

1.04 Hospitalisations for pneumonia

The number of hospital separations with a principal diagnosis of pneumonia for Aboriginal and Torres Strait Islander peoples expressed as a rate by age group, age-standardised rate and ratio

Data sources

Data for this measure come from the Australian Institute of Health and Welfare (AIHW) National Hospital Morbidity Database. Additional information on invasive pneumococcal disease notifications comes from the National Notifiable Disease Surveillance System.

National Hospital Morbidity Database

The National Hospital Morbidity Database is a compilation of episode-level records from admitted patient morbidity data collection systems in Australian hospitals in each state and territory. State and territory health departments provide information on the characteristics, diagnoses and care of admitted patients in public and private hospitals to the AIHW.

Data are presented for the six jurisdictions that have been assessed by the AIHW as having adequate identification of Indigenous hospitalisations in 2006–08 – New South Wales, Victoria, Queensland, Western Australia, South Australia and the Northern Territory. These six jurisdictions represent approximately 96% of the Indigenous population of Australia. Data are presented by state/territory of usual residence of the patient.

In the period 2007–08, there were 276,000 hospital separations (episodes of care for admitted patients) for Aboriginal and Torres Strait Islander patients, around 3.5% of all separations. The proportion of separations of Aboriginal and Torres Strait Islander persons was higher in public hospitals (5.4% or 256,425 separations) compared with private hospitals (0.6% or 20,015 separations). Of all Aboriginal and Torres Strait Islander separations, nearly 93% occurred in public hospitals (AIHW 2009).

Hospitalisations for which the Indigenous status of the patient was not reported have been included with hospitalisations data for non-Indigenous people under the 'other' category. This is to enable consistency across jurisdictions, because public hospitals in some states and territories do not have a category for the reporting of 'not stated' or inadequately recorded/reported Indigenous status.

Hospitalisation data are presented for the 2-year period from July 2006 to June 2008. An aggregate of 2 years of data has been used, because the number of hospitalisations for some conditions is likely to be small for a single year.

The principal diagnosis is the diagnosis established to be the problem that was chiefly responsible for the patient's episode of care in hospital. The additional diagnosis is a condition or complaint either coexisting with the principal diagnosis or arising during the episode of care. The term 'hospitalisation' has been used to refer to a separation, which is the episode of admitted patient care. This can include a total hospital stay (from admission to discharge, transfer or death) or a portion of a hospital stay beginning or ending in a change in the type of care (for example, from acute to rehabilitation). 'Separation' also means the process by which an admitted patient completes an episode of care by being discharged, dying, transferring to another hospital or changing type of care.

National Notifiable Diseases Surveillance System

A set of 65 diseases and conditions are notifiable nationally to the National Notifiable Diseases Surveillance System (NNDSS), which is managed by the Australian Government Department of Health and Ageing.

Identification of Indigenous notifications in all states and territories is incomplete, with the level of completeness varying across diseases as well as jurisdictions. The NNDSS provided the AIHW with data on Indigenous status completeness by disease and jurisdiction. Using a cut-off of 50% completeness of Indigenous status, New South Wales, Victoria, Queensland, Western Australia, South Australia, Tasmania and the Northern Territory were assessed to have adequate identification for invasive pneumococcal disease.

Current period data (2006–2008) for this indicator were extracted by the NNDSS in April 2010.

Detailed accounts of the methods of data collection and methods used by NNDSS within the Department of Health and Ageing can be found here
< <http://www.health.gov.au/internet/main/publishing.nsf/Content/cda-surveil-nndss-nndssintro.htm> >.

Analyses

Age-standardised rates and ratios have been used as a measure of hospitalisations in the Indigenous population relative to other Australians. Ratios of this type illustrate differences between the rates of hospital admissions among Indigenous people and those of other Australians, taking into account differences in age distributions.

Hospitalisations

- In the 2-year period July 2006 to June 2008, there were 121,994 hospitalisations for pneumonia in New South Wales, Victoria, Queensland, Western Australia, South Australia and the Northern Territory combined, 7,741 (6.3%) of which were hospitalisations of Aboriginal and Torres Strait Islander peoples (Table 1.04.2).
- Hospitalisations for pneumonia represented 1.5% of all hospital separations for Aboriginal and Torres Strait Islander Australians.

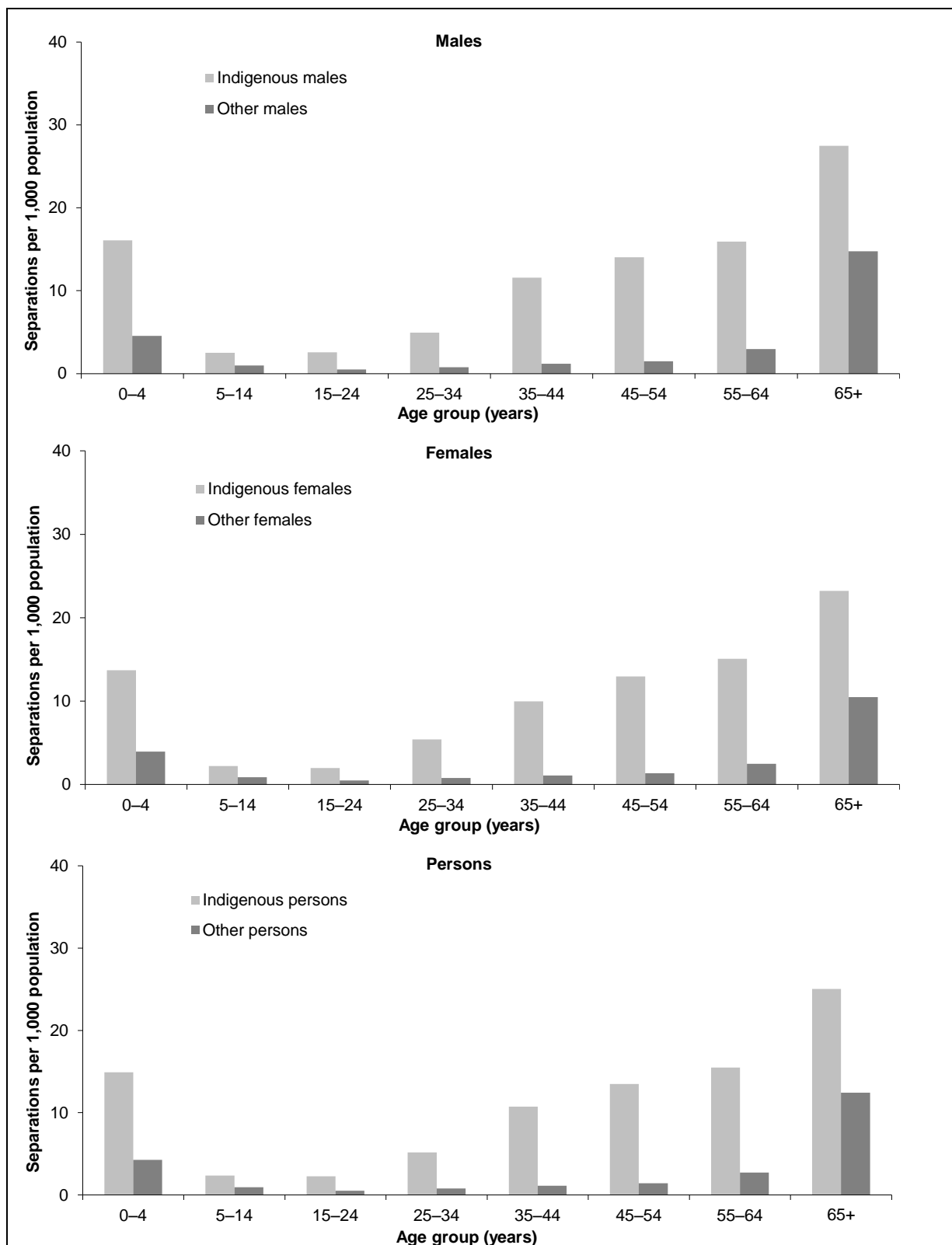
Hospitalisations by age and sex

- In the 2-year period July 2006 to June 2008, in New South Wales, Victoria, Queensland, Western Australia, South Australia and the Northern Territory combined, Indigenous males and females had higher hospitalisation rates for pneumonia than other males and females across all age groups (Table 1.04.1; Figure 1.04.1).
- For both Indigenous and other Australian males and females, hospitalisation rates for pneumonia were highest among those aged 0–4 years, 55–64 years and 65 years and over.
- The greatest difference in rates occurred in the 35–44 and 45–54 year age groups where Indigenous males and females were hospitalised at around 9–10 times the rate of other Australians.
- Approximately 51.5% of Indigenous Australians hospitalised for pneumonia were males (3,987) and 48.5% were females (3,754) (table 1.04.2).

Table 1.04.1: Age-specific hospitalisation rates for a principal diagnosis of pneumonia, by Indigenous status and sex, NSW, Vic, Qld, WA, SA and NT, July 2006 to June 2008

	0-4	5-14	15-24	25-34	35-44	45-54	55-64	65+
Males								
Indigenous	16.1	2.5	2.6	4.9	11.6	14.0	15.9	27.5
Other	4.5	1.0	0.5	0.8	1.2	1.5	3.0	14.8
Females								
Indigenous	13.7	2.2	2.0	5.4	10.0	13.0	15.1	23.2
Other	4.0	0.9	0.5	0.8	1.1	1.4	2.5	10.5
Persons								
Indigenous	14.9	2.4	2.3	5.2	10.7	13.5	15.5	25.0
Other	4.3	0.9	0.5	0.8	1.1	1.4	2.7	12.4

Source: AIHW analysis of National Hospital Morbidity Database.



Source: AIHW analysis of National Hospital Morbidity Database.

Figure 1.04.1: Age-specific hospitalisation rates for a principal diagnosis of pneumonia, by Indigenous status and sex, NSW, Vic, Qld, WA, SA and NT, July 2006 to June 2008

Hospitalisations by state/territory

Table 1.04.2 presents hospitalisations for a principal diagnosis of pneumonia for the 2-year period July 2006 to June 2008 for New South Wales, Victoria, Queensland, Western Australia, South Australia, the Northern Territory, Tasmania and the Australian Capital Territory.

- Over the period July 2006 to June 2008, Indigenous Australians in New South Wales, Victoria, Queensland, Western Australia, South Australia and the Northern Territory combined were hospitalised for pneumonia at around four times the rate of other Australians.
- In the Northern Territory and Western Australia Indigenous Australians were nearly 8 times as likely as other persons to be hospitalised. In South Australia and Queensland, Indigenous persons were hospitalised for pneumonia at almost four times the rate of other Australians. In Tasmania, New South Wales, Victoria, and the Australian Capital Territory Indigenous Australians were hospitalised at between 1.1 and 2.4 times that of other Australians in these jurisdictions.

Table 1.04.2: Hospitalisations for principal diagnosis of pneumonia, by Indigenous status and sex, NSW, Vic, Qld, WA, SA and NT, Tas and ACT, July 2006 to June 2008^{(a)(b)(c)(d)(e)}

	Indigenous				Other ^(f)				Ratio ⁽ⁱ⁾
	Number	No. per 1,000 ^(g)	LCL 95% ^(h)	UCL 95% ⁽ⁱ⁾	Number	No. per 1,000 ^(g)	LCL 95% ^(h)	UCL 95% ⁽ⁱ⁾	
NSW									
Males	672	5.7	5.1	6.3	21,573	3.2	3.2	3.3	1.8 [†]
Females	651	5.9	5.3	6.5	18,936	2.5	2.4	2.5	2.4 [†]
Persons	1,323	5.9	5.5	6.3	40,509	2.8	2.8	2.8	2.1 [†]
Vic									
Males	113	5.3	4.1	6.5	18,210	3.6	3.6	3.7	1.5 [†]
Females	94	3.9	3.0	4.8	16,061	2.7	2.6	2.7	1.5 [†]
Persons	207	4.6	3.8	5.3	34,271	3.1	3.1	3.1	1.5 [†]
Qld									
Males	918	10.5	9.5	11.5	10,834	2.8	2.8	2.9	3.7 [†]
Females	847	8.3	7.5	9.0	9,389	2.2	2.2	2.2	3.8 [†]
Persons	1,765	9.2	8.6	9.8	20,223	2.5	2.5	2.5	3.7 [†]
WA									
Males	915	17.5	16.0	19.1	4,977	2.7	2.6	2.7	6.6 [†]
Females	850	16.2	14.9	17.6	3,905	1.8	1.8	1.9	8.8 [†]
Persons	1,765	16.9	15.9	17.9	8,882	2.2	2.2	2.3	7.7 [†]
SA									
Males	220	11.2	9.2	13.1	5,038	3.1	3.0	3.2	3.6 [†]
Females	213	9.9	8.3	11.4	4,706	2.5	2.4	2.6	4.0 [†]
Persons	433	10.4	9.2	11.6	9,744	2.7	2.7	2.8	3.8 [†]
NT									
Males	1,149	25.7	23.5	27.8	389	3.6	3.2	4.0	7.2 [†]
Females	1,099	21.1	19.6	22.6	235	2.4	2.0	2.7	8.9 [†]
Persons	2,248	22.9	21.7	24.2	624	3.0	2.7	3.3	7.6 [†]
NSW, Vic, Qld, WA, SA and NT^(k)									
Males	3,987	11.5	11.0	12.0	61,021	3.2	3.2	3.2	3.6[†]
Females	3,754	10.1	9.7	10.5	53,232	2.4	2.4	2.4	4.2[†]
Persons	7,741	10.7	10.4	11.0	114,253	2.8	2.7	2.8	3.9[†]
Tasmania									
Males	16	1.4	0.5	2.3	1,067	2.1	2.0	2.2	0.7
Females	31	2.8	1.6	4.0	963	1.7	1.6	1.8	1.6 [*]
Persons	47	2.2	1.4	2.9	2,030	1.9	1.8	2.0	1.1

(continued)

Table 1.04.2 (continued): Hospitalisations for principal diagnosis of pneumonia, by Indigenous status and sex, NSW, Vic, Qld, WA, SA and NT, Tas and ACT, July 2006 to June 2008 ^{(a)(b)(c)(d)(e)}

	Indigenous				Other ^(f)				Ratio ^(j)
	Number	No. per 1,000 ^(g)	LCL 95% ^(h)	UCL 95% ⁽ⁱ⁾	Number	No. per 1,000 ^(g)	LCL 95% ^(h)	UCL 95% ⁽ⁱ⁾	
ACT									
Males	8	5.5	-0.3	11.4	777	2.8	2.6	3.0	2.0
Females	10	6.4	0.7	12.0	699	2.3	2.1	2.4	2.8*
Persons	18	6.0	1.9	10.1	1,476	2.5	2.4	2.6	2.4*

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

- (a) Data are from public and most private hospitals. Jurisdictional data excludes private hospitals in the Northern Territory, Tasmania and the Australian Capital Territory.
- (b) Categories are based on the ICD-10-AM 5th edition (National Centre for Classification in Health 2006).
- (c) Financial year reporting.
- (d) Data are reported by state/territory of usual residence of the patient hospitalised.
- (e) Age-standardised rates for New South Wales, Victoria, Queensland, Western Australia, South Australia, the Northern Territory and Australia have been calculated using the direct method, age standardised by 5 year age group to 75+. Age-standardised rates for Tasmania and the Australian Capital Territory have been calculated using the direct method, age-standardised by 5 year age group to 65+.
- (f) 'Other' includes hospitalisations of non-Indigenous people and those for whom Indigenous status was not stated.
- (g) Directly age-standardised using the Australian 2001 standard population.
- (h) LCL = lower confidence limit.
- (i) UCL = upper confidence limit.
- (j) Rate ratio Indigenous: other.
- (k) New South Wales, Victoria, Western Australia, South Australia, the Northern Territory and Queensland are considered to have adequate levels of Indigenous identification, although the level of accuracy varies by jurisdiction and hospital. Hospitalisation data for these six jurisdictions should not be assumed to represent the hospitalisation experience in the other jurisdictions.

Notes

1. Rates for Indigenous are calculated using the 2006 population estimates based on the 2006 Census (Series B).
2. Care types 7.3, 9 & 10 (Newborn – unqualified days only; organ procurement; hospital boarder) excluded from analysis.

Source: AIHW analysis of National Hospital Morbidity Database.

Hospitalisations by remoteness

Hospitalisation rates for pneumonia in New South Wales, Victoria, Queensland, Western Australia, South Australia and the Northern Territory are presented by Australian Standard Geographical Classification (ASGC) in Table 1.04.3, covering the period July 2007 to June 2009.

- Indigenous Australians in all remoteness areas were more likely to be hospitalised for a principal diagnosis of pneumonia than other Australians. The ratio of hospitalisations of Indigenous people compared to other Australians was higher and the difference was statistically significant for all ASGC areas.
- Rates of hospitalisations per 1,000 head of population were highest for Indigenous people living in *Remote* areas, at 25 per 1,000. The rate was highest for other Australians who lived in *Very remote* areas, at 4.1 per 1,000. The lowest rates were observed in *Major cities* areas for both Indigenous people (5.0 per 1,000) and other Australians (2.9 per 1,000).
- Indigenous people in *Remote* areas were hospitalised for pneumonia at 6.5 times the rate of other Australians. In *Major cities*, where the lowest ratio was observed, Indigenous Australians were hospitalised at a rate which was 1.7 times that of other Australians. Nationally, the rate was 3.7 times.

Table 1.04.3: Hospitalisations for principal diagnosis of pneumonia, by Indigenous status and remoteness, NSW, Vic, Qld, WA, SA and NT, July 2007 to June 2009^{(a)(b)(c)(d)(e)(f)}

	Indigenous				Other ^(g)				Ratio ^(k)
	Number	No. per 1,000 ^(h)	LCL 95% ⁽ⁱ⁾	UCL 95% ^(j)	Number	No. per 1,000 ^(h)	LCL 95% ⁽ⁱ⁾	UCL 95% ^(j)	
Major cities	1,035	5.0	4.6	5.4	79,376	2.9	2.9	2.9	1.7*
Inner regional	985	7.4	6.8	8.0	28,787	3.5	3.5	3.5	2.1*
Outer regional ^(l)	1,756	12.0	11.3	12.6	12,598	3.4	3.4	3.5	3.5*
Remote	1,826	24.9	23.6	26.3	1,844	3.8	3.6	4.0	6.5*
Very remote	2,353	19.7	18.1	21.4	615	4.1	4.0	4.2	4.8*
Total^(m)	7,967	11.5	11.1	11.8	123,320	3.1	3.1	3.1	3.7*

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

- (a) Data are from public and most private hospitals. Jurisdictional data excludes private hospitals in the Northern Territory.
 (b) Categories are based on the ICD-10-AM fifth edition (National Centre for Classification in Health 2006).
 (c) Financial year reporting.
 (d) Data are reported by state/territory of usual residence of the patient hospitalised.
 (e) Age standardised rates for New South Wales, Victoria, Queensland, Western Australia, South Australia, the Northern Territory and Australia have been calculated using the direct method, age standardised by 5 year age group to 65+.
 (f) New South Wales, Victoria, Western Australia, South Australia, the Northern Territory and Queensland are considered to have adequate levels of Indigenous identification, although the level of accuracy varies by jurisdiction and hospital. Hospitalisation data for these six jurisdictions should not be assumed to represent the hospitalisation experience in the other jurisdictions.
 (g) 'Other' includes hospitalisations of non-Indigenous people and those for whom Indigenous status was not stated.
 (h) Directly age-standardised using the Australian 2001 standard population.
 (i) LCL = lower confidence limit.
 (j) UCL = upper confidence limit.
 (k) Rate ratio Indigenous: other.
 (l) Outer regional includes remote Victoria
 (m) Total includes hospitalisations where ASGC is missing.

Notes

1. Rates for Indigenous are calculated using the 2006 population estimates based on the 2006 Census (Series B).
2. Care types 7.3, 9 & 10 (Newborn – unqualified days only; organ procurement; hospital boarder) excluded from analysis.

Source: AIHW analysis of National Hospital Morbidity Database.

Time series analysis

Time series data from 2001–02 to 2007–08 are presented for the four jurisdictions that have been assessed as having adequate identification of Indigenous hospitalisations over this period – Queensland, Western Australia, South Australia and the Northern Territory. These four jurisdictions represent approximately 60% of the Indigenous Australian population. Additional trend analysis has also been presented for New South Wales, Victoria, Queensland, Western Australia, South Australia and the Northern Territory combined from 2004–05 to 2007–08 for Indigenous and Other Australians. New South Wales and Victoria have been assessed as having adequate identification of Indigenous hospitalisations from 2004–05. These six jurisdictions represent approximately 96% of the Indigenous population of Australia.

Pneumonia – 2001–02 to 2007–08

All ages

Hospitalisation rates, rate ratios and rate differences between Indigenous and other Australians for pneumonia over the 7-year period 2001–02 to 2007–08 are presented in Table 1.04.4 and Figure 1.04.2.

- In Queensland, Western Australia, South Australia and the Northern Territory combined, there were significant declines in hospitalisation rates for pneumonia among Indigenous males and persons overall during the period 2001–02 to 2007–08, with an average yearly decline in hospitalisation rates of 0.4 per 1,000 (13% decline), and 0.2 per 1,000 (8% decline) respectively.
- There were also significant declines in hospitalisation rates among other Australian males and females over the same period. The average yearly decline was 0.1 per 1,000 for both other males and other females.
- There was a significant increase in the hospitalisation rate ratio between Indigenous and other Australian females, and a significant decrease in the rate difference between Indigenous and other Australian males for pneumonia.

Children aged 0–4 years

Hospitalisation rates, rate ratios and rate differences between Indigenous and other children aged 0–4 years for pneumonia over the 9-year period 2001–02 to 2007–08 are presented in Table 1.04.5 and Figure 1.04.3.

- In Queensland, Western Australia, South Australia and the Northern Territory combined, there was a significant decrease in hospitalisation rates for pneumonia among Indigenous children aged 0–4 years during the period 2001–02 to 2007–08. The fitted trend implies an average yearly decrease in the rate of around 1.9 per 1,000 which is equivalent to a 40% decline over the period.
- Over the same period, there was a significant decrease in the rate of pneumonia hospitalisation among other children aged 0–4 years, with an average yearly decrease of 0.5 per 1,000 or a 44% decline in the rate over the period.
- There was a significant decrease in the hospitalisation rate difference, but not rate ratio between Indigenous and other children for pneumonia. The fitted trend implies an average yearly decrease of around 1.5 per 1,000 around in the rate difference (39% decline) for the period 2001–02 to 2007–08.

Note that changes in the level of accuracy of Indigenous identification in hospital records will result in changes in the level of reported hospital separations for Indigenous Australians, as will changes in access, hospital policies and practices over time. Caution should be used in interpreting changes over time, as it is not possible to ascertain whether a change in reported hospitalisation rates is due to changes in the accuracy of Indigenous identification or real changes in the rates at which Indigenous people are hospitalised. An increase in hospitalisation rates may also reflect increased use of admitted patient hospital services rather than a worsening of health.

Table 1.04.4: Age-standardised hospitalisation rates, rate ratios and rate differences for pneumonia, Qld, WA, SA and NT, 2001–02 to 2007–08^(a)

	2001–02	2002–03	2003–04	2004–05	2005–06	2006–07	2007–08	Annual change ^(b)	Per cent change over period ^(c)
Indigenous separations									
Males	1,838	1,753	1,816	1,617	1,638	1,532	1,670	-40.1*	-13.1*
Females	1,497	1,618	1,615	1,603	1,566	1,505	1,504	-9.1	-3.6
Persons	3,335	3,371	3,431	3,220	3,204	3,037	3,174	-19.2*	-8.9*
Other Australian^(d) separations									
Males	10,639	10,711	10,863	10,832	10,958	9,762	11,476	25.3	1.4
Females	9,400	9,520	9,863	9,525	9,668	8,229	9,615	-76.1	-4.9
Persons	20,039	20,231	20,726	20,357	20,626	17,991	21,091	-50.9	-1.5
Indigenous rate (separations per 1,000)									
Males	17.2	16.8	16.8	16.4	15.7	15.3	15.2	-0.4*	-12.6*
Females	12.5	14.4	14.1	14.4	14.2	13.1	12.8	-0.1	-3.1
Persons	14.6	15.5	15.3	15.2	14.9	14.0	13.9	-0.2*	-8.2*
Other Australian^(d) rate (separations per 1,000)									
Males	3.3	3.3	3.2	3.1	3.1	2.7	3.0	-0.1*	-13.7*
Females	2.6	2.5	2.6	2.4	2.4	2.0	2.3	-0.1*	-18.2*
Persons	2.9	2.8	2.9	2.7	2.7	2.3	2.6	-0.1*	-15.6*
Rate ratio^(e)									
Males	5.2	5.2	5.2	5.2	5.1	5.7	5.0	0.0	1.8
Females	4.9	5.7	5.5	6.0	5.9	6.6	5.6	0.2*	19.9*
Persons	5.1	5.4	5.4	5.6	5.5	6.1	5.3	0.1	9.6
Rate difference^(f)									
Males	13.9	13.6	13.6	13.2	12.7	12.6	12.2	-0.3*	-12.3*
Females	10.0	11.9	11.6	12.0	11.8	11.1	10.5	0.0	0.8
Persons	11.7	12.6	12.5	12.5	12.2	11.7	11.3	-0.1	-6.4

* Represents results with statistically significant increases or declines at the $p < 0.05$ level over the period 2001–02 to 2007–08.

(a) Data are from public and most private hospitals. Data exclude private hospitals in the Northern Territory.

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

(c) Per cent change between 2001–02 and 2007–08 based on the average annual change over the period.

(d) 'Other' includes hospitalisations of non-Indigenous people and those for whom Indigenous status was not stated.

(e) Hospitalisation rates for Indigenous Australians divided by the hospitalisation rates for other Australians.

(f) Hospitalisation rates for Indigenous Australians minus the hospitalisation rates for other Australians.

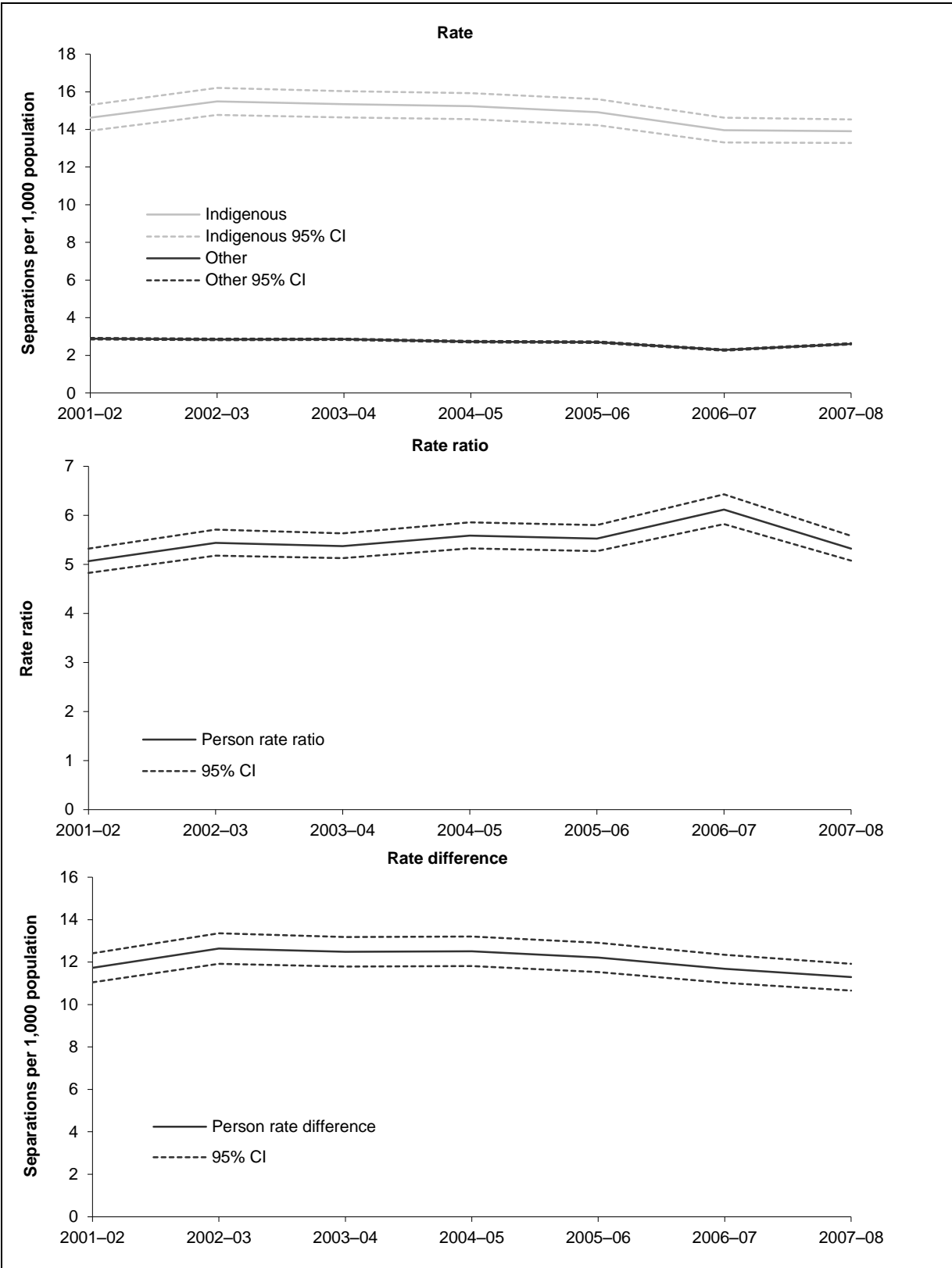
Notes

1. Rates have been directly age-standardised using the 2001 Australian standard population.

2. Population estimates are based on the 2006 Census.

3. Care types 7.3, 9 & 10 (Newborn – unqualified days only; organ procurement; hospital boarder) excluded in analysis.

Source: AIHW analysis of National Hospital Morbidity Database.



Source: AIHW analysis of National Hospital Morbidity Database.

Figure 1.04.2: Hospitalisation rates, rate ratios and rate differences between Indigenous and other Australians for pneumonia, Qld, WA, SA and NT, 2001-02 to 2007-08

Table 1.04.5: Children aged 0–4 years, hospitalisation rates, rate ratios and rate differences for pneumonia, Qld, WA, SA and NT, 2001–02 to 2007–08^(a)

	2001–02	2002–03	2003–04	2004–05	2005–06	2006–07	2007–08	Annual change ^(b)	Per cent change over period ^(c)
Indigenous separations	1,135	1,085	1,065	771	755	748	744	–77*	–41*
Other Australian ^(d) separations	2,809	2,816	2,845	2,506	2,098	1,667	2,211	–173*	–37*
Indigenous rate (separations per 1,000)	29.1	27.6	27.2	19.8	19.5	19.4	19.1	–1.9*	–39.8*
Other Australian ^(d) rate (separations per 1,000)	6.3	6.3	6.3	5.5	4.5	3.5	4.5	–0.5*	–43.8*
Rate ratio ^(e)	4.6	4.4	4.3	3.6	4.3	5.5	4.3	0.0	6.0
Rate difference ^(f)	22.8	21.3	20.9	14.3	15.0	15.9	14.7	–1.5*	–38.7*

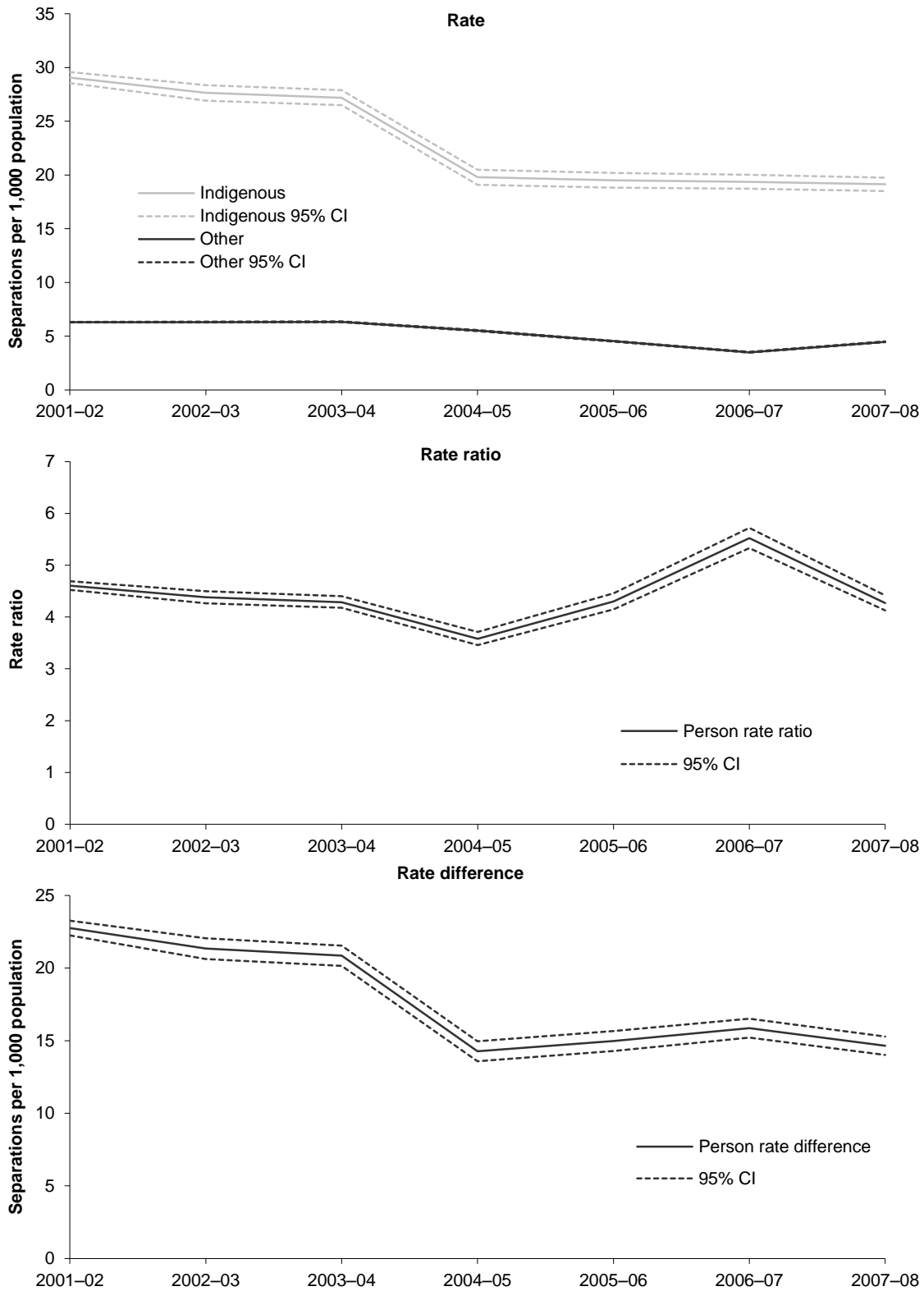
* Represents results with statistically significant increases or declines at the $p < 0.05$ level over the period 2001–02 to 2007–08.

- (a) Data are from public and most private hospitals. Data exclude private hospitals in the Northern Territory.
- (b) Average annual change in rates, rate ratios and rate differences determined using linear regression analysis.
- (c) Per cent change between 2001–02 and 2007–08 based on the average annual change over the period.
- (d) 'Other' includes hospitalisations of non-Indigenous people and those for whom Indigenous status was not stated.
- (e) Hospitalisation rates for Indigenous Australians divided by the hospitalisation rates for other Australians.
- (f) Hospitalisation rates for Indigenous Australians minus the hospitalisation rates for other Australians.

Notes

1. Rates have been directly age-standardised using the 2001 Australian standard population.
2. Population estimates are based on the 2006 census.
3. Care types 7.3, 9 & 10 (Newborn – unqualified days only; organ procurement; hospital boarder) excluded in analysis.

Source: AIHW analysis of National Hospital Morbidity Database.



Source: AIHW analysis of National Hospital Morbidity Database.

Figure 1.04.3: Children aged 0-4 years, hospitalisation rates, rate ratios and rate differences between Indigenous and other Australians for pneumonia, Qld, WA, SA and NT, 2001-02 to 2007-08

Pneumonia – 2004–05 to 2007–08

All ages

Hospitalisation rates, rate ratios and rate differences between Indigenous and other Australians for pneumonia over the four year period 2004–05 to 2007–08 are presented in Table 1.04.6 and Figure 1.04.4.

- In New South Wales, Victoria, Queensland, Western Australia, South Australia and the Northern Territory combined, there were significant decreases in hospitalisation rates for pneumonia among Indigenous females and persons overall during the period 2004–05 to 2007–08, with an average yearly decrease in hospitalisation rates of 0.3 per 1,000 for both Indigenous females and persons. Hospitalisation rates for pneumonia decreased by 9% for Indigenous females, and 7% for Indigenous persons over the period.
- There were no significant changes in hospitalisation rates among other Australian persons over the same period.
- There were also no significant changes in the hospitalisation rate ratios between Indigenous and other Australian persons for the period 2004–05 to 2007–08.
- There were significant declines in the hospitalisation rate differences between Indigenous and other Australian females, and persons for pneumonia. The fitted trend implies an average yearly decrease of 0.3 in the rate difference for females (10% decline) and 0.2 per 1,000 for persons (8% decline) for the period 2004–05 to 2007–08.

Children aged 0–4 years

Hospitalisation rates, rate ratios and rate differences between Indigenous and other children aged 0–4 years for pneumonia over the four year period 2004–05 to 2007–08 are presented in Table 1.04.7 and Figure 1.04.5.

- In New South Wales, Victoria, Queensland, Western Australia, South Australia and the Northern Territory combined, there was a significant decline in hospitalisation rates for pneumonia among Indigenous children aged 0–4 years during the period 2004–05 to 2007–08. The fitted trend implies an average yearly decrease in the rate of around 0.2 per 1,000 which is equivalent to a 3% drop in the rate over the period.
- Over the same period, there were no significant changes in the hospitalisation rates among other children aged 0–4 years for pneumonia.
- There were also no significant changes in both the hospitalisation rate ratios and rate differences between Indigenous and other children for pneumonia during the period.

Note that changes in the level of accuracy of Indigenous identification in hospital records will result in changes in the level of reported hospital separations for Indigenous Australians, as will changes in access, hospital policies and practices over time. Caution should be used in interpreting changes over time, as it is not possible to ascertain whether a change in reported hospitalisation rates is due to changes in the accuracy of Indigenous identification or real changes in the rates at which Indigenous people are hospitalised. An increase in hospitalisation rates may also reflect increased use of admitted patient hospital services rather than a worsening of health.

Table 1.04.6: Age-standardised hospitalisation rates, rate ratios and rate differences for pneumonia, NSW, Vic, Qld, WA, SA and NT, 2004–05 to 2007–08^(a)

	2004–05	2005–06	2006–07	2007–08	Annual change ^(b)	Per cent change over period ^(c)
Indigenous separations						
Males	1,969	2,082	1,927	2,060	12	1.8
Females	1,956	1,936	1,870	1,884	–28*	–4.3*
Persons	3,925	4,018	3,797	3,944	–16	–1.3
Other Australian^(d) separations						
Males	30,830	30,090	28,781	32,240	292	2.8
Females	27,074	27,012	24,886	28,346	169	1.9
Persons	57,906	57,102	53,667	60,586	461	2.4
Indigenous rate (separations per 1,000)						
Males	12.2	12.1	11.2	11.7	–0.2	–5.8
Females	10.9	10.7	10.1	10.1	–0.3*	–8.9*
Persons	11.5	11.4	10.6	10.8	–0.3*	–7.3*
Other Australian^(d) rate (separations per 1,000)						
Males	3.4	3.3	3.1	3.3	0.0	–4.2
Females	2.6	2.5	2.3	2.5	0.0	–4.7
Persons	3.0	2.9	2.6	2.9	0.0	–4.4
Rate ratio^(e)						
Males	3.6	3.7	3.7	3.5	0.0	–1.6
Females	4.2	4.2	4.4	4.0	–0.1	–4.1
Persons	3.9	4.0	4.0	3.7	0.0	–2.8
Rate difference^(f)						
Males	8.8	8.8	8.2	8.3	–0.2	–6.5
Females	8.3	8.2	7.8	7.5	–0.3*	–10.2*
Persons	8.5	8.5	8.0	7.9	–0.2*	–8.3*

* Represents results with statistically significant increases or declines at the $p < 0.05$ level over the period 2004–05 to 2007–08.

(a) Data are from public and most private hospitals. Data exclude private hospitals in the Northern Territory.

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

(c) Per cent change between 2004–05 and 2007–08 based on the average annual change over the period.

(d) 'Other' includes hospitalisations of non-Indigenous people and those for whom Indigenous status was not stated.

(e) Hospitalisation rates for Indigenous Australians divided by the hospitalisation rates for other Australians.

(f) Hospitalisation rates for Indigenous Australians minus the hospitalisation rates for other Australians.

Notes

1. Rates have been directly age-standardised using the 2006 Australian standard population.

2. Population estimates are based on the 2006 Census.

3. Care types 7.3, 9 & 10 (Newborn – unqualified days only; organ procurement; hospital boarder) excluded from analysis.

Source: AIHW analysis of National Hospital Morbidity Database.

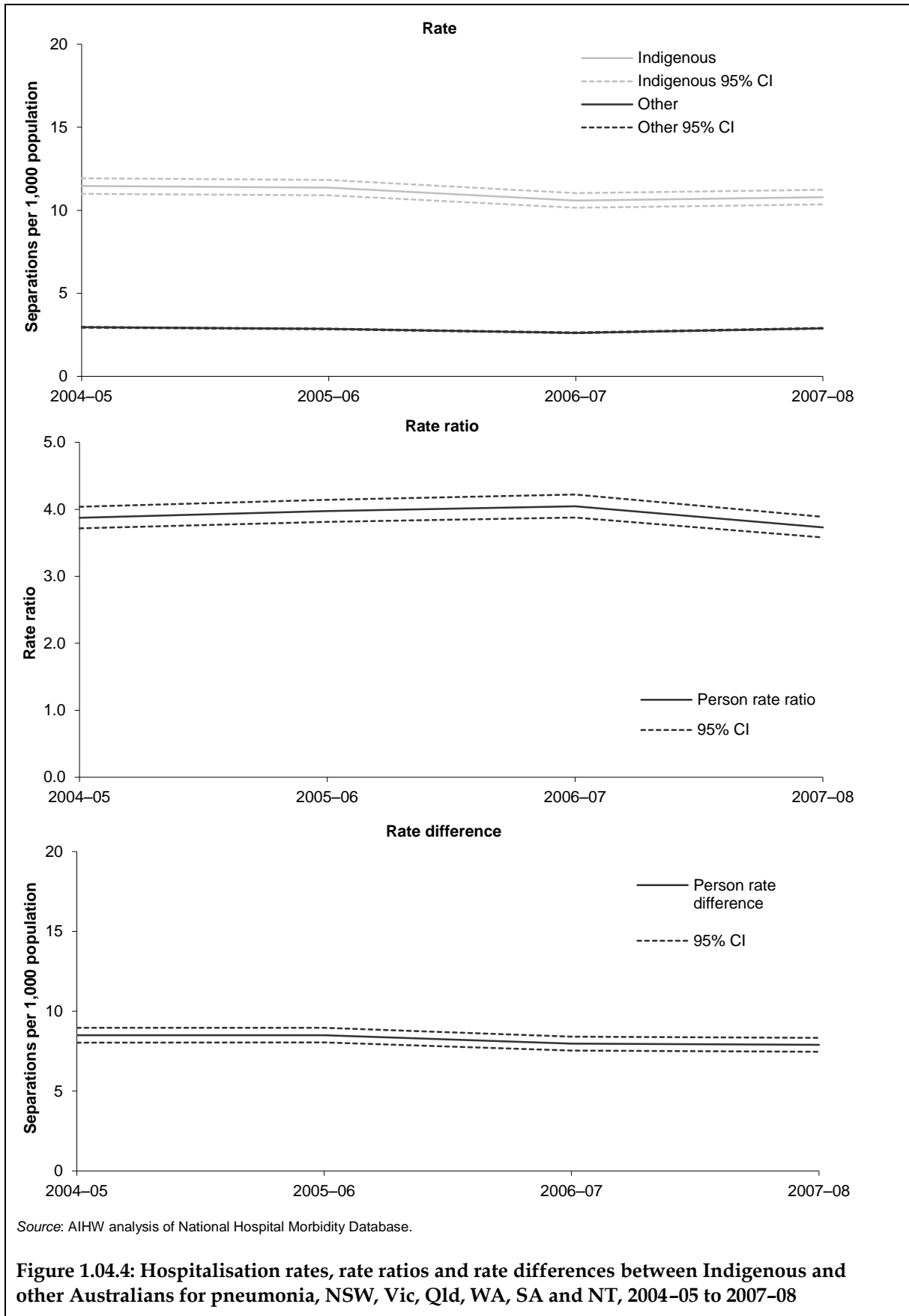


Table 1.04.7: Children aged 0–4 years, hospitalisation rates, rate ratios and rate differences for pneumonia, NSW, Vic, Qld, WA, SA and NT, 2004–05 to 2007–08^(a)

	2004–05	2005–06	2006–07	2007–08	Annual change ^(b)	Per cent change over period ^(c)
Indigenous separations	951	940	921	936	–6	–2.0
Other Australian ^(d) separations	6,242	5,254	4,730	5,693	–217	–10.4
Indigenous rate (separations per 1,000)	15.3	15.2	14.9	15.0	–0.2*	–3.0*
Other Australian ^(d) rate (separations per 1,000)	5.3	4.4	3.9	4.6	–0.3	–15.6
Rate ratio ^(e)	2.9	3.4	3.8	3.3	0.2	16.0
Rate difference ^(f)	10.0	10.8	11.0	10.4	0.1	3.8

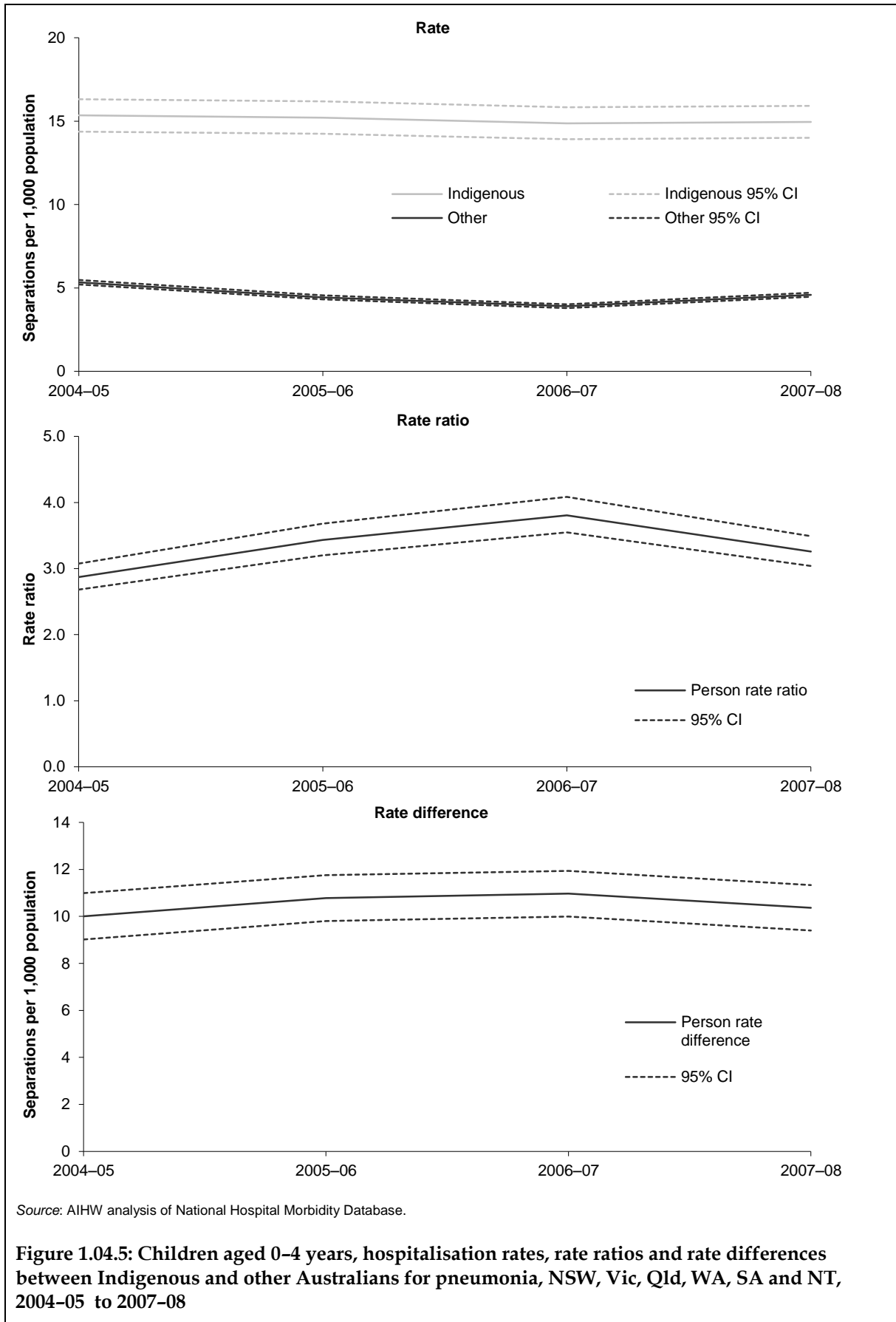
* Represents results with statistically significant increases or declines at the $p < 0.05$ level over the period 2004–05 to 2007–08.

- (a) Data are from public and most private hospitals. Data exclude private hospitals in the Northern Territory.
- (b) Average annual change in rates, rate ratios and rate differences determined using linear regression analysis.
- (c) Per cent change between 2004–05 and 2007–08 based on the average annual change over the period.
- (d) 'Other' includes hospitalisations of non-Indigenous people and those for whom Indigenous status was not stated.
- (e) Hospitalisation rates for Indigenous Australians divided by the hospitalisation rates for other Australians.
- (f) Hospitalisation rates for Indigenous Australians minus the hospitalisation rates for other Australians.

Notes

1. Rates have been directly age-standardised using the 2006 Australian standard population.
2. Population estimates are based on the 2006 Census.
3. Care types 7.3, 9 & 10 (Newborn – unqualified days only; organ procurement; hospital boarder) excluded from analysis.

Source: AIHW analysis of National Hospital Morbidity Database.



Additional information

Invasive pneumococcal disease

Pneumococcal disease is caused by the bacterium *Streptococcus pneumoniae* and can cause infection in parts of the respiratory tract (otitis media, sinusitis, pneumonia) or enter the bloodstream. Manifestations include meningitis, pneumonia and septicaemia. Invasive pneumococcal disease is defined as a sterile site isolate of *Streptococcus pneumoniae*, usually from blood (Menzies et al. 2008).

Incidence

For the period 2006–2008, there were 534 invasive pneumococcal disease notifications among Indigenous persons in New South Wales, Victoria, Queensland, Western Australia, South Australia, Tasmania and the Northern Territory. The age standardised notification rate for Indigenous persons was 46 per 100,000, which was seven times the rate for other persons (6.3 per 100,000). Notification rates were highest among those aged 65 years and over and 45–54 years for Indigenous Australians, and for other Australians the rates were highest in the age groups 0–4 years and 65 years and over.

For all age groups, Indigenous Australians had higher notification rates than other Australians. Rate ratios were highest among the 35–44 and 45–54 year age groups, where Indigenous Australians suffered from invasive pneumococcal disease at around 12 times the rate of other Australians (Table 1.04.8 and Figure 1.04.6).

Table 1.04.8: Invasive pneumococcal disease notification rate, by age group and Indigenous status, NSW, Vic, Qld, WA, SA, Tas and NT, 2006–2008^{(a)(b)(c)}

	Number		Number per 100,000		Rate ratio ^(e)
	Indigenous	Other ^(d)	Indigenous	Other ^(d)	
0-4	112	587	57.9	15.6	3.7*
5-14	42	173	10.9	2.2	4.9*
15-24	41	142	13.2	1.7	7.8*
25-34	58	241	26.5	2.9	9.3*
35-44	99	380	50.1	4.3	11.8*
45-54	81	427	58.4	5.1	11.5*
55-64	42	577	55.0	8.5	6.5*
65+	56	1,399	113.7	17.2	6.6*
Total	534	3,969	34.0	6.5	5.2*
Total age-standardised^(f)			46.1	6.3	7.3*

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

(a) Calendar year reporting. Data are presented in 3-year groupings because of small numbers each year.

(b) Rates are calculated using the sum of notifications divided by the sum of the populations for the relevant years.

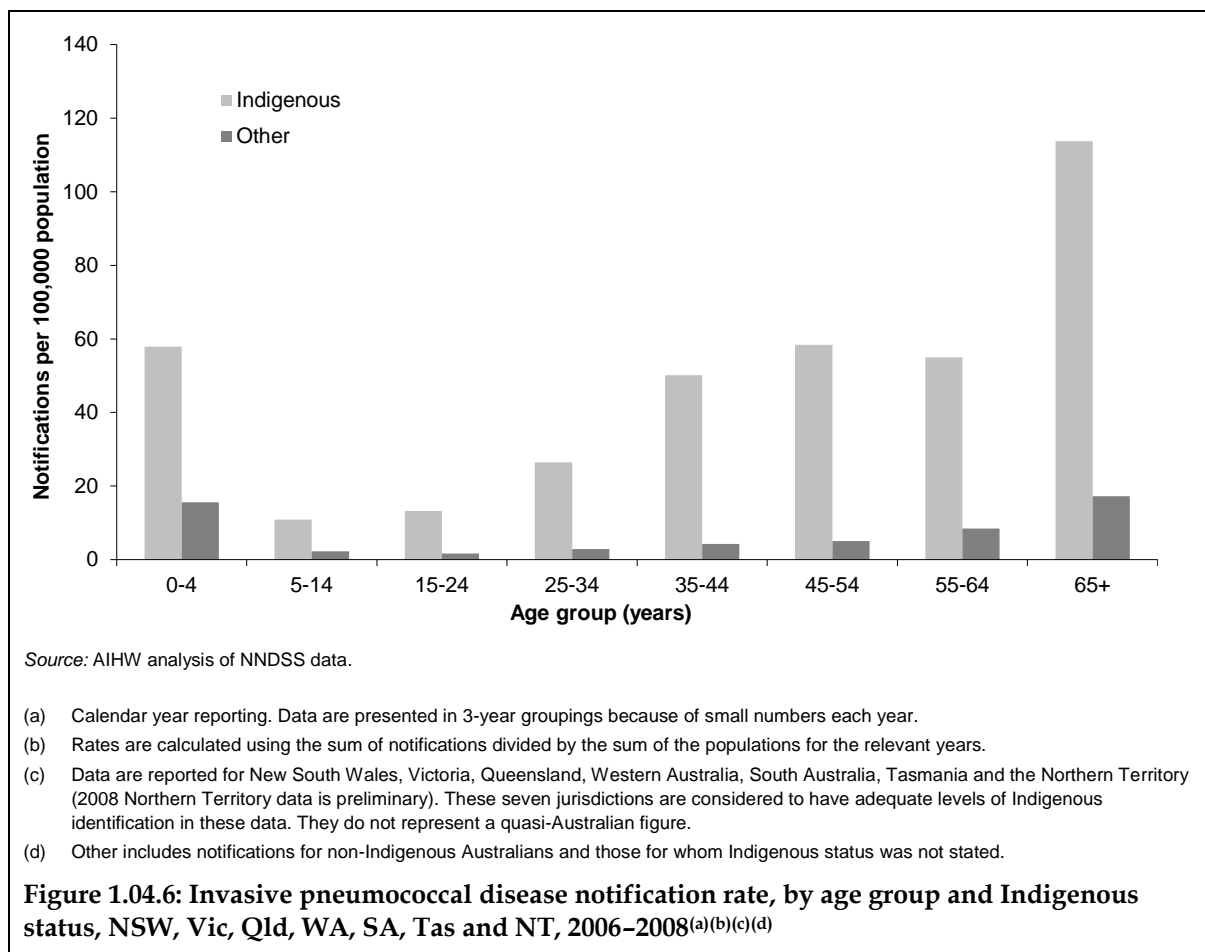
(c) Data are reported for New South Wales, Victoria, Queensland, Western Australia, South Australia, Tasmania and the Northern Territory (2008 Northern Territory data is preliminary). These seven jurisdictions are considered to have adequate levels of Indigenous identification in these data. They do not represent a quasi-Australian figure.

(d) Includes notifications for non-Indigenous Australians and those for whom Indigenous status was not stated.

(e) Rate ratio Indigenous: other.

(f) Directly age-standardised using the Australian 2001 standard population using five year age groups up to 65+.

Source: AIHW analysis of NNDSS data.



Hospitalisations

Over the period June 2006 to July 2008, there were 75 hospitalisations of Indigenous people in New South Wales, Victoria, Queensland, Western Australia, South Australia and the Northern Territory combined for invasive pneumococcal disease. Almost one in three (31%) of these hospitalisations were among Indigenous children aged 0–4 years.

Time series analysis

Time series data from 2001–02 to 2007–08 for children aged 0–4 years are presented for the four jurisdictions that have been assessed as having adequate identification of Indigenous hospitalisations over this period – Queensland, Western Australia, South Australia and the Northern Territory. These four jurisdictions represent approximately 60% of the Indigenous Australian population.

Additional trend analysis has also been presented for New South Wales, Victoria, Queensland, Western Australia, South Australia and the Northern Territory combined from 2004–05 to 2007–08 for Indigenous and other Australians. New South Wales and Victoria have been assessed as having adequate identification of Indigenous hospitalisations from 2004–05. These six jurisdictions represent approximately 96% of the Indigenous population of Australia.

Invasive pneumococcal disease 2001–02 to 2007–08

Hospitalisation rates, rate ratios and rate differences between Indigenous and other children aged 0–4 years in Queensland, Western Australia, South Australia and the Northern

Territory for invasive pneumococcal disease over the 7-year period 2001-02 to 2007-08 are shown in Table 1.04.9.

- In Queensland, Western Australia, South Australia and the Northern Territory combined, there were no significant changes in the hospitalisation rates for invasive pneumococcal disease among Indigenous children aged 0-4 years during the period 2001-02 to 2007-08. The fitted trend implies an average yearly decrease in the rate of around 0.02 per 1,000, which is equivalent to a 57% decline over the period.
- Over the same period, there was a significant decline in the hospitalisation rate for invasive pneumococcal disease among other children aged 0-4 years, at an average yearly rate of 0.04 per 1,000 or a 94% change over the period.
- There was a significant decrease in the hospitalisation rates for other children between 2004-05 and 2005-06. This decrease reflects the impact of the introduction of pneumococcal vaccinations for all Australian children from January 2005 (Roche et al. 2007). The introduction of these vaccinations has not had the same impact for Indigenous children, although free pneumococcal vaccinations have been available to all Indigenous children under 2 years of age since 2001.
- There was a significant increase in the hospitalisation rate ratio between Indigenous and other children for invasive pneumococcal disease, and an increase in the rate difference over the period 2001-02 to 2007-08, but this change was not significant.

Table 1.04.9: Children aged 0–4 years, hospitalisation rates, rate ratios and rate differences for invasive pneumococcal disease, Qld, WA, SA and NT, 2001–02 to 2007–08^(a)

	2001–02	2002–03	2003–04	2004–05	2005–06	2006–07	2007–08	Annual change ^(b)	Per cent change over period ^(c)
Indigenous separations	7	15	10	9	5	5	9	–1	–58.2
Other Australian ^(d) separations	117	99	79	63	8	14	29	–18*	–92.5*
Indigenous rate (separations per 1,000)	0.2	0.4	0.3	0.2	0.1	0.1	0.2	0.02	–56.8
Other Australian ^(d) rate (separations per 1,000)	0.3	0.2	0.2	0.1	0.0	0.0	0.1	–0.04*	–94.2*
Rate ratio ^(e)	0.7	1.7	1.4	1.7	7.5	4.4	3.9	0.8*	663.9*
Rate difference ^(f)	–0.1	0.2	0.1	0.1	0.1	0.1	0.2	0.0	–174.6

* Represents results with statistically significant increases or declines at the $p < 0.05$ level over the period 2001–02 to 2007–08.

(a) Data are from public and most private hospitals. Data exclude private hospitals in the Northern Territory.

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

(c) Per cent change between 2001–02 and 2007–08 based on the average annual change over the period.

(d) 'Other' includes hospitalisations of non-Indigenous people and those for whom Indigenous status was not stated.

(e) Hospitalisation rates for Indigenous Australians divided by the hospitalisation rates for other Australians.

(f) Hospitalisation rates for Indigenous Australians minus the hospitalisation rates for other Australians.

Notes

1. Hospitalisations for pneumococcal meningitis (G00.1) and pneumococcal septicaemia (A40.3) have been used as a measure for invasive pneumococcal disease.

2. Population estimates are based on the 2006 Census.

3. Care types 7.3, 9 & 10 (Newborn – unqualified days only; organ procurement; hospital boarder) excluded from analysis.

Source: AIHW analysis of National Hospital Morbidity Database.

Invasive pneumococcal disease 2004–05 to 2007–08

Hospitalisation rates, rate ratios and rate differences between Indigenous and other children aged 0–4 years in New South Wales, Victoria, Queensland, Western Australia, South Australia and the Northern Territory for invasive pneumococcal disease over the four year period 2004–05 to 2007–08 are shown in Table 1.04.10.

- In New South Wales, Victoria, Queensland, Western Australia, South Australia and the Northern Territory combined, there were non-significant decreases in hospitalisation rates for invasive pneumococcal disease among Indigenous and other children aged 0–4 years during the period 2004–05 to 2007–08.
- Over the same period there were non-significant increases in the hospitalisation rate ratios and rate differences between Indigenous and other children for invasive pneumococcal disease over the period 2004–05 to 2007–08.

Table 1.04.10: Children aged 0–4 years, hospitalisation rates, rate ratios and rate differences for invasive pneumococcal disease, NSW, Vic, Qld, WA, SA and NT, 2004–05 to 2007–08^(a)

	2004–05	2005–06	2006–07	2007–08	Annual change ^(b)	Per cent change over period ^(c)
Indigenous separations	12	8	14	9	0	–7.5
Other Australian ^(d) separations	162	48	54	80	–24	–44.4
Indigenous rate (separations per 1,000)	0.2	0.1	0.2	0.1	0.0	–8.2
Other Australian ^(d) rate (separations per 1,000)	0.1	0.0	0.0	0.1	0.0	–47.2
Rate ratio ^(e)	1.4	3.2	5.1	2.2	0.4	93.9
Rate difference ^(f)	0.1	0.1	0.2	0.1	0.0	90.4

* Represents results with statistically significant increases or declines at the $p < 0.05$ level over the period 2004–05 to 2007–08.

- (a) Data are from public and most private hospitals. Data exclude private hospitals in the Northern Territory.
 (b) Average annual change in rates, rate ratios and rate differences determined using linear regression analysis.
 (c) Per cent change between 2004–05 and 2007–08 based on the average annual change over the period.
 (d) 'Other' includes hospitalisations of non-Indigenous people and those for whom Indigenous status was not stated.
 (e) Hospitalisation rates for Indigenous Australians divided by the hospitalisation rates for other Australians.
 (f) Hospitalisation rates for Indigenous Australians minus the hospitalisation rates for other Australians.

Notes

1. Hospitalisations for pneumococcal meningitis (G00.1) and pneumococcal septicaemia (A40.3) have been used as a measure for invasive pneumococcal disease.
2. Care types 7.3, 9 & 10 (Newborn – unqualified days only; organ procurement; hospital boarder) excluded from analysis.

Source: AIHW analysis of National Hospital Morbidity Database.

Immunisation

A report by the National Centre for Immunisation Research and Surveillance of Vaccine Preventable Diseases found that coverage of pneumococcal vaccine was significantly higher for Indigenous adults compared to non-Indigenous adults, with the exception of those aged 65 years or more (Menzies et al. 2008). It should be noted that pneumococcal vaccinations were funded for non-Indigenous adults in that age group for only part of the period covered by the survey. Indigenous adults aged 50 years and over in remote areas had higher vaccination coverage rates for this disease than in non-remote areas (56% and 26%, respectively). There has been an increase in pneumococcal vaccine coverage in Indigenous adults aged 50 years and over from 25% in 2001 to 34% 2004–05 (Menzies et al. 2008).

Data quality issues

National Hospital Morbidity data

Hospital separations data

Separations

Differing admission practices among the jurisdictions and from year to year, and differing levels and patterns of service delivery, can affect the number and pattern of hospitalisations.

In all states and territories, the proportion of Aboriginal and Torres Strait Islander separations in public hospitals increased over the 11-year period 1996–97 to 2007–08, from 3.7% to 5.4%. In private hospitals, it stayed around 0.2% to 0.3% until 2003–04, when there was a modest increase to 0.5%.

Indigenous status question

Some jurisdictions have slightly different approaches to the collection and storage of the standard Indigenous status question and categories in their hospital collections. The ‘not stated’ category is missing from several collections. It is recommended that the standard wording and categories be used in all jurisdictions (AIHW 2005).

‘Not stated’ responses to the Indigenous status question were around 1% in public hospitals and 4% in private hospitals in 2007–08. This is a reduction from 1998–99 when 2% of responses in public hospitals and 8% of responses in private hospitals had a ‘not stated’ Indigenous status (AIHW 2009).

Under-identification

The incompleteness of Indigenous identification means the number of hospital separations recorded as Indigenous is an underestimate of hospitalisations involving Aboriginal and Torres Strait Islander people. Based on an analysis of a sample of data conducted in 2010, an estimated 89% of Indigenous patients were correctly identified in Australian public hospital admission records in 2007–08 (AIHW 2010). In other words, 11% of Indigenous patients were not identified, and the ‘true’ number of hospital admissions for Indigenous persons was about 12% higher than reported.

For several years, Queensland, South Australia, Western Australia and the Northern Territory reported that Indigenous status in their hospital separations data was of acceptable quality (AIHW 2007). The AIHW, however, has recently completed an assessment of the level of Indigenous under-identification in hospital data in all states and territories. Results from this assessment indicate that all hospitals in New South Wales, Victoria, Queensland, Western Australia and South Australia and public hospitals in the Northern Territory have adequate Indigenous identification (80% or higher overall levels of Indigenous identification in public hospitals only) in their separations data. For Tasmania and the Australian Capital Territory, the levels of Indigenous identification were not considered acceptable for analysis purposes. It has therefore been recommended that reporting of Indigenous hospital separations data be limited to information from New South Wales, Victoria, Queensland, Western Australia, South Australia and the Northern Territory, individually or in aggregate. The proportion of the Indigenous population covered by these six jurisdictions is 96%. The following caveats have also been recommended for analysis of hospitalisation data from selected jurisdictions (AIHW 2010):

- Interpretation of results should take into account the relative quality of the data from the jurisdictions included.
- Interpretation of time series analysis should take into account the possible contribution of changes over time in ascertainment of Indigenous status to changes in hospitalisation rates for Indigenous people.

- Bias may have been introduced due to the sampling method of hospitals used in the study. Hospitals with high proportions of Indigenous separations were used in the study to ensure sufficient numbers of Indigenous people were included in the study. Proportions of Indigenous separations should therefore not be taken to represent the NHMD overall.
- Hospitalisation data for these six jurisdictions are not necessarily representative of other jurisdictions.

From the AIHW study, it was possible to produce correction factors for the level of Indigenous under-identification in hospital data for each jurisdiction and at the national level.

Remoteness areas

There were acceptable levels of Indigenous identification for all remoteness areas, ranging from 80% in *Major cities* to 97% in *Remote* and *Very remote* areas. The quality of data supports analyses by remoteness areas, in aggregate, across states and territories. However, the sample size was insufficient to allow assessment of the quality of Indigenous identification by remoteness area within jurisdictions.

Numerator and denominator

Rate and ratio calculations rely on good numerator and denominator data. There are changes in the completeness of identification of Indigenous people in hospital records. These may take place at different rates from changes in the identification of Indigenous people in other administrative collections and population censuses. Denominators used in this analysis are sourced from *Experimental estimates and projections: Aboriginal and Torres Strait Islander Australians 1991 to 2021* (ABS 2009).

Data sources for injury emergency episodes

The National Non-admitted Patient Emergency Department Care Database is a national collection of de-identified data on emergency department episodes based on the Non-admitted Emergency Department Care National Minimum Data Set. This data set includes the standard Indigenous status question but does not include injury coding (for example, ICD-10). The Injury Surveillance National Minimum Data Set includes injury coding (components of ICD-10) but does not include demographic details such as Indigenous status. Therefore, there is currently no national minimum data set containing both Indigenous status and injury coding.

National Notifiable Diseases Surveillance System (NNDSS)

Notifications

Notification statistics do not measure the incidence or prevalence of infections in the community. Under-reporting of these infections can occur at a number of stages:

- a person infected may not feel ill
- a person may not seek medical care
- a false negative result may occur
- there may be a positive test result but for some reason a notification may not occur
- the case may not be reported to the NNDSS.

The level of under-reporting can vary by disease, jurisdiction and by time. The method of surveillance can vary between jurisdictions with different requirements for notification by medical practitioners, laboratories and hospitals. The case definitions for surveillance also vary among jurisdictions. These can also change over time.

Notification statistics can provide insights into the health of the population which has been diagnosed with a notifiable illness and changes over time.

Under-identification

The incompleteness of Indigenous identification means the number of notifications recorded as Indigenous is an underestimate of Aboriginal and Torres Strait Islander notifications rates. In 2009, Indigenous status was not reported in 51% cases of chlamydia, 37% of cases of gonorrhoea and 63% of cases of hepatitis C (NCHECR 2010).

The completeness of Indigenous identification in notifiable disease registries varies between the states and territories.

The identification of Indigenous notifications is incomplete in all states and territories, but three jurisdictions (Western Australia, South Australia and the Northern Territory) have been assessed as having adequate identification in 2001–2002 in the NNDSS.

Numerator and denominator

Rate and ratio calculations rely on good population estimates. The changes in the completeness of identification of Indigenous people in notification records may take place at different rates from changes in the identification of Indigenous people in the population estimates. Denominators used here are sourced from *Experimental estimates and projections: Aboriginal and Torres Strait Islander Australians 1991 to 2021* (ABS 2009).

List of symbols used in tables

- n.a. not available
- rounded to zero (including null cells)
- 0 zero
- .. not applicable
- n.e.c. not elsewhere classified
- n.f.d. not further defined
- n.p. not available for publication but included in totals where applicable, unless otherwise indicated

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