

## 1.08 Diabetes

Prevalence of diabetes 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 National Aboriginal and Torres Strait Islander Health Survey, the Bettering the Evaluation and Care of Health survey and the AIHW National Hospital Morbidity Database.

#### National Aboriginal and Torres Strait Islander Health Survey (NATSIHS)

The 2004–05 NATSIHS collected information from 10,439 Indigenous Australians of all ages. This sample was considerably larger than the supplementary Indigenous samples in the 1995 and 2001 National Health Surveys. The survey was conducted in remote and non-remote areas of Australia and collected a range of information from Indigenous Australians about health-related issues including health-related actions, health risk factors, health status, socioeconomic circumstances and women's health. It is planned to repeat the NATSIHS at 6-yearly intervals, with the next NATSIHS to be conducted in 2010–11. Selected non-Indigenous comparisons are available through the 2004–05 National Health Survey (NHS).

#### Bettering the Evaluation and Care of Health (BEACH) survey

Information about encounters in general practice is available from the BEACH survey which is conducted by the AIHW Australian GP Statistics and Classification Centre. Information is collected from a random sample of approximately 1,000 general practitioners (GPs) from across Australia each year. A sample of 100 consecutive encounters is collected from each GP.

The number of Indigenous patients identified in the BEACH survey is likely to be underestimated. This is because some GPs might not ask about Indigenous status, or the patient may choose not to identify (AIHW 2002). The estimates presented here are also derived from a relatively small sample of GP encounters involving Indigenous Australians.

Because of a late inclusion of a 'not stated' category of Indigenous status in 2001–02 (before which 'not stated' responses were included with non-Indigenous encounters), GP encounters for which Indigenous status was not reported have been included with encounters for non-Indigenous people under the 'other' category.

Data are presented for the 5-year period 2002–03 to 2006–07, during which there were 7,542 GP encounters with Aboriginal and Torres Strait Islander patients recorded in the survey, representing 1.5% of total GP encounters in the survey.

#### Hospitalisations

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. Information on the characteristics, diagnoses and care of admitted patients in public and private hospitals is provided annually to the AIHW by state and territory health departments.

Data are presented for the six jurisdictions which have been assessed by the AIHW as having adequate identification of Indigenous hospitalisations in 2004–05 – 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.

Hospitalisations for which Indigenous status was not reported have been included with hospitalisations data for non-Indigenous people under the ‘other’ category. This is to enable consistency across jurisdictions, as 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 July 2004 to June 2006. An aggregate of 2 years of data has been used, as 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, which can be a total hospital stay (from admission to discharge, transfer or death) or a portion of a hospital stay beginning or ending a change in a 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.

## Analyses

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

### Self-reported prevalence

Data on the self-reported prevalence of diabetes were measured in the National Aboriginal and Torres Strait Islander Health Survey and are presented below.

#### Prevalence by age, sex and remoteness

- In 2004–05, after adjusting for differences in age structure, approximately 12% of Indigenous Australians reported diabetes/ high sugar levels compared with 4% of non-Indigenous Australians.
- The greatest difference in prevalence rates between Indigenous and non-Indigenous Australians was among those aged 45–54 years. Indigenous Australians were more than five times as likely to report diabetes as non-Indigenous Australians in this age group (Table 1.08.1; Figure 1.08.1).
- Prevalence of diabetes was highest among those aged 55 years and over for both Indigenous Australians (32%) and non-Indigenous Australians (12%) (Figure 1.08.1).
- Indigenous males were three times as likely, and Indigenous females four times as likely, as non-Indigenous males and females to report diabetes/high sugar levels (Table 1.08.2).

- Prevalence of diabetes was higher among Indigenous Australians in remote areas than among Indigenous Australians in non-remote areas (9% compared with 5%) (Table 1.08.3).
- There was no significant change in the prevalence of diabetes among Indigenous Australians between 1995, 2001 and 2004–05 (Table 1.08.3).

**Table 1.08.1: Persons reporting diabetes/high sugar levels, by Indigenous status and age group, 2004–05<sup>(a)</sup>**

Age group	Indigenous	Non-Indigenous
	Per cent	
0–14	— <sup>(b)</sup>	— <sup>(c)</sup>
15–24	1 <sup>(c)</sup>	1 <sup>(c)</sup>
25–34	4*	1*
35–44	10*	2*
45–54	21*	4*
55 years and over	32*	12*
<b>Total</b>	<b>6*</b>	<b>4*</b>
<b>Total (age-standardised)<sup>(d)</sup></b>	<b>12*</b>	<b>4*</b>

\* Represents statistically significant differences in the Indigenous/non-Indigenous comparisons.

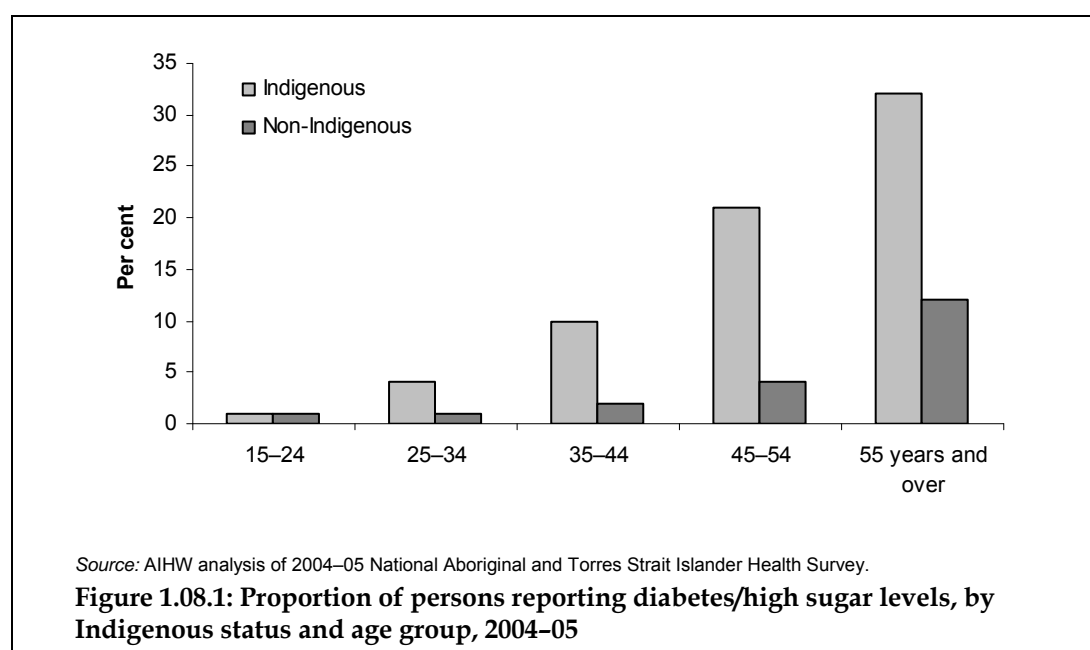
(a) Self-reported data from the National Aboriginal and Torres Strait Islander Health Survey 2004–05.

(b) Estimate has a relative standard error greater than 50% and is considered too unreliable for general use.

(c) Estimate has a relative standard error of 25% to 50% and should be used with caution.

(d) Total is a directly age-standardised proportion.

Source: ABS 2006.



**Table 1.08.2: Persons reporting diabetes/high sugar levels, by Indigenous status, sex and remoteness, 2004–05**

	Males		Females		Persons	
	Indigenous	Non-Indigenous	Indigenous	Non-Indigenous	Indigenous	Non-Indigenous
	<b>Per cent</b>					
Remote	15	n.a.	18	n.a.	16	n.a.
Non-remote	10	4	11	3	11	4
<b>Total</b>	<b>11</b>	<b>4</b>	<b>13</b>	<b>3</b>	<b>12</b>	<b>4</b>
Total number	232,362	9,788,447	241,948	9,893,092	474,310	19,681,539

Note: Data are age-standardised.

Source: ABS and AIHW analysis of 2004–05 National Aboriginal and Torres Strait Islander Health Survey.

**Table 1.08.3: Indigenous persons reporting diabetes/high sugar levels, by remoteness, 1995, 2001 and 2004–05**

	1995	2001	2004–05
	<b>Per cent</b>		
Remote	n.a.	7	9
Non-remote	4	4	5
<b>Total</b>	<b>n.a.</b>	<b>5</b>	<b>6</b>
Total number	265,416	442,995	474,310

Sources: ABS and AIHW analysis of 1995 National Health survey (Indigenous supplement); 2001 National Health Survey (Indigenous supplement); ABS 2006.

### Prevalence by selected population and health characteristics

- In 2004–05, Indigenous Australians aged 15 years and over were more likely to report having diabetes if they were unable to raise \$2000 within a week (11% compared with 8%); if the highest year of school completed was Year 9 or below than if Year 12 was the highest year of school completed (17% compared with 14%); and if they were unemployed than if they were employed (22% compared with 13%). Among non-Indigenous Australians, those who were not in the labour force were more likely to report having diabetes than those who were unemployed or employed (Table 1.08.4).
- Indigenous Australians with reported fair/poor health status were much more likely to have diabetes than Indigenous Australians with excellent/very good health status (22% compared with 9%).
- Indigenous Australians aged 18 years and over were more likely to report having diabetes if they had experienced stressors in the last 12 months (12%) than if no stressors were experienced (9%); if they reported their exercise level as low or sedentary rather than high (14% compared with 11%); and if they were overweight and obese than if they were normal or underweight (18% compared with 9%).
- Indigenous Australians who drank at risky/high-risk levels, smoked daily or reported using substances in the last 12 months were less likely to report diabetes than Indigenous Australians who did not report these behaviours. The same was true for non-Indigenous Australians.

- Indigenous Australians who reported that they did not eat vegetables daily were more likely to report having diabetes than those who did eat vegetables daily. The reverse was true for non-Indigenous Australians.
- Indigenous Australians who reported that they eat fruit daily were more likely to report having diabetes than those who did not eat fruit daily.
- Indigenous Australians aged 15 years and over were much more likely to report having diabetes if they also reported hypertension, circulatory problems or high cholesterol than if they did not report these conditions. This was also the case for non-Indigenous Australians.

**Table 1.08.4: Proportion<sup>(a)</sup> of Indigenous and non-Indigenous Australians aged 15 years and over with diabetes/high sugar levels, by selected population characteristics, 2004–05**

	Indigenous Australians		Non-Indigenous Australians	
	Has diabetes	Does not have diabetes	Has diabetes	Does not have diabetes
<b>Household income</b>				
1st quintile	17.9	82.1	6.0	94.0
5th quintile	16.3	83.7	3.4	96.6
<b>Financial stress—able to raise \$2,000 within a week for something important</b>				
Yes	7.7	92.3	n.a.	n.a.
No	11.2	88.8	n.a.	n.a.
<b>Highest year of school completed</b>				
Year 12	14.4	85.6	3.8	96.2
Year 9 or below	17.3	82.7	6.0	94.0
<b>Whether has non-school qualification</b>				
Has a non-school qualification	13.3	86.7	4.3	95.7
Does not have a non-school qualification	16.6	83.4	4.7	95.3
<b>Employment</b>				
Employed	12.5	87.5	3.2	96.8
Unemployed	22.2	77.8	3.7	96.3
Not in the labour force	17.3	82.7	5.5	94.5
<b>Housing</b>				
Owner	6.6	93.4	n.a.	n.a.
Renter	10.9	89.1	n.a.	n.a.
<b>Stressors in last 12 months<sup>(b)</sup></b>				
Serious illness or disability	12.2	87.8	n.a.	n.a.
Total experienced stressors	11.7	88.3	n.a.	n.a.
No stressors	8.8	91.2	n.a.	n.a.
<b>Self-assessed health status</b>				
Excellent/very good	9.0	91.0	1.9	98.1
Good	14.2	85.8	5.0	95.0
Fair/poor	21.8	78.2	9.6	90.4

(continued)

**Table 1.08.4 (continued): Proportion<sup>(a)</sup> of Indigenous and non-Indigenous Australians aged 15 years and over with heart/circulatory problems, by selected population characteristics, 2004–05**

	Indigenous Australians		Non-Indigenous Australians	
	Has diabetes	Does not have diabetes	Has diabetes	Does not have diabetes
<b>Smoker status<sup>(b)</sup></b>				
Current daily smoker	12.7	87.3	3.5	96.5
Not current daily smoker	18.5	81.5	4.8	95.2
<b>Risky/high-risk alcohol consumption in last 12 months<sup>(b)</sup></b>				
Yes	8.1	91.9	2.9	97.1
No	17.4	82.6	5.0	95.0
<b>Whether used substances in last 12 months<sup>(b)(c)</sup></b>				
Yes	3.7	96.3	n.a.	n.a.
No	10.7	89.3	n.a.	n.a.
<b>Physical activity<sup>(c)</sup></b>				
Low/sedentary	13.6	86.4	4.8	95.2
Moderate	12.1	87.9	4.0	96.0
High	11.2	88.8	2.6	97.4
<b>Overweight/obesity</b>				
Yes	17.7	82.3	5.9	94.1
No	8.7	91.3	2.9	97.1
<b>Eats vegetables daily</b>				
Yes	14.9	85.1	4.5	95.5
No	23.7	76.3	3.4	96.6
<b>Eats fruit daily</b>				
Yes	15.5	84.5	4.5	95.5
No	12.6	87.4	3.5	96.5
<b>Hypertension</b>				
Yes	26.5	73.5	9.6	90.4
No	12.3	87.7	3.3	96.7
<b>Circulatory problems</b>				
Yes	21.9	78.1	7.2	92.8
No	11.3	88.7	2.5	97.5
<b>High cholesterol</b>				
Yes	29.6	70.4	10.3	89.7
No	13.9	86.1	3.6	96.4
<b>Total (age-standardised)</b>	<b>15.4</b>	<b>84.6</b>	<b>4.5</b>	<b>95.5</b>
<b>Total (crude)</b>	<b>9.8</b>	<b>90.2</b>	<b>4.6</b>	<b>95.4</b>
Total number persons aged 15 years and over	28,703	264,938	720,634	14,811,743

(a) Proportions are age-standardised except for data for financial stress, housing tenure, substance use in the last 12 months and stressors experienced in the last 12 months for which crude proportions are presented, as data for non-Indigenous Australians are not available.

(b) Persons aged 18 years and over.

(c) Non-remote areas only.

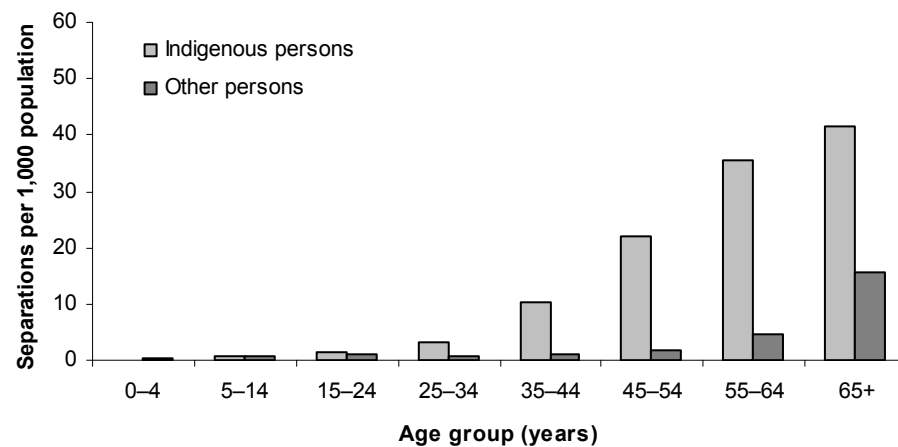
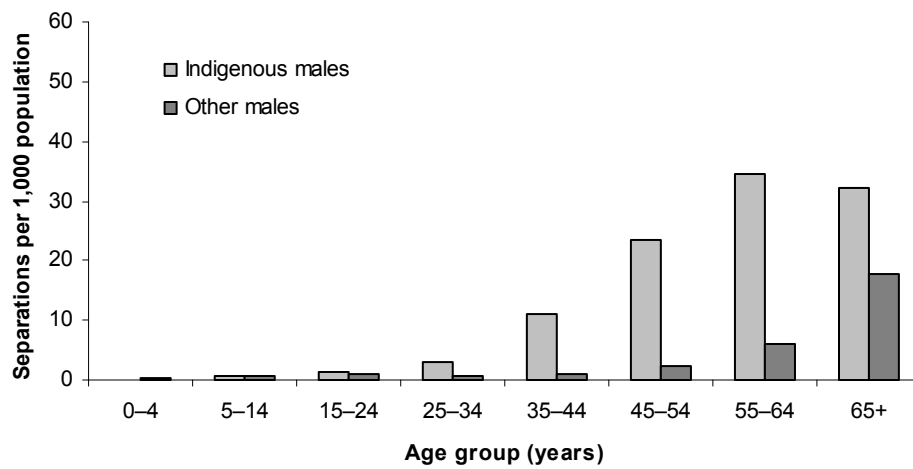
Source: AIHW analysis of 2004–05 National Aboriginal and Torres Strait Islander Health Survey.

## Hospitalisations

- In the 2-year period July 2004 to June 2006, there were 134,295 hospitalisations for diabetes in New South Wales, Victoria, Queensland, Western Australia, South Australia and the Northern Territory combined, of which 6,399 hospitalisations (4.8%) were of Aboriginal and Torres Strait Islander peoples (Table 1.08.5).
- Diabetes was the principal diagnosis in 1.4% of all hospital separations for Aboriginal and Torres Strait Islander Australians.

## Hospitalisations by age and sex

- For the 2-year period July 2004 to June 2006, in New South Wales, Victoria, Queensland, Western Australia, South Australia and the Northern Territory, Indigenous males and females had much higher hospitalisation rates for diabetes than other males and females in all age groups from 25–34 years onwards (Figure 1.08.2).
- The greatest difference in rates for both males and females occurred in the 45–54 year age group, where Indigenous males were hospitalised at around 10 times the rate of other males and Indigenous females were hospitalised at 14 times the rate of other females.
- For Indigenous males, hospitalisation rates for diabetes were highest among those aged 55–64 years, whereas for Indigenous females, other males and other females, rates were highest among those aged 65 years and over.
- Approximately 46% of Indigenous Australians hospitalised for diabetes were males (2,969) and 54% were females (3,429).



Source: AIHW analysis of National Hospital Morbidity Database.

**Figure 1.08.2: Age-specific hospitalisation rates for a principal diagnosis of diabetes, by Indigenous status and sex, NSW, Vic, Qld, WA, SA and NT, July 2004 to June 2006**

## Hospitalisations by state/territory

Table 1.08.5 presents hospitalisations for a principal diagnosis of diabetes for the 2-year period July 2004 to June 2006 for New South Wales, Victoria, Queensland, Western Australia, South Australia and the Northern Territory. As well as rates and ratios for the six jurisdictions which have been assessed as having adequate identification of Indigenous hospitalisations in 2004–05, unadjusted and adjusted national level data are presented in the table below. The Australia data are adjusted by applying a completeness factor of 89.4%, which is an estimate of the level of Indigenous under-identification in hospital separations data.

- In New South Wales, Victoria, Queensland, Western Australia, South Australia and the Northern Territory combined, Indigenous males and females were hospitalised for diabetes at around four and five times the rate of other Australian males and females respectively.
- When hospital rates are adjusted at the national level for Indigenous under-identification, Indigenous males and females were hospitalised for diabetes at 3.8 and 5.7 times the rate of other males and females.
- In South Australia and Western Australia, Indigenous Australians were hospitalised for diabetes at six times the rate of other Australians; in Queensland, the rate was five times; in the Northern Territory the rate was four times; in New South Wales the rate was three times; and in Victoria the rate was twice that of other Australians.

**Table 1.08.5: Hospitalisations for principal diagnosis of diabetes mellitus, by Indigenous status and sex, NSW, Vic, Qld, WA, SA and NT, July 2004 to June 2006<sup>(a)(b)(c)(d)</sup>**

	Indigenous				Other <sup>(e)</sup>				Ratio <sup>(i)</sup>
	Number	No. per 1,000 <sup>(f)</sup>	LCL 95% <sup>(g)</sup>	UCL 95% <sup>(h)</sup>	Number	No. per 1,000 <sup>(g)</sup>	LCL 95% <sup>(g)</sup>	UCL 95% <sup>(h)</sup>	
<b>NSW</b>									
Males	596	8.1	7.3	9.0	21,303	3.3	3.2	3.3	2.5*
Females	595	9.0	8.1	9.8	18,753	2.5	2.4	2.5	3.6*
Persons	1,192	8.7	8.1	9.3	40,056	2.8	2.8	2.9	3.1*
<b>Vic</b>									
Males	107	7.5	5.5	9.5	20,382	4.2	4.1	4.3	1.8*
Females	116	7.8	6.1	9.5	17,885	3.1	3.1	3.2	2.5*
Persons	223	7.6	6.4	8.9	38,267	3.6	3.6	3.7	2.1*
<b>Qld</b>									
Males	870	15.2	13.9	16.5	13,617	3.7	3.6	3.8	4.1*
Females	1,088	17.5	16.2	18.7	10,821	2.7	2.6	2.7	6.6*
Persons	1,958	16.5	15.6	17.3	24,438	3.1	3.1	3.2	5.2*
<b>WA</b>									
Males	635	17.5	16.0	19.1	6,932	3.9	3.8	3.9	4.6*
Females	803	21.5	19.9	23.2	6,157	3.0	3.0	3.1	7.1*
Persons	1,438	19.8	18.6	21.0	13,089	3.4	3.4	3.5	5.8*
<b>SA</b>									
Males	247	18.9	16.0	21.8	5,942	3.7	3.6	3.8	5.1*
Females	291	18.6	16.1	21.1	5,405	2.9	2.8	3.0	6.5*
Persons	538	18.6	16.8	20.5	11,347	3.2	3.2	3.3	5.7*
<b>NT</b>									
Males	514	16.0	14.5	17.6	513	4.9	4.4	5.5	3.2*
Females	536	15.7	14.2	17.1	186	2.0	1.7	2.4	7.7*
Persons	1,050	15.9	14.8	17.0	699	3.6	3.3	3.9	4.4*
<b>NSW, Vic, Qld, WA, SA, NT<sup>(d)</sup></b>									
<b>Males</b>	<b>2,969</b>	<b>13.0</b>	<b>12.4</b>	<b>13.6</b>	<b>68,689</b>	<b>3.7</b>	<b>3.7</b>	<b>3.7</b>	<b>3.5*</b>
<b>Females</b>	<b>3,429</b>	<b>14.6</b>	<b>14.0</b>	<b>15.1</b>	<b>59,207</b>	<b>2.8</b>	<b>2.8</b>	<b>2.8</b>	<b>5.3*</b>
<b>Persons</b>	<b>6,399</b>	<b>13.9</b>	<b>13.5</b>	<b>14.3</b>	<b>127,896</b>	<b>3.2</b>	<b>3.2</b>	<b>3.2</b>	<b>4.4*</b>
<b>Australia unadjusted<sup>(i)</sup></b>									
Males	3,016	12.6	12.1	13.2	71,983	3.7	3.7	3.7	3.4*
Females	3,469	14.1	13.5	14.6	61,932	2.8	2.8	2.8	5.0*
Persons	6,486	13.5	13.1	13.9	133,915	3.2	3.2	3.2	4.2*
<b>Australia adjusted<sup>(i)</sup></b>									
Males	3,370	14.1	13.5	14.7	71,629	3.7	3.7	3.7	3.8*
Females	3,877	15.7	15.2	16.3	61,524	2.8	2.7	2.8	5.7*
Persons	7,248	15.1	14.6	15.5	133,153	3.2	3.2	3.2	4.7*

(continued)

**Table 1.08.5 (continued): Hospitalisations for principal diagnosis of diabetes mellitus, by Indigenous status and sex, NSW, Vic, Qld, WA, SA and NT, July 2004 to June 2006<sup>(a)(b)(c)(d)</sup>**

\* 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. Data exclude private hospitals in the Northern Territory.
- (b) Categories are based on the ICD-10-AM fifth edition (National Centre for Classification in Health 2006); ICD-10-AM codes E10–E14.
- (c) Financial year reporting.
- (d) Data are reported by state/territory of usual residence of the patient hospitalised and are for New South Wales, Victoria, Western Australia, South Australia, the Northern Territory and Queensland only. These six jurisdictions are considered to have adequate coverage 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.
- (e) 'Other' includes hospitalisations of non-Indigenous people and those for whom Indigenous status was not stated.
- (f) Directly age-standardised using the Australian 2001 standard population.
- (g) LCL = lower confidence limit.
- (h) UCL = upper confidence limit.
- (i) Rate ratio Indigenous:other
- (j) Includes all eight states and territories, including the Australian Capital Territory and Tasmania; Other Territories and Residence State not applicable (e.g. overseas, at sea, no fixed address).
- (k) Australian hospitalisation numbers and rates have been adjusted for Indigenous under-identification using a national adjustment factor of 0.89. This factor was derived from a study undertaken by the AIHW in 2007 which assessed the level of Indigenous under-identification in hospital data in all states and territories by comparing information gathered from face-to face interviews in public hospitals with results from hospital records. By applying this factor, the number of Indigenous hospitalisations was increased by 11% and these additional hospitalisations then subtracted from the number of hospitalisations for Other Australians.

Source: AIHW analysis of National Hospital Morbidity database.

### **Hospitalisations by principal diagnosis**

Table 1.08.6 presents hospitalisations for a principal diagnosis of diabetes by type of diabetic condition for the 2-year period July 2004 to June 2006 for New South Wales, Victoria, Queensland, Western Australia, South Australia and the Northern Territory combined.

- For the period 2004–05 to 2005–06 in New South Wales, Victoria, Queensland, Western Australia, South Australia and the Northern Territory combined, of all hospitalisations with a principal diagnosis of diabetes, Type 2 diabetes was the most common, responsible for 85% of hospitalisations of Indigenous Australians for diabetes (excluding gestational diabetes).
- In the six jurisdictions, Indigenous males and females were hospitalised for Type 2 non-insulin-dependent diabetes at much higher rates than other males and females (four and seven times respectively).
- Indigenous males and females were hospitalised for other specified diabetes at three and four times the rate of other males and females respectively.
- Indigenous females were hospitalised for gestational diabetes at twice the rate of other females.

**Table 1.08.6: Hospitalisations of Indigenous persons for principal diagnosis of diabetes mellitus, by type of diabetes and sex, NSW, Vic, Qld, WA, SA and NT, July 2004 to June 2006<sup>(a)(b)(c)(d)</sup>**

Principal diagnosis	Males						Females						Persons					
	No.	% <sup>(e)</sup>	No. per 1,000 <sup>(f)</sup>	LCL 95% <sup>(g)</sup>	UCL 95% <sup>(h)</sup>	Ratio <sup>(i)</sup>	No.	% <sup>(e)</sup>	No. per 1,000 <sup>(f)</sup>	LCL 95% <sup>(g)</sup>	UCL 95% <sup>(h)</sup>	Ratio <sup>(i)</sup>	No.	% <sup>(e)</sup>	No. per 1,000 <sup>(f)</sup>	LCL 95% <sup>(g)</sup>	UCL 95% <sup>(h)</sup>	Ratio <sup>(i)</sup>
Type 2—non-insulin-dependent diabetes (E11)	2,517	84.8	11.9	11.3	12.4	4.2*	2,910	84.9	13.2	12.6	13.7	6.6*	5,428	84.8	12.6	12.2	13.0	5.3*
Type 1—insulin-dependent diabetes (E10)	403	13.6	1.0	0.9	1.1	1.3*	461	13.4	1.2	1.1	1.3	1.6*	864	13.5	1.1	1.0	1.2	1.5*
Other specified diabetes (E13)	21	0.7	0.1	0.0	0.1	2.8*	17	0.5	0.0	0.0	0.1	4.0*	38	0.6	0.1	0.0	0.1	3.2*
Unspecified diabetes (E14)	28	0.9	0.1	0.0	0.1	2.8*	41	1.2	0.1	0.1	0.2	5.7*	69	1.1	0.1	0.1	0.2	4.3*
<b>Total<sup>(j)</sup></b>	<b>2,969</b>	<b>100.0</b>	<b>13.0</b>	<b>12.4</b>	<b>13.6</b>	<b>3.5*</b>	<b>3,429</b>	<b>100.0</b>	<b>14.6</b>	<b>14.0</b>	<b>15.1</b>	<b>5.3*</b>	<b>6,399</b>	<b>100.0</b>	<b>13.9</b>	<b>13.5</b>	<b>14.3</b>	<b>4.4*</b>
Gestational diabetes (O24.4) <sup>(k)</sup>	—	—	—	—	—	—	643	15.8	1.3	1.2	1.4	2.2*	—	—	—	—	—	—

\* 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. Data exclude private hospitals in the Northern Territory.

(b) Categories are based on the ICD-10-AM fifth edition (National Centre for Classification in Health 2006); ICD-10-AM codes E10-E14, O24.4.

(c) Financial year reporting.

(d) Data are reported by state/territory of usual residence of the patient hospitalised and are for New South Wales, Victoria, Western Australia, South Australia, the Northern Territory and Queensland only. These six jurisdictions are considered to have adequate Indigenous identification, although the level of accuracy varies by jurisdiction and hospital. Hospitalisation data for these five jurisdictions should not be assumed to represent the hospitalisation experience in the other jurisdictions.

(e) Proportion of male, female and total hospitalisations of Indigenous people for diabetes (excluding gestational diabetes) in the period 2004–05 to 2005–06. *Note:* Proportions for gestational diabetes are out of the total number of hospitalisations for diabetes, including gestational diabetes.

(f) Directly age-standardised using the Australian 2001 standard population.

(g) LCL = lower confidence limit.

(h) UCL = upper confidence limit.

(i) Rate ratio Indigenous:other.

(j) Total excludes gestational diabetes (O24.4).

(k) Proportion of Indigenous females with gestational diabetes out of those with Type 1, Type 2, other specified, unspecified or gestational diabetes (E10–E14 and O24.4).

*Note:* There were no hospitalisations with a principal diagnosis of malnutrition-related diabetes mellitus (E13).

*Source:* AIHW analysis of National Hospital Morbidity Database.

## **Hospitalisations by additional diagnosis**

Table 1.08.7 presents hospitalisations with a principal diagnosis of diabetes by additional causes of hospitalisation for Aboriginal and Torres Strait Islander peoples in New South Wales, Victoria, Queensland, Western Australia, South Australia and the Northern Territory.

- For the 2-year period July 2004 to June 2006, aside from factors influencing health status and contact with health services for which 60% of Indigenous hospitalisations for diabetes had an additional diagnosis, hospitalisations of Indigenous Australians with a principal diagnosis of diabetes were commonly reported with an additional diagnosis of diseases of the circulatory system (56%), diseases of the genitourinary system (39%) and other endocrine, metabolic and nutritional disorders (29%).
- Aside from the diseases mentioned above, insulin-dependent diabetes was commonly reported with an additional diagnosis of mental and behavioural disorders (15%), and non-insulin-dependent diabetes was commonly reported with an additional diagnosis of diseases of the eyes (24%) and skin (20%).

**Table 1.08.7: Hospitalisations of Indigenous persons for principal diagnosis of diabetes mellitus, by additional diagnosis of hospitalisation, NSW, Vic, Qld, WA, SA and NT, July 2004 to June 2006<sup>(a)(b)(c)(d)</sup>**

Additional diagnosis of hospitalisation	Reported with a principal diagnosis of diabetes				Total
	Insulin-dependent diabetes (E10)	Non-insulin-dependent diabetes (E11)	Other specified diabetes (E13)	Unspecified diabetes (E14)	
	Per cent				
Factors influencing health status and contact with health services (includes dialysis) (Z00–Z99)	55.8	61.5	76.3	26.1	60.4
Diseases of the circulatory system (I00–I99)	18.2	62.3	31.6	13.0	55.6
Diseases of the genitourinary system (N00–N99)	16.9	43.1	28.9	13.0	39.1
Endocrine, nutritional & metabolic diseases (E00–E90) excluding (E10–E14)	19.2	30.9	34.2	8.7	29.1
Diseases of the eye & adnexa (H00–H59)	11.5	24.4	21.1	7.2	22.5
Diseases of the skin & subcutaneous tissue (L00–L99)	9.3	19.8	23.7	1.4	18.2
Certain infectious and parasitic diseases (A00–B99)	12.7	19.1	23.7	1.4	18.1
Diseases of the nervous system (G00–G99)	10.8	16.0	13.2	1.4	15.1
Symptoms, signs & abnormal clinical & laboratory findings (R00–R99)	10.8	14.6	18.4	5.8	14.0
Mental & behavioural disorders (F00–F99)	15.3	12.3	39.5	4.3	12.8
Diseases of the digestive system (K00–K93)	12.2	8.8	42.1	1.4	9.4
Diseases of the respiratory system (J00–J99)	7.3	8.2	0.0	1.4	8.0
Injury & poisoning (S00–T98)	3.0	8.2	5.3	2.9	7.4
Neoplasms (C00–D48)	0.2	1.0	2.6	0.0	0.9
Other <sup>(e)</sup>	8.9	17.9	10.5	8.7	16.5
<b>Total number</b>	<b>864</b>	<b>5,428</b>	<b>38</b>	<b>69</b>	<b>6,399</b>

(a) Data are from public and most private hospitals. Data exclude 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) Indigenous data are reported by state/territory of usual residence of the patient hospitalised and are for New South Wales, Victoria, Western Australia, South Australia, the Northern Territory and Queensland only. These six jurisdictions are considered to have adequate 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.

(e) Includes: diseases of the musculoskeletal system and connective tissue; diseases of the ear and mastoid process; congenital malformations, deformations and chromosomal abnormalities; pregnancy, childbirth and the puerperium; certain conditions originating in the perinatal period; diseases of the blood and blood-forming organs; and certain disorders involving the immune system.

Note: Sum of components may exceed 100% as more than one additional diagnosis can be reported for each hospitalisation.

Source: AIHW analysis of National Hospital Morbidity Database.

## Time series analysis

Time series data are presented for the four jurisdictions that have been assessed as having adequate identification of Indigenous hospitalisations for all years from 2000–01 to 2005–06 – Queensland, Western Australia, South Australia and the Northern Territory. These four jurisdictions represent approximately 60% of the Indigenous Australian population. New South Wales and Victoria were identified as having adequate identification of Indigenous hospitalisations from 2004–05 onwards, therefore they were included as part of the current period analysis (2004–05 to 2005–06) but not as part of the time series analyses. Hospitalisation rates, rate ratios and rate differences between Indigenous and other Australians for diabetes over the period 2000–01 to 2005–06 are presented in Table 1.08.8 and Figure 1.08.3. This period has been used for analysis because coding changes were made to diabetes complications in July 1999 and July 2000. Coding for diabetes is consistent only from 2000–01 onwards and data for previous years should not be included in the analysis of diabetes trends.

- In Queensland, Western Australia, South Australia and the Northern Territory combined, there were significant increases in hospitalisation rates for diabetes among Indigenous males and females during the period 2000–01 to 2005–06. The fitted trend implies an average yearly increase in the rate of around 0.8 per 1,000 population, which is equivalent to an increase of 28% in the hospitalisation rate over this period.
- There were also significant increases in hospitalisation rates among other Australian males and females during the same period, with an average yearly increase in the rate of around 0.2 per 1,000 population. This is equivalent to a 36% increase in the hospitalisation rate between 2001–02 and 2005–06.
- There was no significant change in the hospitalisation rate ratio, but a significant increase in the hospitalisation rate difference between Indigenous and other Australians for diabetes over the period 2000–01 to 2005–06 (26%). This increase was significant for females but not for males.

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. Also, changes in access, hospital policies and practices all affect the level of hospitalisation over time. Caution should be used in interpreting changes over time, as it is not possible to ascertain whether a change in reported hospitalisation 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 reflect better access rather than a worsening of health.

**Table 1.08.8: Age-standardised hospitalisation rates, rate ratios and rate differences from diabetes, Qld, WA, SA and NT, 2000–01 to 2005–06<sup>(a)</sup>**

	2000–01	2001–02	2002–03	2003–04	2004–05	2005–06	Annual change <sup>(b)</sup>	% change over period <sup>(c)</sup>
<b>Indigenous rate (separations per 1,000)</b>								
Males	13.9	14.4	14.3	17.0	15.2	17.2	0.6*	21.9
Females	14.1	15.7	15.4	17.3	17.1	19.1	0.9*	31.5
Persons	14.0	15.1	15.0	17.3	16.3	18.2	0.8*	27.6
<b>Other rate (separations per 1,000)<sup>(d)</sup></b>								
Males	2.8	3.2	3.3	3.5	3.6	3.8	0.2*	34.6
Females	2.0	2.3	2.4	2.6	2.8	2.8	0.2*	37.8
Persons	2.4	2.7	2.8	3.0	3.2	3.3	0.2*	36.1
<b>Rate ratio<sup>(e)</sup></b>								
Males	5.0	4.5	4.4	4.9	4.2	4.5	–0.1	–8.8
Females	6.9	6.7	6.4	6.8	6.2	6.7	–0.1	–4.2
Persons	5.9	5.5	5.3	5.8	5.2	5.5	–0.1	–5.7
<b>Rate difference<sup>(f)</sup></b>								
Males	11.1	11.2	11.1	13.6	11.6	13.3	0.4	18.6
Females	12.1	13.3	13.0	14.7	14.4	16.2	0.7*	30.5
Persons	11.6	12.4	12.1	14.3	13.2	14.9	0.6*	25.9

\* Represents results with statistically significant increases or declines at the  $p < 0.05$  level over the period 2000–01 to 2005–06.

(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 2005–06 based on the average annual change over the period.

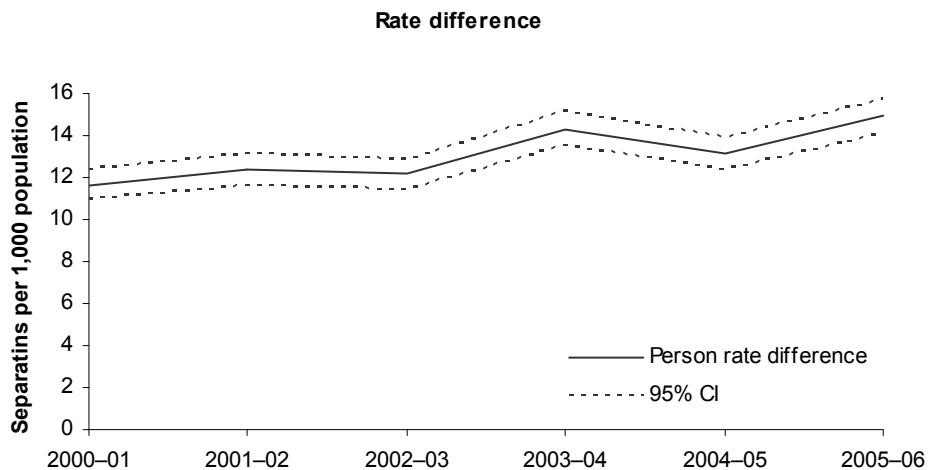
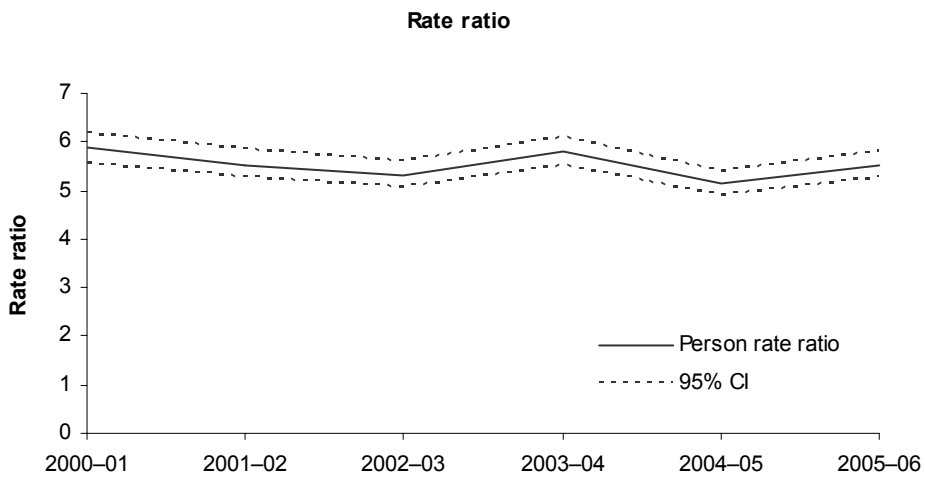
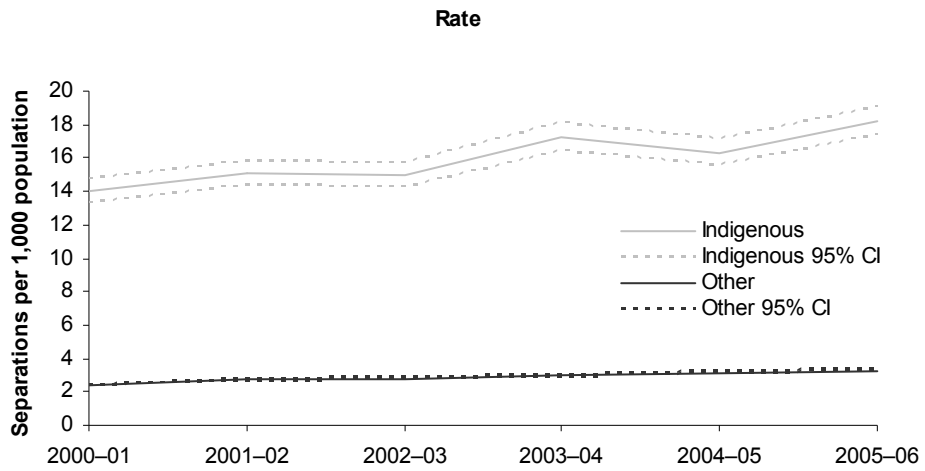
(d) 'Other' includes hospitalisations of non-Indigenous people and those for whom Indigenous status was not stated.

(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.

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

Source: AIHW analysis of National Hospital Morbidity Database.



Source: AIHW analysis of National Hospital Morbidity Database.

**Figure 1.08.3: Hospitalisation rates, rate ratios and rate differences between Indigenous and other Australians from diabetes, Qld, WA, SA and NT, 2000-01 to 2005-06**

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

- The fitted trends described above 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 number of hospitalisations for the period under study were adjusted using the following identification factors:
    - Queensland                      87%
    - Western Australia              97%
    - South Australia                 82%
    - Northern Territory             96%.
  - Under the increasing identification scenario, hospitalisations were adjusted by linearly increasing the identification through the period under study – from 83% in 2000–01 to 87% in 2005–06 for Queensland, from 96% to 97% for Western Australia, from 78% to 82% for South Australia, and from 94% to 96% for the Northern Territory.
  - Under the decreasing identification scenario, hospitalisations were adjusted by linearly decreasing the identification from 90% in 2000–01 to 87% in 2005–06 for Queensland, from 98% to 97% for Western Australia, from 86% to 82% for South Australia, and from 98% to 96% 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 hospitalisations might not persist.
- The observed increases in diabetes hospitalisation rates for Indigenous and other Australians during the period 2000–01 to 2005–06 remained statistically significant under all three identification scenarios.
- The observed increases in rate differences between Indigenous and other Australians also remained statistically significant under all three identification scenarios.

## General practitioner encounters

Information about general practitioner (GP) encounters is available from the BEACH survey. Data for the 5-year period 2002–03 to 2006–07 are presented in Table 1.08.9. Diabetes is the most common individual problem managed at GP encounters with Indigenous patients.

- In the period 2002–03 to 2006–07 there were 7,542 GP encounters with Aboriginal and Torres Strait Islander patients recorded in the survey, at which 11,219 problems were managed. Of these, 5.3% (590) of problems managed were for diabetes.
- Diabetes was managed at a rate of 7.8 per 100 GP encounters with Indigenous patients.
- After adjusting for differences in age distribution, diabetes was managed at encounters with Indigenous patients at almost four times the rate at encounters with other patients.
- Non-insulin-dependent diabetes (Type 2) was the most common type of diabetes managed at encounters with Indigenous patients – at almost four times the rate at encounters with other patients.
- Insulin-dependent diabetes (Type 1) was managed at encounters with Indigenous patients at around three times the rate at encounters with other patients.
- Gestational diabetes was managed at GP encounters with Indigenous females at around four times the management rate at encounters with other females.

**Table 1.08.9: Diabetes problems<sup>(a)</sup> managed by general practitioners, by Indigenous status of patient, 2002–03 to 2006–07<sup>(b)(c)(d)</sup>**

Problem managed	Number		Per cent		Crude rate (no. per 100 encounters)						Age-standardised rate (no. per 100 encounters) <sup>(e)</sup>		
	Indigenous	Other <sup>(f)</sup>	Indigenous	Other <sup>(f)</sup>	Indigenous	95% LCL <sup>(g)</sup>	95% UCL <sup>(h)</sup>	Other	95% LCL <sup>(g)</sup>	95% UCL <sup>(h)</sup>	Indigenous	Other <sup>(f)</sup>	Ratio <sup>(i)</sup>
Diabetes: non-insulin-dependent (T90)	545	13,961	4.9	1.9	7.2	5.6	8.8	2.9	2.8	3.0	10.1	2.8	3.5*
Diabetes: insulin-dependent (T89)	38	1,299	0.3	0.2	0.5	0.3	0.7	0.3	0.3	0.3	0.7	0.3	2.8*
<i>Total diabetes: non-gestational<sup>l</sup></i>	<i>583</i>	<i>15,260</i>	<i>5.2</i>	<i>2.1</i>	<i>7.7</i>	<i>6.1</i>	<i>9.4</i>	<i>3.2</i>	<i>3.1</i>	<i>3.2</i>	<i>10.8</i>	<i>3.1</i>	<i>3.5*</i>
Gestational diabetes (W85) <sup>(j)</sup>	7	88	0.1	—	0.2	—	0.4	—	—	—	0.1	—	3.6
<b>All diabetes</b>	<b>590</b>	<b>15,348</b>	<b>5.3</b>	<b>2.1</b>	<b>7.8</b>	<b>6.1</b>	<b>9.5</b>	<b>3.2</b>	<b>3.1</b>	<b>3.3</b>	<b>10.9</b>	<b>3.1</b>	<b>3.5*</b>
<b>Total problems</b>	<b>11,219</b>	<b>724,060</b>	<b>100.0</b>	<b>100.0</b>	<b>148.8</b>	<b>126.2</b>	<b>171.3</b>	<b>149.8</b>	<b>148.9</b>	<b>150.7</b>	<b>156.7</b>	<b>148.4</b>	<b>1.1</b>

(a) Classified according to ICPC-2 codes (Classification Committee of the World Organization of Family Doctors (WICC) 1998). ICPC-2 codes T90, T89, W85.

(b) These survey results are likely to undercount the number of Indigenous Australians visiting doctors.

(c) Combined financial year data for 5 years.

(d) Data for Indigenous and other Australians have not been weighted.

(e) Directly age-standardised rate (no. per 100 encounters).

(f) Includes non-Indigenous patients and patients for whom Indigenous status was not stated.

(g) LCL = lower confidence interval.

(h) UCL = upper confidence interval.

(i) Rate ratio Indigenous:other.

(j) Proportions, rates and ratios are for females only.

Source: AIHW analysis of BEACH survey of general practice, AGPSCC.

## **Data quality issues**

### **National Aboriginal and Torres Strait Islander Health Survey (NATSIHS)**

*The NATSIHS uses the standard Indigenous status question. The NATSIHS sample was specifically designed to select a representative sample of Aboriginal and Torres Strait Islander Australians and thus overcomes the problem inherent in most national surveys with small and unrepresentative Indigenous samples. As with other surveys, the NATSIHS is subject to sampling and non-sampling errors. Calculations of standard errors and significance testing help to identify the accuracy of the estimates and differences.*

*Information recorded in this survey is essentially 'as reported' by respondents. The ABS makes every effort to collect accurate information from respondents, particularly through careful questionnaire design, pre-testing of questionnaires, use of trained interviewers and assistance from Indigenous facilitators. Nevertheless, some responses may be affected by imperfect recall or individual interpretation of survey questions.*

*Non-Indigenous comparisons are available through the National Health Survey (NHS). The NHS was conducted in major cities and regional and remote areas, but very remote areas were excluded from the sample. Time series comparisons are available through the 1995 and 2001 National Health Survey.*

*In remote communities there were some modifications to the NATSIHS content in order to accommodate language and cultural appropriateness in traditional communities and help respondents understand the concepts. Some questions were excluded and some reworded. Also, paper forms were used in communities in remote areas and computer-assisted interview (CAI) instruments were used in non-remote areas. The CAI process included built-in edit checks and sequencing.*

*Further information on NATSIHS data quality issues can be found in the NATSIHS 2004–05 publication (ABS 2006).*

### **Hospital separations data**

#### **Separations**

*The number and pattern of hospitalisations can be affected by differing admission practices among the jurisdictions and from year to year, and differing levels and patterns of service delivery.*

#### **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).*

#### **Under-identification**

*The incompleteness of Indigenous identification means the number of hospital separations recorded as Indigenous is an underestimate of hospitalisations of Aboriginal and Torres Strait Islander peoples. 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 New South Wales, Victoria, Queensland, Western Australia, South Australia and the Northern Territory have adequate Indigenous identification (20% or less overall under-identification of Indigenous patients) in their hospital separations data (AIHW unpublished data). It has therefore been recommended that reporting of Indigenous hospital separations be limited to aggregated information from New South Wales, Victoria, Queensland, Western Australia, South Australia and the Northern Territory. The proportion of the Indigenous population covered by these six jurisdictions is 96%.*

*(continued)*

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

*The following caveats have also been recommended for analysis of hospitalisation data from selected jurisdictions (ABS & AIHW 2005):*

- *Interpretation of results should take into account the relative quality of the data from the jurisdictions included (currently a small degree of Indigenous under-identification in data from Western Australia and the Northern Territory and relatively marked Indigenous under-identification in data from South Australia and Victoria).*
- *Data for these six jurisdictions over-represent Indigenous populations in less urbanised and more remote locations.*
- *Hospitalisation data for these six jurisdictions are not necessarily representative of the jurisdictions not included.*

*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*

#### **Numerator and denominator**

*Rate and ratio calculations rely on good numerator and denominator data. The changes in the completeness of identification of Indigenous people in hospital records may take place at different rates from changes in the identification of Indigenous people in other administrative collections and population censuses. Denominators used here are sourced from Experimental estimates and projections: Aboriginal and Torres Strait Islander Australians 1991 to 2009 (ABS 2004).*

#### **General practitioner data (BEACH)**

*Information about general practitioner encounters is available from the Bettering the Evaluation and Care of Health (BEACH) survey. The BEACH data on Indigenous Australians should be treated with care. First, the sample frame has not been designed to produce statistically significant results for population subgroups such as Indigenous Australians. Second, the identification of Indigenous Australians is not complete. In the BEACH survey 'not stated' responses to the Indigenous identification question are often higher than the 'yes' responses. It can be assumed, therefore, that the survey consistently undercounts the number of Indigenous Australians visiting general practitioners, but the extent of this undercount is not measurable.*

## **References**

- ABS (Australian Bureau of Statistics) 2004. Experimental estimates and projections: Aboriginal and Torres Strait Islander Australians 1991 to 2009. ABS cat. no. 3238.0. Canberra: ABS.
- ABS 2006. National Aboriginal and Torres Strait Islander Health Survey 2004–05. ABS cat. no. 4715.0. Canberra: ABS
- ABS & AIHW (Australian Institute of Health and Welfare) 2005. The health and welfare of Australia's Aboriginal and Torres Strait Islander peoples 2005. ABS cat. no. 4704.0, AIHW Cat. no. IHW 14. Canberra: ABS & AIHW.
- AIHW 2002. Australia's children 2002. Cat. no. PHE 36. Canberra: AIHW.
- AIHW 2005. Improving the quality of Indigenous identification in hospital statistics. Health services series no. 25. Cat. no. HSE 101. Canberra: AIHW.
- AIHW 2007. Australian hospital statistics 2005–06. Health services series no. 30. Cat. no. HSE 50. Canberra: AIHW.

Classification Committee of the World Organization of Family Doctors (WICC) 1998.  
ICPC-2: International Classification of Primary Care. 2nd ed. Oxford: Oxford University Press.  
National Centre for Classification in Health 2006. International statistical classification of diseases and related health problems, 10th revision, Australian modification. 5th edition. National Centre for Classification in Health.