1.5 Diabetes complications

Context

This data item examines hospitalisations for diabetes complications in people of all ages based on patient place of residence. Long-term complications of diabetes include stroke, heart disease, kidney disease, eye disease, nerve problems and foot ulcers.[1] Short-term complications include diabetic ketoacidosis.

Of hospitalisations with a principal diagnosis of diabetes, type 2 diabetes accounts for most (69%), type 1 diabetes accounts for 22%, and gestational diabetes and 'unspecified' diabetes account for the remainder.[1] Diabetes complications accounted for 222,429 hospital bed days, and 9% of all potentially preventable hospitalisations, in Australia in 2013–14.[2]

Approximately 5% of Australian adults have diabetes, and the prevalence has more than doubled since 1990.[3] Risk factors for developing type 2 diabetes include physical inactivity, obesity, poor diet and a genetic predisposition.[3] Aboriginal and Torres Strait Islander Australians are more than three times as likely to have diabetes as are other Australians, as a result of higher rates of risk factors for type 2 diabetes, including excess weight, poor nutrition and gestational diabetes.[4] Food insecurity (limited or uncertain availability of nutritionally adequate and safe foods) is strongly associated with obesity, and Aboriginal and Torres Strait Islander Australians experience food insecurity at a higher rate than other Australians.[5,6] Socioeconomic disadvantage also strongly increases the risk: adults at greatest socioeconomic disadvantage have three times the rate of diabetes as those with the least socioeconomic disadvantage (9% and 3%, respectively).[3]

Poor management increases the risk of diabetes complications. Access to comprehensive, systematic care and follow-up reduces complications and preventable hospitalisations among people with diabetes.[7] For example, hospitalisation and lower-extremity amputation may be avoided if a patient with diabetic foot complications is seen as soon as possible in a high-risk foot clinic that includes vascular, orthopaedic, endocrine and podiatry services.[8] Aboriginal and Torres Strait Islander Australians were five times as likely as other Australians to be hospitalised for diabetic foot infections, and had poorer diabetes control, in a study from the Northern Territory.[9]

Diabetes complications

The prevalence of diabetes in people aged 20–79 years in Australia is close to the average for countries in the Organisation for Economic Co-operation and Development (OECD) (6.8% and 6.9%, respectively, in 2011).[10] The rate of diabetes hospitalisations in Australia is also close to the OECD average (141 and 150 per 100,000, respectively, in 2013).[11]

The Australian National Diabetes Strategy 2016–2020 includes the goals of reducing the occurrence of diabetes-related complications, improving the quality of life of people with diabetes, and reducing the impact of diabetes among Aboriginal and Torres Strait Islander Australians. Potential areas for action include[12]:

- Culturally relevant awareness programs about diabetes and its complications
- Detecting gestational and previously undiagnosed diabetes, and managing it through pregnancy
- Reducing the use of alcohol and tobacco before conception
- Increasing the availability and affordability of fresh foods.

Strategies relating to people living in rural and remote areas include encouraging use of My Health Record; coordinating regional services across primary, secondary and tertiary care; and developing links between local clinicians and major diabetes centres.[12]

About the data

Data are sourced from the National Hospital Morbidity Database, and include both public and private hospitals. Rates are based on the number of hospitalisations for diabetes complications (based on the potentially preventable hospitalisation specification) per 100,000 people in 2014–15. Data include hospitalisations for type 1 diabetes, type 2 diabetes, and other or unspecified diabetes. Hospitalisations with diabetes complications as the primary diagnosis and dialysis as an additional diagnosis are included. Because a record is included for each hospitalisation, rather than for each patient, patients hospitalised more than once in the financial year will be counted more than once. The full data specification is available from the Australian Institute of Health and Welfare.[13]

The analysis and maps are based on the residential address of the patient and not the location of the hospital. Rates are age and sex standardised to allow comparison between populations with different age and sex structures. Data quality issues – for example, the recognition of Aboriginal and Torres Strait Islander status in datasets – could influence the variation seen.

What do the data show?

Magnitude of variation

In 2014–15, there were 43,737 hospitalisations for diabetes complications, representing 173 hospitalisations per 100,000 people (the Australian rate).

The number of hospitalisations for diabetes complications across 319† local areas (Statistical Area 3 – SA3) ranged from 52 to 601 per 100,000 people. The rate was **11.6 times as high** in the area with the highest rate compared to the area with the lowest rate. The number of hospitalisations varied across states and territories, from 118 per 100,000 people in the Australian Capital Territory to 307 in the Northern Territory (Figures 1.26–1.29).

After the highest and lowest 10% of results were excluded and 256 SA3s remained, the number of hospitalisations per 100,000 people was 2.8 times as high in the area with the highest rate compared to the area with the lowest rate.

Rates by SA3 for two additional years, 2012–13 and 2013–14, are available online at www.safetyandquality.gov.au/atlas.

Analysis by remoteness and socioeconomic status

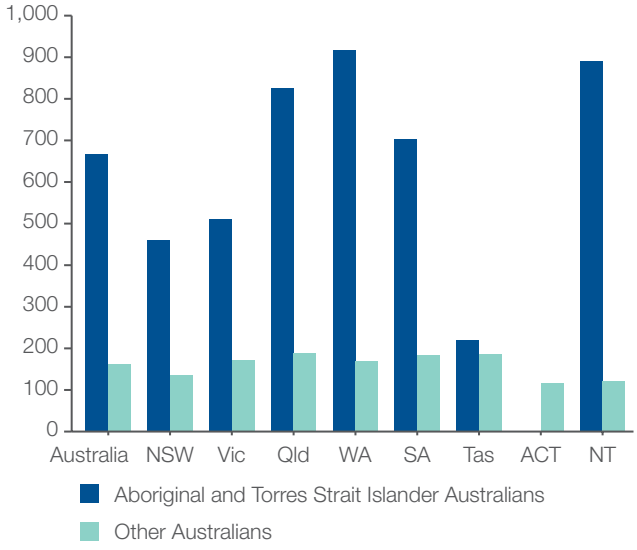
Five SA3s in remote parts of Australia (Kimberley, Alice Springs, Outback – South, Far North, and Outback – North) had hospitalisation rates that were more than double the national rate.

Rates of hospitalisations for diabetes complications were markedly higher in remote and outer regional areas than in other areas. Rates increased with socioeconomic disadvantage, regardless of remoteness category (Figure 1.30).

Analysis by Aboriginal and Torres Strait Islander status

The rate for Aboriginal and Torres Strait Islander Australians (668 per 100,000 people) was 4.1 times as high as the rate for other Australians (163 per 100,000 people). Rates were higher among Aboriginal and Torres Strait Islander Australians than other Australians in all states and territories (Figure 1.25).

Figure 1.25: Number of potentially preventable hospitalisations – diabetes complications per 100,000 people, age and sex standardised, by state and territory and Indigenous status, 2014–15



The data for Figure 1.25 are available at www.safetyandquality.gov.au/atlas.

† There are 333 SA3s. For this item, data were suppressed for 14 SA3s due to a small number of hospitalisations and/or population in an area.

Notes:

Some of the published SA3 rates were considered more volatile than others. These rates are excluded from the calculation of the difference between the highest and lowest SA3 rates in Australia.

Rates are age and sex standardised to the Australian population in 2001.

Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).

Analysis is based on the patient's area of usual residence, not the place of hospitalisation.

Data for ACT (Aboriginal and Torres Strait Islander Australians) have been suppressed.

Data by Indigenous status should be interpreted with caution as hospitalisations for Aboriginal and Torres Strait Islander patients are under-enumerated and there is variation in the under-enumeration among states and territories.

For further detail about the methods used, please refer to the Technical Supplement.

Sources: AIHW analysis of National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

Diabetes complications

Interpretation

Potential reasons for the variation include differences in:

- The prevalence of diabetes and risk factors for type 2 diabetes
- Adherence to evidence-based guidelines by clinicians
- Access to integrated hospital and primary care
- The availability of high-risk foot clinics and eye clinics
- The availability of diabetes educators
- The frequency of preventive checks in primary care
- Socioeconomic disadvantage, health literacy and access to healthy food
- The ability to self-manage diabetes, including access to refrigeration for insulin
- The prevalence of risk factors for complications, including smoking, poor glycaemic control and dialysis (which can contribute to poor glycaemic control)[14]
- Clustering of ethnic groups with higher prevalence of type 2 diabetes, such as Aboriginal and Torres Strait Islander Australians, people born in the Pacific islands, and people born in southern and central Asia[1,15]
- Access to healthcare services that provide culturally appropriate care
- The quality, efficiency and effectiveness of primary health care received by Aboriginal and Torres Strait Islander Australians
- Diagnostic error.

Variations between areas may not directly reflect the practices of the clinicians who are based in these areas. Area boundaries reflect where people live, rather than where they obtain their health care. Patients may travel outside their local area to receive care.

People with diabetes in Australia receive care that corresponds to best-practice guidelines in approximately 63% of encounters with healthcare providers.[16] Only 56% of adults with diabetes in Australia have achieved the target HbA1c (glycated haemoglobin) level of 7.0% or less, and only one-third meet targets for cholesterol or blood pressure levels.[17]

Case study: Integrated primary and secondary care clinic for diabetes

An Australian multidisciplinary, integrated primary and secondary care diabetes service has approximately halved the rate of hospitalisations due to diabetes complications.[18] The success of this model is particularly encouraging, given that the patients had complex type 2 diabetes and were from socioeconomically disadvantaged areas.

The clinical team was made up of an endocrinologist, two or three general practitioners with advanced training in managing diabetes, a diabetes educator, a podiatrist, and other allied health professionals, as required. A trial of the model compared outcomes in 182 patients who lived in the service catchment area and 145 patients who received usual care at a hospital outpatient clinic. Patients attending the integrated service were less educated and had a significantly higher baseline HbA1c level than the control group (8.6% and 7.9%, respectively). Despite these differences, the average number of hospitalisations with a diabetes complication as the principal diagnosis was significantly lower in the intervention group than in the usual care group in the two years after the trial began. Eye and foot complications were the most common reason for hospitalisation. Patients treated in the integrated care model also showed greater improvements in HbA1c level, total cholesterol and blood pressure, and valued the supportive interpersonal care provided and the accessibility of the clinicians in the team.[19]

Integrating primary and secondary care to develop the skills of the primary care team during patient management is also being done in other ways – for example, through case conferences conducted by a specialist and involving the patient, general practitioner and practice nurse. A recent Australian initiative based on this model has shown significant improvements in glycaemic control and blood pressure.[20]

Addressing variation

Preventing type 2 diabetes is key to reducing hospitalisations for diabetes complications – for example, through population health programs to reduce lifestyle-related risk factors. For people with established diabetes, models of integrated primary and secondary care have been successful in reducing diabetes complications (see the case study on this page).

In addition to new models of care, a number of specific interventions show promise for reducing complications of diabetes. Point-of-care testing for HbA1c has been suggested as a strategy to facilitate earlier diagnosis of diabetes – obtaining a fasting blood sugar level or undertaking an oral glucose tolerance test can present a barrier to diagnosis for many patients.[21]

Women who have had gestational diabetes are seven times as likely to develop type 2 diabetes, and follow-up of these women is often poor.[22] Among Australian women with gestational diabetes, Aboriginal and Torres Strait Islander women are four times as likely as other women to develop type 2 diabetes.[23] Improving detection and follow-up of diabetes in pregnancy could reduce complications in both the mother and the child.

Diabetic retinopathy is a leading cause of blindness in Australians aged 20–74 years. Early detection and treatment can prevent severe vision loss and blindness in almost all cases.[1] Screening for diabetic retinopathy has been shown to be effective in preventing blindness in rural and urban Australian settings, and preventive eye care is highly cost-effective.[24] Rural and remote populations have successfully been screened via telemedicine.[24] National diabetic retinopathy screening programs in other countries have shown impressive reductions in blindness among people with diabetes, and the feasibility of a similar program in Australia merits examination.[24]

Diabetes complications

Diabetes requires intensive self-management to prevent complications.[25] Structured education for people with type 2 diabetes reduces a range of risk factors for complications, such as dietary habits, foot care and smoking.[25] Structured education for people with type 1 diabetes also reduces severe hypoglycaemic events.[26] Structured diabetes education has significant potential to improve outcomes among people with diabetes.[12,27]

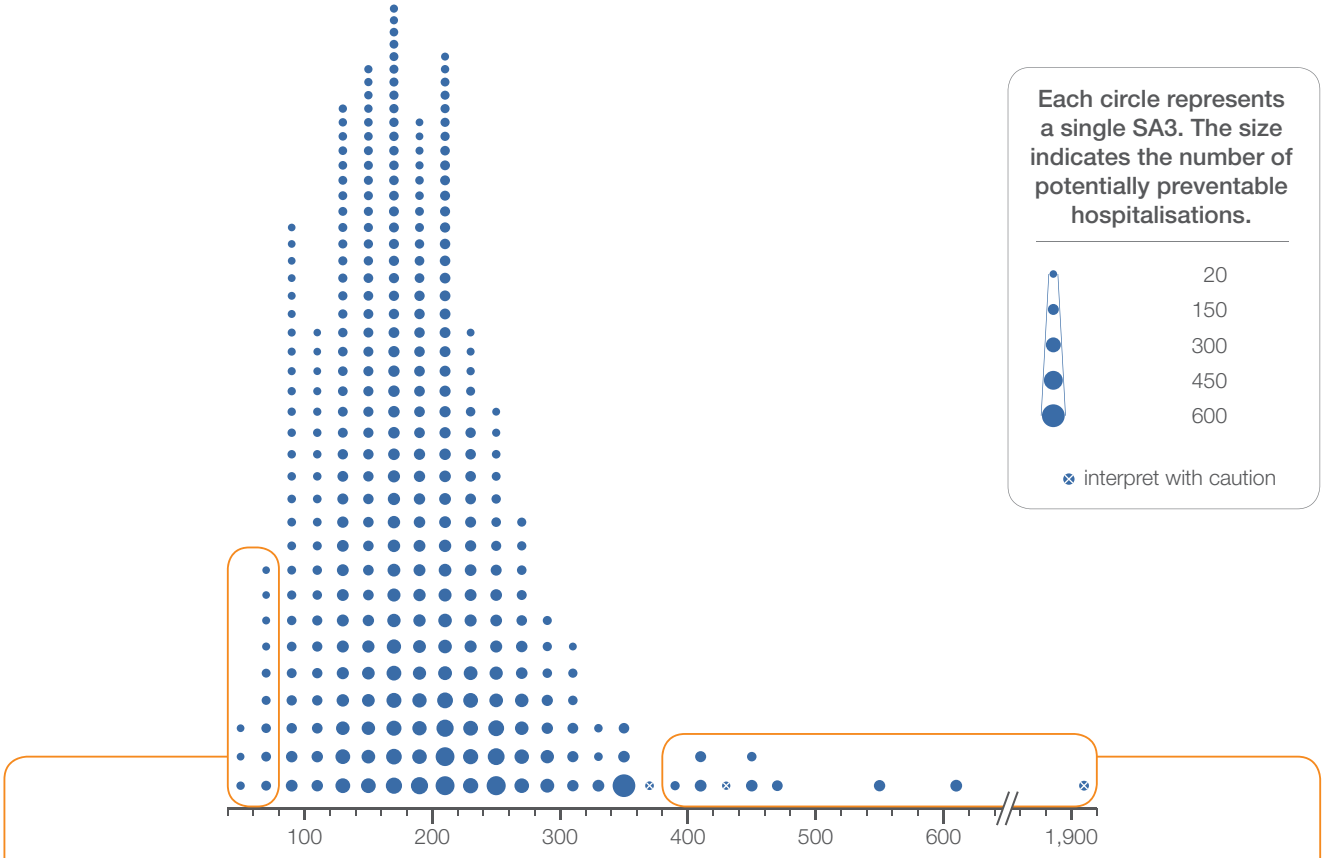
Aboriginal and Torres Strait Islander Australians with diabetes are at greater risk of vision impairment from diabetic eye disease, but are less likely to have eye checks in the recommended time frame than are other Australians with diabetes.[28–30] Annual eye screening, clearly defined pathways of care and timely treatment are key to improving eye health in Aboriginal and Torres Strait Islander Australians with diabetes.[28] The Roadmap to Close the Gap for Vision includes a range of strategies aimed at increasing the accessibility and uptake of eye care services by Aboriginal and Torres Strait Islander Australians, some of which have been implemented.[31]

Models of care showing early success for Aboriginal and Torres Strait Islander Australians with diabetes include home-based outreach case management that provides holistic, multidisciplinary care. A program based on this model has been highly rated by patients and staff, and achieved significant improvements in blood pressure and diabetes control.[32] A mobile outreach service that provides foot care and diabetes education in a metropolitan area has been similarly well received by the Aboriginal and Torres Strait Islander community. The service addresses social issues as well as clinical care, and patients are managed in partnership with their general practitioners. This model has achieved high attendance levels. Its outcomes are currently being evaluated.[33]

In the remote setting, preventive management of diabetes in Aboriginal and Torres Strait Islander Australians has been improved through partnerships between the local hospital, population health unit and community health centre. This has enabled primary care services in the area to be integrated, and health services to be reoriented from predominantly acute, reactive care to more preventive activities and primary care. Activities included health promotion days for screening and education, and team outreach clinics for developing self-management plans with patients. An almost 10-fold increase in the proportion of eligible patients having a diabetes annual cycle of care was seen after the integrated model of care was introduced.[34]

Medical-grade footwear and orthotics can help prevent diabetic foot complications, but are difficult to access for people in many rural and remote areas. Providing appropriate footwear for Aboriginal and Torres Strait Islander Australians with diabetes in remote areas could prevent a substantial number of foot complications.[35]

Figure 1.26: Number of potentially preventable hospitalisations – diabetes complications per 100,000 people, age and sex standardised, by Statistical Area Level 3 (SA3), 2014–15



Lowest rate areas

SA3	State	Rate	Hospitalisations
Brisbane Inner - West	Qld	**52**	28
Manly	NSW	**52**	26
Blue Mountains	NSW	**58**	53
Baulkham Hills	NSW	**65**	97
Eastern Suburbs - North	NSW	**66**	107
North Sydney - Mosman	NSW	**69**	72
Dural - Wisemans Ferry	NSW	**69**	22
Pennant Hills - Epping	NSW	**72**	38
Macedon Ranges	Vic	**72**	23
Ku-ring-gai	NSW	**73**	105
Stonnington - East	Vic	**74**	36
Mitcham	SA	**78**	75

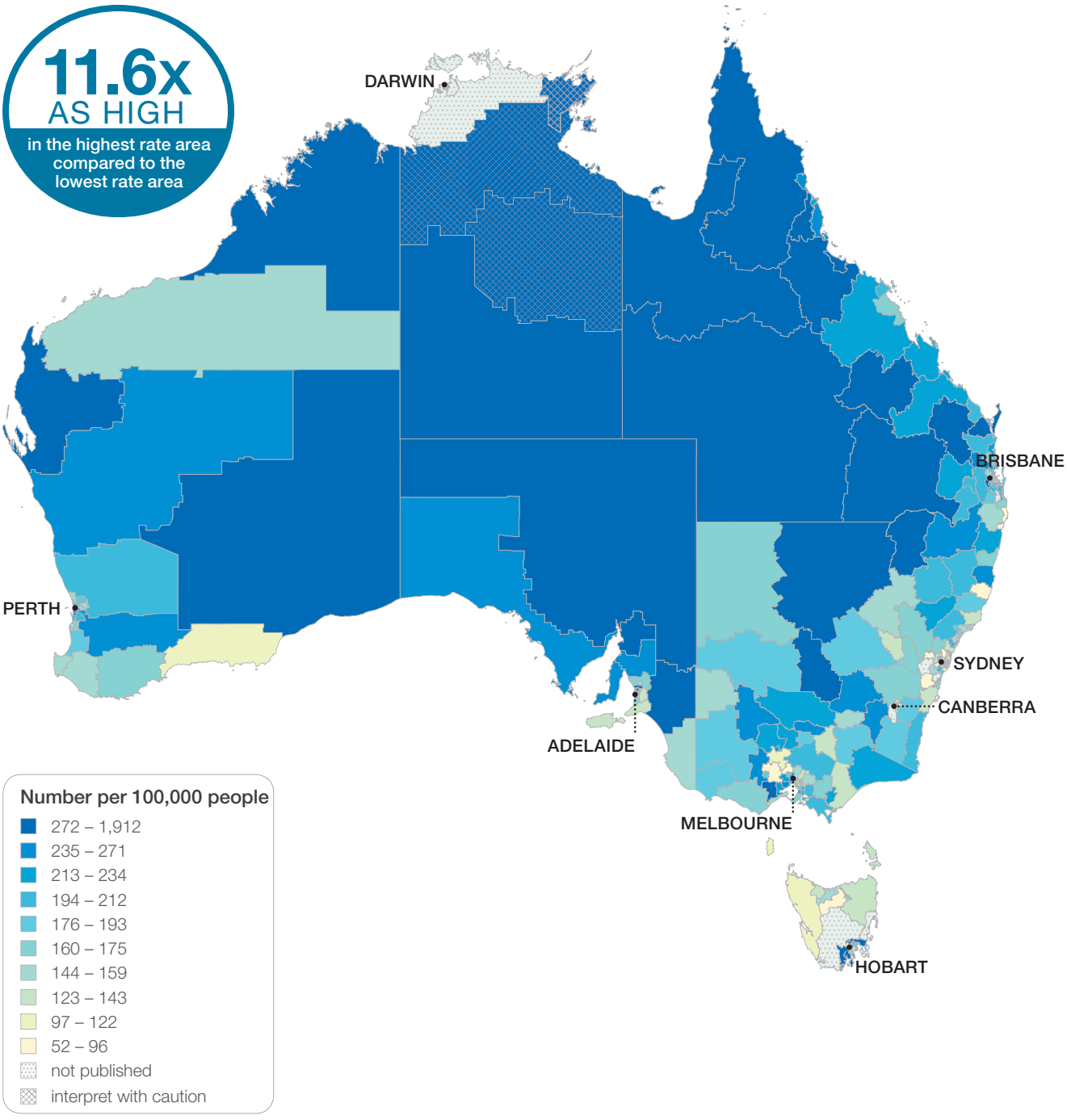
Highest rate areas

SA3	State	Rate	Hospitalisations
Barkly	NT	**1,912***	107
Outback - North	Qld	**601**	181
Far North	Qld	**542**	164
Outback - North and East	SA	**473**	141
Outback - South	Qld	**453**	95
Alice Springs	NT	**452**	173
East Arnhem	NT	**421***	50
Kimberley	WA	**408**	152
Tablelands (East) - Kuranda	Qld	**407**	181
Barwon - West	Vic	**395**	84

Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
Crosses and asterisks indicate rates that are considered more volatile than other published rates and should be interpreted with caution.
These rates are excluded from the calculation of the difference between the highest and lowest SA3 rates in Australia.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

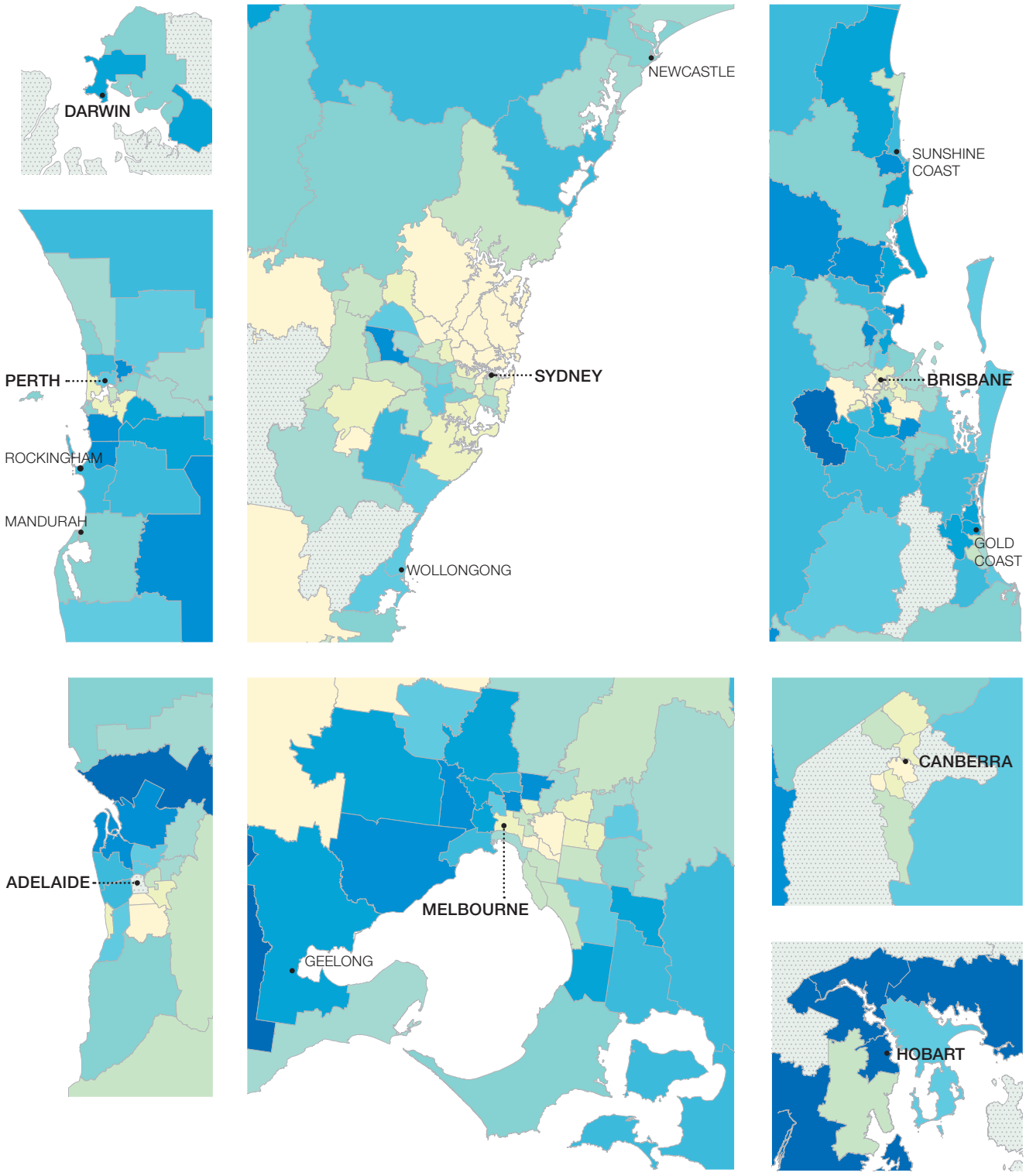
Diabetes complications

Figure 1.27: Number of potentially preventable hospitalisations – diabetes complications per 100,000 people, age and sex standardised, by Statistical Area Level 3 (SA3), 2014–15: Australia map



Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
Hatching indicates a rate that is considered more volatile than other published rates and should be interpreted with caution.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

Figure 1.28: Number of potentially preventable hospitalisations – diabetes complications per 100,000 people, age and sex standardised, by Statistical Area Level 3 (SA3), 2014–15: capital city area maps

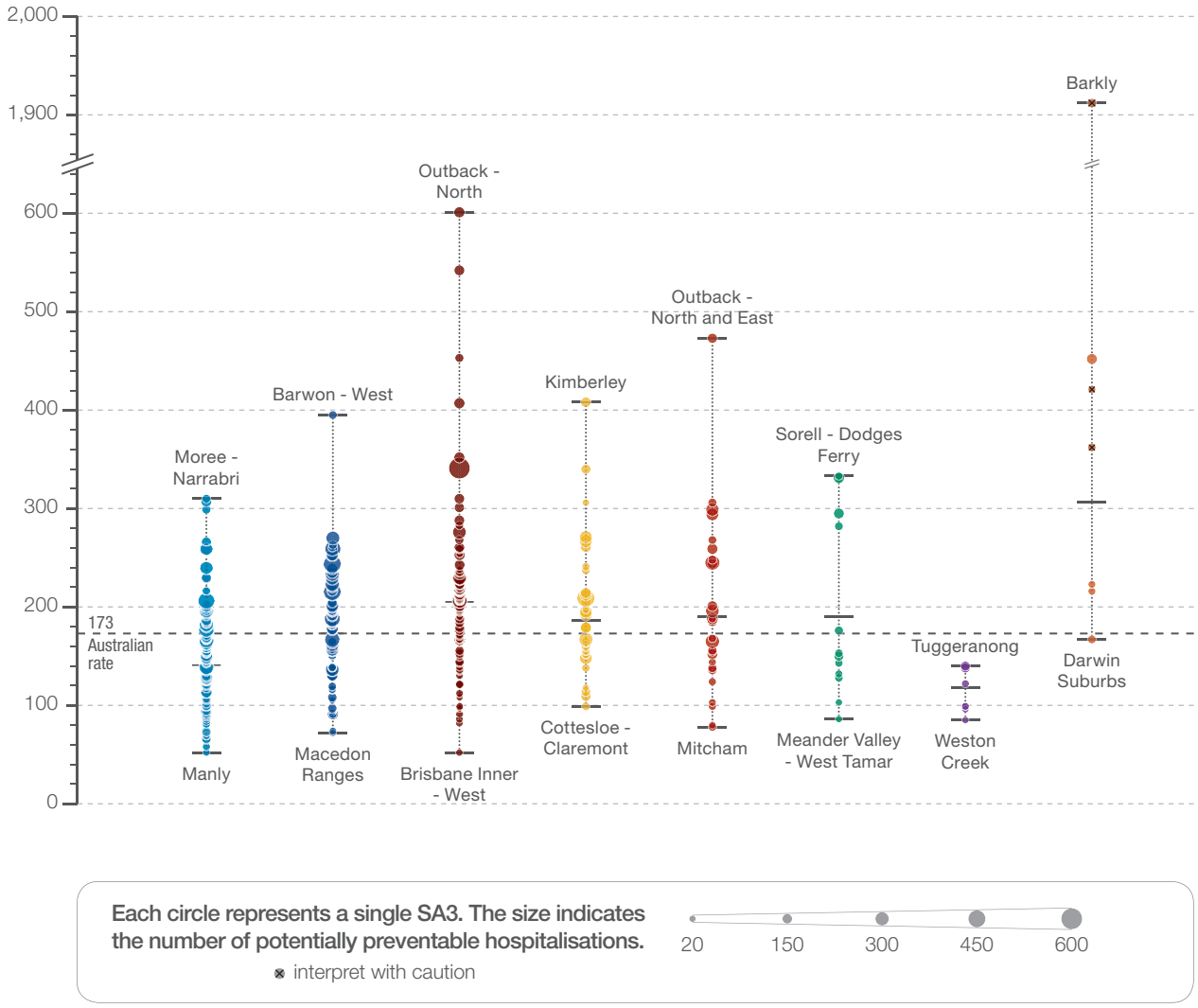


Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
Hatching indicates a rate that is considered more volatile than other published rates and should be interpreted with caution.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

Diabetes complications

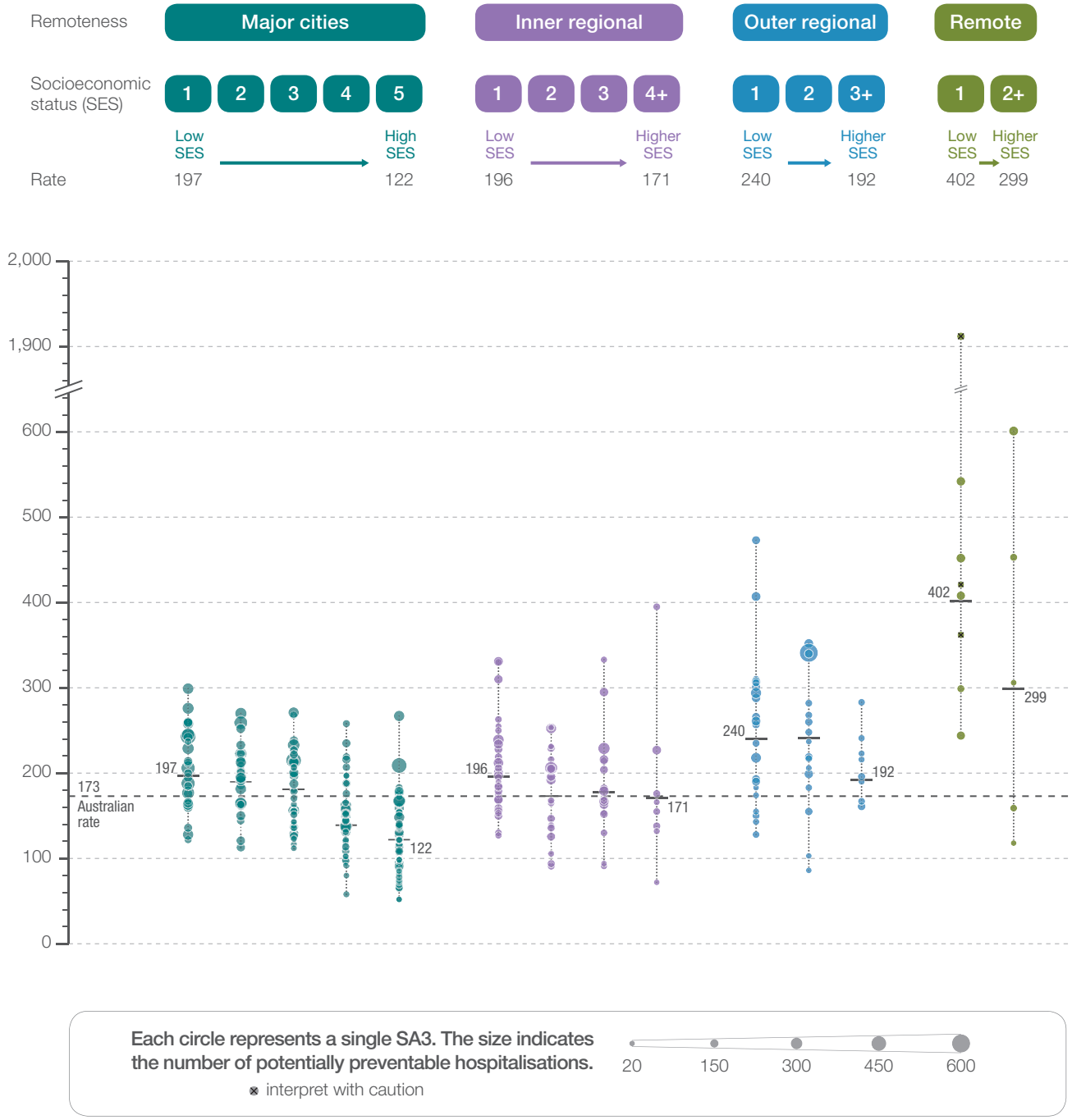
Figure 1.29: Number of potentially preventable hospitalisations – diabetes complications per 100,000 people, age and sex standardised, by Statistical Area Level 3 (SA3), state and territory, 2014–15

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT
Highest rate	310	395	601	408	473	333	140	1,912*
State/territory	141	173	205	186	190	190	118	307
Lowest rate	52	72	52	99	78	86	85	167
No. hospitalisations	11,660	10,968	10,120	4,892	3,714	1,119	443	643



Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
Crosses and asterisks indicate rates that are considered more volatile than other published rates and should be interpreted with caution. These rates are excluded from the calculation of the difference between the highest and lowest SA3 rates in Australia.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

Figure 1.30: Number of potentially preventable hospitalisations – diabetes complications per 100,000 people, age and sex standardised, by Statistical Area Level 3 (SA3), remoteness and socioeconomic status, 2014–15



Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
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For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

Diabetes complications

Resources

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- International Society for Pediatric and Adolescent Diabetes. Clinical practice consensus guidelines 2014. Berlin: ISPAD; 2014.
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  - Type 2 diabetes in adults: management, 2016
  - Diabetes (type 1 and type 2) in children and young people: diagnosis and management, 2016
  - Type 1 diabetes in adults: diagnosis and management, 2016
  - Diabetes in pregnancy: management from preconception to the postnatal period.

Australian initiatives

The information in this chapter will complement work already under way to prevent diabetes and improve its management in Australia. At a national level, this work includes:

- Australian National Diabetes Strategy 2016–2020
- A Wellbeing Framework for Aboriginal and Torres Strait Islander Peoples Living with Chronic Disease.

Many state and territory initiatives are also in place, including:

- Diabetes Taskforce, NSW Agency for Clinical Innovation
- Get Healthy Information and Coaching Service, New South Wales
- Aunty Jean's Good Health Team Program, New South Wales
- Framework for Action on Diabetes and Diabetes Service Standards, Western Australia
- My Healthy Balance, Western Australia
- Moorditj Djena – Strong Feet, Western Australia
- Education Services for Heart Disease and Diabetes, Northern Territory
- Improving Health Outcomes in the Tropical North: A Multidisciplinary Collaboration (Hot North); Northern Territory, Queensland and Western Australia
- Structured systems approach to improving health promotion practice for chronic disease prevention in Indigenous communities, Northern Territory
- HealthLAB Project, Northern Territory
- Diabetes in Pregnancy Partnership, Northern Territory
- LIFE! program, Victoria
- Aboriginal Health Promotion and Chronic Care Partnership Initiative, Victoria
- COACH program, Tasmania
- Move for Diabetes, Australian Capital Territory and New South Wales
- Better Living Diabetes Program, Queensland
- Diabetes Queensland Aboriginal and Torres Strait Islander Online Peer Support Program, Queensland
- Improving Diabetes Care and Management in Torres Strait Remote Primary Health Care Settings, Queensland
- Diabetes Service, Country Health SA, South Australia.

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