate (per 1,000 live births) for that period**

## Data sources

Data for this measure come from the AIHW National Mortality Database.

The National Mortality Database is a national collection of de-identified information for all deaths in Australia and is maintained by the AIHW. Information on the characteristics and causes of death of the deceased is provided by the Registrars of Births, Deaths and Marriages and coded nationally by the ABS. Information on the cause of death is supplied by the medical practitioner certifying the death or by a coroner. The data are updated each calendar year.

Although the identification of Indigenous deaths is incomplete in all state and territory registration systems, four jurisdictions (Queensland, Western Australia, South Australia and the Northern Territory) have been assessed by the ABS and the AIHW as having adequate identification. These four jurisdictions represent approximately 60% of the Indigenous population of Australia. Data are presented by state/territory of usual residence rather than state/territory where death occurs.

Deaths for which the Indigenous status of the deceased was not reported have been excluded from the analysis.

Several years of data have been combined because of the small number of deaths from some conditions each year. Data have been analysed using the year of registration of death for all years. Note that the 2006 edition of this report used year of occurrence of death for all years of analysis except for the latest year of available data, for which year of registration of death was used. Rates published in this report may therefore differ slightly from those published in the previous edition for comparable years of data.

## Analyses

### Mortality

- Over the period 2002–2006 there were 2,408 deaths of infants in Queensland, Western Australia, South Australia and the Northern Territory, 455 (19%) of which were deaths of Aboriginal and Torres Strait Islander infants and 62 (3%) were of infants for whom Indigenous status was not stated.
- The mortality rate for Indigenous infants was 12.3 per 1,000 live births compared with 4.2 per 1,000 live births for non-Indigenous infants in Queensland, Western Australia, South Australia and the Northern Territory combined. Indigenous infants died at around three times the rate of non-Indigenous infants in these jurisdictions (Table 1.19.1).

### Mortality by sex

- Over the period 2002–2006 in Queensland, Western Australia, South Australia and the Northern Territory combined, the mortality rate for Indigenous male infants was 14.4

per 1,000 live births compared with 10.1 per 1,000 live births for Indigenous female infants (Table 1.19.1).

- Over the same period Indigenous male and female infants died at around three times the rate of non-Indigenous infants.

**Table 1.19.1: Infant mortality rates per 1,000 live births, by Indigenous status and sex, Qld, WA, SA and NT, 2002–2006<sup>(a)(b)(c)(d)(e)</sup>**

	Indigenous				Non-Indigenous				Rate ratio <sup>(i)</sup>
	Deaths	No. per 1,000 <sup>(f)</sup>	LCL 95% <sup>(g)</sup>	UCL 95% <sup>(h)</sup>	Deaths	No. per 1,000 <sup>(f)</sup>	LCL 95% <sup>(g)</sup>	UCL 95% <sup>(h)</sup>	
Males	272	14.4	12.7	16.2	1,036	4.5	4.2	4.8	3.2*
Females	183	10.1	8.6	11.6	855	3.9	3.7	4.2	2.6*
Persons	455	12.3	11.2	13.4	1,891	4.2	4.0	4.4	2.9*

\* Represents results with statistically significant differences in the Indigenous/non-Indigenous comparisons at the  $p < 0.05$  level.

- (a) Data are reported for Queensland, Western Australia, South Australia and the Northern Territory only. These jurisdictions are considered to have adequate levels of Indigenous identification in mortality data for these periods. They do not represent a quasi-Australian figure.
- (b) Data exclude 62 registered infant deaths where Indigenous status was not stated over the period 2002–2006 in Queensland, Western Australia, South Australia and the Northern Territory combined.
- (c) Although most deaths of Indigenous Australians are registered, it is likely that some are not accurately identified as Indigenous. Therefore, these statistics are likely to underestimate the Indigenous infant deaths and, depending on the under-identification in births, may either underestimate or overestimate the rates. The ABS calculated the completeness of identification of Indigenous deaths for the period 2002–2006 using population estimates as 51% for Queensland, 72% for Western Australia, 62% for South Australia and 90% for the Northern Territory. The completeness of Indigenous identification for infant mortality may differ from the estimates for 'all causes'.
- (d) Because of changes in the level of accuracy of Indigenous identification in the births and deaths data over time, caution should be used in interpreting changes in Indigenous infant mortality rates. It is also difficult to exactly identify the difference between the Indigenous and non-Indigenous infant mortality rates because of these data quality issues.
- (e) Deaths are by year of registration and state/territory of usual residence.
- (f) No. per 1,000 live births.
- (g) LCL = lower confidence limit.
- (h) UCL = upper confidence limit.
- (i) Rate ratio Indigenous:non-Indigenous.

Source: AIHW analysis of National Mortality Database.

## Mortality by state/territory

Table 1.19.2 presents infant deaths, mortality rates and rate ratios for Queensland, Western Australia, South Australia and the Northern Territory for the years 1996–1998, 1999–2001, 2002–2004 and 2005–2006.

- For the period 1996–1998, there were 189 deaths of Aboriginal and Torres Strait Islander infants in Western Australia, South Australia and the Northern Territory combined. Indigenous infant mortality rates were 8.3 per 1,000 live births in South Australia, 18.3 per 1,000 in Western Australia and 23.7 per 1,000 in the Northern Territory. In South Australia, Indigenous infants died at twice the rate of non-Indigenous infants and in Western Australia and the Northern Territory, Indigenous infants died at around four times the rate of non-Indigenous infants.
- For the period 1999–2001, there were 296 deaths of Indigenous infants in Queensland, Western Australia, South Australia and the Northern Territory combined. Infant mortality rates ranged from 8.0 per 1,000 live births in South Australia to 19.2 per 1,000 live births in the Northern Territory. In Western Australia and the Northern Territory, Indigenous infants died at three to five times the rate of non-Indigenous infants. In Queensland, Western Australia, South Australia and the Northern Territory combined, Indigenous infants died at three times the rate of non-Indigenous infants.
- For the period 2002–2004, there were 270 deaths of Aboriginal and Torres Strait Islander infants in the four jurisdictions. Infant mortality rates ranged from 9.4 per 1,000 live

births in South Australia to 15.4 per 1,000 live births in the Northern Territory. In Queensland, Western Australia, South Australia and the Northern Territory combined, Indigenous infants died at three times the rate of non-Indigenous infants.

- For the period 2005–2006, there were 185 deaths of Aboriginal and Torres Strait Islander infants in the four jurisdictions. Infant mortality rates ranged from 6.9 per 1,000 live births in South Australia to 16.1 per 1,000 live births in the Northern Territory. In Queensland, Western Australia, South Australia and the Northern Territory combined, Indigenous infants died at three times the rate of non-Indigenous infants.

### **Mortality by cause of death**

- In the period 2002–2006, the most common group of diseases causing mortality among Indigenous infants was conditions originating in the perinatal period such as birth trauma, disorders related to fetal growth, complications of pregnancy, labour and delivery, and respiratory and cardiovascular disorders specific to the perinatal period. Indigenous infants died at three times the rate of non-Indigenous infants for these conditions (Table 1.19.3).
- Congenital malformations, deformations and chromosomal abnormalities and sudden infant death syndrome (SIDS) were also leading causes of death among Indigenous infants who died at twice and five times the rates of non-Indigenous infants respectively for these conditions.
- Indigenous infants also died at much higher rates for respiratory diseases, infectious and parasitic diseases, and injury and poisoning than non-Indigenous infants (nine, four and four times the rates respectively).

**Table 1.19.2: Infant mortality rates per 1,000 live births, by Indigenous status, Qld, WA, SA and NT, 1996–1998, 1999–2001, 2002–2004 and 2005–2006<sup>(a)(b)(c)(d)(e)(f)(g)</sup>**

	Indigenous				Non-Indigenous				Rate ratio <sup>(k)</sup>
	Deaths	No. per 1,000 <sup>(h)</sup>	LCL 95% <sup>(i)</sup>	UCL 95% <sup>(j)</sup>	Deaths	No. per 1,000 <sup>(h)</sup>	LCL 95% <sup>(i)</sup>	UCL 95% <sup>(j)</sup>	
<b>1996–98<sup>(b)</sup></b>									
WA	82	18.3	14.3	22.3	332	4.8	4.2	5.3	3.8*
SA	15	8.3	4.1	12.5	239	4.4	3.9	5.0	1.9*
NT	92	23.7	18.8	28.5	39	5.6	3.9	7.4	4.2*
<b>1999–2001</b>									
Qld	111	11.7	9.5	13.9	721	5.5	5.1	5.9	2.1*
WA	81	16.6	13.0	20.2	251	3.6	3.2	4.1	4.6*
SA	15	8.0	3.9	12.0	219	4.3	3.7	4.8	1.9*
NT	89	19.2	15.2	23.2	37	5.7	3.9	7.6	3.3*
<b>Qld, WA, SA &amp; NT<sup>(a)</sup></b>	<b>296</b>	<b>14.2</b>	<b>12.6</b>	<b>15.8</b>	<b>1,228</b>	<b>4.7</b>	<b>4.5</b>	<b>5.0</b>	<b>3.0*</b>
<b>2002–04</b>									
Qld	111	10.9	8.9	12.9	643	4.7	4.4	5.1	2.3*
WA	69	14.1	10.8	17.5	222	3.3	2.8	3.7	4.3*
SA	18	9.4	5.1	13.8	184	3.7	3.1	4.2	2.6*
NT	72	15.4	11.8	18.9	39	6.1	4.2	8.0	2.5*
<b>Qld, WA, SA &amp; NT<sup>(a)</sup></b>	<b>270</b>	<b>12.5</b>	<b>11.0</b>	<b>14.0</b>	<b>1,088</b>	<b>4.2</b>	<b>3.9</b>	<b>4.4</b>	<b>3.0*</b>
<b>2005–06</b>									
Qld	81	11.4	8.9	13.9	452	4.6	4.2	5.1	2.4*
WA	45	12.3	8.7	15.8	199	4.0	3.4	4.5	3.1*
SA	10	6.9	2.6	11.2	133	3.8	3.2	4.5	1.8
NT	49	16.1	11.6	20.6	19	4.4	2.4	6.4	3.6*
<b>Qld, WA, SA &amp; NT<sup>(a)</sup></b>	<b>185</b>	<b>12.1</b>	<b>10.4</b>	<b>13.8</b>	<b>803</b>	<b>4.3</b>	<b>4.0</b>	<b>4.6</b>	<b>2.8*</b>

\* Represents results with statistically significant differences in the Indigenous/non-Indigenous comparisons at the p < 0.05 level.

**Table 1.19.2 (continued): Infant mortality rates per 1,000 live births, by Indigenous status, Qld, WA, SA and NT, 1996–1998, 1999–2001, 2002–2004 and 2005–2006<sup>(a)(b)(c)(d)(e)(f)(g)</sup>**

- (a) Data are reported for Queensland, Western Australia, South Australia and the Northern Territory only. These jurisdictions are considered to have adequate levels of Indigenous identification in mortality data for these periods. They do not represent a quasi-Australian figure.
- (b) A subtotal for Queensland, Western Australia, South Australia and the Northern Territory has not been provided for the period 1996–1998, as Indigenous mortality data for Queensland are reliable only from 1998 onwards.
- (c) Data are presented in 3- and 2-year groupings because of small numbers each year.
- (d) Data exclude 90 registered infant deaths where Indigenous status was not stated over the period 1996–2006 in Queensland, Western Australia, South Australia and the Northern Territory combined.
- (e) Although most deaths of Indigenous Australians are registered, it is likely that some are not accurately identified as Indigenous. Therefore, these statistics are likely to underestimate the Indigenous infant deaths and, depending on the under-identification in births, may either underestimate or overestimate the rates. The ABS calculated the completeness of identification of Indigenous deaths for the period 2002–2006 using population estimates as 51% for Queensland, 72% for Western Australia, 62% for South Australia and 90% for the Northern Territory. The completeness of Indigenous identification for infant mortality may differ from the estimates for 'all causes'.
- (f) Because of changes in the level of accuracy of Indigenous identification in the births and deaths data over time, caution should be used in interpreting changes in Indigenous infant mortality rates. It is also difficult to exactly identify the difference between the Indigenous and non-Indigenous infant mortality rates because of these data quality issues.
- (g) Deaths are by year of registration and state/territory of usual residence.
- (h) No. per 1,000 live births.
- (i) LCL = lower confidence limit.
- (j) UCL = upper confidence limit.
- (k) Rate ratio Indigenous:non-Indigenous.

Source: AIHW analysis of National Mortality Database.

**Table 1.19.3: Causes of infant death by Indigenous status, Qld, WA, SA and NT, 2002–2006<sup>(a)(b)(c)(d)(e)</sup>**

Cause of death	Number of deaths		No. per 1,000 <sup>(f)</sup>		Rate ratio <sup>(g)</sup>
	Indigenous	Non-Indigenous	Indigenous	Non-Indigenous	
Certain conditions originating in the perinatal period (P00–P96)	209	937	5.7	2.1	2.7*
Signs, symptoms & ill-defined conditions (R00–R99)	101	214	2.7	0.5	5.7*
<i>SIDS (R95)<sup>(h)</sup></i>	39	88	1.1	0.2	5.4*
Congenital malformations (Q00–Q99)	54	447	1.5	1.0	1.5*
Diseases of the respiratory system (J00–J99)	35	49	0.9	0.1	8.6*
Injury & poisoning (V01–Y99)	19	60	0.5	0.1	3.8*
Infectious and parasitic diseases (A00–B99)	11	32	0.3	0.1	4.2*
Diseases of the circulatory system (I00–I99)	7	27	0.2	0.1	3.1*
Other conditions <sup>(i)</sup>	19	125	0.5	0.3	1.8*
<b>Total</b>	<b>455</b>	<b>1,891</b>	<b>12.3</b>	<b>4.2</b>	<b>2.9*</b>

\* Represents results with statistically significant differences in the Indigenous/non-Indigenous comparisons at the  $p < 0.05$  level.

- (a) Data are reported for Queensland, Western Australia, South Australia and the Northern Territory only. These four states and territories are considered to have adequate levels of Indigenous identification in mortality data. They do not represent a quasi-Australian figure.
- (b) Data are presented in 5-year groupings because of small numbers each year.
- (c) These data exclude 62 infant deaths where the Indigenous status is not stated.
- (d) Although most deaths of Indigenous infants are registered, it is likely that some are not accurately identified as Indigenous. Therefore, these statistics are likely to underestimate Indigenous infant deaths and, depending on the under-identification in births, may either underestimate or overestimate the rates. Different causes of death may have levels of completeness of identification of Indigenous deaths that differ from the all-cause under-identification (coverage) estimates.
- (e) Deaths are by year of registration.
- (f) No. per 1,000 live births.
- (g) Rate ratio Indigenous:non-Indigenous.
- (h) Data presented for SIDS are a subset of data presented for signs, symptoms and ill-defined conditions presented in this table.
- (i) Other conditions include: neoplasms; diseases of blood and blood-forming organs; endocrine, nutritional and metabolic diseases; mental and behavioural disorders; diseases of the nervous system; diseases of the eye and adnexa; diseases of the ear and mastoid process; diseases of the digestive system; diseases of the musculoskeletal system and connective tissues; diseases of the genitourinary system; and diseases of the skin and subcutaneous tissue.

Source: AIHW analysis of National Mortality Database.

## **Mortality by associated causes of death**

Table 1.19.4 presents underlying causes of deaths for Indigenous infants by associated causes of death for the period 2002–2006 in Queensland, Western Australia, South Australia and the Northern Territory combined.

- In the period 2002–2006, just over half (52%) of infant deaths were reported with no associated causes of death.
- Deaths of Indigenous infants were most commonly reported with conditions originating in the perinatal period (32%) and congenital malformations, deformations and chromosomal abnormalities (7%) as associated causes of death.
- Indigenous infants who died from infectious and parasitic diseases, respiratory diseases or congenital malformations as an underlying cause of death were commonly reported with conditions originating in the perinatal period as an associated cause of death (18%, 20% and 52% respectively).

**Table 1.19.4: Underlying and associated causes of death for Indigenous infants, Qld, WA, SA and NT, 2002–2006<sup>(a)(b)(c)(d)(e)</sup>**

Associated cause of death	Underlying cause of death									
	Conditions originating in perinatal period	Signs, symptoms & ill-defined conditions (excluding SIDS)	Congenital malformations	SIDS	Disease of respiratory system	Injury & poisoning	Infectious & parasitic diseases	Disease of circulatory system	Other conditions <sup>(f)</sup>	Total
	Per cent									
Reported alone (no associated causes)	45.9	100.0	22.2	92.3	45.7	0.0	63.6	57.1	15.8	51.9
Conditions originating in perinatal period (P00–P96)	49.3	0.0	51.9	0.0	20.0	0.0	18.2	0.0	26.3	31.9
Congenital malformations (Q00–Q99)	3.3	0.0	37.0	2.6	2.9	0.0	9.1	14.3	10.5	7.3
Diseases of the respiratory system (J00–J99)	2.4	0.0	11.1	0.0	20.0	10.5	0.0	14.3	21.1	5.5
Injury & poisoning (V01–Y98)	0.0	0.0	3.7	0.0	2.9	94.7	0.0	0.0	5.3	4.8
Infectious & parasitic diseases (A00–B99)	1.4	0.0	3.7	2.6	14.3	0.0	0.0	14.3	26.3	3.7
Signs, symptoms & ill-defined conditions (R00–R99)	2.4	0.0	3.7	2.6	0.0	15.8	0.0	14.3	15.8	3.3
Circulatory diseases (I00–I99)	1.0	0.0	11.1	0.0	2.9	0.0	0.0	42.9	5.3	2.9
Other conditions <sup>(f)</sup>	4.3	0.0	9.3	0.0	5.7	10.5	18.2	14.3	42.1	6.4
<b>Total deaths</b>	<b>209</b>	<b>62</b>	<b>54</b>	<b>39</b>	<b>35</b>	<b>19</b>	<b>11</b>	<b>7</b>	<b>19</b>	<b>455</b>

*(continued)*

**Table 1.19.4 (continued): Underlying and associated causes of death for Indigenous infants, Qld, WA, SA and NT, 2002–2006<sup>(a)(b)(c)(d)(e)</sup>**

- (a) Data are reported for Queensland, Western Australia, South Australia and the Northern Territory only. These four states and territories are considered to have adequate levels of Indigenous identification in mortality data. They do not represent a quasi-Australian figure.
- (b) Data are presented in 5-year groupings because of small numbers each year.
- (c) These data exclude 62 infant deaths where the Indigenous status is not stated.
- (d) Although most deaths of Indigenous infants are registered, it is likely that some are not accurately identified as Indigenous. Therefore, these statistics are likely to underestimate Indigenous infant deaths and, depending on the under-identification in births, may either underestimate or overestimate the rates. Different causes of death may have levels of completeness of identification of Indigenous deaths that differ from the all-cause under-identification (coverage) estimates.
- (e) Deaths are by year of occurrence except the latest year, which is based on year of registration.
- (f) Other conditions include: neoplasms; diseases of blood and blood-forming organs; endocrine, nutritional and metabolic diseases; mental and behavioural disorders; diseases of the nervous system; diseases of the eye and adnexa; diseases of the ear and mastoid process; diseases of the digestive system; diseases of the musculoskeletal system and connective tissues; diseases of the genitourinary system; and diseases of the skin and subcutaneous tissue.

*Note:* Sum of components may exceed 100% as more than one associated cause of death can be reported for each death.

*Source:* AIHW analysis of National Mortality Database.

## Time series analysis

Longer term mortality trend data are limited to three jurisdictions – Western Australia, South Australia and the Northern Territory, which have over 10 years of adequate identification of Indigenous deaths in their recording systems.

As there is a consistent time series of population estimates from 1991, data for the period 1991–2006 have been used for the analysis of Indigenous mortality in this indicator.

Because of the late inclusion of a ‘not stated’ category of Indigenous status in 1998 (before which ‘not stated’ responses were included with non-Indigenous deaths), Indigenous mortality rates have been compared with the mortality rates of other Australians (which include deaths of both non-Indigenous people and people for whom Indigenous status was not stated).

Infant mortality rates, rate ratios and rate differences between Indigenous and other Australian infants over the period 1991–2006 in Western Australia, South Australia and the Northern Territory are presented in Table 1.19.5 and Figure 1.19.1.

- Over the period 1991–2006, there were significant declines in recorded mortality rates for Indigenous infants and other infants in Western Australia, South Australia and the Northern Territory combined. The fitted trend implies an average yearly decline in the rate of around 0.8 per 1,000 births for Indigenous infants (equivalent to a 47% reduction in the rate over the period) and 0.1 per 1,000 births for other infants (equivalent to a 34% reduction in the rate over the period) (Table 1.19.5).
- Over the same period, there were significant declines in the mortality rate ratios and rate differences between Indigenous and other Australian infants of around 20% and 51% respectively (Table 1.19.5).

Fluctuations in the level of Indigenous mortality over time partly reflect changing levels of identification of Indigenous deaths and population estimates. Given the variability in the measures of Indigenous mortality, caution should be exercised in assessing trends in Indigenous mortality over time and comparisons between jurisdictions and with the non-Indigenous population.

**Table 1.19.5: Infant mortality rates, rate ratios and rate differences, WA, SA and NT, 1991–2006**

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	Annual change <sup>(a)</sup>	% change over period <sup>(b)</sup>
<b>Indigenous rate (no. per 1,000 live births)</b>																		
Persons	24.5	25.5	21.7	17.4	17.9	20.4	18.7	16.7	16.0	18.3	14.4	15.7	13.1	12.9	13.1	12.4	–0.8*	–47.4*
<b>Other<sup>(c)</sup> rate (no. per 1,000 live births)</b>																		
Persons	5.7	5.9	5.1	4.8	5.1	5.1	4.6	4.3	4.2	3.8	4.5	4.3	3.5	3.3	4.4	3.9	–0.1*	–34.2*
<b>Rate ratio<sup>(d)</sup></b>																		
Persons	4.3	4.3	4.2	3.7	3.5	4.0	4.0	3.9	3.8	4.8	3.2	3.7	3.7	3.8	3.0	3.2	–0.1*	–19.8*
<b>Rate difference<sup>(e)</sup></b>																		
Persons	18.8	19.6	16.6	12.6	12.8	15.2	14.0	12.4	11.8	14.5	9.9	11.4	9.6	9.5	8.7	8.5	–0.6*	–51.4*

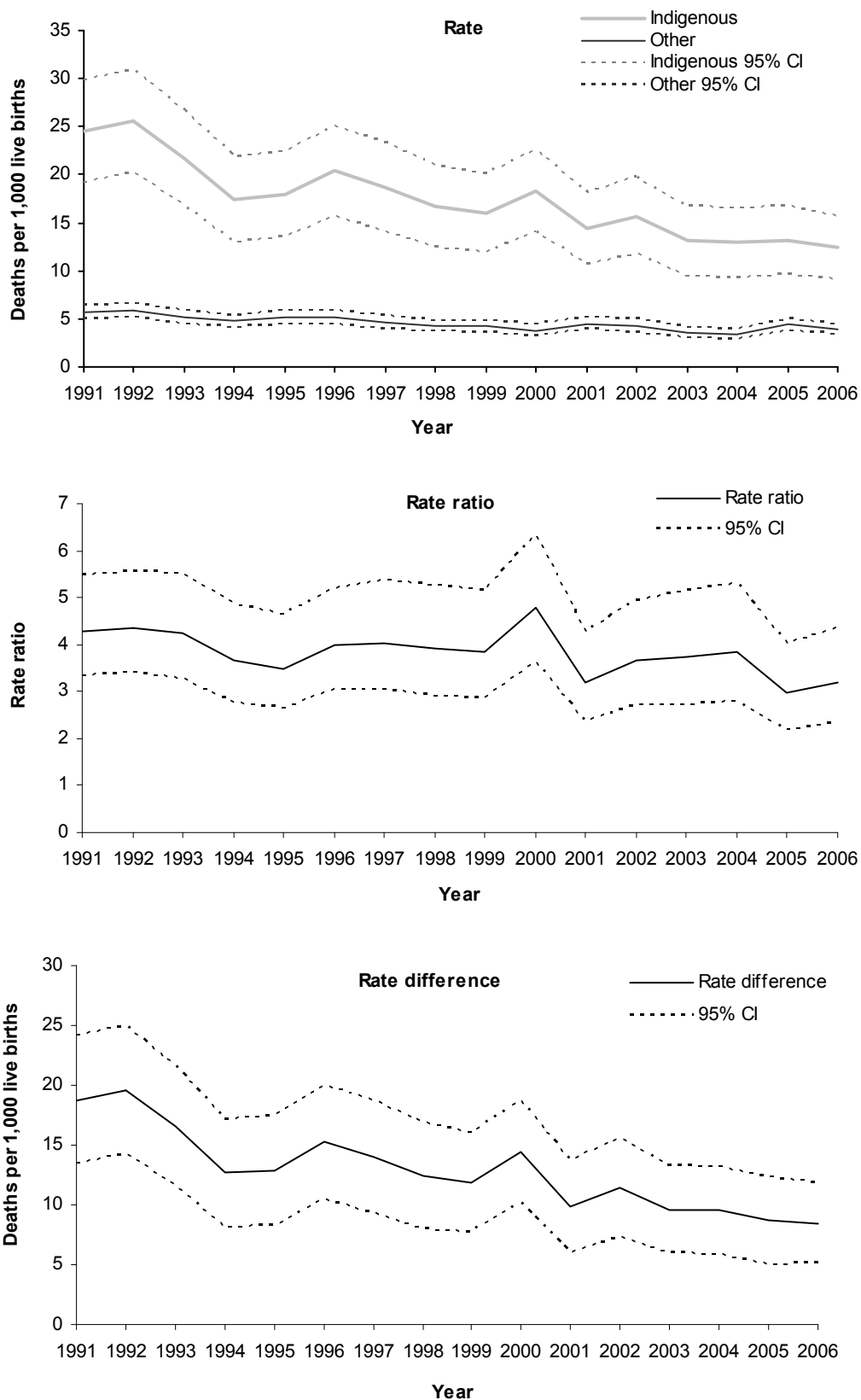
\* Represents results with statistically significant increases or decreases at the  $p < 0.05$  level over the period 1991–2006.

- (a) Average annual change in rates, rate ratios and rate differences determined using linear regression analysis.
- (b) Per cent change between 1991 and 2006 based on the average annual change over the period.
- (c) 'Other' includes deaths of non-Indigenous people and those for whom Indigenous status was not stated.
- (d) Mortality rate for Indigenous Australians divided by the mortality rate for other Australians.
- (e) Mortality rate for Indigenous Australians minus the mortality rate for other Australians.

*Notes*

1. Rates presented in this table may differ from those presented in the 2006 edition of this report for comparable years because of a change from using year of occurrence of death to year of registration of death for mortality analyses.
2. The average of births over the period 1993–1995 in Western Australia was used for births in that state in 1991 and 1992, as there were errors in the number of births recorded in these years.

Source: AIHW analysis of National Mortality Database.



Source: AIHW analysis of National Mortality Database.

**Figure 1.19.1: Infant mortality rates, rate ratios and rate differences between Indigenous and other Australians, WA, SA and NT, 1991-2006**

Additional trends analysis has been presented for Queensland, Western Australia, South Australia and the Northern Territory combined from 1998 to 2006 for Indigenous and non-Indigenous infants in Table 1.19.6 and Figure 1.19.2. Queensland has had adequate identification of Indigenous deaths in its recording systems since 1998, and these have been compared with those of non-Indigenous Australians (excluding deaths for which Indigenous status was not stated).

- Over the period 1998–2006, there were significant declines in recorded mortality rates for Indigenous and non-Indigenous infants in Queensland, Western Australia, South Australia and the Northern Territory combined. The fitted trend implies an average yearly decline in the rate of around 0.5 per 1,000 births for Indigenous infants (equivalent to a 25% reduction in the rate over the period) and 0.1 per 1,000 births for other infants (equivalent to an 18% reduction in the rate over the period) (Table 1.19.6).
- Over the same period, there was no significant change in the mortality rate ratios, but there was a significant decline in the mortality rate differences between Indigenous and other Australian infants (decline of 29%).

**Table 1.19.6: Infant mortality rates, rate ratios and rate differences, Qld, WA, SA and NT, 1998–2006<sup>(a)</sup>**

	1998	1999	2000	2001	2002	2003	2004	2005	2006	Annual change <sup>(b)</sup>	% change over period <sup>(c)</sup>
<b>Indigenous rate (no. per 1,000 live births)</b>											
Persons	15.2	14.7	14.9	13.0	14.0	11.6	11.8	12.6	11.6	–0.5*	–24.9*
<b>Non-Indigenous rate (no. per 1,000 live births)</b>											
Persons	5.1	4.7	4.7	4.8	4.8	3.8	4.0	4.4	4.2	–0.1*	–17.8*
<b>Rate ratio<sup>(d)</sup></b>											
Persons	3.0	3.2	3.1	2.7	3.0	3.1	3.0	2.9	2.7	0.0	–8.4
<b>Rate difference<sup>(e)</sup></b>											
Persons	10.2	10.1	10.1	8.2	9.3	7.8	7.8	8.2	7.4	–0.4*	–28.5*

\* Represents results with statistically significant increases or decreases at the  $p < 0.05$  level over the period 1998–2006.

(a) Data exclude 90 registered infant deaths where Indigenous status was not stated over the period 1998–2006 in Queensland, Western Australia, South Australia and the Northern Territory combined.

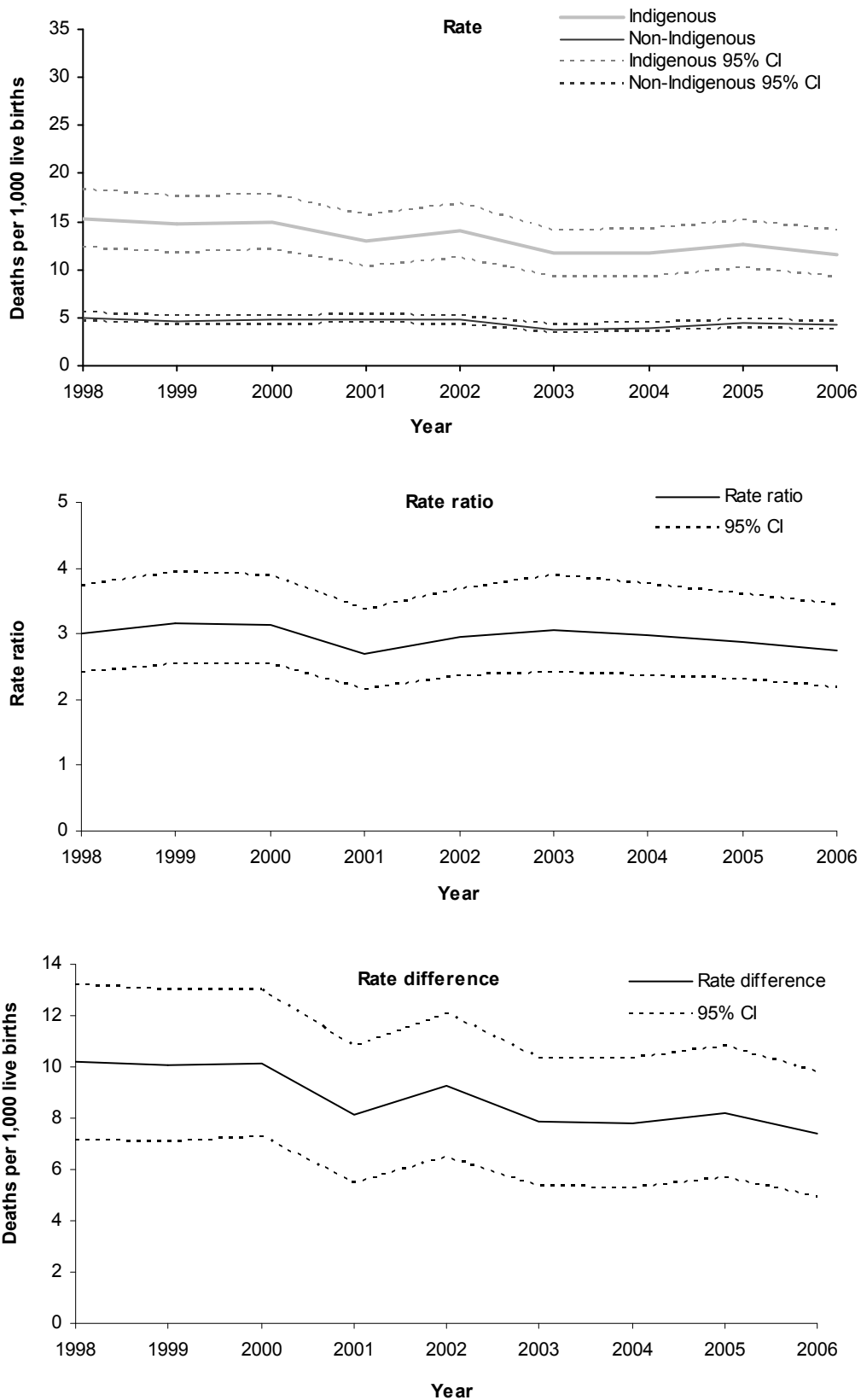
(b) Average annual change in rates, rate ratios and rate differences determined using linear regression analysis.

(c) Per cent change between 1998 and 2006 based on the average annual change over the period.

(d) Mortality rate for Indigenous Australians divided by the mortality rate for non-Indigenous Australians.

(e) Mortality rate for Indigenous Australians minus the mortality rate for non-Indigenous Australians.

Source: AIHW analysis of National Mortality Database.



Source: AIHW analysis of National Mortality Database.

**Figure 1.19.2: Infant mortality rates, rate ratios and rate differences between Indigenous and non-Indigenous Australians, Qld, WA, SA and NT, 1998-2006**

### **Sensitivity of mortality trends to changes in identification**

- The fitted trends described above for the period 1991–2006 in Western Australia, South Australia and the Northern Territory have been examined for their sensitivity to changes in Indigenous identification. Three scenarios for identification were posted – constant identification, increasing identification and decreasing identification.
  - Under the constant identification scenario, the numbers of deaths for the period under study were adjusted using the following identification estimates derived from the most recent ABS analyses (relating to the period 2002–2006):
    - Western Australia 72%
    - South Australia 62%
    - Northern Territory 90%.
  - Under the increasing identification scenario, deaths were adjusted by linearly increasing the identification through the period under study – from 64% in 1991 to 72% in 2006 for Western Australia, from 52% to 62% for South Australia, and from 80% to 90% for the Northern Territory.
  - Under the decreasing identification scenario, deaths were adjusted by linearly decreasing the identification from 80% in 1991 to 72% in 2006 for Western Australia, from 72% to 62% for South Australia, and from 100% to 90% for the Northern Territory.
- The adjustments in the latter two scenarios were based on judgments about the largest plausible shifts in identification during the period; of course, if any actual shift in identification was more extreme than has been posted under these scenarios, then the observed trends in mortality might not persist.
- The declines in infant mortality rates for Indigenous and other Australians, and the declines in the mortality rate differences between Indigenous and other infants during the period 1991–2006 remained statistically significant under all three identification scenarios. The decline in the mortality rate ratios between Indigenous and other infants remained statistically significant only under the constant and increasing identification scenarios.

### **Time series analysis by cause of death**

Table 1.19.7 presents infant mortality rates by cause of death for the periods 1991–1996 and 1997–2006.

- Over the periods 1991–1996 and 1997–2006, the most common causes of death among Indigenous infants were certain conditions originating in the perinatal period, SIDS and congenital malformations.
- Between 1991–1996 and 1997–2006, there were declines in infant mortality rates for congenital malformations, SIDS, certain conditions originating in the perinatal period and diseases of the respiratory system for Indigenous infants.

**Table 1.19.7: Causes of infant death, by Indigenous status, WA, SA and NT, 1991–1996 and 1997–2003<sup>(a)(b)(c)(d)(e)</sup>**

	Number of deaths		No. per 1,000 <sup>(f)</sup>		Rate ratio <sup>(h)</sup>
	Indigenous	Other <sup>(g)</sup>	Indigenous	Other <sup>(g)</sup>	
<b>1991–1996</b>					
Certain conditions originating in the perinatal period (760–779)	157	626	7.6	2.3	3.3*
Congenital malformations (740–759)	69	387	3.4	1.4	2.3*
Signs, symptoms & ill-defined conditions (780–799)	110	245	5.4	0.9	5.9*
<i>SIDS (798)<sup>(j)</sup></i>	106	241	5.2	0.9	5.8*
Diseases of the respiratory system (460–519)	41	24	2.0	0.1	22.4*
Injury & poisoning (800–999)	15	40	0.7	0.1	4.9*
Infectious and parasitic diseases (001–139)	18	15	0.9	0.1	15.7*
Diseases of the circulatory system (390–459)	11	13	0.5	0.05	11.1*
Other conditions <sup>(i)</sup>	15	72	0.7	0.3	2.7*
<b>Total</b>	<b>436</b>	<b>1,422</b>	<b>21.2</b>	<b>5.3</b>	<b>4.0*</b>
<b>1997–2006</b>					
Certain conditions originating in the perinatal period (P00–P96)	243	793	6.4	1.9	3.5*
Congenital malformations (Q00–Q99)	83	439	2.2	1.0	2.1*
Signs, symptoms & ill-defined conditions (R00–R99)	124	231	3.3	0.5	6.1*
<i>SIDS (R95)<sup>(j)</sup></i>	69	125	1.8	0.3	6.2*
Diseases of the respiratory system (J00–J99)	44	36	1.2	0.1	13.8*
Injury & poisoning (V01–Y99)	23	71	0.6	0.2	3.7*
Infectious and parasitic diseases (A00–B99)	17	24	0.4	0.1	8.0*
Diseases of the circulatory system (I00–I99)	9	23	0.2	0.1	4.4*
Other conditions <sup>(i)</sup>	24	129	0.6	0.3	2.1*
<b>Total</b>	<b>567</b>	<b>1,746</b>	<b>15.0</b>	<b>4.1</b>	<b>3.7*</b>

\* Represents results with statistically significant differences in the Indigenous/non-Indigenous comparisons at the  $p < 0.05$  level.

- (a) Data are reported for Western Australia, South Australia and the Northern Territory only. These three states and territories are considered to have adequate levels of Indigenous identification in mortality data. They do not represent a quasi-Australian figure.
- (b) Data are presented in multi-year groupings because of small numbers each year.
- (c) Although most deaths of Indigenous infants are registered, it is likely that some are not accurately identified as Indigenous. Therefore, these statistics are likely to underestimate Indigenous infant deaths and, depending on the under-identification in births, may either underestimate or overestimate the rates. Different causes of death may have levels of completeness of identification of Indigenous deaths that differ from the all-cause under-identification (coverage) estimates.
- (d) Because of changes in the level of accuracy of Indigenous identification in the births and deaths data over time, caution should be used in interpreting changes in Indigenous infant mortality rates. It is also difficult to exactly identify the difference between the Indigenous and non-Indigenous infant mortality rates because of these data quality issues.
- (e) Deaths are by year of registration and state/territory of usual residence.
- (f) No. per 1,000 live births.
- (g) 'Other' includes deaths of non-Indigenous people and those for whom Indigenous status was not stated.
- (h) Rate ratio Indigenous:non-Indigenous.
- (i) Data presented for SIDS are a subset of data presented for signs, symptoms and ill-defined conditions in this table.
- (j) 'Other conditions' include: neoplasms; diseases of blood and blood-forming organs; endocrine, nutritional and metabolic diseases; mental and behavioural disorders; diseases of the nervous system; diseases of the eye and adnexa; diseases of the ear and mastoid process; diseases of the digestive system; diseases of the musculoskeletal system and connective tissues; diseases of the genitourinary system; and diseases of the skin and subcutaneous tissue.

*Note:* Rates presented in this table may differ from those presented in the 2006 edition of this report for comparable years because of a change from using year of occurrence of death to year of registration of death for mortality analyses.

*Source:* AIHW analysis of National Mortality Database.

## International comparisons

International indigenous data are available for New Zealand, the United States and Canada.

There are several common issues that adversely affect the quality of Indigenous mortality data in these three countries and Australia. These include the lack of an accurate denominator value for the Indigenous population and the lack of agreement over which population denominator values to use if they do exist. There are differences in how Indigenous status is defined in the different countries. There have also been frequent modifications to the ethnicity question recorded in the censuses in some of these countries. These frequent changes in the census ethnicity question have led to difficulties in comparing mortality trends over time and have also produced difficulties in estimating inter-census population denominator counts. Another difficulty is that data are not always available for the same time periods.

The most important issue in relation to the quality of Indigenous mortality data is the undercounting of deaths (the numerator for mortality data). In each of the four countries, the undercounting of Indigenous deaths is likely to lead to an underestimation of the relative size of disparities that exist between Indigenous and non-Indigenous populations.

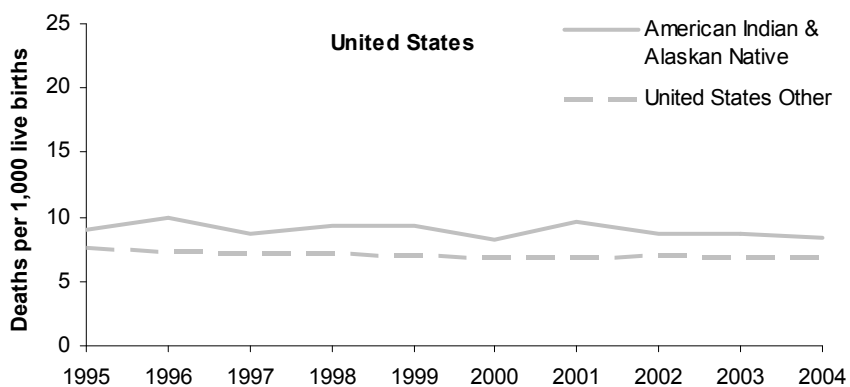
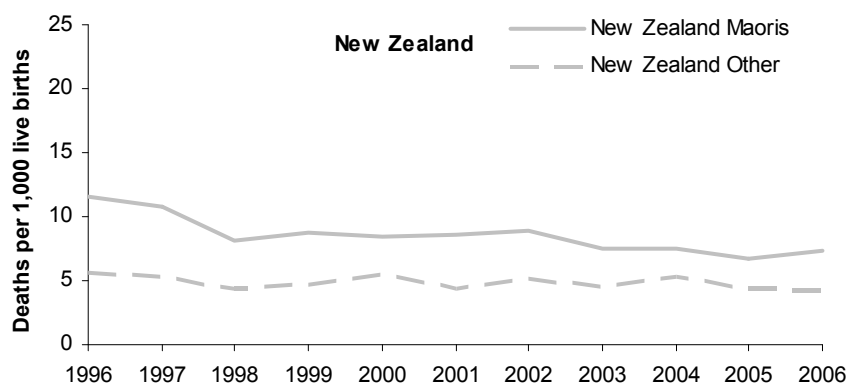
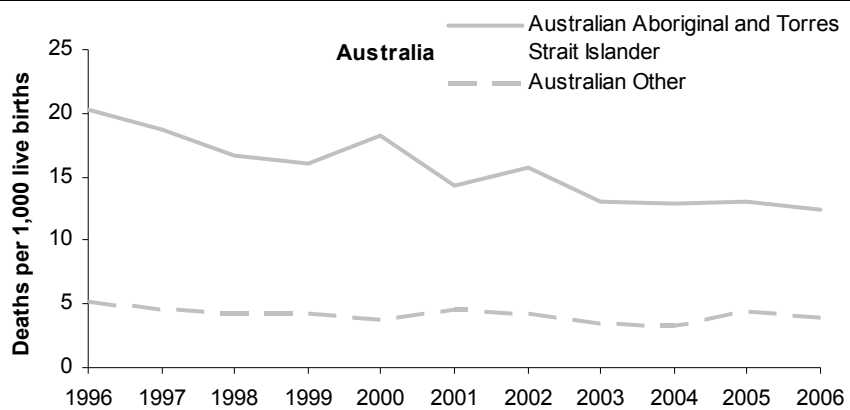
International statistics on infant mortality show that Indigenous infants in the United States, Canada and New Zealand have higher mortality rates than infants in the general population but the gap is not as great as for Aboriginal and Torres Strait Islander infants. The infant mortality rate for Aboriginal and Torres Strait Islander infants is around three times that for non-Indigenous infants (12 per 1,000 live births compared with 5 per 1,000 live births). The latest available data from the United States, Canada and New Zealand are outlined below.

- For the period 2002–2004, the infant mortality rate of babies born to American Indian or Alaskan Native mothers was 8.6 per 1,000 live births, compared with 6.9 per 1,000 live births for babies born to all mothers in the United States (United States department of Health and Human Services unpublished data).
- For the period 2002–2006 in New Zealand, the mortality rate of Maori infants was 7.5 per 1,000 live births, compared with 4.7 per 1,000 live births for non-Indigenous infants (Statistics New Zealand unpublished data).
- In 2000, the mortality rate of Canadian First Nations infants was 6.4 per 1,000 live births, compared with the 2001 Canadian rate of 5.2 per 1,000 live births (Health Canada 2005).

## Time series

Infant mortality data are available from 1996 to 2006 for the Maori population in New Zealand, and from 1995 to 2004 for the American Indian and Alaskan Native populations in the United States. These data are presented in Figure 1.19.3 along with data for Australia for the period 1996–2006. Reliable time series of infant mortality data for Canadian First Nations is not available at present.

- In New Zealand between 1996 and 2006 there was a significant decline in mortality for Maori infants. The fitted trend implies an average yearly decline in the rate of around 0.4 per 1,000 live births, which is equivalent to a 33% reduction in the rate over this period. Over the same period there was no significant decline in non-Indigenous infant mortality (Statistics New Zealand unpublished data).
- In the United States between 1995 and 2004 there was no significant decline in infant mortality for American Indians and Alaskan Natives. Over the same period there was a significant decline in other infant mortality (a reduction of 9%) (United States Department of Health and Human Services, unpublished data).



Note: Australia data is for Western Australia, South Australia & the Northern Territory combined.

Source: AIHW analysis of National Mortality Database; Statistics New Zealand; United States Department of Health and Human Services.

**Figure 1.19.3: Infant mortality rates per 1,000 live births, by Indigenous status, Australia (1996–2006), New Zealand (1996–2006) and the United States (1995–2004)**

## **Additional information**

### **Children aged under 5 years mortality**

Table 1.19.8 presents the main causes of death among Indigenous children aged 0–4 years in Queensland, Western Australia, South Australia and the Northern Territory combined for the period 2002–2006.

- Over the period 2002–2006, there were 551 deaths of Indigenous children aged 0–4 years in Queensland, Western Australia, South Australia and the Northern Territory combined, which represented 19% of total deaths of children aged 0–4 years in these jurisdictions.
- Indigenous children aged 0–4 years in these jurisdictions died at around three times the rate of non-Indigenous children.
- The most common causes of death among Indigenous children were conditions originating in the perinatal period (40%), symptoms, signs & ill-defined conditions (20%), congenital malformations (11%) and injury and poisoning (11%). Indigenous children died at around three times the rate of non-Indigenous children for conditions originating in the perinatal period and injury and poisoning; at almost six times the rate of non-Indigenous children for symptoms, signs and ill-defined conditions, and at twice the rate of non-Indigenous children for congenital malformations.
- Indigenous children died from respiratory diseases at seven times the rate of other children and from infectious and parasitic diseases and diseases of the circulatory system at around four times the rate of non-Indigenous children.

**Table 1.19.8: Causes of death among children aged 0–4 years by Indigenous status, Qld, WA, SA and NT, 2002–2006<sup>(a)(b)(c)(d)(e)</sup>**

Cause of death	Number of deaths		No. per 100,000 <sup>(f)</sup>		Rate ratio <sup>(g)</sup>
	Indigenous	Non-Indigenous	Indigenous	Non-Indigenous	
Certain conditions originating in the perinatal period (P00–P96)	209	947	115.8	41.5	2.8*
Signs, symptoms & ill-defined conditions (R00–R99)	109	250	60.4	11.0	5.5*
Congenital malformations (Q00–Q99)	61	477	33.8	20.9	1.6*
Injury & poisoning (V01–Y99)	59	251	32.7	11.0	3.0*
Diseases of the respiratory system (J00–J99)	39	68	21.6	3.0	7.2*
Diseases of the nervous system (G00–G99)	20	85	11.1	3.7	3.0*
Infectious and parasitic diseases (A00–B99)	17	51	9.4	2.2	4.2*
Diseases of the circulatory system (I00–I99)	13	44	7.2	1.9	3.7*
Other conditions <sup>(h)</sup>	24	161	13.3	7.1	1.9*
<b>Total</b>	<b>551</b>	<b>2334</b>	<b>305.2</b>	<b>102.4</b>	<b>3.0*</b>

\* Represents results with statistically significant differences in the Indigenous/non-Indigenous comparisons at the  $p < 0.05$  level.

- (a) Data are reported for Queensland, Western Australia, South Australia and the Northern Territory only. These four states and territories are considered to have adequate levels of Indigenous identification in mortality data. They do not represent a quasi-Australian figure.
- (b) Data are presented in 5-year groupings because of small numbers each year.
- (c) These data exclude 79 deaths of children aged 0–4 years where the Indigenous status is not stated.
- (d) Although most deaths of Indigenous children are registered, it is likely that some are not accurately identified as Indigenous. Therefore, these statistics are likely to underestimate Indigenous child mortality rates.
- (e) Deaths are by year of registration and state/territory of usual residence.
- (f) No. per 100,000 population.
- (g) Rate ratio Indigenous:non-Indigenous.
- (h) Other conditions include: neoplasms; diseases of blood and blood-forming organs; endocrine, nutritional and metabolic diseases; mental and behavioural disorders; diseases of the eye and adnexa; diseases of the ear and mastoid process; diseases of the digestive system; diseases of the musculoskeletal system and connective tissues; diseases of the genitourinary system; and diseases of the skin and subcutaneous tissue.

Source: AIHW analysis of National Mortality Database.

## Time series analyses

Infant mortality rates, rate ratios and rate differences between Indigenous and other Australian children aged 0–4 years over the period 1991–2006 in Western Australia, South Australia and the Northern Territory are presented in Table 1.19.9.

- Over the period 1991–2006, there were significant declines in recorded mortality rates for Indigenous children and other children in Western Australia, South Australia and the Northern Territory. The fitted trend implies an average yearly decline in the rate of around 14 deaths per 100,000 for Indigenous children (equivalent to a 36% reduction in the rate over the period) and 3 deaths per 100,000 for other infants (equivalent to a 36% reduction in the rate over the period).
- Over the same period, there were no significant changes in the mortality rate ratios but significant declines in the mortality rate differences between Indigenous and other Australian children (36%).

**Table 1.19.9: Mortality rates, rate ratios and rate differences for children aged 0–4 years, WA, SA and NT, 1991–2006**

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	Annual change <sup>(a)</sup>	% change over period <sup>(b)</sup>
<b>Indigenous rate (no. per 100,000)</b>																		
Persons	594.0	535.4	506.5	425.0	396.5	458.9	419.8	324.4	367.9	460.6	371.0	385.2	312.5	306.6	390.2	309.3	–14.3*	–36.1
<b>Other<sup>(c)</sup> rate (no. per 100,000)</b>																		
Persons	134.3	148.5	129.7	117.4	128.1	124.7	116.6	106.7	104.4	92.2	108.5	102.4	90.9	82.3	109.4	95.8	–3.2*	–35.9
<b>Rate ratio<sup>(d)</sup></b>																		
Persons	4.4	3.6	3.9	3.6	3.1	3.7	3.6	3.0	3.5	5.0	3.4	3.8	3.4	3.7	3.6	3.2	0.0	–7.0
<b>Rate difference<sup>(e)</sup></b>																		
Persons	459.7	386.9	376.8	307.5	268.4	334.2	303.2	217.7	263.4	368.4	262.5	282.8	221.6	224.2	280.8	213.4	–11.1*	–36.2

\* Represents results with statistically significant increases or decreases at the  $p < 0.05$  level over the period 1991–2006.

- (a) Average annual change in rates, rate ratios and rate differences determined using linear regression analysis.
- (b) Per cent change between 1991 and 2006 based on the average annual change over the period.
- (c) 'Other' includes deaths of non-Indigenous people and those for whom Indigenous status was not stated.
- (d) Mortality rate for Indigenous Australians divided by the mortality rate for other Australians.
- (e) Mortality rate for Indigenous Australians minus the mortality rate for other Australians.

Source: AIHW analysis of National Mortality Database.

Additional trends analysis has been presented for Queensland, Western Australia, South Australia and the Northern Territory combined from 1998 to 2006 for Indigenous and non-Indigenous children aged 0–4 years in Table 1.19.10. Queensland has had adequate identification of Indigenous deaths in its recording systems since 1998, and these deaths have been compared with those of non-Indigenous Australians (excluding deaths for which Indigenous status was not stated).

- Over the period 1998–2006, there were non-significant declines in recorded mortality rates for Indigenous children and significant declines in recorded mortality rates for non-Indigenous children in Queensland, Western Australia, South Australia and the Northern Territory combined (a decline of 16% over the period).
- Over the same period, there was no significant change in the mortality rate ratios or rate differences between Indigenous and non-Indigenous children.

**Table 1.19.10: Mortality rates, rate ratios and rate differences for children aged 0–4 years, Qld, WA, SA and NT, 1998–2006<sup>(a)</sup>**

	1998	1999	2000	2001	2002	2003	2004	2005	2006	Annual change <sup>(b)</sup>	% change over period <sup>(c)</sup>
<b>Indigenous rate (no. per 100,000)</b>											
Persons	308.2	318.1	342.4	325.0	324.9	280.8	293.6	344.8	282.0	–2.8	–7.2
<b>Non-Indigenous rate (no. per 100,000)</b>											
Persons	125.3	112.9	110.4	114.0	111.3	93.2	98.4	103.8	105.2	–2.5*	–16.3
<b>Rate ratio<sup>(d)</sup></b>											
Persons	2.5	2.8	3.1	2.9	2.9	3.0	3.0	3.3	2.7	0.0	12.6
<b>Rate difference<sup>(e)</sup></b>											
Persons	182.9	205.2	232.0	211.0	213.6	187.6	195.2	241.0	176.8	–0.2	–1.0

\* Represents results with statistically significant increases or decreases at the  $p < 0.05$  level over the period 1998–2006.

(a) Data exclude 116 registered deaths where Indigenous status was not stated over the period 1998–2006 in Queensland, Western Australia, South Australia and the Northern Territory combined.

(b) Average annual change in rates, rate ratios and rate differences determined using linear regression analysis.

(c) Per cent change between 1998 and 2006 based on the average annual change over the period.

(d) Mortality rate for Indigenous Australians divided by the mortality rate for non-Indigenous Australians.

(e) Mortality rate for Indigenous Australians minus the mortality rate for non-Indigenous Australians.

Source: AIHW analysis of National Mortality Database.

## **Data quality issues**

### **Mortality**

#### **Deaths**

*The mortality rate for Indigenous Australians can be influenced by late registration of deaths, identification of Indigenous deaths and changes to death forms and/or processing systems. Because of the small size of the Indigenous population, these factors can significantly affect trends over time and between jurisdictions.*

#### **Indigenous status question**

*All jurisdictions comply with the standard wording for the Indigenous status question and categories for their death registration forms. However, New South Wales, Victoria, South Australia, the Northern Territory and the Australian Capital Territory all have slightly different wording from the national standard for the instruction on those with both Aboriginal and Torres Strait Islander origin (ABS & AIHW 2005). Although the wording is only slightly different, it would be ideal to have all jurisdictions asking the question in exactly the same way.*

#### **Under-identification**

*Almost all deaths in Australia are registered. However, the Indigenous status of the deceased is not always recorded or recorded correctly. The incompleteness of Indigenous identification means the number of deaths registered as Indigenous is an underestimate of deaths occurring in the Aboriginal and Torres Strait Islander population (ABS 1997). As a result, the observed differences between Indigenous and non-Indigenous mortality are underestimates of the true differences.*

*Although the identification of Indigenous deaths is incomplete in all state and territory registration systems, four jurisdictions (Queensland, Western Australia, South Australia and the Northern Territory) have been assessed by the ABS and the AIHW as having adequate identification. Longer term mortality trend data are limited to three jurisdictions (Western Australia, South Australia and the Northern Territory) with 10 years of adequate identification of Indigenous deaths in their recording systems. The quality of the time series data is also influenced by the late inclusion of a 'not stated' category for Indigenous status in 1998. Before this time, the 'not stated' responses were probably included with the non-Indigenous. The ABS calculated the implied coverage (identification) of Indigenous deaths for the period 2002–2006 using population estimates: New South Wales 45%, Victoria 32%, Queensland 51%, South Australia 62%, Western Australia 72%, the Northern Territory 90%, Tasmania and the Australian Capital Territory were not calculated because of small numbers, Australia 55% (ABS 2007a).*

*Note that different causes may have levels of under-identification that differ from the all-cause coverage estimates. Note also that the quality of the cause of death data depends on every step of the process of recording and registering deaths (including the documentation available at each step of the process) from certification to coding of cause of death.*

*There are also current concerns about data quality for causes of death especially relating to external causes of death of all Australians (not just Indigenous) (ABS 2006).*

#### **Numerator and denominator**

*Infant mortality data also rely on birth registration data. Unfortunately, as with deaths, some Indigenous births are not correctly identified as Indigenous. The estimated identification of births as Indigenous in 2002–06 was 95%. Identification for the states and territories ranged from 83% for the Australian Capital Territory to 107% for the Northern Territory (ABS 2007b). Given the identification is higher in births than deaths it is likely that Indigenous infant mortality rates are underestimated.*

*(continued)*

### **Data quality issues (continued)**

*The numerator and denominator are not based on the same collection or the same method of collection. Births are registered by the parents while death registration forms are completed by doctors and funeral directors. Therefore, there would be inconsistency of Indigenous identification between the numerator and denominator.*

#### ***International comparisons***

*International Indigenous data are available for New Zealand, the United States and Canada. Data quality is an important issue in all countries with small Indigenous populations. The mortality rates are therefore likely to be underestimated to some degree for each of the Indigenous groups. The scope of data collections in Canada and the United States is often limited to the registered or reserve Indigenous populations and therefore does not cover the whole Indigenous population. International comparisons need to take into account that the definition of Indigenous status is specific to each country.*

#### ***Cause of death coding***

*Causes of death are based on the 10th revision of the International Classification of Diseases (ICD-10). Mortality coding using ICD-10 was introduced into Australia on 1 January 1997.*

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