Australian Government
Australian Institute of Health and Welfare

bulletin 47

Diabetes hospitalisations in Australia, 2003–04

Highlights

Diabetes has been estimated to affect around one million Australians and is reportedly increasing in prevalence. Australian hospitals data help to give an indication of the impact of diabetes on health service use. This report presents information on Australian hospital statistics for people with diabetes; trends are presented for 1996–97 to 1998–99 and for 2000–01 to 2003–04, and data for 2003–04 are examined for a number of key characteristics.
The key findings below relate to hospitalisations involving diabetes—that is where diabetes was a principal or additional diagnosis:

- Hospitalisations increased by 19–20% between 2000–01 and 2003–04.
- The average length of hospital stay was over three times the overall average.
- Type 2 cases accounted for nearly six out of every seven hospitalisations with a diagnosis of diabetes.
- Diabetes was most commonly associated with hospitalisations for 'diseases of the circulatory system' (such as coronary heart disease and stroke) and 'factors influencing health and contact with health services' (which includes dialysis).
- Aboriginal and Torres Strait Islander peoples had substantially higher hospitalisation rates than other Australians.
- Hospitalisation rates rose with increasing socioeconomic disadvantage and increasing remoteness.

CONTENTS

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Introduction

Diabetes has been estimated to affect around one million Australians, a number which has increased dramatically over the last 20 years (Dunstan et al. 2001). The prevalence of diabetes, in particular Type 2 diabetes, is predicted to continue rising along with the increasing prevalence of its risk factors, notably obesity (Dunstan et al. 2001). Diabetes can lead to other adverse health conditions and death, and is a significant contributor to the overall burden of disease in Australia. It also poses a substantial financial burden on people with the disease, to the community and to government (see AIHW: Dixon (2005) for more information).

Australian hospitals data provide valuable information about health service provision. In terms of diabetes, this gives an indication of the impact of diabetes and can help provide some background information on people with diabetes who are accessing services. Data over a number of years can also help to detect trends in diabetes-related service use and in the treatment of complications.

The purpose of this bulletin is to provide up-to-date data on hospitalisations for diabetes. It presents trends for 1996–97 to 1998–99 and for 2000–01 to 2003–04, and examines data for 2003–04 for a number of key characteristics such as age and sex, place of residence, socioeconomic status, Aboriginal and Torres Strait Islander status and region of birth. It also briefly analyses the type of diabetes and associated conditions for which patients were admitted. Understanding sociodemographic patterns in hospitalisations for diabetes can assist in focusing policy, programs and service provision for the increasing problem of diabetes.

About diabetes

Diabetes mellitus (in this bulletin referred to as diabetes) is a condition in which blood glucose levels become too high because the body produces little or no insulin, or cannot use insulin properly. Insulin is a hormone produced by the pancreas that helps the body to use glucose (a type of sugar) for energy. Diabetes can have both short- and long-term effects, the latter through damage to various parts of the body, especially the heart and blood vessels, eyes, kidneys and nerves (AIHW 2002).

The complications of diabetes include macrovascular disease (diseases of the large blood vessels) such as coronary heart disease, stroke and peripheral vascular disease, and microvascular disease (diseases of the small blood vessels) such as retinopathy, kidney disease and neuropathy, as well as acute metabolic reactions such as ketoacidosis and diabetic coma. When present, diabetes almost always complicates pregnancy (AIHW 2002).

Complications of diabetes can result in loss of working ability, invalidism, shortened life expectancy and reduced quality of life (AIHW 2002). Improving the management and care of diabetes, particularly the early identification and reduction of risk factors, can delay the onset or slow the progression of complications.

Types of diabetes

There are several types of diabetes, with different causes. Three main types of diabetes, which are included in this report, are Type 1, Type 2 and gestational. Types 1 and 2 diabetes are chronic (long-term) conditions.

Type 1 diabetes

Type 1 diabetes results from the body destroying its own insulin-producing cells in the pancreas. People with Type 1 diabetes require daily injections of insulin for survival. No modifiable risk factors have been clearly identified for Type 1 diabetes although the disease is thought to be related to exposure to environmental factors, such as certain viruses or food toxins. Type 1 diabetes is the most common cause of childhood diabetes. Based on self-reported information from the 2004–05 National Health Survey, an estimated 91,900 Australians had Type 1 diabetes (0.5% of the population and 13% of reported diabetes) (ABS 2006b).

Type 2 diabetes

Type 2 diabetes affected an estimated 582,800 Australians in 2004–05 (3.0% of the population and 83% of all self-reported diabetes) (ABS 2006b). It is important to note that this reflects only diagnosed cases, and so is likely to underestimate the true prevalence of the disease. Type 2 diabetes is marked by reduced levels of insulin or the inability of the body to use insulin properly (insulin resistance or abnormal insulin secretion). In most cases, Type 2 diabetes can be prevented or at least delayed through the modification of its major risk factors which include poor nutrition, obesity and insufficient physical activity. Other risk factors include age, ethnicity, family history and metabolic factors such as impaired glucose metabolism.

Some population groups have been found to have a higher rate of Type 2 diabetes than others. The prevalence of diabetes among Aboriginal and Torres Strait Islander adults is in the range of 10–30% (de Courten et al. 1998:14, 20) compared with 3.5% for the general population (based on self-reported data) (ABS 2006b). Overseas-born Australians also appear to have a high prevalence of diabetes, with the highest rates among men born in the Middle East and North Africa, and in South-East and Southern Asia, and among women born in Southern and Eastern Europe and Central Asia (AIHW: Holdenson et al. 2003).

Gestational diabetes

Gestational diabetes mellitus (GDM) is a form of diabetes that develops during pregnancy in some women. It is defined as glucose intolerance in pregnant women who have not been previously diagnosed with diabetes. GDM is a temporary form of diabetes and usually disappears after the baby is born. However, women who have had GDM are at an increased risk of developing Type 2 diabetes (Martin 1991; O'Sullivan 1991).

Women with a higher risk of developing GDM during their pregnancy include those aged over 25 years, those with a history of glucose intolerance or previous GDM or a family history of diabetes, those with a history of 'large for gestational age' babies, those from certain high-risk ethnic groups, and those who are overweight or obese before their pregnancy (Davey & Hamblin 2001).

Other types of diabetes

Type 1, Type 2 and gestational diabetes account for 98–99% of all diagnosed cases of diabetes (CDC 1998). The remaining cases are other types of diabetes caused by medications or other health conditions.

Diabetes hospitalisations in Australia, 2003–04

Methods

The statistics presented in this report were extracted from the National Hospital Morbidity Database. The National Hospital Morbidity Database is maintained by the Australian Institute of Health and Welfare (AIHW) and is a compilation of records from data collection systems in Australian hospitals.

Data are collected for each 'separation', which begins when a patient is admitted to hospital and ends when the total hospital stay ends (for example, the patient is discharged or dies) or there is a change to the type of care (for example, from acute to rehabilitation).

This bulletin presents analysis of hospital separations with any diagnosis (principal or additional) of diabetes (see Box 1). People with diabetes are at high risk of developing a range of complications, and these complications, rather than diabetes as such, may be the primary reason for their hospital episode. Therefore, analysis of separations for principal diagnosis alone will tend to underestimate the number of hospital separations ultimately caused by diabetes. However, analysis of separations with any diagnosis of diabetes will tend to overestimate the number of hospital separations caused by diabetes, as diabetes is recorded as an additional diagnosis even when it does not explicitly affect patient management (see Box 1). The true number of hospitalisations attributable to diabetes lies somewhere between the numbers for these two groups. At this stage, an accepted method for calculating diabetes-attributable hospitalisations using hospital separations data has not been developed, and so an estimation of the true number could not be made for this report.

Data for patients of all ages have been analysed in relation to patient sex, age, Indigenous status, area of usual residence and region of birth. Hospital separations by Indigenous status and region of birth are presented as standardised separation ratios. Remaining data are presented as age-standardised rates per 10,000 population unless otherwise specified.

Trends in diabetes separations have been presented from 1996–97 to 1998–99 and from 2000–01 to 2003–04. This period has been split because of two key changes made in the protocol for coding diabetes in Australia. These changes are described in Appendix 1.

By including data on diabetes hospitalisations for the years before and after these changes, this report helps to give an indication of their impact. However it is important to note that this analysis cannot distinguish between real changes in hospitalisation rates and effects of the coding changes. For more information about these coding changes, see AIHW: Phillips (2003).

Box 1: How are diabetes hospital separations recorded?

Principal diagnosis: *diabetes is recorded as the principal diagnosis when it is considered to be the primary reason for the patient being hospitalised.*

Additional diagnosis: *generally, conditions are recorded as additional diagnoses when they affect patient management in terms of requiring therapeutic management, diagnostic procedures or increased nursing care and/or monitoring. However, diabetes is subject to special standards for coding as an additional diagnosis, which means it is to be recorded even when it does not explicitly affect patient management. For more information see NCCH (2002).*

Source: *NCCH 2002.*

There are some important points to note when interpreting hospital data. The information presented in this bulletin refer to hospital separations, not patients. A separation is an episode of care, which can be a whole hospital stay, or part of a hospital stay beginning or ending in a change of type of care. The same patient can have multiple separations within the same year and indeed within the same hospitalisation period. A new separation is generated when there is a change in care type, for example when a patient is transferred from a medical ward to a rehabilitation unit. Similarly, when a patient is transferred from one hospital to another a new record is created. Therefore, individual patients may be represented by more than one separation. For these reasons, the data do not represent the number or proportion of people in Australia with diabetes admitted to hospital.

Results

Trends in diabetes hospitalisations, 1996–97 to 1998–99 and 2000–01 to 2003–04

In 2003–04 there were a total of 66,716 hospital separations with diabetes as a principal diagnosis, accounting for 0.8% of all hospital separations for that year (Table 1). Over the period 2000–01 to 2003–04, both the number of diabetes separations and the rate steadily increased (by 28% and 20% respectively).

Before the coding changes of 1999 and 2000, the rate of separations with a principal diagnosis of diabetes remained stable from 1996–97 to 1998–99.

Table 1: Trends in separations with diabetes as a principal diagnosis, 1996–97 to 1998–99 and 2000–01 to 2003–04

Separations	1996–97	1997–98	1998–99	1999–00	2000–01	2001–02	2002–03	2003–04
Number	31,135	32,181	31,582	Changes to coding rules	52,126	59,323	62,800	66,716
Percentage of all[(a)]	0.60	0.60	0.58		0.73	0.77	0.79	0.81
Rate per 10,000 population[(a)]	17.2	17.5	16.9		27.2	30.3	31.4	32.7

(a) Directly age-standardised to the 2001 Australian population.

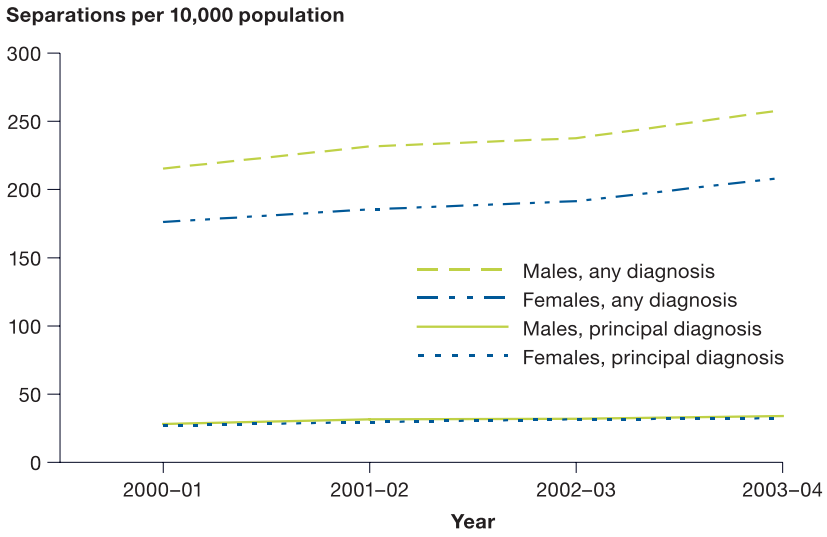
Note: Diabetes separations were affected by coding changes that came into effect in July 1999 and July 2000. Caution should be exercised in comparing results before and after this period. See AIHW: Phillips (2003) for more detail.

Source: AIHW National Hospital Morbidity Database.

Trends for separations with any diagnosis of diabetes showed a stronger absolute but smaller relative rate of increase than those for separations with a principal diagnosis of diabetes (Figure 1; Table A2.1). In absolute terms, the hospitalisation rate for cases involving any diagnosis of diabetes increased by 37.1 separations per 10,000 population, and the rate for a principal diagnosis of diabetes increased by 5.5. In relative terms, the hospitalisation rate for cases involving any diagnosis of diabetes increased by 19% and the rate for a principal diagnosis of diabetes increased by 20%.

The increase in hospital separation rates from 2000–01 to 2003–04—for both principal and any diagnoses of diabetes—was observed for both males and females. While males had higher separation rates for diabetes than females, rates for both trended upwards at a similar rate.

Diabetes hospitalisations in Australia, 2003–04



Notes

1. Directly age-standardised to the 2001 Australian population.
2. Separations for any diagnosis of diabetes include those with a principal diagnosis of diabetes.

Source: AIHW National Hospital Morbidity Database.

Figure 1: Trends in diabetes hospital separations, 2000–01 to 2003–04

Diabetes hospitalisations, 2003–04

Overview

In 2003–04 there were a total of 473,864 hospital separations with a principal or additional diagnosis of diabetes, six out of seven (86%) of which were for diabetes as an additional diagnosis (Table 2).

Just over half (51%) of separations with a principal diagnosis of diabetes were same-day separations, compared with 44% of separations with any diagnosis of diabetes and 54% of all hospital separations (Table 2; AIHW 2005a). The average length of stay (ALOS) for separations with any diagnosis of diabetes (10.7 days) was longer than for separations with a principal diagnosis of diabetes (9.4 days) and for all hospital separations (3.1 days). This suggests that diabetes separations have a higher burden on the health system on average than many other conditions. While males had a longer ALOS for separations with a principal diagnosis of diabetes, the ALOS for separations with any diagnosis of diabetes was similar for males and females.

Overall, there were more hospital separations with any diagnosis of diabetes for males than for females, while there were more hospital separations with a principal diagnosis of diabetes among females than males. However, the age-standardised separation rates were higher among males (for both principal and additional diagnoses).

Table 2: Separations with a diagnosis of diabetes, 2003–04

	Diabetes as principal diagnosis			Diabetes as any diagnosis[a]		
	Males	Females	Persons[b]	Males	Females	Persons[b]
Separations (number)	32,333	34,382	66,716	246,262	227,595	473,864
Separations per 10,000 population[c]	33.9	32.2	32.7	258.3	208.4	230.3
Same day separations	17,022	17,175	34,197	113,993	95,421	209,415
Average length of stay (days)[c]	9.9	8.9	9.4	10.6	10.8	10.7

(a) Includes separations with diabetes as the principal or additional diagnosis.
(b) Includes persons for whom sex is unknown.
(c) Directly age-standardised to the 2001 Australian population.
Source: AIHW National Hospital Morbidity Database.

Type of diabetes

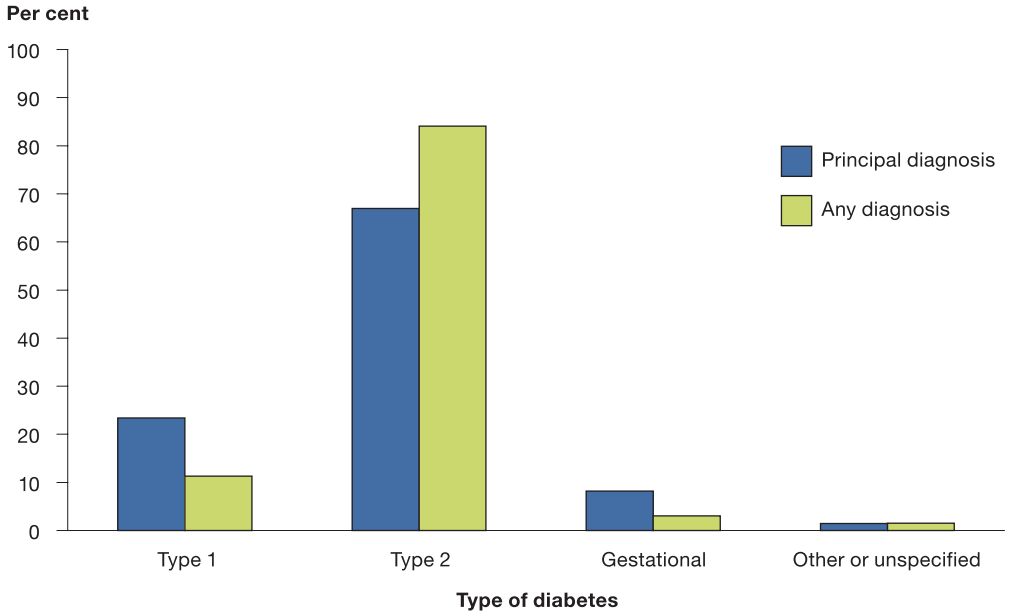
There was a higher number of hospital separations for Type 2 diabetes than for Type 1 diabetes in 2003–04; Type 1 diabetes accounted for nearly one-quarter (23%) of separations with a principal diagnosis of diabetes and 11% of those with any diagnosis of diabetes, while Type 2 diabetes accounted for two-thirds (67%) of separations with a principal diagnosis of diabetes and 84% of those with any diagnosis of diabetes (Figure 2). The proportion of diabetes separations classified as Type 1 was comparable for males and females (for both principal and any diagnosis); however three-quarters of separations with diabetes as a principal diagnosis for males were for Type 2 compared with 60% for females (Table A2.2). The difference in the proportion of Type 2 diabetes hospitalisations among males and females is due to the contribution of gestational diabetes; around one in six (16%) separations with diabetes as a principal diagnosis for females were for gestational diabetes. In contrast, just 6% of separations with any diagnosis of diabetes for females were for gestational diabetes.

Age and sex

Hospital separation rates with any diagnosis of diabetes increased with age up to 84 years—with a rapid increase from age 45—then declined for persons aged 85 years and over (Figure 3). Among females, a smaller peak was seen for those aged 15 to 44 years. Among people aged 15 to 44 years, females tended to have higher diabetes separation rates than males, however males had higher rates in the older age groups (45 years and over). Rates were similar for boys and girls up to 14 years of age. A similar pattern was seen for separations with a principal diagnosis of diabetes (Table A2.3).

Analysis of diabetes separations (for both principal and any diagnosis) by age group and type of diabetes reveals that, not surprisingly, the peak in diabetes separations among females aged 15–44 years is due to the impact of gestational diabetes (Figure 4; Table A2.4), with the highest rate for gestational diabetes seen among women aged 30–34 years. Furthermore, the rapid increase in diabetes separations among men and women aged 55 years and over was attributed to Type 2 diabetes. Separation rates for Type 1 diabetes remained relatively constant, with small peaks among people aged 10–19 years and 75–84 years.

Diabetes hospitalisations in Australia, 2003–04

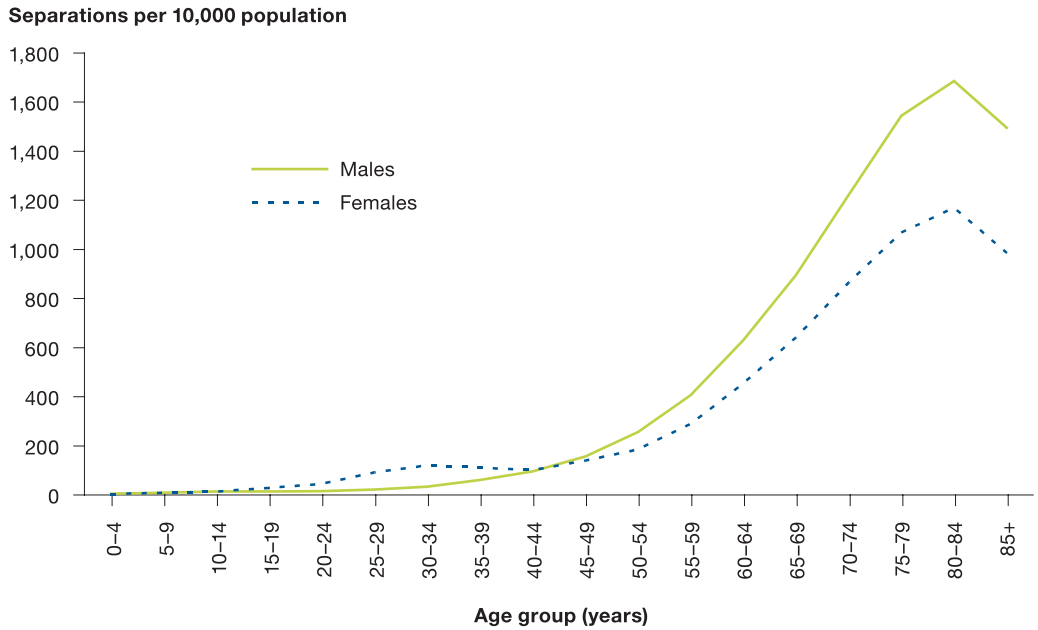


Notes

1. There were 512 separations for which more than one type of diabetes was recorded. Diabetes type was assigned based on the first listed diabetes diagnosis.
2. Separations for any diagnosis of diabetes include those with a principal diagnosis of diabetes.

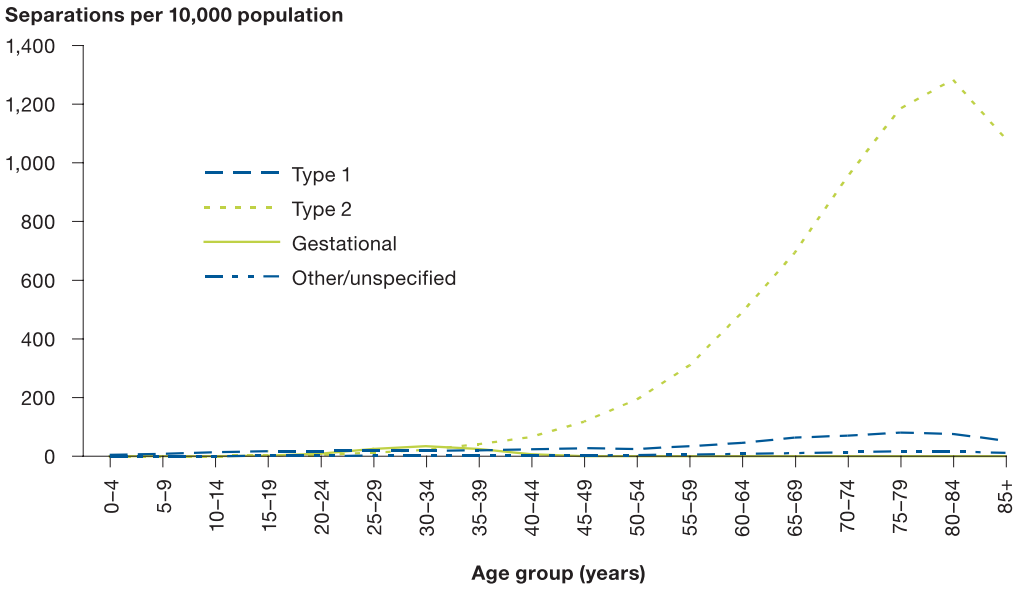
Source: AIHW National Hospital Morbidity Database.

Figure 2: Proportion of separations with a diagnosis of diabetes, by type of diabetes, 2003–04



Source: AIHW National Hospital Morbidity Database.

Figure 3: Separations with any diagnosis of diabetes, 2003–04



Source: AIHW National Hospital Morbidity Database.

Figure 4: Separations with any diagnosis of diabetes by type of diabetes, 2003–04

Diabetes hospital separations with associated conditions

This section explores the principal diagnoses that are associated with hospital separations with any diagnosis (that is principal or additional) of diabetes.

The most common principal diagnoses associated with a diagnosis of diabetes, grouped by chapter of the third edition of the *International Statistical Classification of Diseases and Related Health Problems, 10th revision, Australian modification* (ICD-10-AM) are shown in Table 3.

The two chapters accounting for the largest proportion of principal diagnoses associated with diabetes were 'diseases of the circulatory system' (which includes coronary heart disease, peripheral vascular disease, stroke, etc.) and 'factors influencing health and contact with health services' (which includes dialysis, use of rehabilitation procedures, chemotherapy, etc.) (15% each). 'Endocrine, nutritional and metabolic diseases'—which includes diabetes—ranked third.

The proportion of hospital separations with circulatory system diseases as a principal diagnosis is much higher for separations with diabetes as an additional diagnosis than for overall hospital separations—15% compared with 7% (Table 3; AIHW 2005a).

Type 2 diabetes was recorded as the principal diagnosis for 9% of separations with any diagnosis of diabetes, followed closely by dialysis at 8%. The prominence of dialysis is partly explained by the relationship between diabetes and end-stage renal disease (that is, diabetes is a key cause of end-stage renal disease) and the frequency with which patients must attend hospital for dialysis treatment (on average, three times per week). Coronary heart disease (acute myocardial infarction and other coronary heart disease) accounted for 7% of all principal diagnoses, however it represented a higher proportion of diabetes separations for males than females (9% versus 6%). For females, diabetes in pregnancy and gestational diabetes accounted for just under 3% of principal diagnoses where any diagnosis of diabetes was recorded.

Table 3: Group of principal diagnosis[a] for separations with any diagnosis of diabetes, most common groups, 2003–04

Group of principal diagnosis[a]	Males		Females		Persons[b]	
	Number	Per cent	Number	Per cent	Number	Per cent
Chapter 9—diseases of the circulatory system	43,215	17.5	29,572	13.0	72,789	15.4
Acute myocardial infarction	6,485	2.6	3,969	1.7	10,454	2.2
Other coronary heart disease	15,768	6.4	8,668	3.8	24,436	5.2
Cerebrovascular disease	4,394	1.8	3,217	1.4	7,611	1.6
Rest of Chapter 9	16,568	6.7	13,718	6.0	30,288	6.4
Chapter 21—factors influencing health and contact with health services	40,261	16.3	32,187	14.1	72,449	15.3
Dialysis	22,906	9.3	16,010	7.0	38,916	8.2
Rest of Chapter 21	17,355	7.0	16,177	7.1	33,533	7.1
Chapter 4—endocrine, nutritional and metabolic diseases	34,270	13.9	30,592	13.4	64,863	13.7
Type 1 diabetes	7,731	3.1	7,410	3.3	15,141	3.2
Type 2 diabetes	24,126	9.8	20,151	8.9	44,278	9.3
Other/unspecified diabetes	476	0.2	387	0.2	863	0.2
Rest of Chapter 4	1,937	0.8	2,644	1.2	4,581	1.0
Chapter 11—diseases of the digestive system	21,494	8.7	18,898	8.3	40,393	8.5
Chapter 2—neoplasms	18,379	7.5	12,980	5.7	31,359	6.6
Chapter 15—pregnancy, childbirth and the puerperium	n.a.	n.a.	17,172	7.5	17,172	3.6
Gestational diabetes	n.a.	n.a.	5,450	2.4	5,450	1.2
Diabetes in pregnancy	n.a.	n.a.	984	0.4	984	0.2
Rest of Chapter 15	n.a.	n.a.	10,738	4.7	10,738	2.3

n.a.not applicable

(a) See appendix for coding of ICD-10-AM groups.

(b) Includes persons for whom sex is unknown.

Source: AIHW National Hospital Morbidity Database.

Diabetes hospital separations among Aboriginal and Torres Strait Islander peoples

Analysis of diabetes separations by Indigenous status only included hospitals in Queensland, Western Australia, South Australia and the Northern Territory due to data quality issues. Care should be exercised when interpreting these statistics, as the data may not be representative of the jurisdictions excluded from the analysis (AIHW 2005b).

Table 4 uses standardised separation ratios to compare diabetes among Indigenous Australians with that among other Australians. For diabetes as a principal diagnosis, the rate among Aboriginal and Torres Strait Islander peoples was seven times as high. For diabetes as any diagnosis, the ratio was about twelve. In each case, the difference was larger for females than for males.

Table 4: Separations with a diagnosis of diabetes among Aboriginal and Torres Strait Islander peoples, 2003–04

	Diabetes as a principal diagnosis		Diabetes as any diagnosis	
Sex	Number of separations	Standardised separation ratio[(a)]	Number of separations	Standardised separation ratio[(a)]
Males	1,131	6.7*	9,128	10.1*
Females	1,724	7.4*	14,492	14.2*
Persons	2,855	7.2*	23,620	12.2*

* Statistically significantly different to the reference category.

(a) The standardised separation ratio is the ratio of the observed number of diabetes separations to the number of expected separations if Indigenous Australians had experienced the same age–sex-specific hospitalisation rates as other Australians.

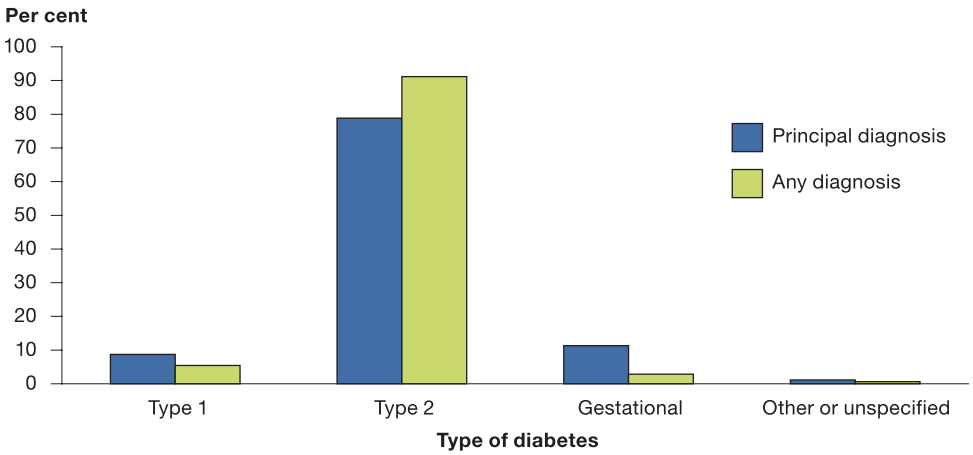
Notes

1. Data are for hospitalisations in Queensland, Western Australia, South Australia and the Northern Territory only. These are the jurisdictions with the most complete Indigenous identification in hospital, but significant under-identification remains. These numbers underestimate the actual Indigenous separations for diabetes.
2. Separations for which Indigenous status is unknown were amalgamated with those for non-Indigenous Australians.

Source: AIHW National Hospital Morbidity Database.

Type 2 diabetes made up the bulk of diabetes separations for Aboriginal and Torres Strait Islander peoples—79% of separations with a principal diagnosis of diabetes and 91% of separations with any diagnosis of diabetes (Figure 5; Table A2.5). Type 2 diabetes accounted for a higher proportion of separations with any diagnosis of diabetes among Indigenous males than females (96% versus 88%), which is partly accounted for by the contribution of gestational diabetes (similar to the whole Australian population).

Considering principal diagnoses and Indigenous females, gestational diabetes accounted for 19% of the cases. Considering any diagnoses (principal or additional), gestational diabetes appeared in only 5% of cases.



Notes

1. Data are for hospitalisations in Queensland, Western Australia, South Australia and the Northern Territory only.
2. Separations for which Indigenous status is unknown were amalgamated with those for non-Indigenous Australians.
3. Separations for any diagnosis of diabetes include those with a principal diagnosis of diabetes.

Source: AIHW National Hospital Morbidity Database.

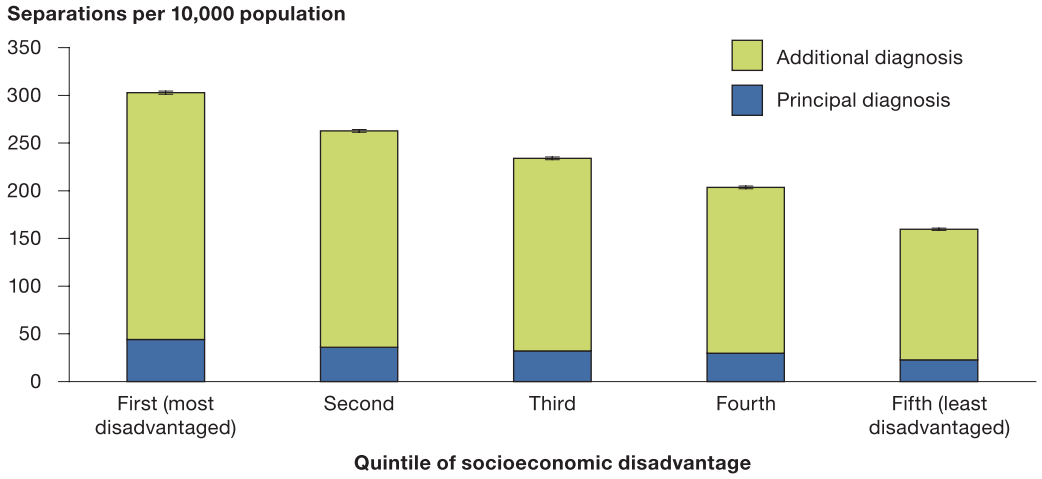
Figure 5: Proportion of separations with a diagnosis of diabetes among Aboriginal and Torres Strait Islander peoples, by type of diabetes, 2003–04

Diabetes hospitalisations in Australia, 2003–04

Diabetes hospital separations by socioeconomic status

Socioeconomic status is related to a range of characteristics, including education, employment status and income. In the absence of such information on the National Hospital Morbidity Database, separations in this section have been classified according to the level of relative socioeconomic disadvantage of the statistical local area (SLA) of the patient's usual residence. Each SLA is mapped to the area-based Socioeconomic Indexes for Areas (SEIFA) (developed by the Australian Bureau of Statistics). The index is presented here in five equal groups (quintiles). The first quintile corresponds to the most disadvantaged group and the fifth quintile to the least disadvantaged group. An area in the most disadvantaged group would have a smaller proportion of households with high incomes, tertiary education, employees in skilled occupations, and other similar characteristics (for more details see Appendix 1).

In 2003–04 there was a socioeconomic gradient in separation rates for diabetes as any diagnosis with rates increasing from 160 per 10,000 population for the least disadvantaged (fifth quintile) to 303 per 10,000 population for the most disadvantaged (first quintile) (Figure 6). A similar pattern was seen for separations with a principal diagnosis of diabetes (23 separations per 10,000 in the least disadvantaged group and 44 per 10,000 in the most disadvantaged group) (Table A2.6). Males had higher separation rates than females in all quintiles for any diagnosis of diabetes, and all except the most disadvantaged group for principal diagnosis.



Notes

1. Directly age-standardised to the 2001 Australian population.
2. Socioeconomic Indexes for Areas (SEIFA). The first quintile corresponds to the most disadvantaged group and the fifth to the least disadvantaged group.
3. Error bars indicate 95% confidence intervals for separations with any (principal or additional) diagnosis of diabetes.
4. Excludes 110 principal diagnosis and 601 additional diagnosis separations where SEIFA quintile was unknown or not applicable.

Source: AIHW National Hospital Morbidity Database.

Figure 6: Separations with any diagnosis of diabetes by quintile of relative socioeconomic disadvantage, 2003–04

Diabetes hospital separations by place of usual residence

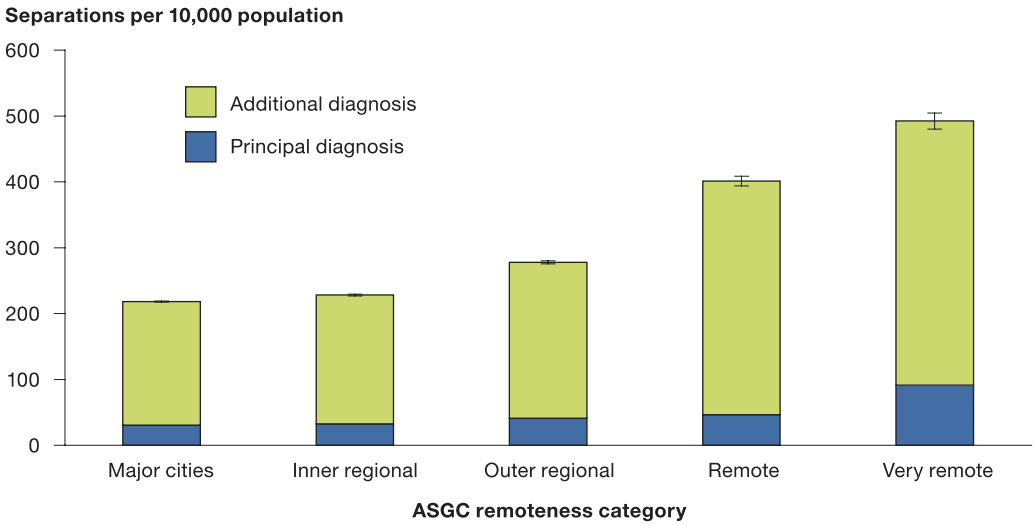
Remoteness

The Australian Standard Geographical Classification (ASGC) Remoteness Structure categories were used to classify the remoteness of patients' area of usual residence.

Diabetes separation rates tended to rise with increasing remoteness, with the greatest change seen between the remote and very remote groups (Figure 7)—the rate of hospital separations with any diagnosis of diabetes for people from very remote Australia was more than double that for major cities. Similarly for separations with a principal diagnosis of diabetes; there was a steady increase in rates with increasing remoteness, with rates in very remote Australia being nearly triple that for the rest of Australia (Table A2.7).

Males in major cities, inner and outer regional Australia had higher diabetes separation rates than females (although there was little difference when considering diabetes as a principal diagnosis only), while females in remote and very remote Australia had higher separation rates than males.

Further analysis suggests that higher rates in the very remote category are related to the higher proportion of separations for Indigenous Australians compared with other Australians (78% of principal or any diagnosis separations were for Indigenous Australians) (unpublished analysis). The proportion of separations in remote areas for Aboriginal and Torres Strait Islander peoples were also higher than those for other Australians. It is important to note that the accuracy of Indigenous identification may vary by remoteness.



Notes

1. Directly age-standardised to the 2001 Australian population.
2. Error bars indicate 95% confidence intervals for separations with any (principal or additional) diagnosis of diabetes.
3. Excludes 396 principal diagnosis and 1,555 additional diagnosis separations where remoteness category was unknown or not applicable.

Source: AIHW National Hospital Morbidity Database.

Figure 7: Separations with any diagnosis of diabetes by remoteness category, 2003–04

Diabetes hospitalisations in Australia, 2003–04

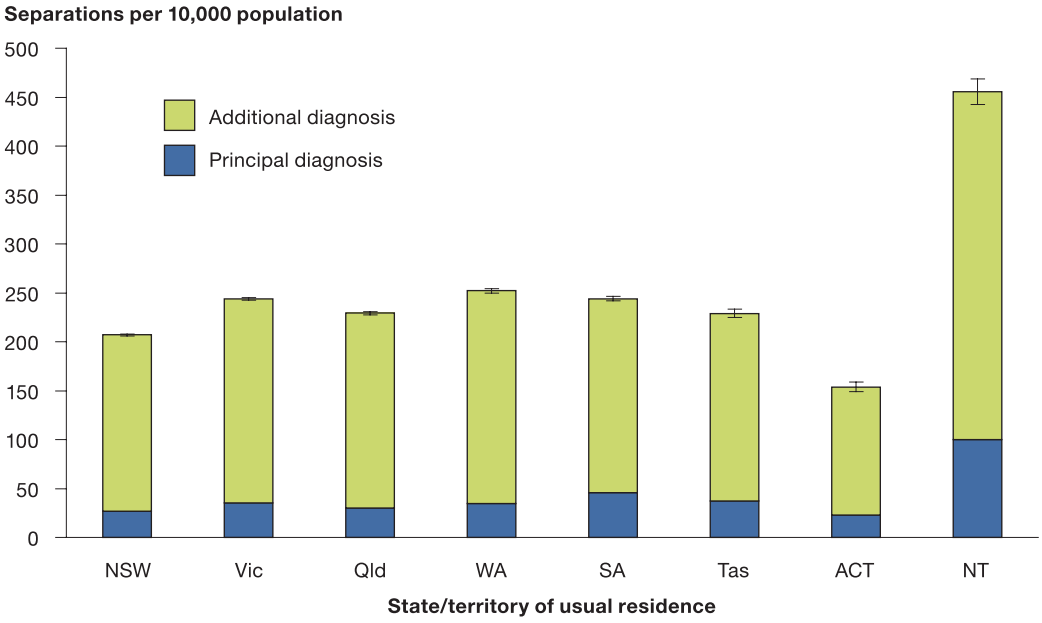
States and territories

The Northern Territory had markedly higher diabetes separation rates (for principal or any diagnosis) than the other jurisdictions, while the lowest rates were seen in the Australian Capital Territory (Figure 8; Table A2.8).

Among separations with any diagnosis of diabetes, male rates were significantly higher than female rates in all jurisdictions other than the Northern Territory. In contrast, separation rates with diabetes as a principal diagnosis were markedly higher among males than females in the Northern Territory, with much smaller differences seen in the remaining jurisdictions.

Higher rates in the Northern Territory may be due to the impact of the Indigenous population on diabetes separations: 58% of separations with a principal diagnosis of diabetes and 61% of those with any diagnosis of diabetes in the Northern Territory were for people who identified as being Aboriginal or Torres Strait Islander (unpublished analysis). In 2001, around one-quarter of the Northern Territory population identified as being Indigenous (ABS & AIHW 2005), further indicating that Aboriginal and Torres Strait Islander peoples are over-represented in hospital statistics. It is important to note that the accuracy of Indigenous identification varies by jurisdiction.

Lower rates in the Australian Capital Territory may be due to its highly urbanised population.



Notes

1. Directly age-standardised to the 2001 Australian population.
2. Error bars indicate 95% confidence intervals for separations with any (principal or additional) diagnosis of diabetes.
3. Excludes 322 principal diagnosis and 1,090 additional diagnosis separations where state/territory was unknown or not applicable.

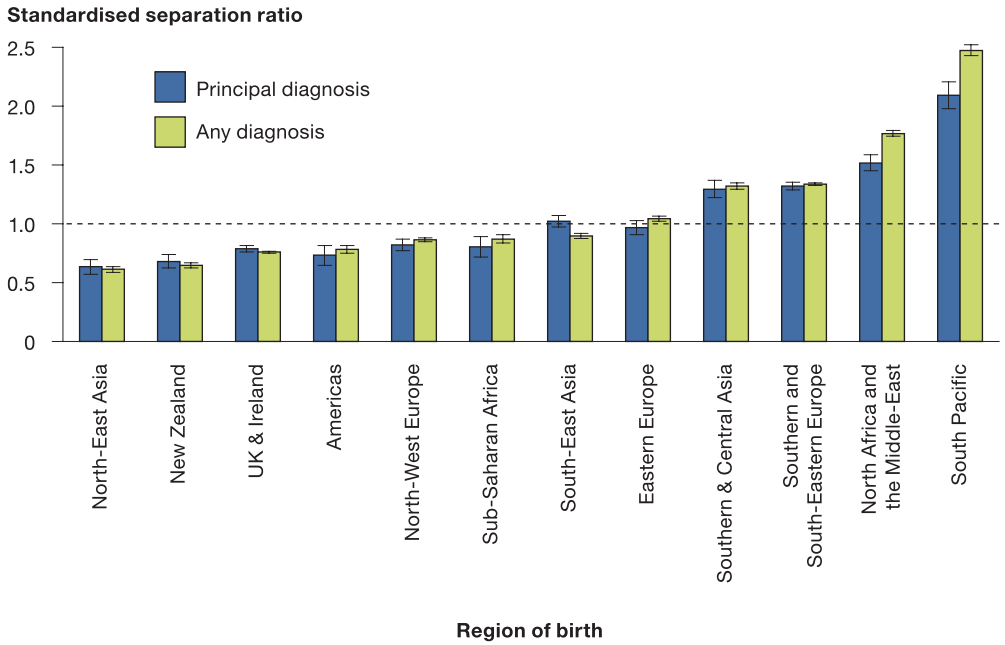
Source: AIHW National Hospital Morbidity Database.

Figure 8: Separations with any diagnosis of diabetes, by state/territory of usual residence of patient, 2003–04

Diabetes hospital separations by region of birth

In 2003–04, people born in the South Pacific had more than twice the rate of diabetes separations of those born in Australia (Figure 9). In addition, people born in North Africa & the Middle East, Southern & South-Eastern Europe and Southern & Central Asia all had significantly higher diabetes separation rates than people born in Australia. People born in North-West Europe, Sub-Saharan Africa, the UK & Ireland, the Americas, New Zealand and North-East Asia all had significantly lower diabetes separation rates than Australian-born persons. A similar pattern was seen for separations with a principal diagnosis of diabetes (Table A2.9).

It is important to note that these results are limited in their ability to represent the effect of ethnicity on diabetes hospitalisations; only people treated in Australian hospitals are represented, and it is likely that overseas-born persons treated in Australia for diabetes may have different characteristics from those who have not migrated or travelled to Australia. For example, people migrating to or visiting Australia may be healthier and have different socioeconomic characteristics to their counterparts who are not in Australia.



Notes

1. Indirectly age-standardised using Australian-born as the reference category (SSR = 1.0).
2. Separations for any diagnosis of diabetes include those with a principal diagnosis of diabetes.
3. Error bars indicate 95% confidence intervals around the standardised separation ratio.
4. Excludes 1,397 separations for analysis by principal diagnosis and 8,264 separations for analysis by any diagnosis where region of birth was unknown.

Source: AIHW National Hospital Morbidity Database.

Figure 9: Separations with a diagnosis of diabetes by region of birth, 2003–04

Discussion

Diabetes was recorded as a principal or additional diagnosis in 7% of all hospital separations in 2003–04, and trend analysis indicates that diabetes hospitalisation rates are increasing. The age-adjusted average length of stay for diabetes separations was longer than that for hospital separations overall, suggesting that diabetes separations (in particular those with an additional diagnosis of diabetes) have a higher burden on the health system on average than many other conditions.

The analysis by type found that Type 1 diabetes was over-represented for separations with a principal diagnosis of diabetes; considering separations with any diagnosis of diabetes, the relative proportions of Type 1 and Type 2 diabetes were in line with their relative community prevalence. These results may reflect the impact of both the coding rules for diabetes and the types of conditions that people with Types 1 and 2 diabetes are admitted to hospital with. For example, a patient who has diabetes and is admitted for poor blood glucose control will be recorded as having a principal diagnosis of 'diabetes mellitus with poor control', whereas a diabetes patient admitted for coronary heart disease (a major complication of diabetes) will have coronary heart disease coded as the principal diagnosis and diabetes listed as an additional diagnosis. If hospitalisations for complications of diabetes vary by type, then this will influence whether diabetes appears as a principal or additional diagnosis.

Overall, hospitalisation rates for diabetes were found to increase with age, which is in line with the increasing prevalence of diabetes and its complications with age (Dunstan et al. 2001). Interestingly, the increase with age in hospitalisation rates was driven almost entirely by Type 2 diabetes. With the prevalence of Type 2 diabetes expected to continue increasing, it is likely that there will be a greater burden on the health care system—particularly by older Australians.

Up to age 14, diabetes hospitalisation rates were similar for males and females. For all other ages bar the child-bearing years (when gestational diabetes can occur in women), males were found to have higher hospitalisation rates than females. The difference was greatest among people aged 85 years and over, where the rate for men was 52% higher than that for women (for separations with any diagnosis of diabetes). The differences seen are particularly interesting as generally the prevalence of diabetes among men and women is similar. The 1999–2000 Australian Diabetes, Obesity and Lifestyle Study estimated that around 9% of men and 7% of women aged 25 years and over had diabetes (AIHW 2004). Among people aged 55–74 years, diabetes prevalence was higher for men than for women (18.4% compared with 12.5%), which is consistent with the hospitalisations for any diagnosis of diabetes (although the difference is of a lesser magnitude). Among people aged 25–54 years and 75 years and over prevalence rates were similar for men and women.

The most common group of principal diagnoses where diabetes was coded as any diagnosis was not diabetes itself but diseases of the circulatory system, which includes coronary heart disease. These comprised a much greater proportion of hospital separations where diabetes appeared as a diagnosis than of all hospital separations (15% versus 7%). While it is important to note that this analysis cannot determine whether the cardiovascular disease was caused by the diabetes or was simply concurrent with it, cardiovascular disease is a major

complication of diabetes, and people with diabetes are two to four times as likely to develop cardiovascular disease than people without diabetes (Wu et al. 1999).

Dialysis was also found to account for a large proportion of separations with any diagnosis of diabetes (8%). The cause of the kidney failure, whether it be from diabetic nephropathy (kidney disease) or another form of kidney disease, cannot be determined from the hospital separation record. However, data from the Australia and New Zealand Dialysis and Transplant Registry (ANZDATA) showed that nearly one-third (30%) of new cases of end-stage renal disease in 2004 were attributed to diabetic nephropathy (McDonald et al 2006). Interestingly, dialysis as a principal diagnosis was less prevalent among separations with any diagnosis of diabetes than among all hospital separations (8% versus 11%).

An important finding of this analysis, which confirms the findings of previous studies, was the major difference in diabetes hospitalisation rates between Aboriginal and Torres Strait Islander peoples and other Australians. Aboriginal and Torres Strait Islander peoples have among the highest rates of diabetes in the world, with data suggesting that the prevalence of diabetes among adults is in the range of 10–30% (de Courten et al. 1998:20). The prevalence of Type 2 diabetes among Indigenous Australians is considerably higher than among other Australians—and Type 2 diabetes is estimated to account for around 98–99% of all cases of diabetes in Aboriginal and Torres Strait Islander peoples (de Courten et al. 1998:14).

Hospitalisation rates among Indigenous Australians were found to be seven times as high for principal diagnoses of diabetes and 12 times as high for any diagnosis of diabetes than those for other Australians. The disparity in health-service use was higher in areas with a higher proportion of Indigenous Australians, such as the Northern Territory, and very remote Australia. The much greater disparity for hospital separations with any diagnosis of diabetes (as compared with those with a principal diagnosis of diabetes) may be due to the higher prevalence of diabetes-related conditions such as end-stage renal disease and heart and circulatory problems among Aboriginal and Torres Strait Islander peoples (ABS & AIHW 2005:105; ABS 2006a:22).

Previous work found age-adjusted hospitalisation rates for diabetes as a principal diagnosis for Indigenous Australians to be five times those of other Australians (ABS & AIHW 2005:103). It is important to note that those results are not directly comparable with those presented in this bulletin. The results by Indigenous status in this bulletin are limited to hospitals in Queensland, Western Australia, South Australia and the Northern Territory (as the quality of Indigenous status data for these jurisdictions only is considered acceptable (AIHW 2005b)) while those in ABS & AIHW (2005) are for the whole of Australia.

People born in the South Pacific, Southern & South-Eastern Europe, North Africa & the Middle East and Southern & Central Asia all had significantly higher diabetes separation rates than people born in Australia. Limited data on the prevalence of diabetes by region of birth are available, and these indicate that men born in the Middle East, North Africa, South-East and Southern Asia and women born in Southern & Central Europe & Central Asia had a higher prevalence of diabetes than men and women born in Australia (AIHW: Holdenson et al. 2003). As noted earlier, these results are limited in their ability to represent the effect of ethnicity on diabetes hospitalisations, as only people treated in Australian hospitals are represented.

Diabetes hospitalisations in Australia, 2003–04

The analysis presented in this report has quantified hospitalisations for people with diabetes in two ways: by considering separations with a principal diagnosis of diabetes and separations with any diagnosis of diabetes. These methods are likely to under- and over-estimate diabetes-attributable hospitalisations respectively. The concept of diabetes-attributable hospitalisations—that is hospital episodes for diabetes or complications caused by diabetes—is an area of work that requires further development. The challenge in analysing hospital data is to identify what proportion of conditions that are common complications of diabetes are actually caused by diabetes. Such work is out of the scope of this report.

A related area of work is that of potentially preventable hospitalisations. These are hospital episodes which are considered to have been avoidable 'if timely and adequate non-hospital care is provided' (AIHW 2005a:43). This area of work is still subject to refinement, but published data indicate that in 2003–04 there were 169,715 potentially preventable hospitalisations for diabetes complications (AIHW 2005a:72)—around one-third (36%) of separations with any diagnosis of diabetes. For more information refer to *Australian hospital statistics 2003–04* (AIHW 2005a).

Some points for interpretation of the hospital data presented in this report should be noted. First, as discussed earlier, data on the National Hospital Morbidity Database represent episodes of care rather than patients, so the number or proportion of people affected cannot be determined. Second, diabetes is recorded as an additional diagnosis even when it does not explicitly affect patient management. While it is useful to be able to identify all hospitalisations where diabetes is present, the true contribution of diabetes to hospital separations cannot be easily determined.

Conclusion

This bulletin has provided up-to-date data on hospitalisations for diabetes. The analysis adds to the knowledge that diabetes is a major contributor to the morbidity burden in Australia, with trend data—both in the prevalence of risk factors (AIHW 2004) and in hospitalisation rates for diabetes—suggesting that this will continue to increase.

Hospitalisation rates for diabetes increased dramatically with age, which was driven by Type 2 diabetes, a disease which is predicted to become increasingly prevalent.

Diabetes hospital separations were found to be more common among people of low socioeconomic status and those living in remote regions of Australia. Analysis for Queensland, Western Australia, South Australia and the Northern Territory found that Aboriginal and Torres Strait Islander peoples in particular had much higher rates of diabetes hospital separations than other Australians.

Appendix 1: Methods and data sources

National Hospital Morbidity Database

The National Hospital Morbidity Database contains demographic, diagnostic, procedural and duration of stay information on episodes of care for patients admitted to hospital. The data items are supplied by state and territory health authorities to the AIHW for storage and custodianship. The database provides information on the number of hospitalisations and therefore it is not possible to count patients individually.

Diagnosis coding

Data for 2000–01 to 2001–02 were coded to ICD-10-AM (2nd edition) and for 2003–04 were coded to ICD-10-AM (3rd edition) for principal or additional diagnoses (Table A.1.1), while those for 1996–97 to 1998–1999 were coded to ICD-9-CM (250.–, 648.0, 648.8). The codes used to define groups of principal diagnosis are described in Table A1.2.

Table A1.1: ICD-10-AM codes used to identify diabetes mellitus

Diagnosis	ICD-10-AM
Type 1 diabetes mellitus	E10.–
Type 2 diabetes mellitus	E11.–
Other specified diabetes mellitus	E13.–
Unspecified diabetes mellitus	E14.–
Pre-existing diabetes mellitus in pregnancy[(a)]	O24.0, O24.1, O24.2, O24.3, O24.9
Diabetes mellitus arising in pregnancy (gestational diabetes mellitus)	O24.4

(a) Includes diabetes mellitus in pregnancy, unspecified onset.

For the purposes of this bulletin, diabetes type was categorised as follows:

- Type 1: E10.– and O24.0
- Type 2: E11.– and O24.1
- Gestational: O24.4
- Other or unspecified: E13.–, E14.–, O24.2, O24.3, O24.9.

Note that diabetes is coded according to whether or not it appears with complications. For example:

'E11.2—Type 1 diabetes mellitus with renal complication'

'E11.9—Type 2 diabetes mellitus without complication'

'E13.7—Other specified diabetes mellitus with multiple complications'

Groups of principal diagnosis

Table A1.2: ICD-10-AM codes used to define groups of principal diagnosis

Group of principal diagnosis	ICD-10-AM
Chapter 9—diseases of the circulatory system	I00–I99
Acute myocardial infarction	I21
Other coronary heart disease	I20, I22–I25
Cerebrovascular disease	I60–I69
Rest of Chapter 9	I00–I19, I26–I59, I70–I99
Chapter 21—factors influencing health and contact with health services	Z00–Z99
Dialysis	Z49
Rest of Chapter 21	Z00–Z48, Z50–Z99
Chapter 4—endocrine, nutritional and metabolic diseases	E00–E89
Type 1 diabetes	E10
Type 2 diabetes	E11
Other/unspecified diabetes	E13, E14
Rest of Chapter 4	E00–E09, E15–E89
Chapter 11—diseases of the digestive system	K00–K93
Chapter 2—neoplasms	C00–D48
Chapter 15—pregnancy, childbirth and the puerperium	O00–O99
Gestational diabetes	O24.4
Diabetes in pregnancy	O24.1–O24.3, O24.9
Rest of Chapter 15	O00–O23, O25–O99

Aboriginal and Torres Strait Islander peoples

Analysis for Aboriginal and Torres Strait Islander peoples was restricted to Queensland, Western Australia, South Australia and the Northern Territory only due to data quality. Separations where Indigenous status was unknown were amalgamated with separations for non-Indigenous Australians.

Socioeconomic status

In this report, the Index of Disadvantage was used to determine socioeconomic status (ABS 2004a). This index is one of several socioeconomic indexes derived by the Australian Bureau of Statistics from information collected in the Census of Population and Housing. The Index of Disadvantage is an area-based measure which represents the average level of disadvantage across a geographic area, in this case the statistical local area (SLA). It is derived from social and economic characteristics of the SLA such as low income, low educational attainment, high levels of public sector housing, high unemployment, and jobs in relatively less skilled occupations.

In this analysis, individual hospital separations were classified into quintiles of socioeconomic disadvantage based on the 2001 Index of Disadvantage value of the SLA of the patient's usual residence. SLAs were grouped into quintiles so that each quintile contained

approximately 20% of the total Australian population. Quintile 1 includes the most disadvantaged households and Quintile 5 the least disadvantaged households. A total of 110 separations with a principal diagnosis and 711 separations with any diagnosis of diabetes were excluded from the analysis as they were not assigned a SEIFA quintile due to missing or invalid data or being non-Australian residents.

It is important to note that the Index of Disadvantage is an area-based measure of disadvantage. It will therefore tend to understate the true inequality in health at an individual level.

Remoteness

Remoteness was categorised using the Australian Standard Geographical Classification (ASGC) Remoteness Structure categories. The ASGC uses the Accessibility/Remoteness Index of Australia (ARIA), which is based on how distant a place is by road from urban centres of different sizes, and therefore provides a relative indication of how difficult it might be for residents to access certain services such as health care and education.

The categories used in this bulletin are 'Major cities of Australia', 'Inner regional Australia', 'Outer regional Australia', 'Remote Australia' and 'Very remote Australia'. A total of 396 separations with a principal diagnosis and 1,951 separations with any diagnosis of diabetes were excluded from the analysis as they were not assigned a remoteness area due to missing or invalid data or being non-Australian residents.

State/territory

Data by state/territory were based on usual residence of the patient, rather than location of the hospital. Records where state/territory was unknown or not recorded (322 separations with a principal diagnosis and 1,412 separations with any diagnosis of diabetes) were excluded from the state/territory analysis in this bulletin.

Region of birth

Country of birth of patients is recorded in the AIHW National Hospital Morbidity Database and is coded using the Standard Australian Classification of Countries (SACC). The SACC coding system was used to group countries into regions for this analysis. Records where the country of birth was unknown or not recorded (1,397 separations with a principal diagnosis and 8,264 separations with any diagnosis of diabetes) were excluded from the region of birth analysis in this bulletin.

Changes to diabetes coding

Two key changes were made to the protocol for coding diabetes in Australia in 1999 and 2000. The first coding change was implemented in July 1999. This change was not specific to diabetes, however it does affect diabetes with or without complications and exclusively as an additional diagnosis. Before the change, diabetes was coded regardless of whether it was treated or related to the hospitalisation. After the first change, diabetes was only coded when specifically treated or if it contributed to the reason for hospitalisation.

The second change was implemented in July 2000, and applies exclusively to diabetes with a complication, as an additional or principal diagnosis. Before the change, any diabetes complication code appearing in the separation record indicated that diabetes *caused* the complication. After the change, the diabetes complication codes indicate that the complication *appears with* diabetes.

For more information about these coding changes, see AIHW: Phillips (2003).

Estimated resident population

The Australian Bureau of Statistics Estimated Resident Population (ERP) were used in the calculation of rates. Where possible, the December ERP for the relevant financial year was used (e.g. December 2003 for use with 2003–04 hospital data).

Aboriginal and Torres Strait Islander peoples

The Indigenous ERP is considered to be experimental because satisfactory data on births, deaths and migration are not generally available and because of the volatility of counts of the Indigenous population between censuses (ABS 2004b). Analysis for the population data for Aboriginal and Torres Strait Islander peoples was limited to Queensland, Western Australia, South Australia and the Northern Territory due to data quality reported to the National Hospital Morbidity Database. The average of the June 2003 and June 2004 populations were used.

Socioeconomic status

Socioeconomic status was categorised using 2001 SEIFA quintiles as described above. SEIFA quintiles were mapped onto the ERP data by SLA. At the time of publication, ERP data by SLA were available only for June 2003.

Urban, rural and remote areas

Remoteness was categorised using the ASGC remoteness categories described above. At the time of publication, ERP data by ASGC remoteness were available only for June 2003.

Region of birth

Country of birth data were categorised using SACC codes as described above. At the time of publication, ERP data by country of birth were available only for June 2003.

Age standardisation

Age-standardised rates were used to remove the influence of age when comparing populations with different age structures. There are two methods used for age-standardising: direct and indirect.

Direct age standardisation

Direct age standardisation is used when the populations under study are large and the age-specific rates are considered to be reliable.

The calculation of direct age-standardised rates comprises three steps:

1. Calculate the age-specific rate for each age group in the study population.
2. Calculate the expected number of cases in each age group by multiplying the age-specific rate by the corresponding standard population for each age group.
3. Sum the expected number of cases in each age group and divide by the total standard population to give the age-standardised rate.

The 2001 Australian population was used as the standard population for this report.

Confidence intervals for directly age-standardised results were calculated using the methods outlined in Dobson et. al (1990).

Indirect age standardisation

Indirect age standardisation is used when populations under study are small or where there is some uncertainty about the stability of age-specific rates. The method removes the influence of age structure, but does not provide a measure of prevalence in terms of a rate. Rather, the measure is a comparison of the number of observed cases compared with the number expected if the age-specific prevalence rates of the standard population are applied to the study population.

The calculation of indirectly age-standardised rates comprises three steps:

1. Calculate the age-specific rates for each age group in the standard population.
2. Calculate the expected number of cases in each age group by multiplying the age-specific rates by the corresponding study population for each age group. Sum these to derive the total expected number of cases for the study population.
3. Sum the observed number of cases in the study population and divide by the total expected cases to give the standardised separation ratio (SSR).

An SSR of 1 indicates that the number of observed cases was the same as the expected number of cases, indicating that rates in the study and standard populations are similar. A result greater than 1 indicates that more cases were observed than expected, and a result less than one indicates fewer cases than expected.

In this report, indirect age standardisation was used for comparing separation rates between Indigenous and other Australians, and between overseas-born and Australian-born persons. The standard populations used were other Australians and Australian-born persons respectively.

Confidence intervals for SSRs were calculated using the methods outlined in Armitage & Berry (1996:439–41).

Appendix 2: Statistical tables

Table A2.1: Trends in diabetes separations, 2000–01 to 2003–04

	Diabetes as principal diagnosis			Diabetes as any diagnosis[a]		
Year	Males	Females	Persons	Males	Females	Persons
	Rate per 10,000 population					
2000–01	28.1	26.9	27.2	215.4	176.2	193.2
2001–02	31.6	29.6	30.3	231.6	185.5	205.7
2002–03	31.9	31.6	31.4	237.5	191.4	211.6
2003–04	33.9	32.2	32.7	258.3	208.4	230.3

(a) Includes separations with diabetes as the principal or additional diagnosis.

Note: Directly age-standardised to the 2001 Australian population.

Source: AIHW National Hospital Morbidity Database.

Table A2.2: Separations with a diagnosis of diabetes, by type of diabetes, 2003–04

	Males		Females		Persons[a]	
Type of diabetes	Number	Per cent	Number	Per cent	Number	Per cent
Diabetes as a principal diagnosis						
Type 1	7,731	23.9	7,898	23.0	15,629	23.4
Type 2	24,126	74.6	20,536	59.7	44,663	66.9
Gestational	n.a.	n.a.	5,450	15.9	5,450	8.2
Other or unspecified	476	1.5	498	1.4	974	1.5
Total	**32,333**	**100.0**	**34,382**	**100.0**	**66,716**	**100.0**
Diabetes as any diagnosis[b][c]						
Type 1	27,650	11.2	25,968	11.4	53,618	11.3
Type 2	214,936	87.3	183,669	80.7	398,612	84.1
Gestational	n.a.	n.a.	14,563	6.4	14,563	3.1
Other or unspecified	3,676	1.5	3,395	1.5	7,071	1.5
Total	**246,262**	**100.0**	**227,595**	**100.0**	**473,864**	**100.0**

n.a.not applicable

(a) Includes persons for whom sex is unknown.

(b) There were 512 separations for which more than one type of diabetes was recorded. Diabetes type was assigned based on the first listed diabetes diagnosis.

(c) Includes separations with diabetes as the principal or additional diagnosis.

Source: AIHW National Hospital Morbidity Database.

Table A2.3: Diabetes hospital separations by age group and sex, 2003–04

	Diabetes as principal diagnosis			Diabetes as any diagnosis[a]		
Age group	Males	Females	Persons[b]	Males	Females	Persons[b]
			Rate per 10,000 population			
0–4	3.5	2.8	3.1	5.1	4.0	4.6
5–9	5.7	5.9	5.8	8.9	9.0	9.0
10–14	9.4	9.8	9.6	13.7	14.7	14.2
15–19	8.1	15.0	11.5	14.8	28.4	21.4
20–24	7.5	18.1	12.6	15.5	45.5	30.2
25–29	8.0	31.6	19.7	22.6	91.4	56.8
30–34	9.1	38.7	24.0	34.0	120.3	77.5
35–39	12.3	29.4	20.9	61.5	112.0	86.9
40–44	12.8	14.9	13.9	95.3	100.6	98.0
45–49	20.2	14.4	17.3	156.1	140.3	148.2
50–54	29.4	18.3	23.9	256.0	185.8	220.8
55–59	45.5	28.3	37.0	407.0	289.4	348.8
60–64	67.3	45.7	56.6	630.4	454.2	543.2
65–69	100.3	72.9	86.4	896.4	641.2	767.1
70–74	147.0	114.2	129.9	1,222.9	865.6	1,036.8
75–79	195.4	147.8	169.1	1,545.2	1,068.7	1,282.3
80–84	220.1	154.1	180.4	1,686.1	1,168.9	1,375.5
85+	178.7	113.4	134.0	1,496.1	985.1	1,146.4
All ages	**32.6**	**34.2**	**33.4**	**247.9**	**226.5**	**237.1**

(a) Includes separations with diabetes as the principal or additional diagnosis.

(b) Includes persons for whom sex is unknown.

Source: AIHW National Hospital Morbidity Database.

Diabetes hospitalisations in Australia, 2003–04

Table A2.4: Diabetes hospital separations by age group and type of diabetes, 2003–04

	Diabetes as principal diagnosis				Diabetes as any diagnosis[a]			
Age group	Type 1	Type 2	GDM[b]	Other[c]	Type 1	Type 2	GDM[b]	Other[c]
	Rate per 10,000 population							
0–4	3.1	0.0	0.0	0.1	4.4	0.0	0.0	0.1
5–9	5.7	0.0	0.0	0.1	8.8	0.0	0.0	0.1
10–14	9.4	0.1	0.0	0.1	13.6	0.3	0.0	0.3
15–19	10.4	0.4	0.7	0.1	17.3	2.0	1.6	0.6
20–24	8.3	0.7	3.4	0.2	16.9	3.8	8.4	1.0
25–29	7.9	2.0	9.5	0.3	18.7	12.3	24.3	1.5
30–34	7.7	3.1	12.8	0.5	19.4	21.5	34.5	2.1
35–39	6.5	5.2	8.7	0.4	20.2	40.4	24.3	2.0
40–44	5.2	6.2	2.3	0.2	23.9	65.6	6.5	1.9
45–49	5.5	11.3	0.2	0.4	27.9	117.2	0.4	2.7
50–54	5.2	18.3	0.0	0.3	24.8	192.5	0.0	3.4
55–59	6.8	29.6	0.0	0.6	34.1	308.8	0.0	5.8
60–64	8.6	47.1	0.0	0.9	45.8	489.6	0.0	7.8
65–69	12.2	73.2	0.0	1.0	63.9	693.2	0.0	10.0
70–74	13.8	114.3	0.0	1.7	70.0	953.3	0.0	13.6
75–79	16.5	150.2	0.0	2.5	80.8	1184.4	0.0	17.1
80–84	16.3	161.8	0.0	2.3	75.6	1283.5	0.0	16.4
85+	11.5	120.9	0.0	1.7	53.4	1082.1	0.0	11.0
All ages	**7.8**	**22.4**	**2.7**	**0.5**	**26.8**	**199.5**	**7.3**	**3.5**

(a) Includes separations with diabetes as the principal or additional diagnosis.

(b) Gestational diabetes mellitus.

(c) Includes unspecified diabetes.

Source: AIHW National Hospital Morbidity Database.

Table A2.5: Diabetes separations among Indigenous Australians, by type of diabetes, 2003–04

	Males		Females		Persons	
Type of diabetes	**Number**	**Per cent**	**Number**	**Per cent**	**Number**	**Per cent**
Diabetes as a principal diagnosis						
Type 1	110	9.7	138	8.0	248	8.7
Type 2	1,006	88.9	1,245	72.2	2,251	78.8
Gestational	n.a.	n.a.	323	18.7	323	11.3
Other or unspecified	15	1.3	18	1.0	33	1.2
Total	**1,131**	**100.0**	**1,724**	**100.0**	**2,855**	**100.0**
Diabetes as any diagnosis[(a)]						
Type 1	358	3.9	931	6.4	1,289	5.5
Type 2	8,716	95.5	12,808	88.4	21,524	91.1
Gestational	n.a.	n.a.	664	4.6	664	2.8
Other or unspecified	54	0.6	89	0.6	143	0.6
Total	**9,128**	**100.0**	**14,492**	**100.0**	**23,620**	**100.0**

n.a.not applicable

(a) There were 4 separations for which more than one type of diabetes was recorded. Diabetes type was assigned based on the first listed diabetes diagnosis.

Notes

1. Data are for hospitalisations in Queensland, Western Australia, South Australia and the Northern Territory only.
2. Separations for which Indigenous status is unknown were amalgamated with those for non-Indigenous Australians.

Source: AIHW National Hospital Morbidity Database.

Table A2.6: Diabetes separations by quintile of socioeconomic disadvantage, 2003–04

	Diabetes as principal diagnosis[(a)]			Diabetes as any diagnosis[(b)]		
SEIFA quintile	**Males**	**Females**	**Persons[(c)]**	**Males**	**Females**	**Persons[(c)]**
	Rate per 10,000 population (95% confidence interval)					
First	42.9 (42.0–43.9)	46.1 (45.1–47.0)	44.1 (43.5–44.8)	327.9 (32.5.2–330.6)	284.2 (281.9–286.6)	302.7 (301.0–304.5)
Second	36.6 (35.8–37.4)	36.0 (35.2–36.8)	36.0 (33.5–36.6)	286.8 (284.5–289.1)	243.3 (241.3–245.4)	262.7 (261.2–264.2)
Third	34.5 (33.7–35.4)	30.4 (29.7–31.2)	32.1 (31.6–32.7)	266.6 (264.3–269.0)	207.7 (205.8–209.6)	234.0 (232.5–235.5)
Fourth	32.2 (31.3–33.0)	28.2 (27.5–28.9)	29.7 (29.2–30.3)	232.6 (230.4–234.9)	181.0 (179.2–182.8)	203.5 (202.1–204.9)
Fifth	24.5 (23.7–25.2)	21.8 (21.2–22.4)	22.7 (22.2–23.2)	190.2 (188.2–192.2)	137.0 (135.5–138.6)	159.6 (158.4–160.8)

(a) Excludes 110 separations where SEIFA quintile was unknown or not applicable.

(b) Excludes 711 separations where SEIFA quintile was unknown or not applicable.

(c) Includes persons for whom sex is unknown.

Notes

1. Directly age-standardised to the 2001 Australian population.
2. Socioeconomic Indexes for Areas (SEIFA). The first quintile corresponds to the most disadvantaged group and the fifth to the least disadvantaged group.

Source: AIHW National Hospital Morbidity Database.

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Table A2.7: Diabetes hospital separations by remoteness, 2003–04

ASGC Remoteness	Diabetes as principal diagnosis[a]			Diabetes as any diagnosis[b]		
	Males	Females	Persons[c]	Males	Females	Persons[c]
	Rate per 10,000 population (95% confidence interval)					
Major cities	32.1 (31.7–32.6)	30.2 (29.8–30.6)	30.7 (30.4–31.0)	248.2 (246.9–249.4)	195.6 (194.5–196.6)	218.1 (217.3–218.9)
Inner regional	34.0 (33.2–34.8)	31.4 (30.6–32.1)	32.3 (31.8–32.9)	264.8 (262.7–267.0)	197.4 (195.7–199.3)	228.2 (226.8–229.6)
Outer regional	41.7 (40.5–43.0)	41.2 (40.0–42.5)	41.2 (40.3–42.1)	295.3 (292.0–298.6)	263.1 (260.0–266.2)	277.7 (275.4–279.9)
Remote	41.7 (38.4–45.1)	51.4 (47.7–55.2)	46.4 (43.9–48.9)	360.3 (350.5–370.3)	452.7 (441.6–464.0)	401.0 (393.7–408.4)
Very remote	79.0 (72.6–85.7)	104.8 (97.1–113.0)	91.4 (86.3–96.6)	401.5 (386.4–417.0)	599.6 (580.5–619.3)	492.3 (480.2–504.6)

(a) Excludes 396 separations where remoteness category was unknown or not applicable.

(b) Excludes 1,951 separations where remoteness category was unknown or not applicable.

(c) Includes persons for whom sex is unknown.

Note: Directly age-standardised to the 2001 Australian population.

Source: AIHW National Hospital Morbidity Database.

Table A2.8: Diabetes hospital separations by state/territory of usual residence, 2003–04

State/territory	Diabetes as a principal diagnosis[a]			Diabetes as any diagnosis[b]		
	Males	Females	Persons[c]	Males	Females	Persons[c]
	Rate per 10,000 population (95% confidence interval)					
New South Wales	27.5 (26.9–28.1)	26.7 (26.2–27.3)	26.8 (26.4–27.2)	233.3 (231.7–235.0)	186.3 (184.9–187.7)	207.1 (206.0–208.1)
Victoria	37.3 (36.6–38.1)	34.3 (33.6–35.0)	35.4 (34.9–35.9)	280.1 (277.9–282.2)	214.8 (213.1–216.5)	243.6 (242.3–245.0)
Queensland	31.0 (30.2–31.8)	29.8 (29.1–30.6)	30.0 (29.5–30.6)	259.7 (257.3–262.1)	204.7 (202.8–206.8)	229.3 (227.8–230.8)
Western Australia	36.6 (35.4–37.9)	33.4 (32.3–34.6)	34.7 (33.8–35.5)	266.6 (263.1–270.0)	242.9 (239.8–246.0)	252.1 (249.9–254.4)
South Australia	45.9 (44.4–47.4)	47.1 (45.7–48.6)	45.9 (44.9–47.0)	266.9 (263.3–270.5)	228.2 (225.1–231.4)	244.1 (241.8–246.5)
Tasmania	39.1 (36.7–41.6)	36.4 (34.1–38.8)	37.3 (35.7–39.1)	260.6 (254.3–267.1)	203.0 (197.7–208.4)	229.0 (225.0–233.2)
Australian Capital Territory	22.1 (19.4–25.0)	24.2 (21.8–26.8)	22.8 (21.0–24.7)	173.4 (165.8–181.3)	139.4 (133.4–145.5)	153.8 (149.1–158.7)
Northern Territory	110.1 (101.2–119.4)	88.6 (81.1–96.4)	100.1 (94.3–106.2)	445.1 (426.5–464.3)	468.5 (450.2–487.2)	455.4 (442.4–468.7)

(a) Excludes 322 separations where state/territory was unknown or not applicable.

(b) Excludes 1,412 separations where state/territory was unknown or not applicable.

(c) Includes persons for whom sex is unknown.

Note: Directly age-standardised to the 2001 Australian population.

Source: AIHW National Hospital Morbidity Database.

Table A2.9: Standardised separation ratios by region of birth, 2003–04

	Diabetes as a principal diagnosis[a]			Diabetes as any diagnosis[b]		
Region of birth	Males	Females	Persons	Males	Females	Persons
	Standardised separation ratio					
South Pacific	1.9	2.3	2.1	2.3	2.6	2.5
North Africa & the Middle-East	1.4	1.6	1.5	1.7	1.8	1.8
Southern & South-Eastern Europe	1.2	1.4	1.3	1.3	1.4	1.3
Southern & Central Asia	1.1	1.5	1.3	1.3	1.4	1.3
Eastern Europe	0.9*	1.0*	1.0*	1.0	1.1	1.0
Australia	1.0	1.0	1.0	1.0	1.0	1.0
South-East Asia	0.7	1.2	1.0*	0.7	1.0	0.9
Sub-Saharan Africa	0.7	0.9	0.8	0.9	0.8	0.9
North-West Europe	0.7	0.9	0.8	0.8	0.9	0.9
Americas	0.7	0.7	0.7	0.7	0.8	0.8
UK & Ireland	0.8	0.8	0.8	0.7	0.8	0.8
New Zealand	0.7	0.7	0.7	0.7	0.6	0.6
North-East Asia	0.4	0.8	0.6	0.5	0.7	0.6

* Not statistically significantly different from the reference category (Australian-born).

(a) Excludes 1,397 separations where region of birth was unknown.

(b) Excludes 8,264 separations where region of birth was unknown.

Note: Indirectly age-standardised using Australian-born as the reference category.

Source: AIHW National Hospital Morbidity Database.

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Glossary

additional diagnosis	Condition or complaint either coexisting with the principal diagnosis or arising during the episode of admitted patient care, episode of residential care or attendance at a health care establishment. These are conditions which affect patient management in terms of requiring therapeutic management, diagnostic procedures or increased nursing care and/or monitoring. Diabetes is subject to speciality standards for coding as an additional diagnosis, which means it is to be coded even when it does not explicitly affect patient management.
complications	Conditions and illness resulting directly or indirectly from another disease or condition.
diabetes complicating pregnancy	Pre-existing diabetes mellitus in pregnancy. Diabetes mellitus nearly always complicates the pregnancy. The pregnant state may destabilise the diabetes which may be the main reason for obstetric care.
glucose	A type of sugar the body uses for energy. The main source of glucose is carbohydrates in the diet.
hospital separation	The formal process by which a hospital records the completion of treatment and/or care for an admitted patient. The episode of care may be completed by an admitted patient's discharge, death, transfer to another hospital, or change in the type of care.
ICD-10-AM	International Statistical Classification of Diseases and Related Health Problems, 10th revision, Australian modification
ICD-9-CM	International Classification of Diseases, 9th revision, clinical modification
insulin	A hormone produced by the pancreas which helps the body to use glucose for energy.
ketoacidosis	Severe out-of-control diabetes occurring when blood sugar levels get too high as a result of illness, taking too little insulin or not enough exercise.
principal diagnosis	The diagnosis established after study to be chiefly responsible for occasioning the patient's episode of care in hospital (or attendance at the health care facility).
separation	An episode of care in a hospital. This can refer to either the total stay (from admission to discharge, transfer, or death) or a portion of the total stay which ends in a change in the type of care (for example, moving from acute care to rehabilitation).

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