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Atlas of Avoidable Hospitalisations in Australia: ambulatory care-sensitive conditions

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Glossary and symbols used

Glossary

ACS conditions
Ambulatory care-sensitive conditions

Admissions

The technical term describing a completed hospital episode (i.e. the discharge, death or transfer of a patient) is a 'separation'.

Separation is an episode of care for an admitted patient which can be a total hospital stay (from admission to discharge, transfer or death), or a portion of a hospital stay beginning or ending in a change of type of care (for example, from acute to rehabilitation). Separation also means the process by which an admitted patient completes an episode of care either by being discharged, dying, transferring to another hospital or changing type of care. Separations of unqualified newborns, boarders or organ procurement patients are excluded.

In this atlas, the more commonly used term of 'admission' has been used. In an analysis such as this, which excludes most long stay patients, there is little difference between the number of admissions and the number of separations in a year. Also, 'admission' is a much more familiar term to many people who will use this atlas.

Health regions
Health regions (variously called regions, areas, districts etc. – see below) are areas used by the States and Territories to present data. These are mostly based on groupings of Statistical Local Areas: note that boundaries will not match regions that are not defined on 2001 SLAs, such as the Northern Territory regions, but reflect the closest alignment with the 2001 SLAs. As the ACT has no health regions as such, district groupings from ACT Health population projections have been used. Additional comments of relevance to regions in Queensland and the Northern Territory are on page 62.

Health regions in the jurisdictions are defined as follows:

- Area Health Service (New South Wales)
- District Health Service (Queensland)
- Health Region (Western Australia; South Australia country (Health Service in SA metropolitan area))
- Health Service Area (Northern Territory)
- Primary Care Partnership (Victoria)
- Region (Tasmania)

Hospitalisations
Refer to 'Admissions' above

ICD-9
International Classification of Diseases, Ninth Revision [WHO]

ICD-10-AM
International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, Australian Modification

IRSD
The IRSD is an area-based, summary measure of socioeconomic disadvantage and is calculated from variables relating to education, labour force status, occupation, Indigenous status, etc. of individuals and families. It is expressed as a number with a base for Australia of 1000: numbers above 1000 show relatively low disadvantage, and numbers below 1000 relatively high disadvantage.

RR
Rate ratio – for further information, refer to Chapter 2, *Methods*

Separations
Refer to 'Admissions' above

Symbols used

*	Statistically significant, at the 5% confidence level
**	Statistically significant, at the 1% confidence level
–	nil, or less than half the final digit shown
..	not applicable

Executive summary

Introduction

Avoidable hospitalisations represent a range of conditions for which hospitalisation should be able to be avoided because the disease or condition has been prevented from occurring, or because individuals have had access to timely and effective primary care. This report addresses the level and extent of regional variation in Australia in a sub-set of avoidable hospitalisations, namely those arising from ambulatory care-sensitive (ACS) conditions.

ACS conditions are certain conditions for which hospitalisation is considered potentially avoidable through preventive care and early disease management, usually delivered in a primary care setting, for example by a general medical practitioner, or at a community health centre. They can be used as an indicator to assess the adequacy, efficiency and quality of primary health care within the broader health system. Analyses at the area level may assist as a tool to monitor need; as a performance indicator of variations in access to, or the quality of, primary care; or in allocating limited resources among communities.

Admissions for these conditions can be avoided in three ways. Firstly, for conditions that are usually preventable through immunisation, disease can be prevented almost entirely. Secondly, diseases or conditions that can lead to rapid onset of problems, such as dehydration and gastroenteritis, can be treated. Thirdly, chronic conditions, such as congestive heart failure, can be managed to prevent or reduce the severity of acute flare-ups to avoid hospitalisation.

The analysis is presented for the individual ambulatory care-sensitive conditions, and for these conditions grouped into three sub-categories: conditions that can be prevented through vaccination; acute conditions for which hospitalisations are commonly avoidable with antibiotics or other medical interventions available in primary care; and selected chronic conditions that can be managed by pharmaceuticals, patient education, and lifestyle.

This report does not cover other aspects of avoidable hospitalisations, namely preventable hospitalisations, a sub-category of avoidable hospitalisations, comprising hospitalisations of people from diseases preventable through population-based health promotion strategies (e.g. alcohol-related conditions and most cases of lung cancer); or hospitalisations potentially avoidable through injury prevention strategies (e.g. road traffic accidents). Currently, there is no agreed approach to the categorisation of these aspects of avoidable hospitalisations in Australia, or internationally.

Key points

In 2001/02, admissions resulting from ambulatory care-sensitive (ACS) conditions accounted for 8.7% of all hospital admissions in Australia. This equates to over 552,000 admissions, all of which are potentially avoidable.

Admissions for these conditions accounted for a markedly higher proportion of all admissions of males (9.5% of all admissions of males) than was the case for females (7.9% of all admissions of females).

Over one quarter (27.1%) of avoidable hospitalisations occurred in the 75 years and over age group, with more than one fifth (22.1%) in the 45 to 64 years age group. These two age groups alone contributed to 271,837 avoidable hospitalisations, almost half (49.2%) of all avoidable hospitalisations in this period.

The overall hospitalisation rate from ACS conditions for males was slightly higher than for females, with male rates 5.9% above those for females; however there was marked variation between the age groups. Males in the 0 to 14 year age group had 26% more admissions than the same aged females; with 38% more admissions of males at ages 65 to 74 years, 16% at ages 45 to 64 years and 34% at ages 75 years and over. Rates for males were lower than for females in the 15 to 24 (32% lower) and 25 to 44 (15%) year age groups.

Almost two-thirds of hospital admissions for ACS conditions are attributable to chronic conditions, just over one-third to acute conditions and a small proportion (3.0%) to vaccine-preventable conditions.

The high proportion of admissions for chronic conditions in this period can be primarily attributed to the large number of hospitalisations for diabetes complications (accounting for 25.6% of all avoidable hospitalisations), with a number of circulatory and respiratory conditions contributing to a further 34.0%: these are chronic obstructive pulmonary disease (9.9%), angina (9.0%), congestive heart failure (7.7%) and asthma (7.4%).

Dental conditions (7.9%); dehydration and gastroenteritis (6.8%); ear, nose and throat infections (5.8%); convulsions and epilepsy (5.6%); and cellulitis (5.1%) make the greatest contribution to hospitalisations for acute conditions.

Influenza and pneumonia (2.4%) is the main admission cause for vaccine-preventable conditions.

The Northern Territory, with 10.7%, and Tasmania, 9.5%, both had higher proportions of avoidable hospital admissions compared to the national average of 8.7%. Besides the Australian Capital Territory, where the proportion of total avoidable hospitalisations was below the national average, the five remaining States all had proportions consistent with the national average, ranging from 8.5% in Queensland and South Australia, to 8.8% in Victoria and Western Australia.

In all States and Territories, the highest rates of hospital admissions for ambulatory care-sensitive conditions were attributable to chronic conditions, with diabetes complications consistently the highest ranked condition.

There is a distinct, step-wise socioeconomic gradient evident in total avoidable hospitalisation rates in Australia, with each increase in disadvantage accompanied by an increase in admissions from these conditions. Overall, people in the most disadvantaged areas of Australia had 61.0% more hospitalisations for an ambulatory care-sensitive condition than those in the least disadvantaged areas.

While there is not a clear socioeconomic gradient for all States and Territories, the highest rates for avoidable hospitalisations in each case occur in the most disadvantaged areas.

1 Introduction

1.1 The concept of avoidable hospitalisations

To assess the adequacy, efficiency and quality of primary health care within the broader health system, one indicator that researchers have focused upon is 'avoidable hospitalisations'. In general terms, avoidable hospitalisations represent a range of conditions for which hospitalisation should be able to be avoided because the disease or condition has been prevented from occurring, or because individuals have had access to timely and effective primary care.

The early research introduced the terms 'avoidable hospitalisations' (see Weissman 1992) or 'preventable hospitalisations' (e.g. Billings et al. 1996) to refer to conditions which could be avoided if ambulatory care is provided in a timely and effective manner.

More recently, the term 'ambulatory care-sensitive conditions' (ACS conditions) has been adopted in some research, including in Australia. However, much of this research continues to use the terms 'avoidable' or 'preventable' (hospitalisations) when referring to ACS conditions.

A broader view of the concept of avoidable hospitalisations has been developed in New Zealand to encompass preventable hospitalisations (hospitalisations resulting from diseases preventable through population-based health promotion strategies, e.g. alcohol-related conditions; and lung cancer) and hospitalisations avoidable through injury prevention (e.g. road traffic accidents) (Jackson and Tobias 2001; Ministry of Health 1999); these are described briefly in *Section 1*.7. In this report the concept of avoidable hospitalisations is limited to ambulatory care-sensitive conditions.

Ambulatory care-sensitive (ACS) conditions are certain conditions for which hospitalisation is considered potentially avoidable through preventive care and early disease management, usually delivered in a primary care setting, for example by a general medical practitioner, or at a community health centre: see box opposite.

However, the use of avoidable hospitalisations as a performance indicator of access to, or the quality of, primary care should be predicated by the recognition that many different factors contribute to hospitalisation rates.

These include:

- age and sex;
- socioeconomic factors (ethnicity, income, level of education and insurance status);
- disease incidence, prevalence and severity;
- perceived health need and care-seeking behaviour;
- access to care;
- availability of care including supply of primary care physicians, hospital bed availability, a regular source of care or continuity of care;
- physician practice style; and
- whether care at home is feasible for reasons unrelated to health status or provision (Niti and Ng 2003).

Analyses of avoidable hospitalisations at the area level may assist as a tool to monitor need; as a performance indicator of variations in access to, or the quality of, primary care; or in allocating limited resources among communities. In addition, they may assist in defining the type of intervention which would have the most impact; or may have some use in evaluating interventions (Billings et al. 1993).

Avoidable hospitalisations from ambulatory care-sensitive conditions

Ambulatory care-sensitive (ACS) conditions include hospitalisations of people from causes considered to be responsive to prophylactic or therapeutic interventions deliverable in the primary health care setting, i.e. conditions that, with appropriate primary care, should not become serious enough to require admission to a hospital. Appropriate primary care may prevent the onset of an illness or condition, control an acute episodic illness or condition, or manage a chronic disease or condition.

Thus, these can be divided into three sub-categories (Vic DHS 2002):

- conditions that can be prevented through vaccination (e.g. influenza and pneumonia);
- selected chronic conditions that can be managed by pharmaceuticals, patient education, and lifestyle. Despite the challenges of behavioural change, it is commonly assumed that effective patient education during health care encounters can influence lifestyle (e.g. diabetes complications); and
- acute conditions for which hospitalisations are commonly avoidable with antibiotics or other medical interventions available in primary care (e.g. dental conditions).

1.2 History of the concept

Health services have greatly expanded their range and scope over the past thirty years, during which time interest has grown in attempting to evaluate their performance and to identify areas for improvement. A model for assessing the quality of health services was first articulated by Donabedian (1966). The three domains included in the model were the structure (organisation and inputs) of the service, its process of care, and the outcome for the patient.

Since then, much work has been undertaken to develop techniques for evaluating structures and processes of care. However, methods for assessing health outcomes attributable to the care received have proved more elusive, although there is continuing interest in doing so. This is because there is an ongoing need to ensure that health care investment results in improved health for individuals and populations; to understand the causes of geographic and social variation in practice; and to reduce the frequency of inappropriate, poor quality or unsafe care (Woolf 1990).

An earlier approach to assessing the quality of health care in terms of clinical outcomes has been to identify deaths that should not have occurred, given available health care interventions. This method was initiated in 1976 by Rutstein, who prepared a list of health conditions in consultation with an expert panel. Deaths from these causes represented 'untimely and unnecessary deaths' and their occurrence was 'a warning signal, a sentinel health event, that the quality of care might need to be improved' (Rutstein et al. 1976). Further studies into avoidable deaths have since been undertaken in many countries.

Following on from the avoidable mortality research, Billings and Teicholz (1990) introduced the concept of 'avoidable' or 'preventable' hospitalisations. Billings and Teicholz's study of uninsured patients in Columbia hospitals involved a patient survey, followed by expert judgment on whether the admission could have been avoided had the patients received appropriate, timely ambulatory care. The United Hospital Fund (1991; cited in Blustein et al. 1998), with John Billings as Principal Investigator and a medical advisory panel, subsequently developed a
list of 28 conditions as part of an ambulatory care access project – refer also to the first main research following this work, in Billings et al. 1993.

Subsequently, Weissman et al. (1992) examined hospital discharge data in Massachusetts and Maryland, using 12 avoidable hospital conditions, defined under ICD-9-CM. The conditions were selected based on a literature review and clinical guidance from physicians following specific criteria (refer to Weissman et al. 1992). In 1993, the United States' (US) Institute of Medicine recommended ACS hospitalisations as an outcome indicator of primary care access (Millman 1993). Since then, further research has followed overseas, with the main reporting in Australia arising after the first Victorian study of ambulatory care-sensitive conditions (see Victorian Department of Human Services 2002).

The rationale underlying the concept of avoidable hospitalisations from ambulatory care-sensitive conditions is that timely and effective care for certain conditions, delivered in a primary care setting, can reduce the risk of hospitalisation (Weissman et al. 1992; Billings et al 1993; Millman 1993).

As discussed above, admissions to hospital for these ACS conditions can be avoided in three ways. Firstly, for conditions that are usually preventable through immunisation, disease can be prevented almost entirely. Secondly, diseases or conditions that can lead to rapid onset of problems, such as dehydration and gastroenteritis, can be treated. Thirdly, chronic conditions, such as congestive heart failure, can be managed to prevent or reduce the severity of acute flare-ups to avoid hospitalisation (Laditka et al. 2003).

These conditions are narrowly defined. For example, Weissman et al. exclude stroke and pulmonary emboli because they consider the evidence linking primary care to the avoidance of hospitalisation for these conditions to be inconclusive. The selected conditions are also avoidable to various degrees. Asthma and congestive heart failure are conditions for which primary care treatment cannot be expected to prevent hospitalisations in all circumstances. However, conditions due to immunisable infectious diseases (such as measles) should be preventable in all cases (Pappas et al. 1997).

1.3 Strengths and limitations of the concept

The approach of assessing ACS hospitalisations in this way is appealing due to the general availability of hospital discharge data, compared to the limited data on ambulatory care. Avoiding a hospital admission represents a substantial "win" in limiting costs as well as enhancing the patient's quality of life (Clancy 2005). Differences between populations at risk are linked to the failure to obtain primary care at an earlier stage of the medical episode. As such, the rate of ACS hospitalisations has become an important indicator of health

system performance in the delivery of primary care (DeLia 2003).

In addition to measuring the overall effectiveness of primary health care, the analysis of hospitalisations for ACS conditions is also a commonly used indicator of the accessibility of primary health care. Underpinning this is the view that better access to primary health care should reduce avoidable hospitalisations. The concept of better access is linked to the supply of general practitioners (GPs), where individuals living in areas with reduced supply may experience difficulty in accessing GPs, compared to those living in areas with better GP supply. This can be evidenced by longer waiting times for appointments, longer travel times to obtain care, shorter physician consultations, and reduced follow-up (Zastowny, Roghmann and Caferata 1989; cited in Laditka et al. 2005).

Earlier research by Billings et al. (1993) reported that the largest differences between low and high income populations were observed in the young adult and middle aged populations. They suggest that these groups are most likely to be affected by access problems, with a higher rate of uninsured in these age groups, coupled with less experience in navigating the complexities of the health care system. Similarly, Bindman et al.'s (1995) avoidable hospitalisations analysis found that poor access to medical care resulted in higher rates of hospitalisation for a specified group of five chronic diseases. They concluded that improving access to care is more likely – than changing patients' propensity to health care; or eliminating the variation in physician practice style – to reduce hospitalisation rates for chronic conditions. However it should be noted that such findings are relevant to the US setting, where there is no universal provision of health care; and, as such, are not necessarily comparable to the Australian situation.

Whilst many studies have linked admissions from ACS conditions with the need for improved primary care access, there are conflicting results in the few studies that have directly examined the relationship between physician supply and avoidable hospitalisations (Clancy 2005; Laditka et al. 2005). For example, a recent study by Laditka et al. (2005) found that physician supply was positively associated with the overall performance of the primary health care system in a large sample of urban counties of the United States. However, a Manitoba study reported that those with the poorest health status had the highest hospital use, including for ACS hospitalisations, and expenditure rates, but were also found to found to have higher visits to physicians for several conditions (Roos et al. 2005).

An earlier US study by Blustein et al. (1998) reported that the poorer, sicker and less-educated population aged 65 years and over were more prone to hospitalisation for ACS conditions. However, they questioned whether the relationship between socioeconomic status and avoidable hospitalisations simply reflects socioeconomic gradients in patient health status and not in health care. Similarly, hospital admission rates in the United Kingdom reportedly reflect socioeconomic differences and patient morbidity, rather than quality in primary care (Giuffrida et al. 1999 and Reid et al. 1999; cited in Roos et al. 2005). Roos et al. concludes that doing "more of the same" (e.g. increasing physician supply) is unlikely to change the socioeconomic gradient accompanying physician visits and hospitalisations, and that markedly reducing ACS hospitalisations is likely to prove difficult.

Bearing in mind that much of the research to date – and particularly the discussion surrounding the usefulness of avoidable hospitalisations – has been undertaken in the US, it is still worthwhile to mention Clancy's (2005) alternative hypothesis in relation to the differing findings in relation to avoidable hospitalisations analyses. Clancy suggests that perhaps the aspects of primary care which are most effective in assisting individuals with chronic and acute conditions frequently associated with hospitalisations to manage their care have not yet been identified, and, in particular, for those in lower socioeconomic groups (Clancy 2005). Similarly, Roos et al. (2005) proposes the question whether barriers to care – such as time constraints, costs of transportation, lack of information, and so on – are significantly affecting primary care and eventual hospitalisation rates.

1.4 Research overview

International

Early avoidable hospitalisations research focused on socioeconomic status, comparing ACS hospitalisation rates among communities with differing income levels (Billings et al. 1993; Billings et al. 1996) or with differing insurance profiles (Weissman et al. 1992; Parchman and Culler 1999). Billings et al. (1993) found that area income was generally the most powerful predictor of the rate of avoidable hospitalisations across the zip code areas of New York, with higher rates in the lower socioeconomic population. Later studies have reported similar findings in relation to income (Billings et al. 1996; Pappas et al. 1997; DeLia 2003). Such findings have been replicated in adult, some studies of the elderly (although others suggest the pattern for the elderly is not as strong, e.g. Pappas et al. 1997), and paediatric populations

(Parchman and Culler 1999; Shi et al. 1999; Parker and Schoendorf 2000).

However, these findings are not universal – for example, Billings et al.'s (1996) study of US major cities and also several in Ontario, Canada found major differences between high and low income areas, but these were not applicable to Toronto, Canada's largest metropolitan area, with Billings et al. stating that the difference in the socioeconomic impact between Toronto and the other cities studied was startling.

Recent findings by Roos et al. (2005), introduced in *Section 1.3* above, examining both physician claims and hospital discharge abstracts in Manitoba between 1998 and 2001, found that residents from the lowest income neighbourhoods had higher rates of ACS hospitalisations, however, in addition, these residents also were found to have higher utilisation of physician visits for six (out of twelve) ambulatory conditions.

Other studies include the examination of urban and rural differences in the rate of avoidable hospitalisation, with findings generally reporting higher rates in rural than urban areas (e.g. Cloutier-Fisher et al. 2006). However, again, the suggested link between higher avoidable hospitalisation rates and physician supply is not universal. For example, Laditka et al.'s (2005) examination of ACS hospitalisations and physician supply, whilst controlling for intercounty differences in race, ethnicity, air quality and health system use and other characteristics, found that physician supply is inversely correlated with rates of ACS hospitalisations in urban areas but had no effect in rural areas.

Several US studies report associations between race and ACS hospitalisations with higher rates reported amongst the African Americans than the white population (for example Pappas et al. 1997; Kozak et al. 2001; Laditka et al. 2003). Gaskin and Hoffman (2000) found Hispanics and Afro-Americans more likely to be hospitalised. In particular – whilst controlling for differences in patients' health care needs, socioeconomic status, insurance coverage and availability of primary health care – Hispanic children, working-age African American adults and elderly patients from both minority groups were found to be at greater risk than similar white patients. Similarly, research examining ethnic differences in Singapore reported higher rates of avoidable hospitalisation for the Indian and Malay populations than the Chinese population (Niti and Ng 2003).

Australian

The first main study in Australia into ACS conditions was undertaken by the Victorian Department of Human Services (Vic DHS). Subsequent analyses were released by the Australian Institute of Health Welfare and the New South Wales Department of Health (NSW Health).

The Vic DHS (2002; 2004) *Ambulatory Care-sensitive Conditions* studies[1] examine the rate of ACS conditions by Primary Care Partnerships (PCPs), including presentation of the top ten ACS conditions and trends analyses. The AIHW's *Australian Hospital Statistics* reports (e.g. AIHW 2002; 2006) include analyses of ACS admissions by State/ Territory and remoteness, with the 2006 report including analyses by quintile of socioeconomic advantage/ disadvantage.

The *Report of the New South Wales Chief Health Officer* released in 2002 included ACS condition analyses by Divisions of General Practice, with comparisons to the rate of full-time working equivalent (FWE) GPs, and by condition, health regions and trends over time (see Population Health Division 2002). In NSW Health's 2004 report, trend analyses and ACS admission totals by condition and health region are presented (see Population Health Division 2004).

1.5 Approaches to defining ACS conditions

This section provides a brief overview of some of the main research, internationally and in Australia, to indicate the substantial variations in approaches to defining ambulatory care-sensitive conditions.

International

The majority of international research follows the earlier US approaches of Billings et al. (1993) – comprising 28 ACS conditions; Millman (1993) – 22 conditions; and Weissman et al. (1992) – 12 conditions, definable under ICD-9-CM; or a combination of these. Billings et al.'s (1993) and Millman's (1993) condition lists include additional criteria, in particular the allocation of procedure code exclusions for select conditions.

Examples of recent research mainly following Billings et al. (1993) include DeLia (2003); Laditka et al. (2003); and Laditka et al. (2005). The recent research by Roos et al. (1995) adopted only the recommended 12 ACS conditions by Billings et al.

[1] See also the online fact sheet updates for the DHS regions/PCP partnerships and Victoria as a whole, based on 2002/03 and 2004/05 data at: http://www.health.vic.gov.au/healthstatus/acsc/index.htm (accessed 25 October 2006).

(1993) which allow the use of 3-digit ICD-9-CM codes to allow examination of physician visits (for comparison with avoidable hospitalisations) over broader geographic areas (i.e. Canada), thus excluding the ACS conditions only definable by 4-digit codes.[2] Examples of research following Weissman et al. (1992) include Pappas et al. (1997) and Kozak et al. (2001).

Other researchers (e.g. Niti and Ng 2003) have adopted the methodology of Bindman et al. (1995), examining hospital admissions with a principal diagnosis of five specified chronic conditions – asthma, chronic obstructive pulmonary disease, congestive heart failure, diabetes mellitus or hypertension.

Australian

Stamp et al.'s (1998) study of ACS in Aboriginal and Torres Strait Islanders for specific cohorts, used ACS conditions and procedures based on a US study by Hadley and Steinberg (1993; cited in Stamp et al. 1998).

In Australia, the first Vic DHS (2002) report – titled *The Victorian Ambulatory Care-sensitive Conditions* Study – based their ACS conditions on several international studies, e.g. Weissman et al. (1992), Billings et al. (1993) and Millman (1993), comprising 19 ACS conditions, but additionally classifying the conditions into three sub-categories of vaccine-preventable; acute and chronic conditions. Their latest report (Vic DHS 2004) examines a similar list of conditions to their earlier studies, albeit with some modifications, and excluding the examination by the three sub-categories introduced in the 2002 study.

Since 2002, the AIHW's *Australian Hospital Statistics* reports have included rates of avoidable hospitalisations (termed 'potentially preventable hospitalisations'), with ACS conditions which were initially the same as the Vic DHS' (see AIHW 2002), but now include some variations (see AIHW 2006 – e.g. the coding for diabetes complications has changed substantially, and a new condition, rheumatic heart disease, is included).

Similarly, since 2002, NSW Health's *Reports of the New South Wales Chief Health Officer* (e.g. Population Health Division 2002) reported hospitalisations for ACS conditions, based on the earlier Vic DHS' research, but also with some variations. NSW Health's most recent report (see Population Health Division 2004) has some differences in condition codes and additional coding specifications, compared to the latest Vic DHS and AIHW condition lists. In particular, NSW Health has developed a new method of adopting procedure blocks under ICD-10-AM, as opposed to using procedure codes – the method currently used by Vic DHS and AIHW (and, previously, NSW Health) to exclude admissions based on procedure codes for select conditions.[3] This method of using procedure blocks was introduced as a way of dealing more effectively with the changes in procedure codes between ICD-10-AM editions. Note: NSW Health's list of ACS conditions was developed in conjunction with PHIDU, and as such the rates for all conditions are comparable to the rates presented in this atlas.

A summary of differences in conditions and coding specifications between the Victorian DHS, AIHW and NSW Health is included in Table A2 in Appendix 1.2.

The codes in use in this field change, as coding practices change, and as new medical and surgical procedures are introduced. A process has been initiated for Commonwealth, State and Territory health departments and other interested agencies to discuss the terminology and codes in use in Australia, with a view to obtaining consensus. The initial meeting of this group is planned for April 2007.

1.6 Age limits and classification

This section briefly highlights research where age limits have been applied, and also highlights some of the main differences in terms of the classification of ambulatory care-sensitive conditions.

Age limits

Whilst the main Australian research has examined avoidable hospitalisations from ambulatory conditions for the total population, it should be noted that some of the international research includes alternative age groups. Some of these approaches are described below.

For example, Weissman et al.'s (1992) early research included an analysis for the population aged less than 65 years. Some research adopting Weissman's ACS condition list presents totals for all ages, but includes analyses by age group, including those aged 65 years and over (e.g. Pappas et al. 1997; Kozak et al. 2001).

[2] Refer to the University of Manitoba Centre for Health Policy's 'ACS conditions' summary for a brief overview of Billings et al.'s (1993) methodology, including Roos et al.'s 2005 recent research, at: http://www.umanitoba.ca/centres/mchp/concept/dict/ACS_conditions.html (accessed 25 October 2006).

[3] The majority of the international research, and particularly the United States, continues to allocate ACS hospitalisations based on ICD-9-CM codes.

Similarly, Billings et al.'s 1993 paper reported ACS rates at all ages, but included analyses for several age groups, including the 65 to 74 years and 75 years and over age groups. However, Billings et al.'s (1996) later ACS study examined the population under 65 years of age only. Some international research has followed the approach of presenting total ACS for all ages (e.g. DeLia 2003; Pappas et al. 1997), which is the current approach of the main Australian research by Vic DHS (2002; 2004); AIHW (e.g. 2002; 2006) and NSW Health (Population Health Division 2002; 2004).

Other analyses incorporating differing age groups include an examination of both working and non-working age groups (e.g. Laditka et al. 2003); and the analysis of several age groups under 65, with a specific reference to children (e.g. Shi et al. 1999; Laditka et al. 2005). Casanova and Starfield (1995) included ACS analyses for children only, using a list of 20 conditions they designed for the paediatric population only, and recently utilised by Flores et al. (2006) for a study of avoidable hospitalisations in children under 18 years.

Blustein et al. (1998) presents analyses for the population aged 65 and over, but notes that the ACS conditions in their analysis, developed by the United Hospital Fund (UHF 1991; cited in Blustein et al. 1998) were to monitor hospitalisations primarily in the population under age sixty five, as the panel expressed reservation about using the list to classify hospitalisations in the elderly since some diseases present differently in older populations. Therefore, in Blustein et al.'s analyses they reported ACS hospitalisations in the elderly, excluding pneumonia, due to this condition being a common terminal event in older people.

The majority of the research in New Zealand has adopted the age limit of 74 in their avoidable hospitalisations' research, which includes, but is not limited to, ACS conditions (discussed in *Section 1.7* below – see Ministry of Health 1999 and 2003; Jackson and Tobias 2001). The Ministry of Health (2003) states that beyond the age of 75 classification of avoidable hospitalisations becomes increasingly problematic due to the increasing prevalence of co-morbidities.

In terms of age limits for select conditions only, several researchers present iron deficiency anaemia for children aged up to 5 years only, based on Billings et al. (2003) – e.g. DeLia (2003) and Roos et al. (2005). The main Australian research to date (by Vic DHS, AIHW and NSW Health) includes an age limit for influenza and pneumonia to exclude people under two months of age, following earlier research (e.g. Billings et al. 1993; Millman 1993), and this limit is generally adopted in the current international research.

Classification

Other limitations and differences between the research approaches include variations in the specification of conditions as 'principal diagnosis only' or 'in any diagnosis field'. In addition, there are different approaches in the use of additional selection criteria, including the adoption of exclusions for specific procedures for select conditions (refer also to *Section 1.5* above in relation to procedure codes versus procedure blocks).

In addition, the earlier Vic DHS analysis of ACS conditions, and the AIHW and NSW Health research to date, examined avoidable hospitalisations by preventable, chronic and acute sub-categories. Likewise, Laditka et al.'s (2003) analysis included similar sub-categories, albeit with 'acute' conditions termed 'rapid onset', but they note that the majority of the ACS hospitalisations are mostly examined as a single summary category.

1.7 Avoidable hospitalisations: Further research

As noted earlier, a broader measure of ACS conditions was put forward by the New Zealand Ministry of Health (1999). This measure included two other aspects of avoidable hospitalisations, namely preventable hospitalisations and hospitalisations avoidable through injury prevention.

In a subsequent paper, Jackson and Tobias (2001) developed this concept of potentially avoidable hospitalisations, which included proportioning conditions across preventable (hospitalisations resulting from diseases preventable through population-based health promotion strategies, e.g. alcohol-related conditions and lung cancer); ACS; and hospitalisations avoidable through injury prevention (e.g. road traffic accidents) sub-categories. The research included an age limit of 74 years. Jackson and Tobias (2001) state that the measure used was intended purely as an indicator of the scope for health gain – the potential to reduce the incidence of severe disease in the population – as opposed to ACS measures which are sometimes used as a performance indicator for primary health care.

More recently, New Zealand research has continued to present avoidable hospitalisations at a broader level, but limited to two categories – population preventable hospitalisations (which could be prevented through population health strategies); and ambulatory sensitive conditions (Ministry of Health 2003).

This broader avoidable hospitalisations concept is consistent with the avoidable mortality concept, based on initial work by Tobias and Jackson 2001; and developed further in a joint work between the Ministry of Health and PHIDU – see *Australian and New Zealand Atlas of Avoidable Mortality* (Page et al. 2006).

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2 Methods

2.1 Selection of ACS conditions

The approach to selecting the conditions involved the following steps:

- A review of international and national literature was undertaken and informed the early stages of the project.
- Initial discussions were held with various agencies, including the Victorian Department of Human Services (Vic DHS); Australian Institute of Health and Welfare (AIHW); and New South Wales Department of Health (NSW Health).
- A draft list of conditions was sent to the National Public Health Information Working Group (now Population Health Information Development Group) for comment.
- Following changes in code sets used by some agencies, PHIDU collaborated with NSW Health to produce an agreed set of conditions. In addition, PHIDU adopted the method of using procedure blocks, rather than procedure codes, for the exclusions for specific conditions (developed by NSW Health – see *Section 1.5* above).

The final condition list is included in Table A1 in Appendix 1.1.

2.2 Data sources

Estimated resident population data were purchased from the Australian Bureau of Statistics (ABS).

Hospitalisations data for the State and Territories were supplied from the National Hospital Morbidity Database at AIHW. The data included admissions by age, sex, condition and area.

Measures of remoteness (using the ASGC remoteness classification[4]) and disadvantage (using the ABS Index of Relative Socio-Economic Disadvantage (IRSD)[5]) were added subsequently by matching these measures at the Statistical Local Area (SLA) level to the address of the patient as recorded in patient records.

[4] The ASGC remoteness classification allocates areas (e.g. SLAs) to one of five classes, based on road distances to service centres (towns).

[5] The IRSD is an area-based, summary measure of socioeconomic disadvantage and is calculated from variables relating to education, labour force status, occupation, Indigenous status, etc of individuals and families.

2.3 Data methods and analysis

Calculation of rates and mapping

Admission rates were age standardised to the Australian population by the indirect method.

The data were set up in HealthWIZ[6] to allow for production of counts and admission rates by age, sex, condition and area.

The results were then exported as required from HealthWIZ to HealthMap (a proprietary mapping package developed by PHIDU) for production of maps.

The rates were mapped by health region of usual residence of the person admitted to hospital. For further information, refer to the 'Introduction to map and text pages', page 23.

Data analysis: general

Rate ratios

'Rate ratios' show the differential between the standardised rate for two groups – for example between males and females and between the most disadvantaged areas (Quintile 5) and the least disadvantaged areas (Quintile 1). The statistical significance of rate ratios is shown with an asterisk(s). A single asterisk indicates that the ratio is statistically significant at the 5% confidence level, that is, that the likelihood of the observed ratio being due to change or random error is less than 5%. A double asterisk indicates that the observed ratio is statistically significant at the 1% confidence level.

ASGC remoteness classification

The ASGC remoteness classification has five remoteness classes to which SLAs can be allocated: Major Cities of Australia, Inner Regional, Outer Regional, Remote and Very Remote.

Socioeconomic status

The IRSD was used to allocate admissions to five groups (quintiles) of similar socioeconomic status (referred to as quintiles of socioeconomic disadvantage of area).

SLAs were ranked by their IRSD score and then allocated to one of five groups, each with

[6] HealthWIZ is a publicly available database for exploring statistical data. It is produced by Prometheus Information Pty Ltd for the Australian Government Department of Health and Ageing. This project, and the data on which it is based, is not available on the public release version.

approximately 20% of the population of the area under analysis (Australia, or State/Territory). Rates were then calculated by quintile for each condition.

3 Avoidable hospitalisations: hospital admissions resulting from ambulatory care-sensitive conditions

3.1 Avoidable and unavoidable hospitalisations

In 2001/02, admissions resulting from ambulatory care-sensitive (ACS) conditions accounted for almost nine per cent of all hospital admissions in Australia (Table 3.1). This equates to over 552,000 admissions, all of which are potentially avoidable.

Admissions for these conditions accounted for a markedly higher proportion of all admissions of males (9.5% of all admissions of males) than was the case for females (7.9% of all admissions of females).

The overall rate of avoidable hospitalisations was 2,847.5 admissions per 100,000 population.

Overall, males have slightly higher rates of hospitalisations for ambulatory care-sensitive conditions than females, as indicated by the rate ratio of 1.06** (Table 3.1). Females, however, have a higher rate of unavoidable (and total) hospitalisations, with 32,072.2 admissions per 100,000 population, compared to 27,836.0 admissions per 100,000 for males: the rate ratio of 0.87** indicates that males had 13.0% fewer unavoidable hospitalisations over this period than did females.

Figure 3.1 illustrates the pattern of hospitalisations from avoidable, unavoidable and total admissions for males and females.

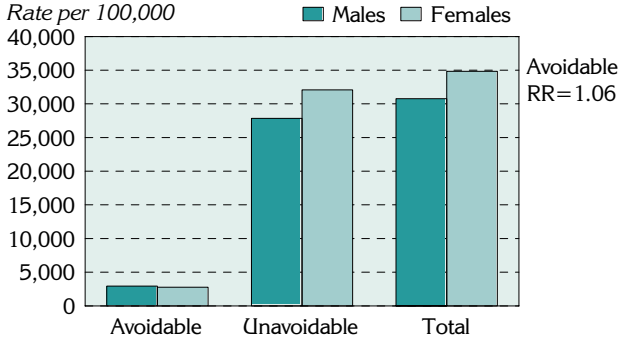
Table 3.1: Avoidable[1] and unavoidable hospitalisations, by sex, Australia, 2001/02

Hospitalisation category	Number			% of	Rate per 100,000			Rate ratio
	Males	Females	Total	total	Males	Females	Total	M:F[2]
Avoidable[1]	282,125	270,661	552,786	8.7	2,929.5	2,766.8	2,847.5	1.06**
Unavoidable	2,680,760	3,137,439	5,818,199	91.3	27,836.0	32,072.2	29,970.7	0.87**
Total	**2,962,885**	**3,408,100**	**6,370,985**	**100.0**	**30,765.6**	**34,839.0**	**32,818.2**	**0.88****
Avoidable[1] (%)	**9.5**	**7.9**	**8.7**	**..**	**..**	**..**	**..**	**..**

[1] **Admissions resulting from ACS conditions**

[2] **Rate ratio (M:F) is the ratio of male to female rates; rate ratios differing significantly from 1.0 are shown with * p <0.05; ** p <0.01**

Figure 3.1: Avoidable[1] and unavoidable hospitalisations, by sex, Australia, 2001/02



[1] **Admissions resulting from ACS conditions**

3.2 Avoidable hospitalisations by age and sex

Over one quarter (27.1%) of admissions resulting from ambulatory care-sensitive (ACS) conditions occurred in the 75 years and over age group, with more than one fifth (22.1%) in the 45 to 64 years age group (Table 3.2). These two age groups alone contributed to 271,837 avoidable hospitalisations, almost half (49.2%) of all avoidable hospitalisations in this period. The 15 to 24 years age group had the lowest proportion with only 5.0%, with the next lowest proportion for people aged 25 to 44 years (13.4%).

The 75 years and over age group had the highest rate of avoidable admissions, 13,426.8 admissions per 100,000 population, followed by the 65 to 74 age group, with 7,344.8 admissions per 100,000 population. The highest rate among the remaining age groups was at ages 45 to 64 years.

Table 3.2: Avoidable hospitalisations[1] by age and sex, Australia, 2001/02

Age	Number			% of	Rate per 100,000			Rate ratio
(years)	Males	Females	Total	total	Males	Females	Total	M:F[2]
0-14	46,970	35,532	82,502	14.9	2,297.5	1,828.9	2,069.2	1.26**
15-24	11,317	16,080	27,397	5.0	837.4	1,233.4	1,031.8	0.68**
25-44	33,856	40,167	74,023	13.4	1,166.0	1,365.5	1,266.4	0.85**
45-64	65,865	56,311	122,176	22.1	2,921.5	2,518.7	2,721.0	1.16**
65-74	54,743	42,274	97,017	17.6	8,565.0	6,200.8	7,344.8	1.38**
75+	69,367	80,294	149,661	27.1	15,854.3	11,858.3	13,426.8	1.34**
Total	**282,125**	**270,661**	**552,786**	**100.0**	**2,929.5**	**2,766.8**	**2,847.5**	**1.06****

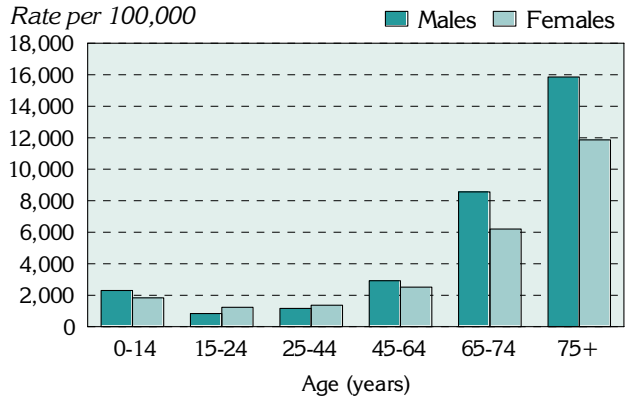
[1] **Admissions resulting from ACS conditions**

[2] **Rate ratio (M:F) is the ratio of male to female hospitalisation rates; rate ratios differing significantly from 1.0 are shown with * p <0.05; ** p <0.01.**

As noted, the overall hospitalisation rates for ambulatory care-sensitive conditions were similar for males and females, a rate ratio of 1.06**; however there was marked variation between the age groups (Figure 3.2). Males in the 65 to 74 year age group had 38.0% more admissions than the same aged females (a rate ratio of 1.38**); similarly, the 75 years and over age group had 34.0% more admissions. Males aged 0 to 14 years had 26.0% more avoidable admissions than females at these ages, while the rate for 45 to 64 year old males was 16.0% higher.

However, avoidable hospitalisation rates for males were lower than for females in the 15 to 24 (32.0% lower, a rate ratio of 0.68**), and 25 to 44 (15.0%) age groups.

Figure 3.2: Avoidable hospitalisations[1] by age and sex, Australia, 2001/02



[1] **Admissions resulting from ACS conditions**

3.3 Avoidable hospitalisations by condition

Table 3.3 shows the number, rate and proportion of avoidable hospitalisations (admissions for ambulatory care-sensitive conditions) by sub-category and individual condition.

Almost two-thirds of hospital admissions for ACS conditions are attributable to chronic conditions. The high proportion of admissions for chronic conditions in this period can be primarily attributed to the large number of hospitalisations for diabetes complications (accounting for 25.6% of all avoidable hospitalisations), with a number of circulatory and respiratory conditions contributing to a further 34.0%: these are chronic obstructive pulmonary disease (9.9%), angina (9.0%), congestive heart failure (7.7%) and asthma (7.4%).

Dental conditions (7.9%); dehydration and gastroenteritis (6.8%); ear, nose and throat infections (5.8%); convulsions and epilepsy (5.6%); and cellulitis (5.1%) make the greatest contribution to hospitalisations for acute conditions.

Influenza and pneumonia (2.4%) is the main admission cause for vaccine-preventable conditions.

Table 3.3: Avoidable hospitalisations[1] by sub-category and condition, Australia, 2001/02

Sub-category and condition	Number	Rate[2]	% of total
Vaccine-preventable	**16,573**	**85.4**	**3.0**
Influenza and pneumonia	13,021	67.1	2.4
Other vaccine preventable	3,552	18.3	0.6
Chronic	**352,558**	**1,803.2**	**63.8**
Diabetes complications	141,345	728.1	25.6
Nutritional deficiencies	123	0.6	–
Iron deficiency anaemia	16,451	84.7	3.0
Hypertension	6,354	32.7	1.1
Congestive heart failure	42,447	218.6	7.7
Angina	49,963	257.4	9.0
Chronic obstructive pulmonary disease	54,853	282.6	9.9
Asthma	41,009	211.3	7.4
Acute	**201,493**	**1,037.7**	**36.5**
Dehydration and gastroenteritis	37,766	194.5	6.8
Convulsions and epilepsy	31,137	160.4	5.6
Ear, nose and throat infections	32,075	165.2	5.8
Dental conditions	43,667	224.9	7.9
Perforated/bleeding ulcer	5,795	29.9	1.0
Ruptured appendix	3,866	19.9	0.7
Pyelonephritis	7,386	38.0	1.3
Pelvic inflammatory disease	6,547	33.7	1.2
Cellulitis	28,204	145.3	5.1
Gangrene	4,470	23.0	0.8
Total avoidable admissions[3]	**552,786**	**2,847.5**	**100.0**

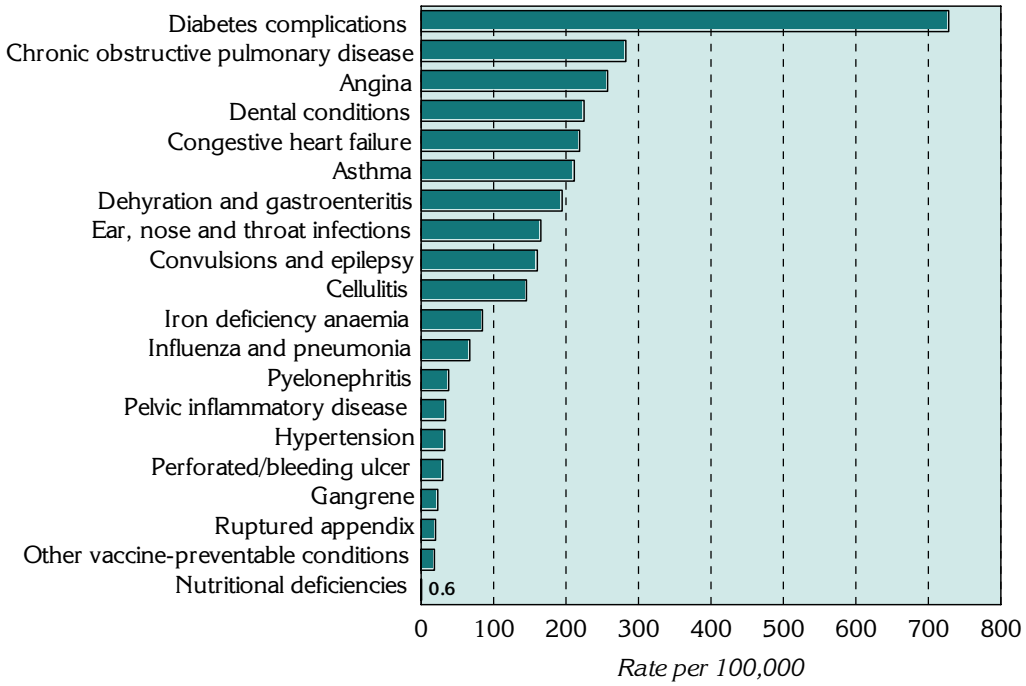
[1] **Admissions resulting from ACS conditions**

[2] **Rate per 100,000 population**

[3] **Sub-category and condition numbers, rates and percentages do not add to the reported total avoidable admissions: five conditions (influenza & pneumonia, other vaccine preventable, diabetes complications, ruptured appendix and gangrene) are counted in 'any diagnosis', so may be included in more than one condition group**

The five conditions with the highest admission rates (Figure 3.3 and Table 3.4) were diabetes complications, chronic obstructive pulmonary disease, angina, dental conditions and congestive heart failure, respectively. Together, they comprised 60% of all avoidable hospital admissions in 2001/02.

Figure 3.3: Avoidable hospitalisations[1] by condition, Australia, 2001/02



[1] **Admissions resulting from ACS conditions**

Diabetes complications were the leading cause of avoidable hospitalisations, with a rate of 728.1 admissions per 100,000 population (Table 3.4). Chronic obstructive pulmonary disease, with a rate of 282.6 admissions per 100,000 population, was ranked next, followed by angina, with a rate of 257.4. Combined, these three conditions accounted for almost one half (44.5%) of avoidable hospital admissions.

The rates for the other causes of avoidable hospitalisations ranged from 0.6 admissions per 100,000 population for nutritional deficiencies (less than one per cent of total avoidable hospitalisations), to 224.9 admissions per 100,000 population for dental conditions (7.9% of total avoidable hospitalisations).

Table 3.4: Avoidable hospitalisations[1] by condition rank, Australia, 2001/02

Conditions	Number	Rate[2]	% of total[3]
Diabetes complications	141,345	728.1	25.6
Chronic obstructive pulmonary disease	54,853	282.6	9.9
Angina	49,976	257.4	9.0
Dental conditions	43,667	224.9	7.9
Congestive heart failure	42,447	218.6	7.7
Asthma	41,009	211.3	7.4
Dehydration and gastroenteritis	37,766	194.5	6.8
Ear, nose and throat infections	32,075	165.2	5.8
Convulsions and epilepsy	31,137	160.4	5.6
Cellulitis	28,204	145.3	5.1
Iron deficiency anaemia	16,451	84.7	3.0
Influenza and pneumonia	13,021	67.1	2.4
Pyelonephritis	7,386	38.0	1.3
Pelvic inflammatory disease	6,547	33.7	1.2
Hypertension	6,354	32.7	1.1
Perforated/bleeding ulcer	5,795	29.9	1.0
Gangrene	4,470	23.0	0.8
Ruptured appendix	3,866	19.9	0.7
Other vaccine-preventable conditions	3,552	18.3	0.6
Nutritional deficiencies	123	0.6	–

[1] **Admissions resulting from ACS conditions**
[2] **Rate per 100,000 population**
[3] **Proportion of all avoidable admissions**

Avoidable hospitalisations by condition and age

Table 3.5 shows variations in hospital admissions for the top four ambulatory care-sensitive conditions by selected age groups.

In the 0 to 14 year age group, asthma was the most common cause of hospitalisation, with a rate of 525.1 admissions per 100,000 population. The next highest causes of avoidable hospitalisation – ear, nose and throat infections (511.6 admissions per 100,000 population) and dental conditions (492.5 admissions per 100,000 population), together with asthma – accounted for almost three-quarters (73.8%) of all avoidable hospital admissions in this age group.

The rates, and therefore the proportion, of admissions for the top three causes of avoidable hospitalisations in the 15 to 24 year age group were similar. Ear, nose and throat infections accounted for 14.0% of avoidable admissions, a rate of 144.4 admissions per 100,000 population in this age group. Asthma; and dehydration and gastroenteritis were the conditions with the next highest admission rates, with 143.5 and 143.1 admissions per 100,000 population, respectively, each accounting for 13.9% of avoidable hospital admissions at these ages.

In the 25 to 44 year age group, diabetes complications were the leading cause of avoidable hospitalisation, with a rate of 208.9 per 100,000 population. Over half (53.5%) of all avoidable hospitalisations in this age group are attributable to the top four causes: 16.5% of admissions were from diabetes complications, 13.4% from dehydration and gastroenteritis, 12.8% from dental conditions and 10.8%, convulsions and epilepsy.

At ages 45 to 64 years, just over one-third (34.0%) of avoidable hospitalisations were attributable to diabetes complications, a rate of 924.1 admissions per 100,000 population. With a much lower rate and percentage, angina ranked second, 347.7 admissions per 100.0000 population aged 45 to 64 years, accounting for 12.8% of avoidable hospital admissions. Chronic obstructive pulmonary disease accounted for 9.6% of admissions for this age group (a rate of 261.8 per 100,000 population), while dehydration and gastroenteritis contributed to 8.0% of admissions, or 217.3 admissions per 100,000 population aged 45 to 64 years.

Diabetes complications, chronic obstructive pulmonary disease and angina were also important causes of avoidable hospital admissions in the 65 to 74 year age group. Diabetes complications accounted for 39.8% of avoidable hospitalisations (a rate of 2,926.8 admissions per 100,000 population), and chronic obstructive pulmonary disease for 17.9% of admissions (1,317.4 per 100,000 population). When combined, over one-fifth of avoidable hospital admissions in this age group were attributable to angina (12.9%) and congestive heart failure (8.8%).

The 75 year and over age group had the highest admission rates for these conditions, overall and for each of the conditions shown, ranging from 1,762.0 admission per 100,000 for angina, to 4,087.7 admissions per 100,000 for diabetes complications. The top two causes accounted for half of all avoidable hospitalisations for this age group; diabetes complications accounted for a further 30.4% of admissions, and congestive heart failure for 19.1%.

Table 3.5: Avoidable hospitalisations[1] by selected condition and age, Australia, 2001/02

Age (years)	Condition	Number	Rate[2]	Per cent[3]
0-14	Asthma	20,936	525.1	25.4
	Ear, nose and throat infections	20,400	511.6	24.7
	Dental conditions	19,635	492.5	23.8
	Convulsions and epilepsy	10,504	263.4	12.7
	Other	11,027	276.5	13.4
	Total	**82,502**	**2,069.2**	**100.0**
15-24	Ear, nose and throat infections	3,833	144.4	14.0
	Asthma	3,810	143.5	13.9
	Dehydration and gastroenteritis	3,800	143.1	13.9
	Dental conditions	3,534	133.1	12.9
	Other	12,420	467.9	45.3
	Total	**27,397**	**1,031.8**	**100.0**
25-44	Diabetes complications	12,208	208.9	16.5
	Dehydration and gastroenteritis	9,892	169.2	13.4
	Dental conditions	9,497	162.5	12.8
	Convulsions and epilepsy	7,984	136.6	10.8
	Other	34,442	589.2	46.5
	Total	**74,023**	**1,266.4**	**100.0**
45-64	Diabetes complications	41,493	924.1	34.0
	Angina	15,614	347.7	12.8
	Chronic obstructive pulmonary disease	11,754	261.8	9.6
	Dehydration and gastroenteritis	9,759	217.3	8.0
	Other	43,556	970.0	35.6
	Total	**122,176**	**2,721.0**	**100.0**
65-74	Diabetes complications	38,660	2,926.8	39.8
	Chronic obstructive pulmonary disease	17,401	1,317.4	17.9
	Angina	12,476	944.5	12.9
	Congestive heart failure	8,573	649.0	8.8
	Other	19,907	1,507.0	20.5
	Total	**97,017**	**7,344.8**	**100.0**
75+	Diabetes complications	45,563	4,087.7	30.4
	Congestive heart failure	28,629	2,568.5	19.1
	Chronic obstructive pulmonary disease	24,057	2,158.3	16.1
	Angina	19,646	1,762.0	13.1
	Other	31,766	2,850.1	21.2
	Total	**149,661**	**13,426.8**	**100.0**

[1] **Admissions resulting from ACS conditions**
[2] **Age standardised rate per 100,000 population**
[3] **Per cent is the proportion of total ACS conditions within the relevant age group**

Avoidable hospitalisations by condition, age and sex

The main ambulatory care-sensitive conditions impacting on rates of avoidable hospital admissions at different ages show interesting variations when further analysed by sex (Table 3.6).

Apart from the 65 to 74 and (to a lesser extent) 75 and over age groups, there were clear differences in the rankings of the main conditions for avoidable admissions for males and females.

In the 0 to 14 year age group, asthma was the reported principal diagnosis for 28.5% of avoidable admissions for males and 21.2% for females; moreover males had a hospitalisation rate 69.0% higher than females (a rate ratio of 1.69**). Ear, nose and throat infections were responsible for 24.7% of avoidable hospitalisations for both males and females. Again, males had a higher admission rate for this condition (26.0% higher, a rate ratio of 1.26**). Dental conditions (ranked highest for females) accounted for 22.2% of hospitalisations for males and 25.9% for females in this age group. Convulsions and epilepsy was the fourth ranked cause of admission for both males and females, accounting for 12.2% and 13.4%, respectively.

In the 15 to 24 year age group, the rank order for major conditions attributed to avoidable admissions varied markedly for males and females.

Convulsions and epilepsy were responsible for15.3% of male avoidable hospitalisations (ranked first), but just 8.8% of female avoidable hospitalisations (ranked sixth) in this age group. The rates for convulsions and epilepsy were 127.8 per 100,000 for males and 108.3 per 100,000 for females, a difference of 18.0%. For males, the conditions with the next highest rates of avoidable hospital admissions were ear, nose and throat infections; dental conditions; and dehydration and gastroenteritis; each contributing to between 13.4% and 13.9% of total hospitalisations for males in this age group. For females, avoidable hospitalisations for asthma ranked highest, accounting for 14.7% of avoidable admissions in this age group, with a rate of 180.9 admissions per 100,000 females. Dehydration and gastroenteritis; and ear, nose and throat infections were the next two highest ranked conditions leading to avoidable hospitalisations in females aged 15 to 24 years, accounting for 14.2% and 14.1% of hospital admissions, respectively.

Diabetes complications accounted for 19.8% of male avoidable hospitalisations at ages 25 to 44 years, a rate of 231.4 admissions per 100,000 males, with convulsions and epilepsy ranked second, accounting for 14.1% of male hospitalisations. Admissions from dehydration and gastroenteritis ranked highest for females in this age group, and were responsible for 14.6% of avoidable admissions for females, a rate of 199.8 admissions per 100,000 females. Diabetes complications ranked second, contributing to 13.7% of female hospitalisations in this age group, followed by dental conditions (12.9%). The proportion of male avoidable admissions for dental conditions was similar to that for females in this age group, at 12.7%; however, male admission rates were 16.0% lower (a rate ratio of 0.84**), with 176.3 admissions per 100,000 females, compared to the male rate of 148.5 admissions per 100,000 males.

Diabetes complications were the main ambulatory care-sensitive condition leading to hospitalisation for both males and females in the 45 to 64 year age group. There were over 50% more admissions resulting from diabetes complications for males in this age group (a rate ratio of 1.57**), 1,129.3 admissions per 100,000 males, compared to 717.2 admissions per 100,000 females. The rates of avoidable admissions resulting from chronic obstructive pulmonary disease were similar for males and females in this age group, 261.3 and 262.2, respectively. Males in this age group had a 46.0% higher rate of hospitalisation for cellulitis than females (a rate ratio of 1.46**), and had almost twice the rate of admissions for angina (a rate ratio of 1.94**). In contrast, males in this age group had a 37.0% lower rate of admission for dehydration and gastroenteritis.

The top four ambulatory care-sensitive conditions were the same for males and females in the 65 to 74 year old age group; however the rates of admission for males and females varied substantially. Diabetes complications was again the main admission condition, contributing 42.6% of male admissions, or 3,646.8 admissions per 100,000 males aged from 65 to 74 years old. The rate of avoidable hospitalisations for diabetes complications in females in this age group was 2,251.9 admissions per 100,000 women, and accounted for 36.3% of admissions for avoidable conditions. Chronic obstructive pulmonary disease was the next most common diagnosis, with rates of 1,569.0 admissions per 100,000 males and 1,081.5 admissions per 100,000 females. Furthermore, the rates of avoidable admissions for angina and congestive heart failure are both over 50% higher for males than for females, with rate ratios of 1.59** and 1.57**, respectively.

For both males and females, diabetes complications were the main contributor to avoidable hospitalisations in the 75 years and over age group, with rates at 5,178.6 admissions per 100,000 males and 3,382.7 admissions per 100,000 females. One fifth (20.3%) of male admissions in this age group were due to chronic obstructive pulmonary disease, with a further 17.7% of admissions attributable to congestive heart failure. The admission rates for males with chronic obstructive pulmonary disease were over two times the female rates (a rate ratio of 2.17**), with 3,210.5 admissions per 100,000 males compared with 1,478.3 admissions per 100,000 women in this age group. Angina was the third most common ambulatory care-sensitive condition for females aged 75 years and over, accounting for 13.6% of avoidable hospitalisations in this age group; for males, it was the fourth most common admission, contributing to 12.5% of avoidable hospitalisations in this age group.

Table 3.6: Avoidable hospitalisations[1] by selected condition, age and sex, Australia, 2001/02

Age (years)	Selected condition	Males				Females				RR–M:F[5]
		No.	Rate[2]	%[3]	Rank[4]	No.	Rate[2]	%[3]	Rank[4]	
0-14	Asthma	13,400	655.5	28.5	1	7,536	387.9	21.2	3	1.69**
	Ear, nose and throat infections	11,617	568.2	24.7	2	8,783	452.1	24.7	2	1.26**
	Dental conditions	10,425	509.9	22.2	3	9,210	474.1	25.9	1	1.08**
	Convulsions and epilepsy	5,725	280.0	12.2	4	4,779	246.0	13.4	4	1.14**
	Other	5,803	283.9	12.3	..	5,224	268.8	14.7	..	1.06**
	Total	**46,970**	**2,297.5**	**100.0**	**..**	**35,532**	**1,828.9**	**100.0**	**..**	**1.26****
15-24	Convulsions and epilepsy	1,727	127.8	15.3	1	1,412	108.3	8.8	6	1.18**
	Ear, nose and throat infections	1,573	116.4	13.9	2	2,260	173.4	14.1	3	0.67**
	Dental conditions	1,558	115.3	13.8	3	1,976	151.6	12.3	4	0.76**
	Dehydration and gastroenteritis	1,520	112.5	13.4	4	2,280	174.9	14.2	2	0.64**
	Asthma	1,451	107.4	12.8	5	2,359	180.9	14.7	1	0.59**
	Other	3,488	258.0	30.9	..	5,793	444.3	36.0	..	0.58**
	Total	**11,317**	**837.4**	**100.0**	**..**	**16,080**	**1,233.4**	**100.0**	**..**	**0.68****
25-44	Diabetes complications	6,719	231.4	19.8	1	5,489	186.6	13.7	2	1.24**
	Convulsions and epilepsy	4,776	164.5	14.1	2	3,208	109.1	8.0	6	1.51**
	Dental conditions	4,312	148.5	12.7	3	5,185	176.3	12.9	3	0.84**
	Cellulitis	4,066	140.0	12.0	4	2,003	68.1	5.0	7	2.06**
	Dehydration and gastroenteritis	4,015	138.3	11.8	5	5,877	199.8	14.6	1	0.69**
	Asthma	2,107	72.6	6.2	6	4,291	145.9	10.7	4	0.50**
	Other	7,861	270.7	23.2	..	14,114	479.7	35.1	..	0.56**
	Total	**33,856**	**1,166.0**	**100.0**	**..**	**40,167**	**1,365.5**	**100.0**	**..**	**0.85****
45-64	Diabetes complications	25,459	1,129.3	38.7	1	16,034	717.2	28.5	1	1.57**
	Angina	10,324	457.9	15.7	2	5,290	236.6	9.4	4	1.94**
	Chronic obstructive pulmonary disease	5,892	261.3	8.9	3	5,862	262.2	10.4	3	1.00
	Cellulitis	4,189	185.8	6.4	4	2,848	127.4	5.1	8	1.46**
	Dehydration and gastroenteritis	3,803	168.7	5.8	5	5,956	266.4	10.6	2	0.63**
	Other	16,198	718.5	24.6	..	20,321	908.9	36.1	..	0.79**
	Total	**65,865**	**2,921.5**	**100.0**	**..**	**56,311**	**2,518.7**	**100.0**	**..**	**1.16****
65-74	Diabetes complications	23,308	3,646.8	42.6	1	15,352	2,251.9	36.3	1	1.62**
	Chronic obstructive pulmonary disease	10,028	1,569.0	18.3	2	7,373	1,081.5	17.4	2	1.45**
	Angina	7,465	1,168.0	13.6	3	5,011	735.0	11.9	3	1.59**
	Congestive heart failure	5,104	798.6	9.3	4	3,469	508.8	8.2	4	1.57**
	Other	8,838	1,382.6	16.1	..	11,069	1,623.6	26.2	..	0.85**
	Total	**54,743**	**8,565.0**	**100.0**	**..**	**42,274**	**6,200.8**	**100.0**	**..**	**1.38****
75+	Diabetes complications	22,658	5,178.6	32.7	1	22,905	3,382.7	28.5	1	1.53**
	Chronic obstructive pulmonary disease	14,047	3,210.5	20.3	2	10,010	1,478.3	12.5	4	2.17**
	Congestive heart failure	12,256	2,801.2	17.7	3	16,373	2,418.1	20.4	2	1.16**
	Angina	8,693	1,986.8	12.5	4	10,953	1,617.6	13.6	3	1.23**
	Other	11,713	2,677.2	16.9	..	20,053	2,961.6	25.0	..	0.90**
	Total	**69,367**	**15,854.3**	**100.0**	**..**	**80,294**	**11,858.3**	**100.0**	**..**	**1.34****

[1] Admissions resulting from ACS conditions
[2] Age-sex standardised rate per 100,000 population
[3] Per cent is the proportion of total ACS conditions within the relevant age-sex group
[4] Rank is the rank order of the rates for the top four causes of avoidable hospitalisations for males and females: note that in some cases the rank order differs between males and females, resulting in the inclusion of more than four causes
[5] RR–M:F is the ratio of male to female hospitalisation rates; rate ratios differing significantly from 1.0 are shown with * $p < 0.05$; ** $p < 0.01$

3.4 Avoidable hospitalisations by State/Territory

The State and Territory rates of admission for ambulatory care-sensitive conditions, as shown in Table 3.7 below, were highest in the Northern Territory (a rate of 4,335.2 per 100,000), and in Tasmania (3,119.3 admissions per 100,000 population).

The lowest rates of avoidable admissions occurred in the Australian Capital Territory (ACT) (1,558.3 per 100,000) and in New South Wales (2,543.8 admissions per 100,000 population). The remaining State and Territory admission rates ranged from 2,915.7 per 100,000 in South Australia, to 3,062.4 per 100,000 in Western Australia.

Table 3.7: Total and avoidable hospitalisations[1] by State/ Territory, Australia, 2001/02

State/ Territory	Avoidable		Total hospitalisations		% Avoidable (of total)
	Number	Rate[2]	Number	Rate[2]	
New South Wales	170,066	2,543.8	1,980,967	29,798.8	8.6
Victoria	145,135	2,983.2	1,655,572	34,071.5	8.8
Queensland	106,884	3,025.0	1,260,403	35,435.5	8.5
South Australia	47,247	2,915.7	554,300	34,952.2	8.5
Western Australia	55,102	3,062.4	623,504	34,070.5	8.8
Tasmania	15,404	3,119.3	143,695	29,651.0	10.7
Northern Territory	6,057	4,335.2	64,081	41,217.3	9.5
ACT	4,272	1,558.3	52,090	17,869.6	8.2
Australia[3]	**552,786**	**2,847.5**	**6,370,985**	**32,818.2**	**8.7**

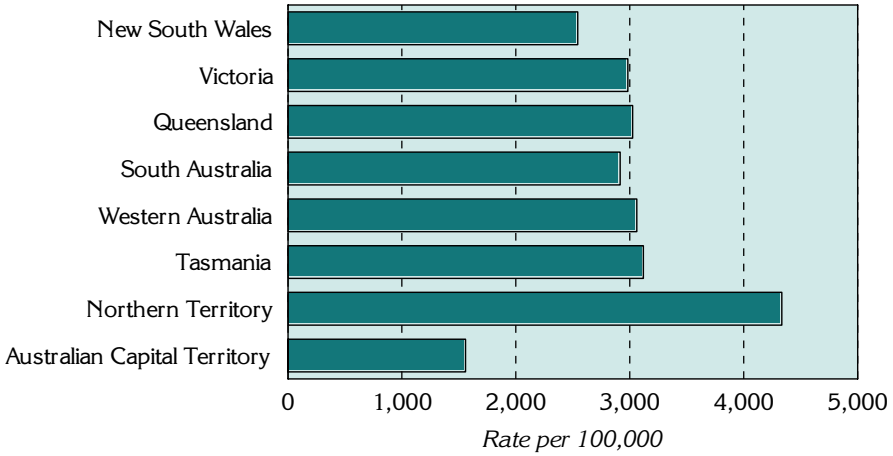
[1] **Admissions resulting from ACS conditions**
[2] **Rate per 100,000 population**
[3] **The State/ Territory totals do not sum to the total for Australia due to the exclusion of overseas and unknown addresses from the State/ Territory totals**

The Northern Territory, with 10.7%, and Tasmania, 9.5%, both had higher proportions of avoidable hospital admissions compared to the national average of 8.7% (Table 3.7).

Besides the Australian Capital Territory, where the proportion of total avoidable hospitalisations was below the national average, the five remaining States all had proportions consistent with the national average, ranging from 8.5% in Queensland and South Australia, to 8.8% in Victoria and Western Australia.

Figure 3.4 below illustrates the variations in admission rates for ambulatory care-sensitive conditions across the States and Territories.

Figure 3.4: Avoidable hospitalisations[1] by State/ Territory, Australia, 2001/02



[1] **Admissions resulting from ACS conditions**

Avoidable hospitalisations by State/ Territory and condition

Table 3.8 shows the rates of avoidable hospitalisations by sub-category and individual condition for Australia and the States and Territories.

In all States and Territories, the highest rates of hospital admissions for ambulatory care-sensitive conditions were attributable to chronic conditions, with diabetes complications consistently the highest ranked condition.

In New South Wales, Victoria, Tasmania and the Northern Territory, the second highest rate of avoidable admissions for chronic conditions – and the second highest rate of all avoidable admissions – was from chronic obstructive pulmonary disease. In Queensland and the Australian Capital Territory the rates of avoidable admissions for angina; and, in South Australia, asthma, were ranked second. In Western Australia, the second ranked chronic condition contributing to avoidable admissions was from chronic obstructive pulmonary disease – albeit ranked third overall (the rate for dental conditions in Western Australia was higher).

Of the avoidable admissions for acute conditions, dental conditions ranked highest in Victoria, Queensland, South Australia and Western Australia. In New South Wales and Tasmania, dehydration and gastroenteritis was the highest ranked acute condition. In the Northern Territory, cellulitis was the highest ranked acute condition, with a rate over twice that of all the other States and Territories. In the Australian Capital Territory, convulsions and epilepsy ranked highest in this category.

Table 3.8: Avoidable hospitalisations[1] by State/ Territory and condition, 2001/02

Rate per 100,000 population

Sub-category/ condition	Aust	NSW	Vic	Qld	SA	WA	Tas	NT	ACT
Vaccine-preventable	**85.4**	**84.5**	**68.0**	**89.6**	**92.9**	**110.7**	**79.4**	**238.4**	**31.3**
Influenza and pneumonia	67.1	64.1	52.0	74.6	67.0	96.2	69.0	181.9	25.6
Other vaccine-preventable diseases	18.3	20.4	16.0	15.0	25.9	14.5	10.4	56.5	5.7
Chronic	**1,816.0**	**1,586.6**	**1,983.2**	**1,882.6**	**1,837.9**	**1,916.9**	**2,233.0**	**3,642.9**	**1,078.7**
Diabetes complications	728.1	519.5	906.9	722.9	692.9	873.6	1,246.8	1,748.2	420.7
Nutritional deficiencies	0.6	0.5	0.6	0.6	0.3	1.3	#	5.1	#
Iron deficiency anaemia	84.7	67.0	105.9	79.7	76.1	113.4	83.7	91.7	62.0
Hypertension	32.7	35.7	27.7	38.3	31.6	29.0	30.8	26.2	6.5
Congestive heart failure	218.6	209.7	234.1	225.5	219.1	202.9	180.1	422.9	141.1
Angina	257.4	251.8	250.4	321.5	221.6	198.5	260.4	408.3	183.7
Chronic obstructive pulmonary disease	282.6	285.6	260.7	308.5	272.9	275.9	293.4	751.4	154.6
Asthma	211.3	216.8	196.9	185.6	323.4	222.3	137.8	189.1	110.1
Acute	**1,034.8**	**945.8**	**1,041.7**	**1,143.3**	**1,077.6**	**1,120.5**	**879.3**	**1,256.9**	**526.6**
Dehydration and gastroenteritis	194.5	176.4	200.0	234.1	194.8	188.7	179.4	109.2	78.3
Convulsions and epilepsy	160.4	168.1	152.4	162.3	143.6	146.7	161.0	260.9	112.8
Ear, nose and throat infections	165.2	161.1	140.5	184.4	210.9	184.4	119.5	159.3	95.8
Dental conditions	224.9	170.3	256.7	247.8	259.2	294.3	163.1	155.0	63.9
Perforated/bleeding ulcer	29.9	27.1	32.9	25.8	32.5	37.1	24.9	23.6	29.6
Ruptured appendix	19.9	18.5	17.9	20.7	17.0	29.4	21.5	17.0	15.7
Pyelonephritis	38.0	31.0	40.2	39.8	44.7	48.7	19.5	72.6	23.8
Pelvic inflammatory disease	33.7	32.7	34.8	36.2	33.7	30.2	32.1	51.2	12.2
Cellulitis	145.3	142.0	139.0	167.4	124.1	135.9	118.5	354.8	85.4
Gangrene	23.0	18.6	27.3	24.8	17.1	25.1	39.8	53.3	9.1
Total admissions[2]	**2,847.5**	**2,543.8**	**2,983.2**	**3,025.0**	**2,915.7**	**3,062.4**	**3,119.3**	**4,335.2**	**1,558.3**

[1] **Admissions resulting from ACS conditions**

[2] **Sub-category and condition numbers and rates do not add to the reported total avoidable admissions: five conditions (influenza & pneumonia, other vaccine preventable, diabetes complications, ruptured appendix and gangrene) are counted in 'any diagnosis', so may be included in more than one condition group**

 # Rate not shown or not calculated, as there are fewer than five admissions over the period shown

Introduction to map and text pages

The following pages include maps of total avoidable hospitalisations and the top ten ambulatory care-sensitive conditions by health region[7], and include:

- a table showing age standardised admission rates for the States and Territories;
- a discussion of the mapped rates by health region; and
- a figure showing the age standardised admission rates by the ASGC remoteness classification[8].

A key to the areas mapped is included in Appendix 1.3.

Additional notes regarding the map and text pages

The text discussing the rates by health region[8] focuses on the highest and lowest rates mapped within each State and Territory.

Rates were not mapped if there were fewer than five admissions. Where the discussion includes rates based on fewer than 20 reported admissions, the number of admissions is shown in brackets after the rate.

The numbers and rates by health region are available at www.publichealth.gov.au.

[7] Refer to *Glossary and Symbols used*, page ix, for specific State/ Territory terminology

[8] See Chapter 2, *Methods*

Avoidable hospitalisations, Australia, 2001/02

In 2001/02, the admission rates for ambulatory care-sensitive conditions ranged from 1,558.5 admissions per 100,000 population in the Australian Capital Territory, to 4,335.2 admissions per 100,000 population in the Northern Territory (Table 3.9). The admission rate for Australia overall was 2,847.5 per 100,000 population.

Table 3.9: Avoidable hospitalisations[1] by State/ Territory, Australia, 2001/02

Rate per 100,000 population

NSW	Vic.	Qld	SA	WA	Tas.	NT	ACT	Total
2,543.8	2,983.2	3,025.0	2,915.7	3,062.4	3,119.3	4,335.2	1,558.3	2,847.5

[1] **Admissions resulting from ACS conditions**

By health region (Map 3.1)

In **New South Wales**, the Greater Western Area Health Service (AHS), with 3,912.4 admissions per 100,000 population, had the highest rate of avoidable hospitalisations: Greater Southern AHS had a rate of 3,260.1. The lowest rates occurred in the North Sydney Central Coast AHS (2,118.7 admissions per 100,000 population) and Sydney South West AHS (2,224.0).

The highest rates in **Victoria** were in the Wimmera Primary Care Partnership (PCP) (4,665.5 admissions per 100,000 population), South West PCP (4,614.7) and Central West Gippsland PCP (4,531.7). The lowest rates were in the Inner East (2,191.6 admissions per 100,000 population), Banyule/Nillumbik (2,367.4) and the Outer East (2,491.8) PCPs.

In **Queensland**, rates of avoidable hospitalisation were highest in the northern and western areas of the State. The Cape Yorke District Health Service (DHS) had the highest regional rate of avoidable hospitalisations in Australia, with 11,118.4 admissions per 100,000 population. Torres DHS (7,436.7) and Mt Isa DHS (7,253.4) also had high rates. The lowest rates were in Prince Charles Hospital & District (2,497.0 admissions per 100,000 population) and Cairns DHS (2,522.6).

The highest rates in **South Australia** were in the Northern & Far Western Health Region (HR) (5,393.2 admissions per 100,000 population), followed by the Eyre HR, with a rate of 3,954.2. Central Northern Adelaide Health Service and Hills Mallee Southern HR had the lowest rates in the State, with 2,692.7 and 2,810.1 admissions per 100,000 population, respectively.

The highest rates of avoidable hospitalisation in **Western Australia** were in the Pilbara & Gascoyne Health Region (7,760.5), the Kimberley HR (7,602.9) and the Goldfields & South East Coastal HR (7,365.7). The lowest rates of avoidable hospitalisations were in the North Metro (2,553.4 admissions per 100,000 population) and South Metro (2,626.6) HRs.

Avoidable hospitalisation rates in **Tasmania** were highest in North West Region, with 3,341.7 admissions per 100,000 population, and the lowest in North Region, a rate of 2,876.6. The rate for South Region was 3,156.1 admissions per 100,000 population.

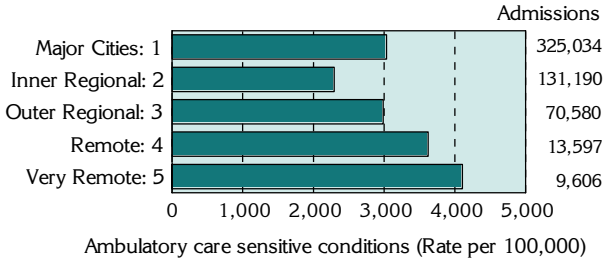
In the **Northern Territory**, Barkly Health Service Area (HSA) had a very high rate of avoidable hospitalisations, with 8,671.6 admissions per 100,000 population. Alice Springs Rural HSA also had a very high rate (7,649.6). Darwin Urban HSA had the lowest rate, with 2,795.9 admissions per 100,000 population.

In the **Australian Capital Territory** (ACT), ACT-Balance had the highest rate of avoidable hospitalisations, with 8,009.0 admissions per 100,000 population, although based on just 195 admissions. The next highest rates were 1,802.8 in South Canberra and 1,753.9 in North Canberra. The lowest rate was in Gungahlin-Hall, with 924.3 admissions per 100,000 population, with rates of 1,327.9 in South Belconnen and 1,331.7 in Weston Creek-Stromlo.

By remoteness

The graph of avoidable hospitalisation rates by remoteness (Figure 3.5) shows the lowest rate of avoidable hospitalisations, 2,293.6 admissions per 100,000 population, in the Inner Regional areas of Australia, below that in the Major Cities class (3,032.1). The rates then increase to 2,985.9 in the Outer Regional areas and 3,620.9 in the Remote areas, with a further increase to 4,105.0 in the Very Remote areas. However, the numbers of avoidable admissions decrease rapidly across the remoteness classes.

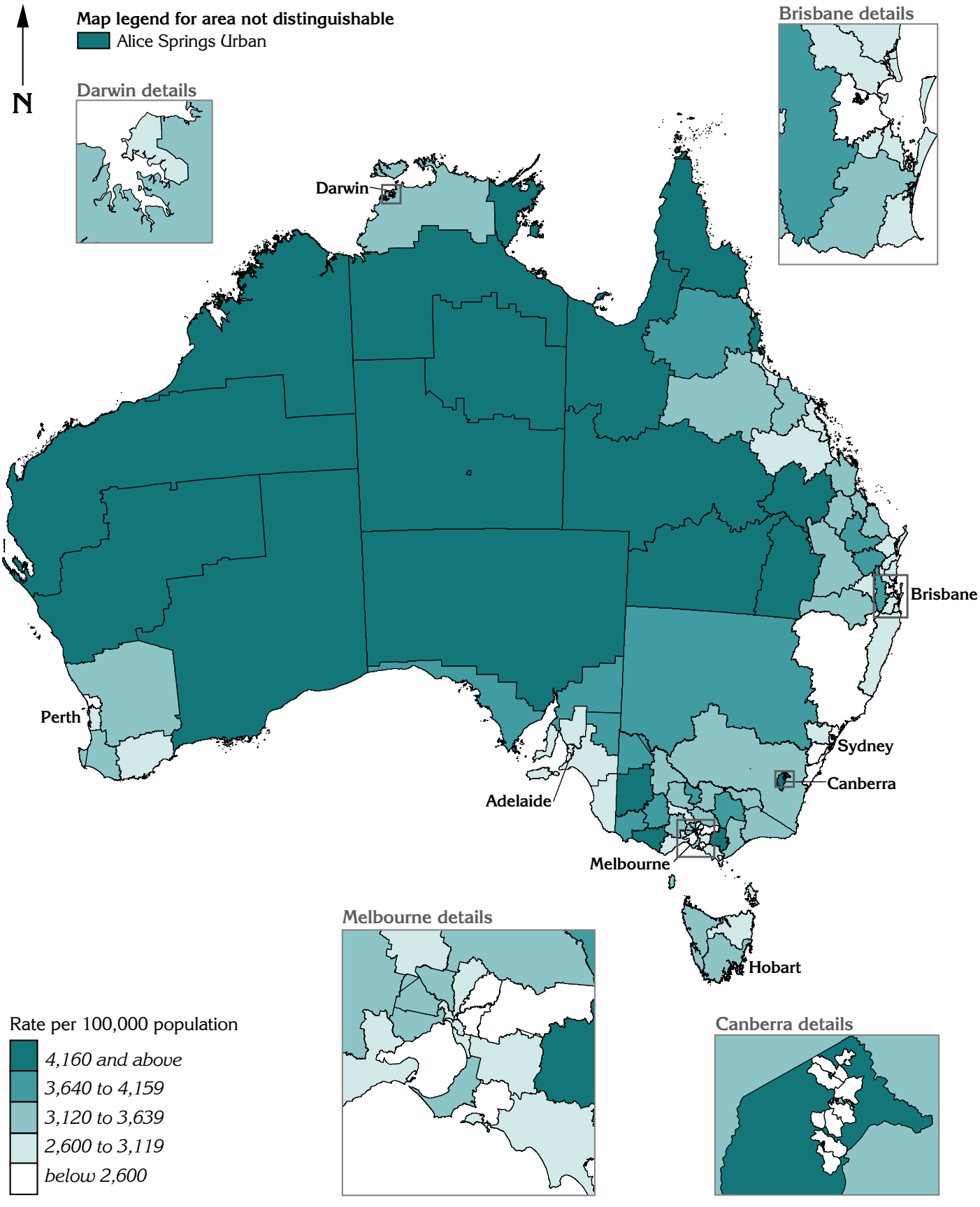
Figure 3.5: Avoidable hospitalisations[1] by remoteness, Australia, 2001/02



[1] **Admissions resulting from ACS conditions**

Map 3.1:
Avoidable hospitalisations: admissions resulting from ACS conditions, Australia, 2001/02

Indirectly age standardised admission rate by health region



Details of map boundaries are in Appendix 1.3

Avoidable hospitalisations: Diabetes complications, Australia, 2001/02

The overall Australian avoidable hospitalisation rate for diabetes complications in 2001/02 was 728.1 per 100,000 population (Table 3.10). The Australian Capital Territory had the lowest admission rate for this condition, with 420.7 admissions per 100,000 population, followed by New South Wales with 519.5 admissions for every 100,000 population. The Northern Territory, with a rate of 1,748.2, and Tasmania, 1,246.8, have the two highest State/ Territory rates for avoidable hospitalisations for diabetes complications in Australia.

Table 3.10: Avoidable hospitalisations[1]: diabetes complications, by State/ Territory, Australia, 2001/02

Rate per 100,000 population

NSW	Vic.	Qld	SA	WA	Tas.	NT	ACT	Total
519.5	906.9	722.9	692.9	873.6	1,246.8	1,748.2	420.7	728.1

[1] **Admissions resulting from ACS conditions**

By health region (Map 3.2)

The highest rates of avoidable hospitalisations for diabetes complications in **New South Wales**, were in the Greater Southern Area Health Service (AHS), with 872.4 admissions per 100,000 population, and the Greater Western AHS, with a rate of 757.2. The lowest rates were in Sydney South West AHS (407.3 admissions per 100,000 population) and North Sydney Central Coast AHS (431.8).

In **Victoria**, the highest regional rate was 2,007.6 admissions per 100,000 population, in the Central West Gippsland Primary Care Partnership (PCP), one and a half times the next highest rate, of 1,301.2, in the Wimmera PCP. The lowest rates were in the South Coast Health Services Consortium (555.1 admissions per 100,000 population) and the Swan Hill-Gannawarra-Buloke (599.3) PCPs.

Avoidable hospitalisation rates for diabetes complications in **Queensland** were highest in the far north of the State: the Cape Yorke District Health Service (DHS) had the highest rate, with 3,878.8 admissions per 100,000 population, followed by Torres DHS (3,443.2) and Tablelands DHS (1,218.2). The lowest rates were in the Central West (341.2 admissions per 100,000 population), Banana (351.4), Southern Downs (361.6) and Fraser Coast (369.7) District Health Services.

In **South Australia,** the rates of hospitalisation from diabetes complications were highest in the Northern & Far Western Health Region (HR), with 1,318.5 admissions per 100,000 population. This rate was three times that of the lowest rate in the State, 438.4, occurring in the Wakefield HR.

Pilbara & Gascoyne and Goldfields & South East Coastal Health Regions in **Western Australia** had the highest regional rates in Australia for avoidable hospitalisations for diabetes complications, of 4,720.0 and 4,702.2 admissions per 100,000 population, respectively. The Great Southern HR had the lowest rate in the State, with 379.0 admissions per 100,000 population.

Rates in **Tasmania** were fairly high overall, with the highest rates in the South and North West Regions, 1,430.4 and 1,246.2, respectively, and a lower rate of 933.2 admissions per 100,000 population in North Region.

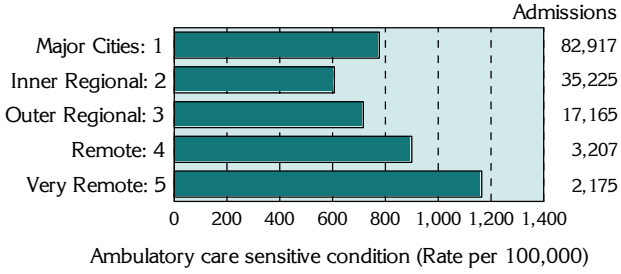
All the avoidable hospitalisation rates for diabetes complications in the **Northern Territory** were particularly high. The rates ranged from 1,182.5 in the Darwin Urban Health Service Area (HSA), to 4,263.8 in Alice Springs Rural HSA. The rates in Barkly HSA were also very high, with 4,226.7 admissions per 100,000 population.

In the **Australian Capital Territory** (ACT), the highest rate of avoidable hospitalisations for diabetes complications (excluding ACT-Balance, with just 36 admissions, a rate of 1,756.6) was in South Tuggeranong, with 652.3 admissions per 100,000 population. Gungahlin-Hall and South Belconnen had the lowest rates in the ACT, with 271.2 and 277.9 admissions per 100,000, respectively.

By remoteness

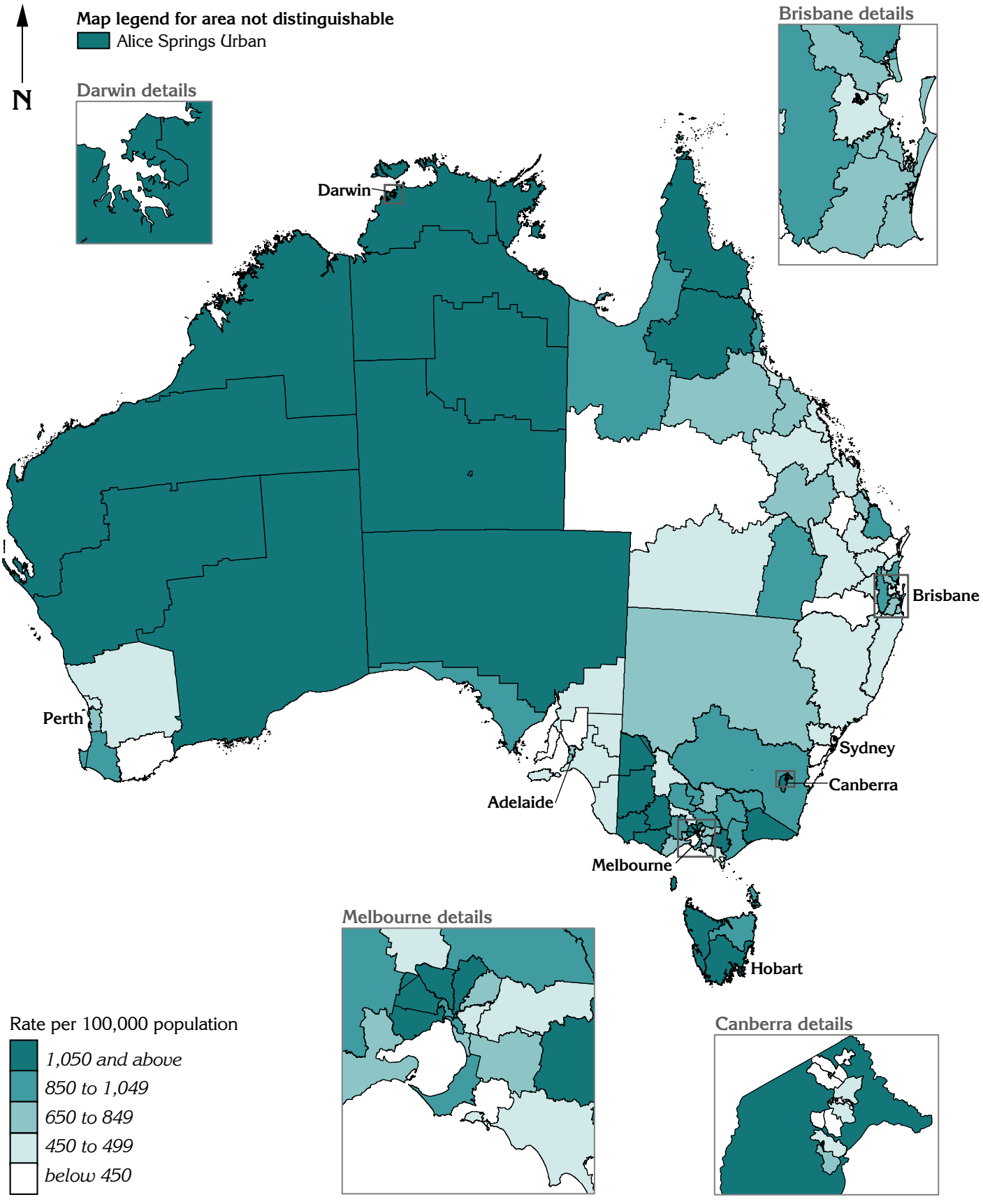
Avoidable hospitalisation rates for diabetes complications are lowest in the Inner Regional areas of Australia, with 606.0 admissions per 100,000 population (Figure 3.6). The rates are highest in the Very Remote areas with 1,137.6 admissions per 100,000 population. The numbers of admissions for these conditions decrease rapidly across the remoteness classes.

Figure 3.6: Avoidable hospitalisations[1]: diabetes complications, by remoteness, Australia, 2001/02



[1] **Admissions resulting from ACS conditions**

Map 3.2
Avoidable hospitalisations: Diabetes complications, Australia, 2001/02
Indirectly age standardised admission rate by health region



Details of map boundaries are in Appendix 1.3

Avoidable hospitalisations: Chronic obstructive pulmonary disease, Australia, 2001/02

The rate of avoidable hospitalisations for chronic obstructive pulmonary disease (COPD) in the Northern Territory (NT) was substantially higher than the Australian average rate, 751.4 admissions per 100,000 population in the NT, compared to 282.6 for Australia (Table 3.11). The Australian Capital Territory had the lowest avoidable hospitalisations rate for COPD, with 154.6 admissions per 100,000 population. The rate of admissions in New South Wales (285.6) was consistent with the Australian average.

Table 3.11: Avoidable hospitalisations[1]: chronic obstructive pulmonary disease, by State/ Territory, Australia, 2001/02

Rate per 100,000 population

NSW	Vic.	Qld	SA	WA	Tas.	NT	ACT	Total
285.6	260.7	308.5	272.9	275.9	293.4	751.4	154.6	282.6

[1] **Admissions resulting from ACS conditions**

By health region (Map 3.3)

The highest avoidable hospitalisation rates for COPD in **New South Wales** were in the Greater Western (457.8 admissions per 100,000 population) and Greater Southern (403.0) Area Health Services (AHS). North Sydney Central Coast AHS had the lowest rate in the State with 214.5 admissions per 100,000 population.

For **Victoria**, rates were highest in South Grampians/ Glenelg (455.4), Campaspe (420.0) and Central Hume (413.0) Primary Care Partnerships (PCPs). The lowest rates were in the PCPs of Inner East (130.3), Northern Mallee (177.6) and Banyule/ Nillumbik (189.6).

In **Queensland**, Mt Isa (1,256.6) and Cape York (1,044.0) District Health Services (DHS) had the highest rates of avoidable hospitalisations for COPD. The lowest rates in the State are substantially (almost six times) lower than the rate in Mt Isa DHS, and were recorded for Gladstone (217.4), the Queen Elizabeth 2 Hospital & District (225.8) and the Gold Coast (226.3) DHS.

The Northern & Far Western Health Region (HR) had the highest rate of avoidable hospitalisations in **South Australia**, with 665.1 admissions per 100,000 population. This was considerably higher than the next highest rate, of 430.6, in Mid North HR. The Central Northern Adelaide Health Service had the lowest rate in the State, with 236.1 admissions per 100,000 population.

In **Western Australia**, the highest rates occurred in the Pilbara & Gascoyne (808.5) and Kimberley (791.4) Health Regions, almost three times the overall State rate, of 275.9. The lowest rates were in the Great Southern (242.7 admissions per 100,000 population) and North Metro (246.7) HRs.

The highest rate of avoidable hospitalisations for COPD in **Tasmania** was in the North West Region, with 364.6 admissions per 100,000 population; the lowest rate was in South Region (255.5). The North Region had 300.9 admissions per 100,000 population.

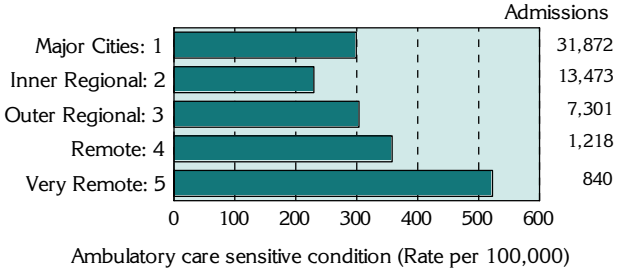
East Arnhem Health Service Area (HSA) in the **Northern Territory** had the highest regional rate of avoidable hospitalisations for COPD in Australia, with 2,392.1 admissions per 100,000 population. Alice Springs Rural and Barkly HSAs also had high rates, of 1,596.4 and 1,596.1, respectively. The lowest admission rate in the Territory was 392.1, in the Darwin Urban HSA.

The highest rate of admissions for these conditions in the **Australian Capital Territory** (ACT) (excluding ACT-Balance, with just seven admissions, a rate of 418.2) was in South Tuggeranong (220.2 admissions per 100,000 population). South Belconnen (108.8) and Woden Valley (112.3) had the lowest rates in the ACT.

By remoteness

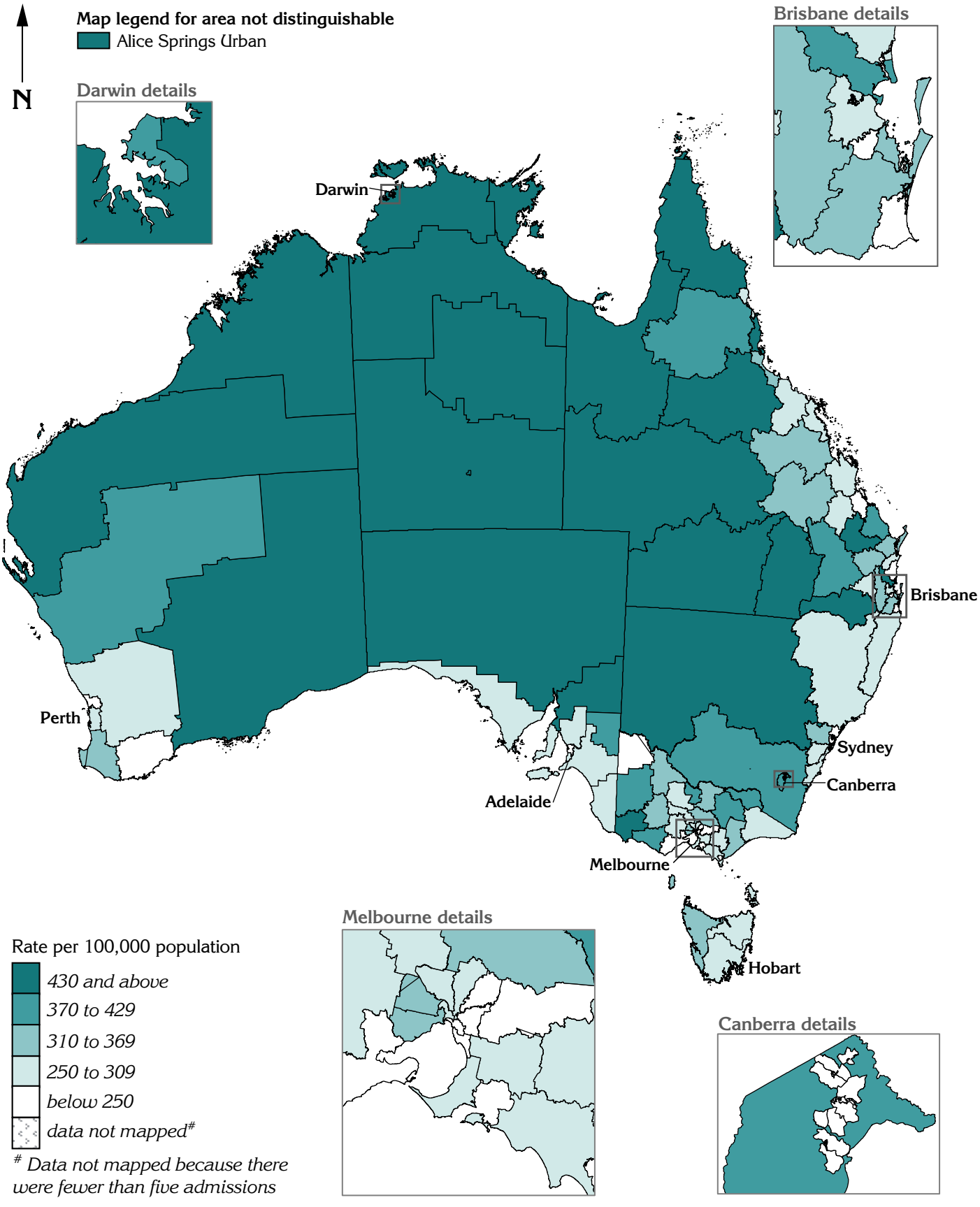
Avoidable hospitalisation rates for COPD are lowest in the Inner Regional areas, with 229.0 admissions per 100,000 population, lower than in the Major Cities areas and Outer Regional areas, with rates of 301.0 and 300.7, respectively (Figure 3.7). The Very Remote areas of Australia had the highest rate, with 509.7 admissions per 100,000 population. The numbers of admissions for COPD decrease rapidly across the remoteness classes.

Figure 3.7: Avoidable hospitalisations[1]: chronic obstructive pulmonary disease, by remoteness, Australia, 2001/02



[1] **Admissions resulting from ACS conditions**

Map 3.3
Avoidable hospitalisations: Chronic obstructive pulmonary disease, Australia, 2001/02
Indirectly age standardised admission rate by health region



Details of map boundaries are in Appendix 1.3

Avoidable hospitalisations: Angina, Australia, 2001/02

Avoidable hospitalisation rates for angina were lowest in the Australian Capital Territory, a rate of 183.7, followed by Western Australia, with 198.5 admissions per 100,000 population (Table 3.12). The highest rate of 408.3 occurred in the Northern Territory. New South Wales and Victoria had similar rates, 251.8 and 250.4, respectively, which were slightly below the Australian average rate of 257.4.

Table 3.12: Avoidable hospitalisations[1]: angina, by State/ Territory, Australia, 2001/02

Rate per 100,000 population

NSW	Vic.	Qld	SA	WA	Tas.	NT	ACT	Total
251.8	250.4	321.5	221.6	198.5	260.4	408.3	183.7	257.4

[1] **Admissions resulting from ACS conditions**

By health region (Map 3.4)

In **New South Wales**, the Greater Western Area Health Service (AHS) had the highest rate of avoidable hospitalisations for angina, with 422.4 admissions per 100,000 population. The North Coast AHS ranked second with a rate of 357.9. South Eastern Sydney/ Illawarra AHS had the lowest rate in the State with a rate of 190.4, followed by Sydney South West AHS with a rate of 208.7.

The highest rates in **Victoria** were in the Primary Care Partnerships (PCPs) of Wimmera (464.4 admissions per 100,000 population) and South West (448.7). Inner East (155.4), Inner South East (161.2) and Moonee Valley/Melbourne (167.6) PCPs had the lowest rates in the State.

For **Queensland**, rates of avoidable hospitalisations for angina were highest in the District Health Services (DHS) of Mt Isa (801.2 admissions per 100,000 population) and Torres (625.0), both rates well above the overall State rate of 321.5. Moranbah DHS had the State's lowest rate (133.2, 14 admissions), followed by Innisfail DHS, with a rate of 195.4.

The Eyre and Mid North Health Regions had the highest rates in **South Australia**, with 388.9 and 387.9 admissions per 100,000 population, respectively. The lowest rates occurred in the Central Northern Adelaide (199.9) and Southern Adelaide (204.4) Health Services.

In **Western Australia**, the highest rates of avoidable hospitalisations for angina were in the Health Regions (HRs) of Kimberley (432.1 admissions per 100,000 population) and Pilbara & Gascoyne (387.9); substantially higher than the State's rate of 198.5. The North Metro and South Metro HRs had the lowest admission rates with 180.5 and 180.8 per 100,000 population, respectively.

The North West Region in **Tasmania** had the highest rate, with 377.8 admissions per 100,000 population. The South Region had a rate of 236.3, while North Region had the lowest rate, of 207.8.

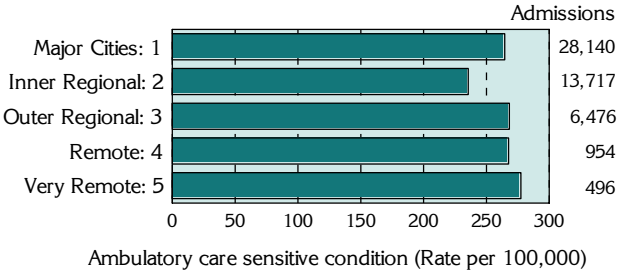
In the **Northern Territory,** Barkly Health Service Area (HSA) had the highest avoidable hospitalisations rate for angina, of 791.6 admissions per 100,000 population. This was 2.8 times the lowest rate in the Territory, of 274.2 admissions per 100,000 population, in the Darwin Rural HSA. The Katherine HSA also had a high rate of admissions for angina (681.8).

The highest rate of avoidable hospitalisations for angina in the **Australian Capital Territory** (ACT) (excluding ACT-Balance, with just 32 admissions, a rate of 1,760.9) was in North Canberra, with 235.6 admissions per 100,000 population. Gungahlin-Hall (a rate of 51.0 admissions per 100,000 population, five admissions) and Weston Creek-Stromlo (92.7, 22 admissions) had the lowest admission rates in the ACT.

By remoteness

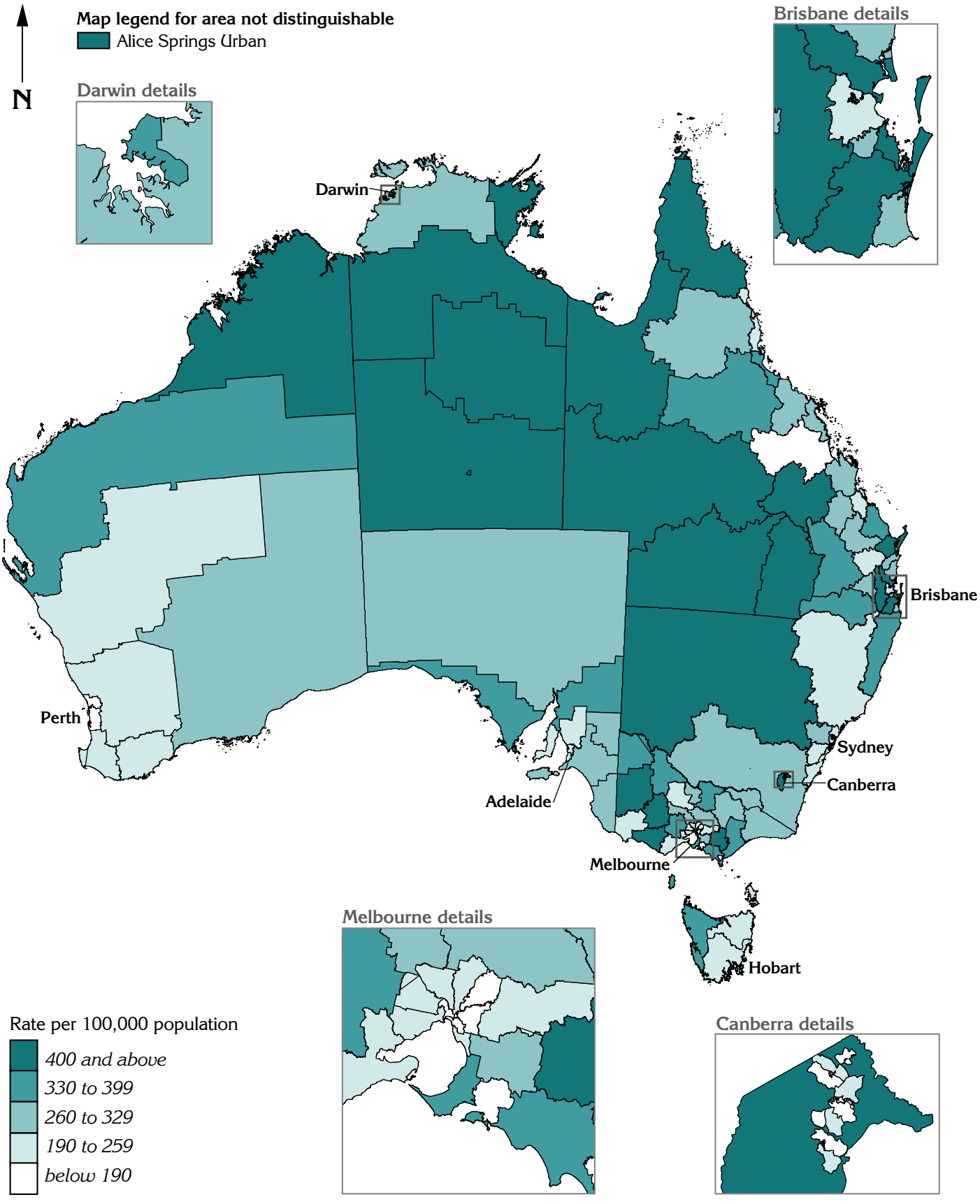
Avoidable hospitalisation rates for angina are lowest in the Inner Regional areas of Australia, a rate of 235.5 admissions per 100,000 population (Figure 3.8). The Major Cities, Outer Regional and Remote areas had similar rates of admission, with 264.5, 268.2 and 267.6 admissions per 100,000 population, respectively. The rate in the Very Remote areas is slightly higher, at 277.4 admissions per 100,000 population. The numbers of admissions for angina decrease rapidly across the remoteness classes.

Figure 3.8: Avoidable hospitalisations[1]: angina, by remoteness, Australia, 2001/02



[1] **Admissions resulting from ACS conditions**

Map 3.4
Avoidable hospitalisations: Angina, Australia, 2001/02
Indirectly age standardised admission rate by health region



Details of map boundaries are in Appendix 1.3

Avoidable hospitalisations: Dental conditions, Australia, 2001/02

The Australian Capital Territory had the lowest rate of avoidable hospitalisations for dental conditions, 63.9 admissions per 100,000 population, and substantially lower than the Australian rate of 224.9 (Table 3.13). Western Australia had the highest rate, of 294.3 admissions per 100,000 population. The rates in Northern Territory (155.0), Tasmania (163.1) and New South Wales (170.3) were all lower than the national average.

Table 3.13: Avoidable hospitalisations[1]: dental conditions, by State/ Territory, Australia, 2001/02

Rate per 100,000 population

NSW	Vic.	Qld	SA	WA	Tas.	NT	ACT	Total
170.3	256.7	247.8	259.2	294.3	163.1	155.0	63.9	224.9

[1] **Admissions resulting from ACS conditions**

By health region (Map 3.5)

Avoidable hospitalisation rates for dental conditions in **New South Wales** were highest in the Greater Western (247.0 admissions per 100,000 population) and North Coast (230.5) Area Health Services. Sydney South West Area Health Service had the lowest admission rates in the State, with 121.3 admissions per 100,000 population.

In **Victoria**, Wimmera Primary Care Partnership (PCP) had the highest rate of avoidable hospitalisations for these conditions, with 740.0 admissions per 100,000 population, followed by Northern Mallee PCP, with 573.7 admissions per 100,000. Westbay and North Central Melbourne PCPs had the lowest rates, with 166.8 and 176.0 , respectively.

Cape York District Health Service (DHS) in **Queensland** had the highest regional rate of avoidable hospitalisations for dental conditions in Australia, with a rate of 824.1 admissions per 100,000 population: this is over three and a half times the State average. Rockhampton (568.6), Central Highlands (450.5) and Torres (448.3) DHS also had high rates of admissions for dental conditions. The lowest rates in the State occurred in Charters Towers DHS and Bayside DHS, with 142.3 and 143.1 admissions per 100,000 population, respectively.

For **South Australia**, the Riverland Health Region (HR) had the highest admission rate, of 442.2 admissions per 100,000 population, followed by a rate of 389.6 in the Northern and Far Western HR. The South East HR (220.6) and Central Northern Adelaide Health Service (246.3) had the lowest admission rates in the State.

The Great Southern (397.0 admissions per 100,000 population) and Midwest (367.8) Health Regions had the highest avoidable hospitalisation rates for dental conditions in **Western Australia**. The lowest rates were found in the Goldfields & South-East Coastal (176.1 admissions per 100,000 population) and Kimberley (191.7) HRs.

In **Tasmania**, the North Region had the highest admission rate in the State, with 227.7 admissions per 100,000 population: this rate is consistent with the overall Australian average. The South Region had the lowest rate (117.4 admissions per 100,000 population).

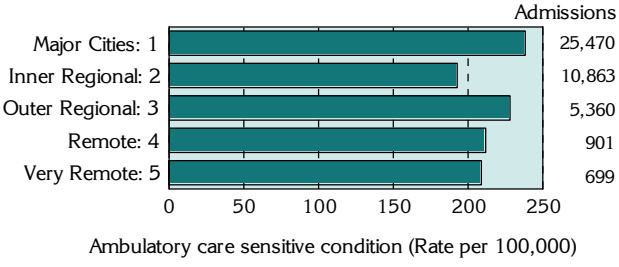
Rates in the **Northern Territory** were highest in the East Arnhem Health Service Area (HAS), with 454.5 admissions per 100,000 population, almost three times the State average (a rate ratio of 2.93**). Alice Springs Rural HSA had the next highest rate, of 220.6 admissions per 100,000 population. The HSAs of Barkly (74.5, 5 admissions) and Darwin Urban (100.9) had the lowest avoidable hospitalisation rates for dental conditions.

In the **Australian Capital Territory** (ACT), the highest rate of avoidable hospitalisations for dental conditions (excluding ACT-Balance, with just six admissions) was in North Tuggeranong, with 72.8 admissions per 100,000 population. Gungahlin-Hall (25.7 admissions per 100,000 population, seven admissions) and Weston Creek-Stromlo (44.6, ten admissions) had the lowest rates.

By remoteness

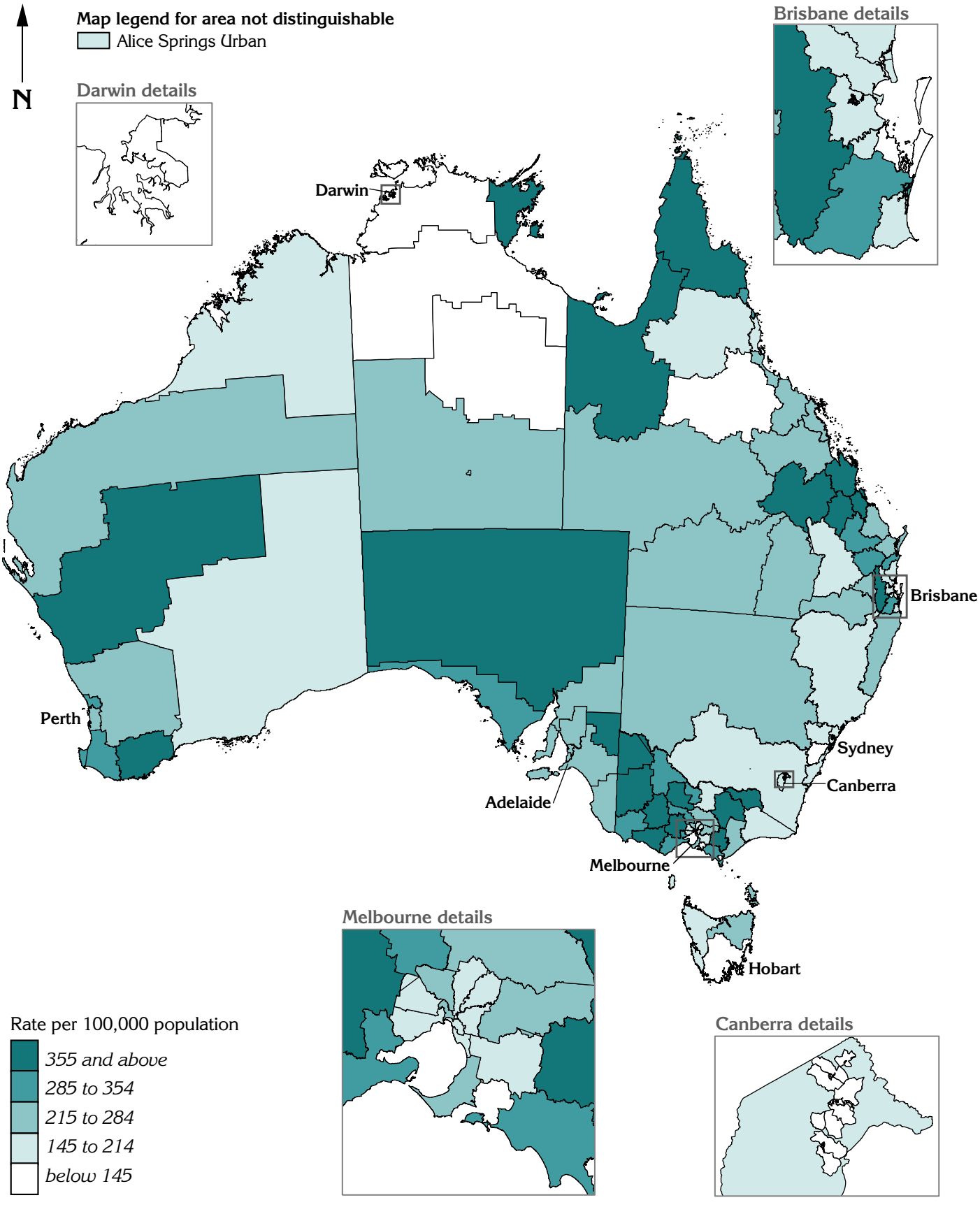
The admission rates for dental conditions (Figure 3.9) are lowest in the Inner Regional areas of Australia (193.2), and highest in the Major Cities (238.2). The Remote and Very Remote areas had similar rates, with 212.7 and 210.0 admissions per 100,000 population, respectively. The numbers of admissions for dental conditions decrease rapidly across the remoteness classes.

Figure 3.9: Avoidable hospitalisations[1]: dental conditions, by remoteness, Australia, 2001/02



[1] **Admissions resulting from ACS conditions**

Map 3.5
Avoidable hospitalisations: Dental conditions, Australia, 2001/02
Indirectly age standardised admission rate by health region



Details of map boundaries are in Appendix 1.3

Avoidable hospitalisations: Congestive heart failure, Australia, 2001/02

The Northern Territory had the highest rate of avoidable hospitalisations for congestive heart failure, with 422.9 admissions per 100,000 population, substantially higher than the Australian average of 218.6 (Table 3.14). The Australian Capital Territory had the lowest rate, at 141.1, followed by Tasmania, with 180.1 admissions per 100,000 population.

Table 3.14: Avoidable hospitalisations[1]: congestive heart failure, by State/ Territory, Australia, 2001/02

Rate per 100,000 population

NSW	Vic.	Qld	SA	WA	Tas.	NT	ACT	Total
209.7	234.1	225.5	219.1	202.9	180.1	422.9	141.1	218.6

[1] **Admissions resulting from ACS conditions**

By health region (Map 3.6)

For **New South Wales**, the Greater Southern Area Health Service (AHS) had the highest avoidable hospitalisation rate for congestive heart failure, with 307.1 admissions per 100,000 population. The Greater Western AHS had the next highest rate (286.0). Northern Sydney/ Central Coast AHS had the lowest rate in the State, with 150.0 admissions per 100,000 population.

Rates in **Victoria** were highest in the South West Primary Care Partnership (PCP), with a rate of 347.7 admissions per 100,000 population: the Lower Hume PCP also had a high admission rate (326.5). The Inner East and Banyule/Nillumbik PCPs had the lowest rates in Victoria, with 173.4 and 176.4 admissions per 100,000 population, respectively.

The District Health Services (DHS) in the eastern and far northern areas of **Queensland** generally had the highest rates of avoidable hospitalisations for congestive heart failure. Torres DHS had the highest rate, with 970.9 admissions per 100,000 population, followed by Mt Isa (718.7) and Cape York (558.9) DHS. The lowest rates were in Moranbah (145.2, 11 admissions) and Bundaberg (158.1) DHS.

Eyre Health Region (HR) in **South Australia** had the highest rates in the State (332.9 admissions per 100,000 population), with similar rates also occurring in Mid North HR (332.9) and Northern & Far Western HR (329.7). The Central Northern Adelaide Health Service had the lowest rate, with 194.8 admissions per 100,000 population: the next lowest rate was in the Southern Adelaide Health Service (202.6).

In **Western Australia**, the Kimberley Health Region had the highest rate of avoidable hospitalisations for congestive heart failure in the State, with 631.9 admissions per 100,000 population. Pilbara-Gascoyne HR also had a high rate, with 541.0 admissions per 100,000 population. South Metro (173.6) and North Metro (188.8) HRs had the lowest rates in the State for this condition.

In **Tasmania**, the highest admission rate for this condition was in the North West Region (207.9 admissions per 100,000 population); and the lowest rate was in North Region (150.5). South Region had a rate of 184.8, similar to the State average rate.

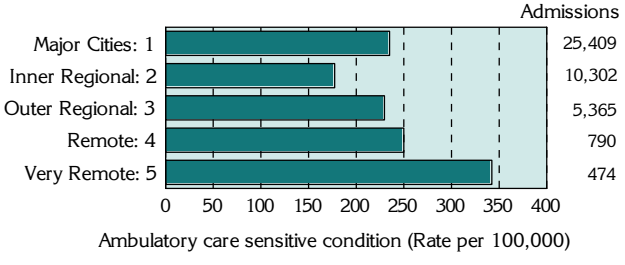
Barkly Health Service Area (HSA) in the **Northern Territory** had the highest regional rate of avoidable hospitalisations for congestive heart failure in Australia, with 1,167.0 admissions per 100,000 population. Alice Springs Rural HSA had a similarly high rate, with 1,093.2. Darwin Rural HSA had the lowest rate (151.8, 13 admissions), followed by Darwin Urban HSA, with a rate of 260.9.

In the **Australian Capital Territory** (ACT), the highest rate of avoidable hospitalisations for congestive heart failure (excluding ACT-Balance, with twelve admissions, a rate of 943.9 admissions per 100,000 population) was in South Tuggeranong (213.0). The lowest rates were in Woden Valley (95.2 admissions per 100,000 population) and South Belconnen (117.6).

By remoteness

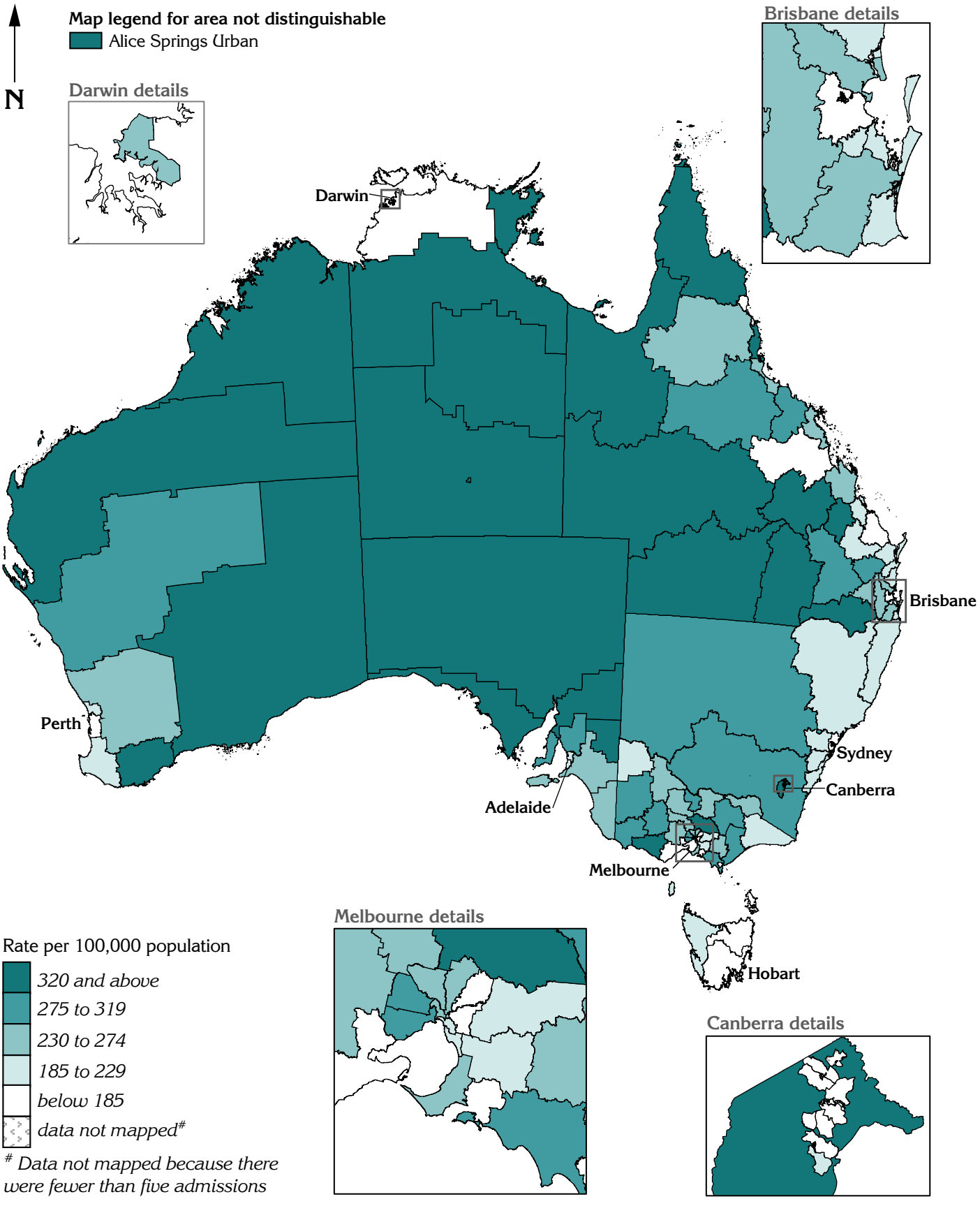
The graph of avoidable hospitalisations for congestive heart failure by remoteness (Figure 3.10) shows the lowest rate in the Inner Regional areas (177.1 admissions per 100,000 population), increasing to 246.0 in the Remote areas, followed by a sharp increase to 334.5 in the Very Remote areas. The numbers of admissions decrease rapidly across the remoteness classes.

Figure 3.10: Avoidable hospitalisations[1]: congestive heart failure, by remoteness, Australia, 2001/02



[1] **Admissions resulting from ACS conditions**

Map 3.6
Avoidable hospitalisations: Congestive heart failure, Australia, 2001/02
Indirectly age standardised admission rate by health region



Details of map boundaries are in Appendix 1.3

Avoidable hospitalisations: Asthma, Australia, 2001/02

The Australian Capital Territory had the lowest rate of avoidable hospitalisations for asthma, with 110.1 admissions per 100,000 population, followed by the next lowest rate of 137.8 in Tasmania (Table 3.15). Theses rates were below the Australian rate of 211.3. The highest rate was in South Australia, with 323.4 admissions per 100,000 population: this was substantially higher than the next highest rate, of 222.3 admissions per 100,000 population, in Western Australia, and the overall admission rate for Australia.

Table 3.15: Avoidable hospitalisations[1]: asthma, by State/ Territory, Australia, 2001/02

Rate per 100,000 population

NSW	Vic.	Qld	SA	WA	Tas.	NT	ACT	Total
216.8	196.9	185.6	323.4	222.3	137.8	189.1	110.1	211.3

[1] **Admissions resulting from ACS conditions**

By health region (Map 3.7)

The highest avoidable hospitalisation rates for asthma in **New South Wales** were in the Greater Western (303.6 admissions per 100,000 population) and Sydney West (262.7) Area Health Services (AHS). Hunter/ New England AHS had the lowest rate, with 188.4 admissions per 100,000 population.

South West Primary Care Partnership (PCP) had the highest rate of avoidable hospitalisations for asthma in **Victoria**, with 369.4 admissions per 100,000 population. Campaspe PCP had the next highest rate in the State, with 337.0 admissions per 100,000 population. The lowest rates occurred in the PCPs of East Gippsland (127.6), Banyule/ Nillumbik (135.2) and Upper Hume (139.4).

In **Queensland**, the District Health Services with the highest rates were Charleville (343.6 admissions per 100,000 population), Mt Isa (330.2), Roma (314.6) and Central West (314.1). Charters Towers (116.3 admissions per 100,000 population, 19 admissions), Gladstone (128.0) and Moranbah (135.1) District Health Services had the lowest rates in the State.

The Mid North Health Region (HR) in **South Australia** had the highest regional rate of avoidable hospitalisations for asthma in Australia, with 589.8 admissions per 100,000 population. The Riverland HR also had a high admission rate (460.6). The lowest rates were in the Southern Adelaide Health Service (243.3) and South East HR (280.8).

In **Western Australia,** the highest admission rates for asthma occurred in the Midwest-Murchison Health Region with 452.2 admissions per 100,000 population. The North and South Metro HRs had the lowest rates with 182.4 and 188.5 admissions per 100,000 population, respectively.

The North Region had the highest rate of avoidable hospitalisations for asthma in **Tasmania**, with 169.2 admissions per 100,000 population. The rates in the North West (125.2) and South (125.6) Regions were almost identical.

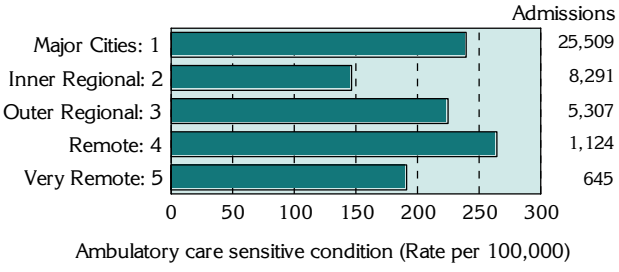
In the **Northern Territory**, Alice Springs Urban Health Service Area (HSA) had the highest rate of admissions for asthma, with 360.2 admissions per 100,000 population. Katherine HSA also had a high rate of avoidable hospitalisations for asthma (290.4). The lowest rates were in the Darwin Rural HSA (132.4 admissions per 100,000 population), while Darwin Urban (150.6) and East Arnhem (152.5) HSAs had similar rates.

In the **Australian Capital Territory** (ACT), the highest rate of avoidable hospitalisations for congestive heart failure (excluding ACT-Balance, with 17 admissions, a rate of 558.5 admissions per 100,000 population) was in South Canberra, with 149.3 admissions per 100,000 population. The lowest rates were in Weston Creek-Stromlo (45.6 per 100,000 population, ten admissions), North Canberra (82.1) and South Belconnen (85.2).

By remoteness

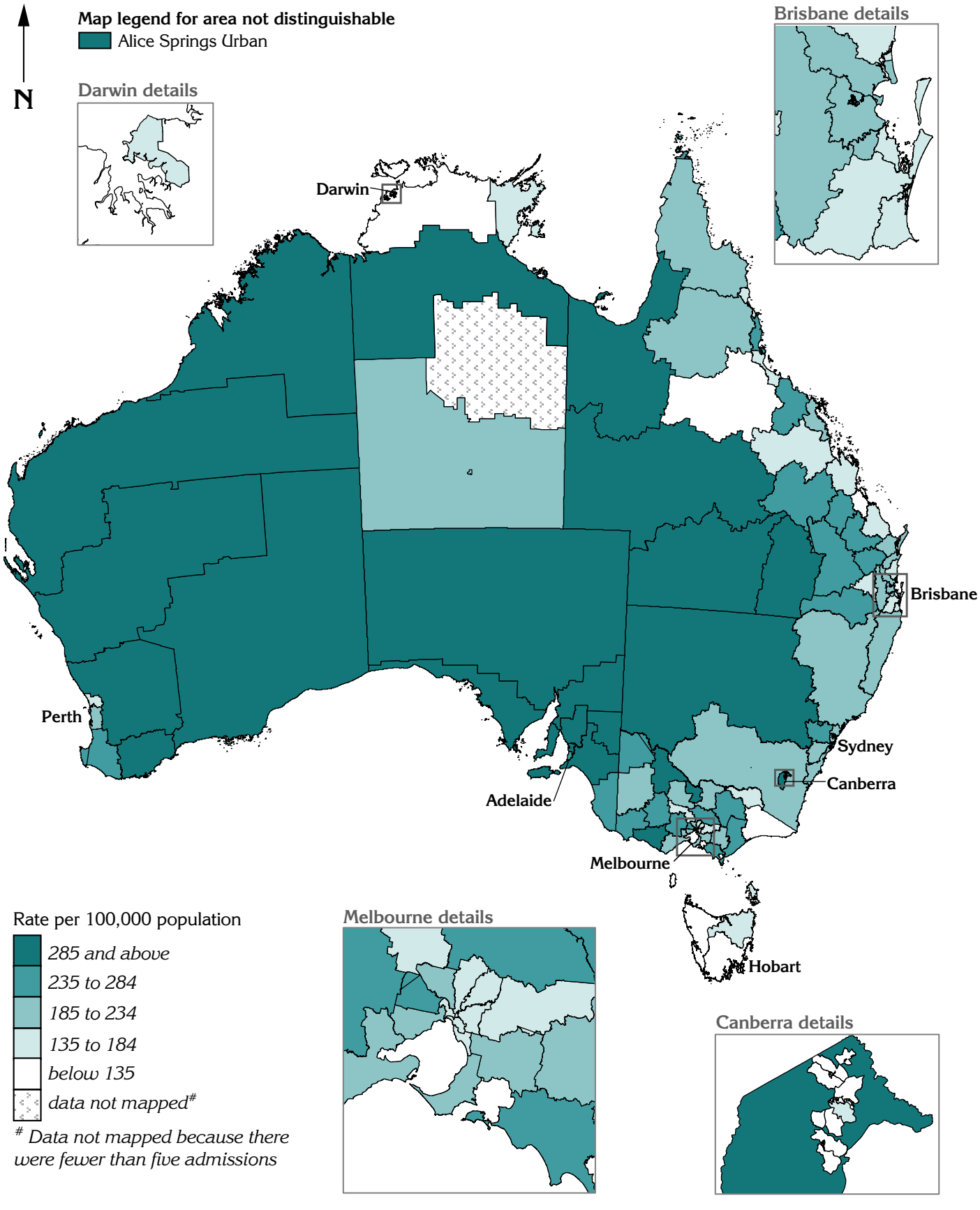
Figure 3.11 indicates that there was no consistent gradient across the remoteness classes, with the rate of avoidable hospitalisations for asthma in the Major Cities areas (239.1 admissions per 100,000 population) higher than in the Very Remote areas (193.6). The highest admission rate, of 267.5 per 100,000 population, occurred in the Remote areas, with the lowest rate, 146.9, in the Inner Regional areas. The numbers of admissions for asthma decrease rapidly across the remoteness classes.

Figure 3.11: Avoidable hospitalisations[1]: asthma, by remoteness, Australia, 2001/02



[1] **Admissions resulting from ACS conditions**

Map 3.7
Avoidable hospitalisations: Asthma, Australia, 2001/02
Indirectly age standardised admission rate by health region



Details of map boundaries are in Appendix 1.3

Avoidable hospitalisations: Dehydration and gastroenteritis, Australia, 2001/02

The rates of avoidable hospitalisation for dehydration and gastroenteritis ranged from 78.3 per 100,000 population in Tasmania, to 234.1 admissions per 100,000 population in Queensland (Table 3.16). The South Australian rate of 194.8 admissions per 100,000 population was consistent with the overall Australian rate of 194.5 admissions per 100,000 population.

Table 3.16: Avoidable hospitalisations[1]: dehydration and gastroenteritis, by State/ Territory, Australia, 2001/02

Rate per 100,000 population

NSW	Vic.	Qld	SA	WA	Tas.	NT	ACT	Total
176.4	200.0	234.1	194.8	188.7	179.4	109.2	78.3	194.5

[1] **Admissions resulting from ACS conditions**

By health region (Map 3.8)

The highest rate of avoidable hospitalisations for dehydration and gastroenteritis in **New South Wales** was in the Greater Western Area Health Service (AHS), with 298.5 admissions per 100,000 population. The Hunter/ New England AHS had the lowest rate, with 147.9 admissions per 100,000 population.

In **Victoria**, Campaspe Primary Care Partnership (PCP) had the highest rate of avoidable hospitalisations for dehydration and gastroenteritis (381.8 admissions per 100,000 population), followed by that in the South West PCP (357.0). Northern Mallee PCP had the lowest admission rate in the State, with a rate of 118.2.

For **Queensland**, Cape York District Health Service (DHS) had the highest rate, with 582.2 admissions per 100,000 population. North Burnett (498.8), Central Highlands (495.0), Gladstone (472.3) and Roma (457.1) District Health Services also had high rates. Torres DHS (98.5 admissions per 100,000 population, seven admissions) had the lowest rate, followed by Cairns DHS (128.5).

Admission rates for dehydration and gastroenteritis in **South Australia** were highest in the Northern & Far Western (434.4 admissions per 100,000 population) and Riverland (406.2) Health Regions (HRs). The lowest rate was in the Central Northern Adelaide Health Service, with a rate of 148.6 admissions per 100,000 population.

The highest rates of avoidable hospitalisation for dehydration and gastroenteritis in **Western Australia** were in the Health Regions of Kimberley (383.9) and Pilbara-Gascoyne (319.5). South Metro (160.3), Great Southern (168.0) and North Metro (173.4) HRs had the lowest rates in the State.

Rates of admission for dehydration and gastroenteritis in **Tasmania** were highest in the North Region, with 192.35 admissions per 100,000 population; and lowest in the South Region, 170.9 admissions per 100,000 population. The rate in the North West Region fell between these rates, with 180.7 admissions per 100,000 population.

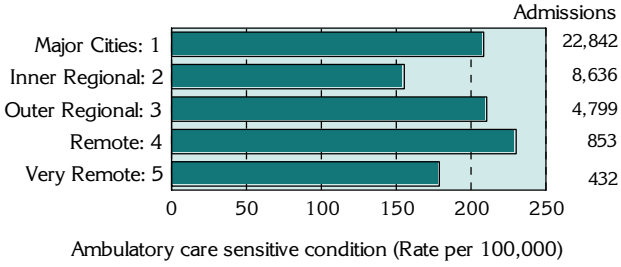
The highest rate in the **Northern Territory** was the 511.3 admissions per 100,000 population in Barkly Health Service Area (HSA). The next highest rate, of 190.6 admissions per 100,000 population, occurred in East Arnhem HSA. The lowest rates occurred in the Darwin Rural (47.4, ten admissions) and Darwin Urban (80.2) HSAs.

The highest rate of avoidable hospitalisations for dehydration and gastroenteritis in the **Australian Capital Territory** (ACT) (excluding ACT-Balance, with 18 admissions, a rate of 594.3 admissions per 100,000 population) was in North Canberra (100.5). South Tuggeranong and Gungahlin-Hall had the lowest rates, with 38.2 admissions per 100,000 population (ten admissions) and 53.6 (ten admissions), respectively.

By remoteness

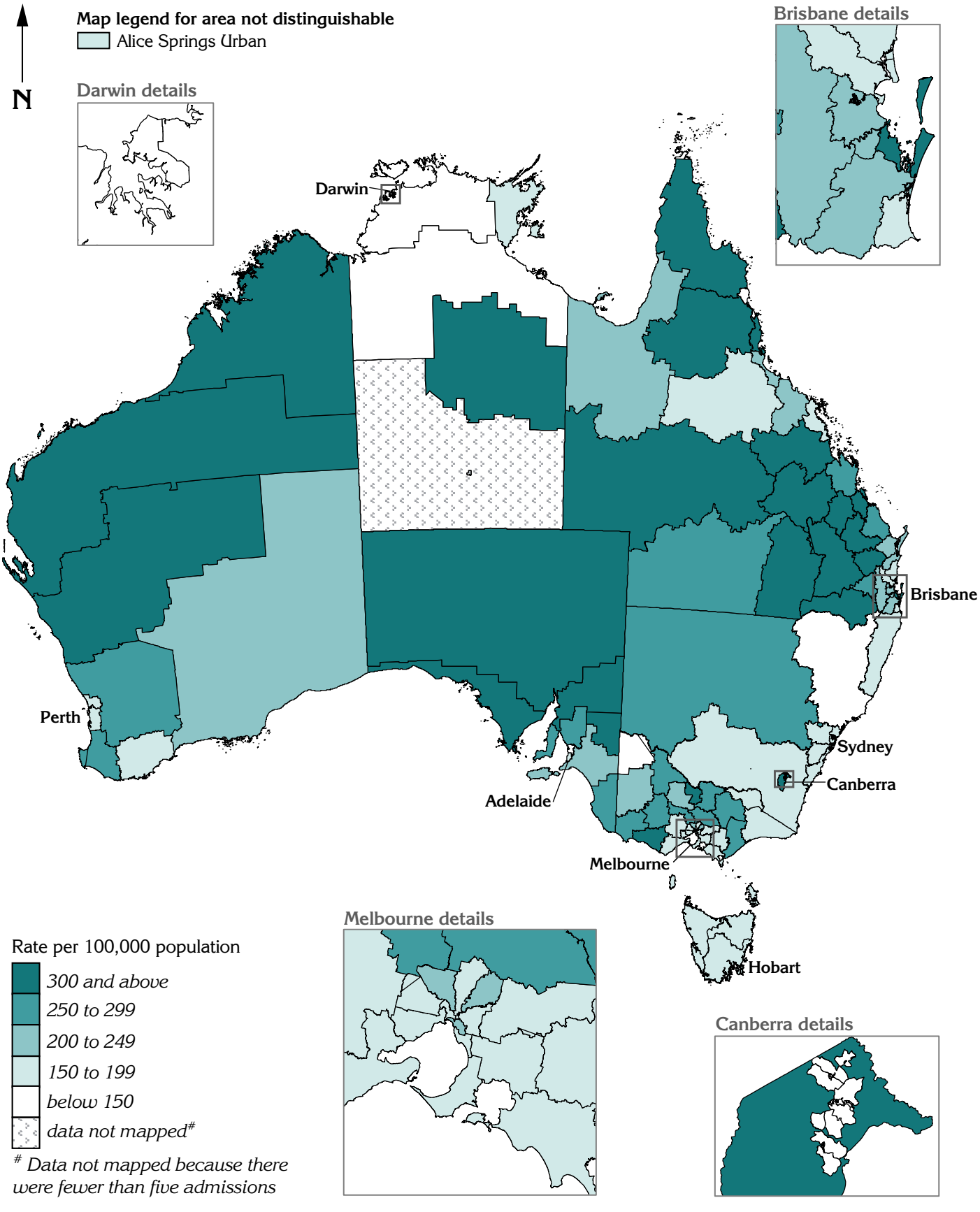
The graph of avoidable hospitalisations for dehydration and gastroenteritis by remoteness shows (Figure 3.12) the lowest rate, of 155.3 admissions per 100,000 population, in the Inner Regional areas, with rates increasing sharply to 211.4 in the Outer Regional areas, followed by an increase to 232.7 in the Remote areas. The numbers of admissions for dehydration and gastroenteritis decrease rapidly across the remoteness classes.

Figure 3.12: Avoidable hospitalisations[1]: dehydration and gastroenteritis, by remoteness, Australia, 2001/02



[1] **Admissions resulting from ACS conditions**

Map 3.8
Avoidable hospitalisations: Dehydration and gastroenteritis, Australia, 2001/02
Indirectly age standardised admission rate by health region



Details of map boundaries are in Appendix 1.3

Avoidable hospitalisations: Ear, nose and throat infections, Australia, 2001/02

Avoidable hospitalisation rates for ear, nose and throat infections ranged from 95.8 admissions per 100,000 population in the Australian Capital Territory, to 210.9 in South Australia (Table 3.17). Queensland and Western Australia had similar rates, of 184.4 and 185.3 admissions per 100,000 population, respectively; while the rates for New South Wales (161.1) and Northern Territory (159.3) were slightly below the overall Australian rate of 165.2 admissions per 100,000 population.

Table 3.17: Avoidable hospitalisations[1]: ear, nose and throat infections, by State/ Territory, Australia, 2001/02

Rate per 100,000 population

NSW	Vic.	Qld	SA	WA	Tas.	NT	ACT	Total
161.1	140.5	184.4	210.9	185.3	119.5	159.3	95.8	165.2

[1] **Admissions resulting from ACS conditions**

By health region (Map 3.9)

The highest avoidable hospitalisation rates for ear, nose and throat conditions in **New South Wales** were in the Greater Western (271.3), Sydney West (219.5), and Greater Southern (214.1) Area Health Services (AHS). South Eastern Sydney/ Illawarra AHS had the lowest rate, with 115.9 admissions per 100,000 population.

In **Victoria**, Swan Hill-Gannawarra-Buloke Primary Care Partnership (PCP) had the highest rate of admissions for ear, nose and throat infections, with 320.6 admissions per 100,000 population. South West PCP (256.9) and Campaspe PCP (243.8) also had high rates. The lowest rates occurred in the PCPs of Bendigo/Loddon (96.3 admissions per 100,000 population), Central West Gippsland (109.6) and Westbay (112.7).

The District Health Services in the north and west of **Queensland** had the highest admissions rates for these conditions. Charleville DHS had the highest regional rate in Australia, with 682.9 admissions per 100,000 population. High rates also occurred in Roma (650.8), Central West (539.3) and South Burnett (536.9) District Health Services. The lowest rates were in the Sunshine Coast (104.7 admissions per 100,000 population), Redcliffe-Caboolture (136.4), Cairns (138.4) and Townsville (138.8) District Health Services.

Rates in **South Australia** were highest in Northern & Far Western and Eyre Health Regions (HRs), with 377.4 and 352.0 admissions per 100,000 population, respectively. The lowest rates were in Southern Adelaide (186.5) and Central Northern Adelaide (189.4) Health Services.

In **Western Australia**, the Kimberley Health Region had the highest rate of admissions for ear, nose and throat infections, with 496.9 admissions per 100,000 population. Goldfields-South East Coastal HR had the next highest rate, with a rate of 396.4. North Metro (134.8 per 100,000 population) and South Metro (153.8) HRs had the lowest rates.

The North West Region had the highest avoidable hospitalisation rate for ear, nose and throat conditions in **Tasmania**, with 146.7 admissions per 100,000 population. North and South Regions had lower rates, of 109.2 and 112.6 admissions per 100,000 population, respectively.

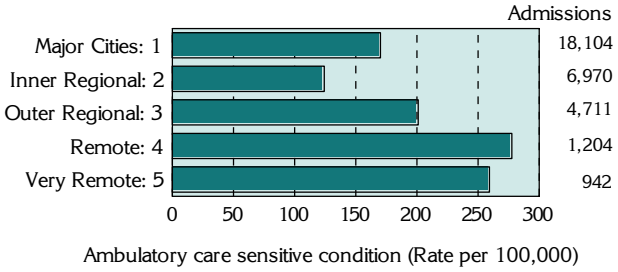
In the **Northern Territory**, Katherine and Alice Springs Urban Health Service Areas (HSAs) had the highest rates for these conditions, with 308.1 and 241.3 admissions per 100,000 population, respectively. The lowest rates were in the Darwin Urban (111.5) and Darwin Rural (111.8) HSAs.

In the **Australian Capital Territory** (ACT), the highest rate of avoidable hospitalisation (excluding ACT-Balance, with nine admissions, a rate of 272.1 admissions per 100,000 population) was in North & West Belconnen (128.8). The lowest rates were in Gungahlin-Hall (54.9, 17 admissions), Weston Creek-Stromlo (72.4, 15 admissions), North Canberra (75.0) and South Canberra (80.1).

By remoteness

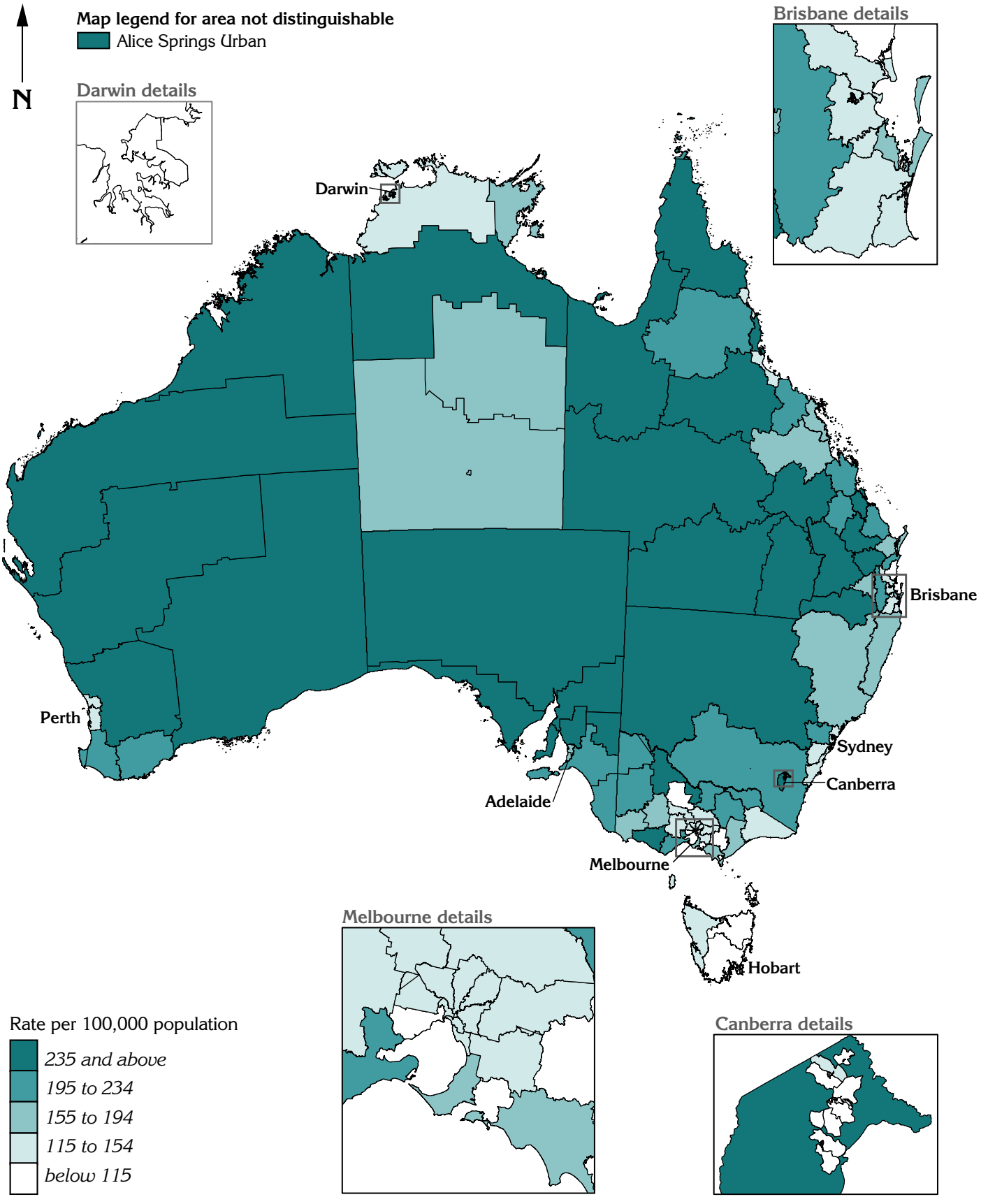
The graph of avoidable hospitalisations for ear, nose and throat conditions by remoteness (Figure 3.13) shows a rate range from 123.9 admissions per 100,000 population in the Inner Regional areas, to 277.8 in the Remote areas: the rate in the Very Remote areas was also high (259.7). The numbers of admissions for ear, nose and throat conditions decrease rapidly across the remoteness classes.

Figure 3.13: Avoidable hospitalisations[1]: ear, nose and throat infections, by remoteness, Australia, 2001/02



[1] **Admissions resulting from ACS conditions**

Map 3.9
Avoidable hospitalisations: Ear, nose and throat infections, Australia, 2001/02
Indirectly age standardised admission rate by health region



Details of map boundaries are in Appendix 1.3

Avoidable hospitalisations: Convulsions and epilepsy, Australia, 2001/02

The highest rate of avoidable hospitalisations for convulsions and epilepsy occurred in the Northern Territory, with 260.9 admissions per 100,000 population: this rate was substantially higher than the next highest rate of 168.1 admissions per100,000 population in New South Wales (Table 3.18). The lowest rate, of 112.8 admissions per100,000 population, occurred in the Australian Capital Territory.

Table 3.18: Avoidable hospitalisations[1]: convulsions and epilepsy, by State/ Territory, Australia, 2001/02

Rate per 100,000 population

NSW	Vic.	Qld	SA	WA	Tas.	NT	ACT	Total
168.1	152.4	162.3	143.6	146.7	161.0	260.9	112.8	160.4

[1] **Admissions resulting from ACS conditions**

By health region (Map 3.10)

In **New South Wales**, the highest avoidable hospitalisations rate for convulsions and epilepsy occurred in the Greater Western Area Health Service (AHS), with 254.3 admissions per 100,000 population. Northern Sydney/ Central Coast (140.1) and Sydney South West (152.8) AHS had the lowest admission rates in the State.

The Primary Care Partnerships (PCPs) in **Victoria** with the highest avoidable hospitalisation rates for convulsions and epilepsy were East Gippsland (206.6) and Wellington (203.2). The lowest rates were recorded for the Central Victorian Health Alliance (98.0) and Swan Hill-Gannawarra-Buloke (124.8) PCPs.

In **Queensland**, the Cape York District Health Service (DHS) had the highest regional rate of avoidable hospitalisations for these conditions in Australia, with 802.5 admissions per 100,000 population. The DHS of Roma (470.4) and Mt Isa (455.5) also had high admission rates. The lowest rates occurred in Cairns (97.9 admissions per 100,000 population) Prince Charles Hospital & District (120.5), Bayside (120.5), and Logan-Beaudesert (125.0) DHS.

For **South Australia**, the Northern & Far Western Health Region (HR) had the highest rate, of 428.4 admissions per 100,000 population. The Riverland HR also had a high rate, with 241.6 admissions per 100,000 population. The Southern Adelaide Health Service (102.1 admissions per 100,000 population) had the lowest rate of avoidable hospitalisations for convulsions and epilepsy in the State.

The avoidable hospitalisation rates for these conditions in **Western Australia** were highest in the Health Regions of Kimberley, with 567.4 admissions per 100,000 population, and Pilbara-Gascoyne, 380.0 admissions per 100,000 population. North Metro and South Metro HRs had the lowest rates in the State, with 114.7 and 119.0 admissions per 100,000 population, respectively.

In **Tasmania**, the North West Region had the highest rate, with 173.3 admissions per 100,000 population, similar to the North Region rate of 171.5 admissions per 100,000 population. The South Region had the lowest rate, of 149.2.

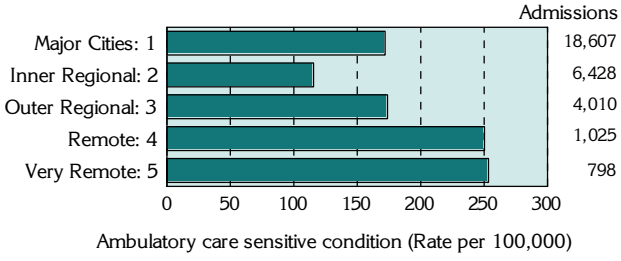
Alice Springs Urban (555.5 admissions per 100,000 population) and Barkly (457.9) Health Service Areas (HSAs) had the highest rates in the **Northern Territory**. East Arnhem HSA had the next highest rate (292.5). Darwin Rural (154.8 admissions per 100,000 population) and Darwin Urban (157.7) HSAs had the lowest rates.

In the **Australian Capital Territory** (ACT), the highest rate of avoidable hospitalisation from convulsions and epilepsy (excluding ACT-Balance, with 13 admissions, a rate of 368.8 admissions per 100,000 population) was in South Canberra, with a rate of 225.5. The lowest rates occurred in Weston Creek-Stromlo (85.4 admissions per 100,000 population) and Woden Valley (86.3).

By remoteness

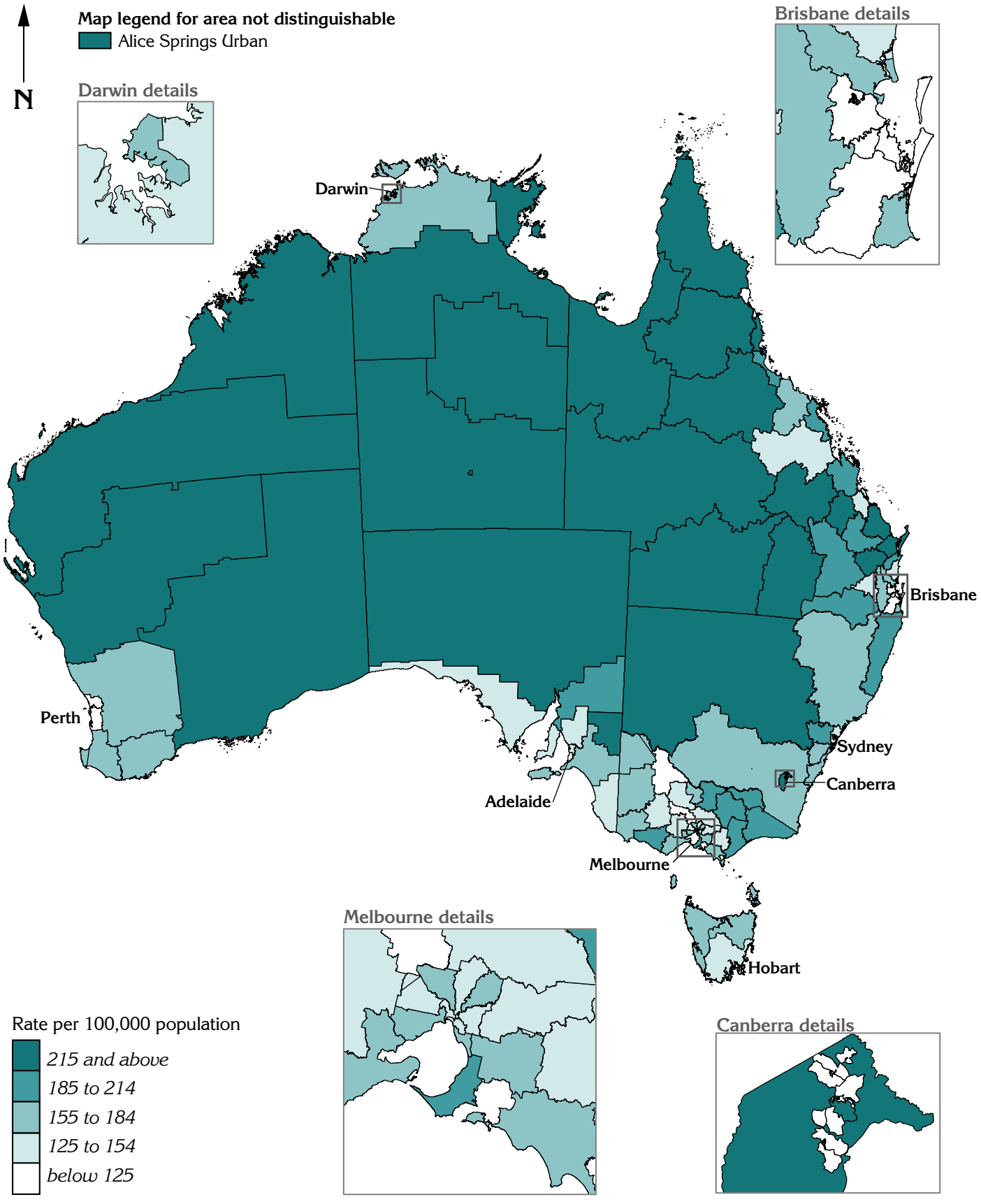
Avoidable hospitalisations from convulsions and epilepsy generally increase with remoteness (Figure 3.14), although the lowest rate, of 115.6 admissions per 100,000 population, is in the Inner Regional areas. The Major Cities and Outer Regional areas had the next highest rates, with considerably higher admission rates of 248.4 and 251.2, respectively, in the Remote and Very Remote areas. The numbers of admissions decrease rapidly across the remoteness classes.

Figure 3.14: Avoidable hospitalisations[1]: convulsions and epilepsy, by remoteness, Australia, 2001/02



[1] **Admissions resulting from ACS conditions**

Map 3.10
Avoidable hospitalisations: Convulsions and epilepsy, Australia, 2001/02
Indirectly age standardised admission rate by health region



Details of map boundaries are in Appendix 1.3

Avoidable hospitalisations: Cellulitis, Australia, 2001/02

In 2001/02, avoidable hospitalisation rates for cellulitis varied considerably, from 85.4 admissions per 100,000 in the Australian Capital Territory, to a rate of 354.8 in the Northern Territory (Table 3.19). The overall rate for Australia was 145.3 admissions per 100,000 population.

Table 3.19: Avoidable hospitalisations[1]: cellulitis, by State/ Territory, Australia, 2001/02

Rate per 100,000 population

NSW	Vic.	Qld	SA	WA	Tas.	NT	ACT	Total
142.0	139.0	167.4	124.1	135.9	118.5	354.8	85.4	145.3

[1] **Admissions resulting from ACS conditions**

By health region (Map 3.11)

Avoidable hospitalisation rates for cellulitis in **New South Wales** were highest in the Greater Western (237.8) and North Coast (176.4) Area Health Services (AHS). The Northern Sydney/ Central Coast AHS had the lowest rate, of 106.3 admissions per 100,000 population.

In **Victoria**, Campaspe (248.7), Swan Hill-Gannawarra-Buloke (247.5) and South West (217.8) Primary Care Partnerships (PCPs) had the highest rates of avoidable hospitalisations for cellulitis. The lowest rates occurred in the Banyule/Nillumbik (93.5) and Inner East (98.5) PCPs.

The Cape York District Health Service had the highest rate of avoidable hospitalisations for cellulitis in **Queensland** and Australia, with 1,670.3 admissions per 100,000 population. The District Health Services of Torres (1,147.9), Mt Isa (755.9) and Innisfail (522.8) also had high admission rates. The Prince Charles Hospital & District had the lowest rate, with 109.5 admissions per 100,000 population.

The highest rate of admissions for cellulitis in **South Australia** was in the Northern & Far Western Health Region (HR) with 257.7 admissions per 100,000 population. Central Northern Adelaide (110.4) and Southern Adelaide (111.9) Health Services had the lowest rates.

In **Western Australia**, the Kimberley Health Region had the highest rate of avoidable hospitalisations for cellulitis, with 753.2 admissions per 100,000 population. The rate in the Pilbara-Gascoyne HR was also high, at 409.8 admissions per 100,000 population. The North Metro and South West HRs had the lowest rates, with 98.0 and 103.2 admissions per 100,000 population, respectively.

The South Region in **Tasmania** had the highest rate of 125.2 admissions per 100,000 population, and the North Region had the lowest, with 106.0 admissions per 100,000 population. The North West Region had a rate of 116.9 admissions per 100,000 population.

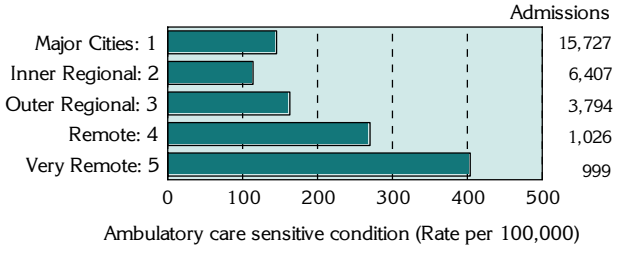
In the **Northern Territory**, Barkly Health Service Area (HSA) had the highest rate of avoidable hospitalisations for cellulitis, with 1,184.8 admissions per 100,000 population. East Arnhem HSA had the next highest rate, with 691.1 admissions per 100,000 population. Darwin Urban HSA had the lowest admission rate in the Territory, with 189.2 admissions per 100,000 population.

In the **Australian Capital Territory** (ACT), the highest rate of avoidable hospitalisation for cellulitis (excluding ACT-Balance, with ten admissions, a rate of 335.8 admissions per 100,000 population) was in North & West Belconnen, with 118.3 admissions per 100,000 population. Woden Valley (53.4 admissions per 100,000 population, 18 admissions) had the lowest rate of admissions (after Gungahlin-Hall, a rate of 38.7, and seven admissions).

By remoteness

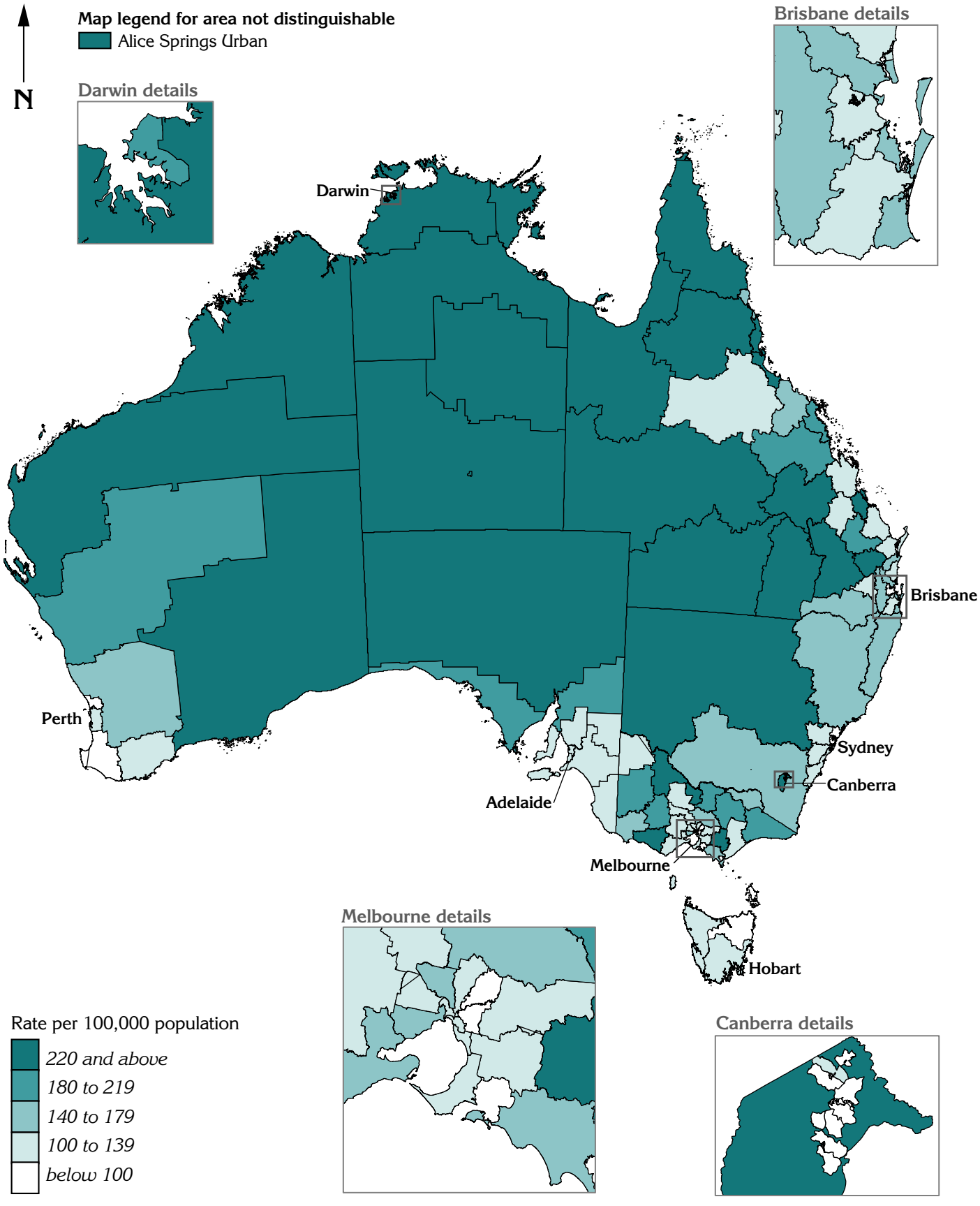
Avoidable hospitalisation rates for cellulitis increase with increasing remoteness (Figure 3.15), apart from a lower rate in the Inner Regional areas. The increase is particularly substantial to the Remote and Very Remote areas, with rates of 270.1 and 403.9 admissions per 100,000 population, respectively, compared to the Inner Regional rate of 113.9 admissions per 100,000 population. The numbers of admissions for cellulitis decrease rapidly across the remoteness classes.

Figure 3.15: Avoidable hospitalisations[1]: cellulitis, by remoteness, Australia, 2001/02



[1] **Admissions resulting from ACS conditions**

Map 3.11
Avoidable hospitalisations: Cellulitis, Australia, 2001/02
Indirectly age standardised admission rate by health region



Details of map boundaries are in Appendix 1.3

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3.5 Avoidable hospitalisations by socioeconomic status

This section examines ambulatory care-sensitive conditions by socioeconomic status, in order to show the extent of any inequality in rates of admissions for these conditions.

Socioeconomic status is based on the Index of Relative Socio-Economic Disadvantage (IRSD): the calculation of rates by groupings of areas (quintiles), and the particular measure of socioeconomic disadvantage used (the IRSD), are described in Chapter 2, *Methods*.

Overall, admission rates for ambulatory care-sensitive conditions are higher in areas of greater socioeconomic disadvantage (Quintiles 2 to 5) when compared with those of least socioeconomic disadvantage (Quintile 1).

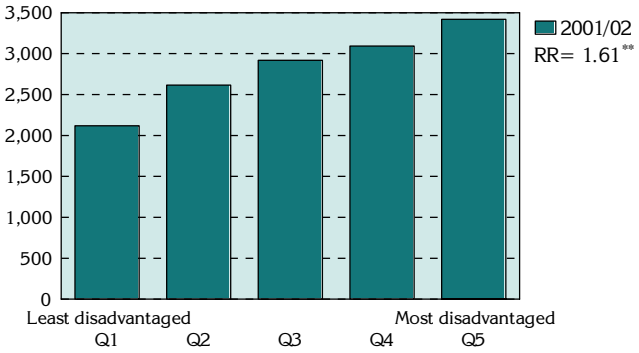
Avoidable hospitalisations by socioeconomic status

There is a distinct, step-wise socioeconomic gradient evident in total avoidable hospitalisation rates in Australia (Figure 3.16), with each increase in disadvantage accompanied by an increase in admissions from these conditions.

The rate ratio of 1.61** indicates that people in the most disadvantaged areas of Australia had 61.0% more hospitalisations for an ambulatory care-sensitive condition than those in the least disadvantaged areas.

Figure 3.16: Avoidable hospitalisations[1] by socioeconomic status, Australia, 2001/02

Rate per 100,000 population



[1] **Admissions resulting from ACS conditions**

Avoidable hospitalisations: vaccine-preventable conditions by socioeconomic status

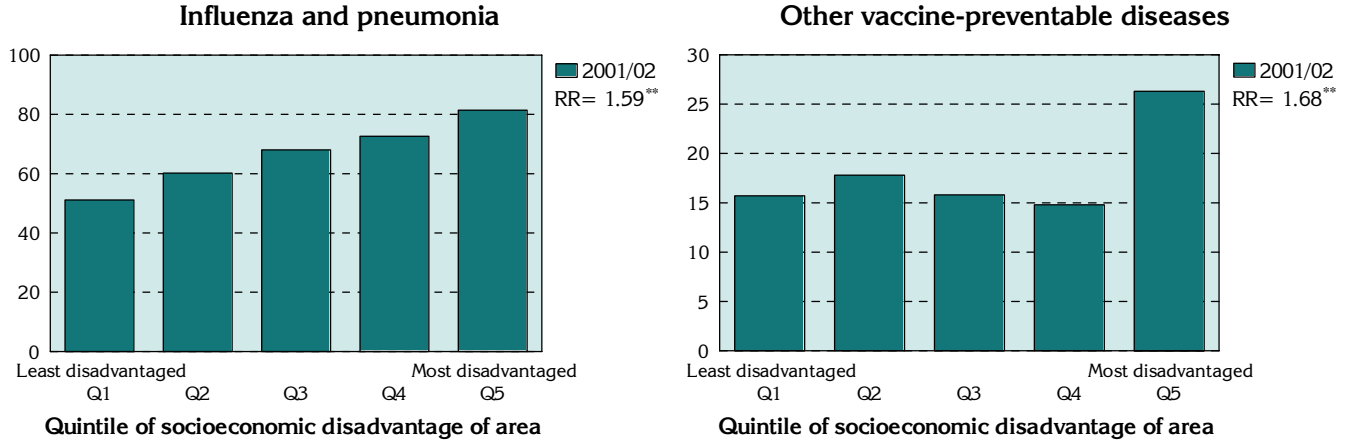
There is a distinct socioeconomic gradient associated with avoidable hospitalisations for influenza and pneumonia, with increasing admission rates associated with increasing disadvantage (Figure 3.17).

Fifty-nine per cent more people in disadvantaged areas were hospitalised due to influenza and pneumonia than those in the least disadvantaged areas.

There is no clear socioeconomic pattern for admissions due to other vaccine-preventable diseases (Figure 3.17); however admission rates were 68.0% higher in the most disadvantaged areas compared to the least disadvantaged areas.

Figure 3.17: Avoidable hospitalisations[1]: vaccine-preventable conditions by socioeconomic status, Australia, 2001/02

Rate per 100,000 population: note the different scales



[1] **Admissions resulting from ACS conditions**

Avoidable hospitalisations: chronic conditions by socioeconomic status

For the majority of the chronic conditions there is a clear, and strong, association between rates of avoidable hospitalisations and socioeconomic status (Figure 3.18).

For both hypertension and angina, there was a strong, continuous socioeconomic gradient in admissions rates, such that in the most disadvantaged areas rates of admission for these conditions were over twice those in the least disadvantaged areas (2.42** times for hypertension, and 2.03** times for angina).

Similarly, chronic obstructive pulmonary disease and diabetes complications showed very strong socioeconomic gradients, with 95.0% and 92.0%, respectively, more admissions in the most disadvantaged areas than in the least disadvantaged areas.

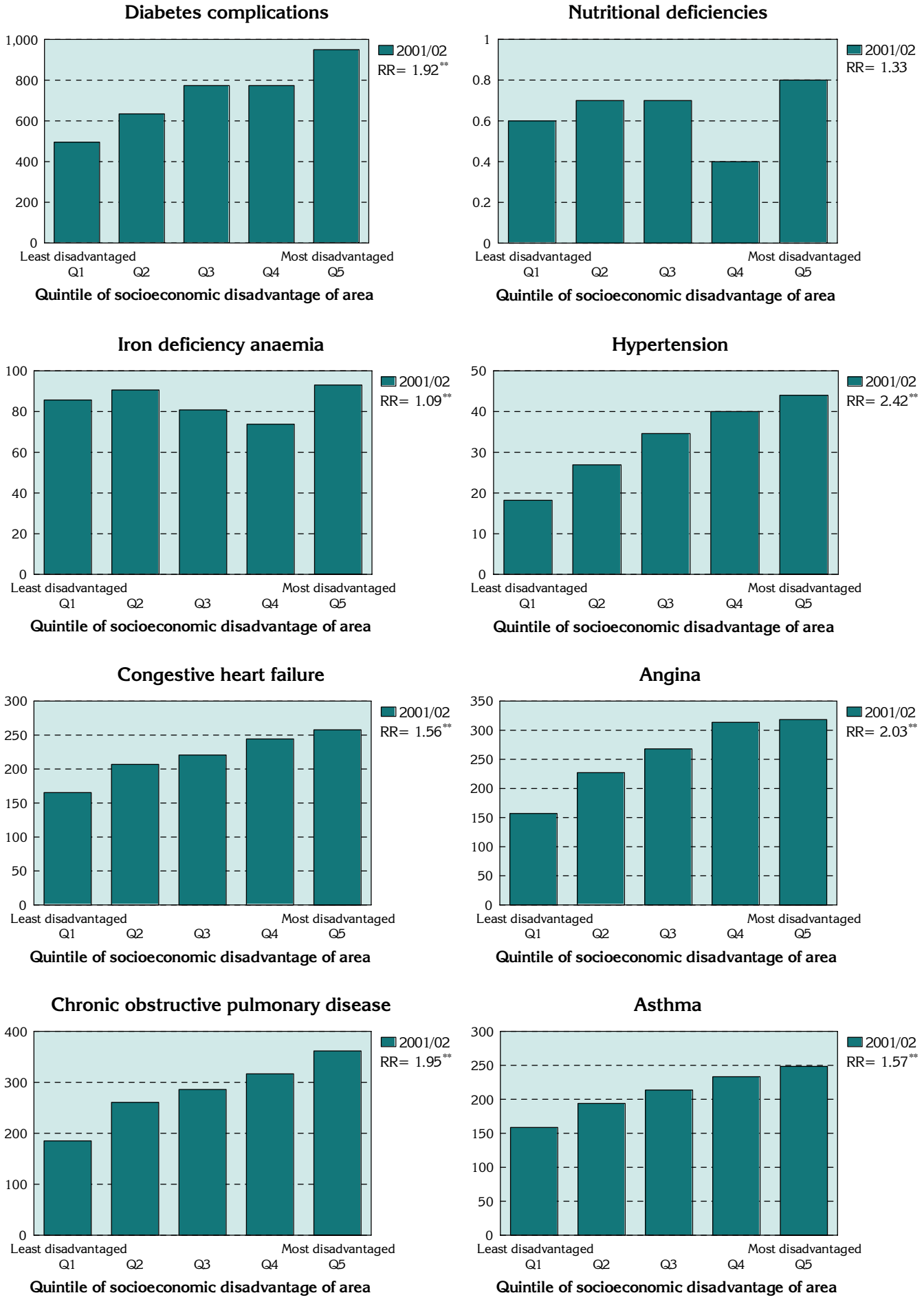
Both asthma (a rate ratio of 1.57**) and congestive heart failure (a rate ratio of 1.56**) had over fifty per cent more admissions in the most disadvantaged areas.

For nutritional deficiencies, the avoidable hospitalisation rates were 33.0% higher in the most disadvantage areas compared to the least disadvantaged areas; however, the step-wise socioeconomic pattern was interrupted by the low rate in Quintile 4. The small numbers of admissions for these conditions should be noted.

There was no clear socioeconomic gradient across the areas of socioeconomic disadvantage for avoidable hospitalisation for iron deficiency anaemia, and only marginal variation (9.0% difference) between the admission rates in the most disadvantaged areas and least disadvantaged areas.

Figure 3.18: Avoidable hospitalisations[1]: chronic conditions by socioeconomic status, Australia, 2001/02

Rate per 100,000 population: note the different scales



[1] Admissions resulting from ACS conditions

Avoidable hospitalisations: acute conditions by socioeconomic status

For the majority of the acute ambulatory sensitive conditions there was a clear association between rates of avoidable hospitalisations and socioeconomic status (Figure 3.19).

Avoidable hospitalisations for cellulitis had a strong and distinct socioeconomic gradient, with an admission rate 67.0% higher in the most disadvantaged areas compared to the least disadvantaged areas. Ear, nose and throat infections; convulsions and epilepsy; and pelvic inflammatory disease also had strong socioeconomic gradients, and admission rates over 50% higher in the most disadvantaged areas compared to the least disadvantaged areas.

For gangrene, those living in the most disadvantaged areas were 87.0% more likely to be admitted to hospital than those in the least disadvantaged areas, a very strong differential with a rate ratio of 1.87**; however, there was not a continuous socioeconomic gradient across Quintiles 1 to 5, as the rates were lower in Quintile 4.

Avoidable hospitalisations rates for pyelonephritis also showed a strong socioeconomic association, with those living in the most disadvantaged areas having 41.0% more admissions than those in the least disadvantaged areas.

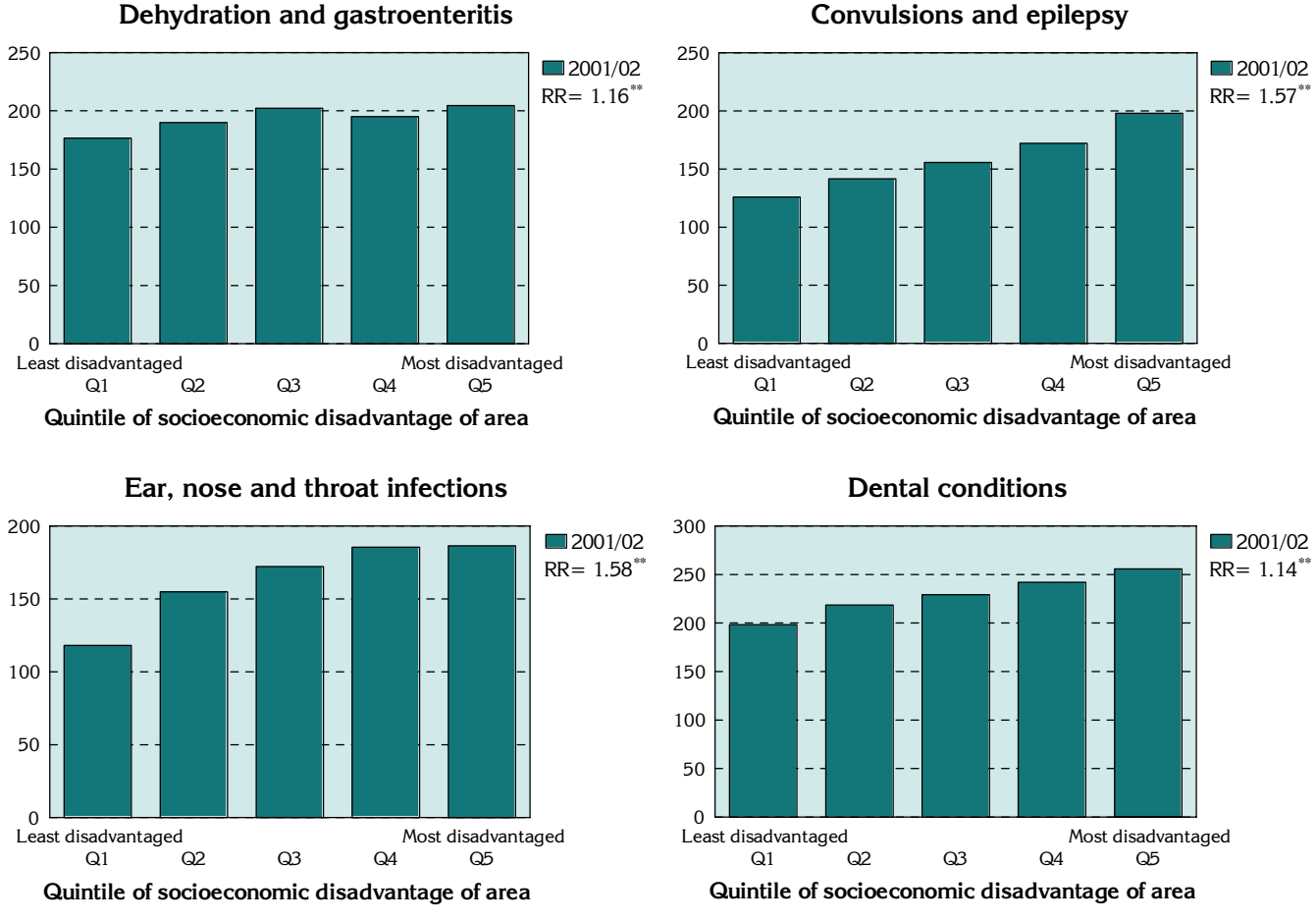
Avoidable hospitalisation rates for perforated/bleeding ulcers had a moderate socioeconomic gradient, with 28.0% more admissions in the most disadvantaged areas.

For dehydration and gastroenteritis, and for dental conditions, the figures show variations in rate differentials between Quintiles 5 and 1 of around 15%. Admissions for dehydration and gastroenteritis of people living in the most disadvantaged areas are 16.0% higher, and for dental conditions, 14.0% higher, than those living in the least disadvantaged areas.

There was a slightly (3.0%) lower rate of avoidable hospitalisations for ruptured appendix in the most disadvantaged areas (a rate ratio of 0.97). The highest rate (21.8 admissions per 100,000 population) occurred in Quintile 4, and overall there was no socioeconomic pattern.

Figure 3.19: Avoidable hospitalisations[1]: acute conditions by socioeconomic status, Australia, 2001/02

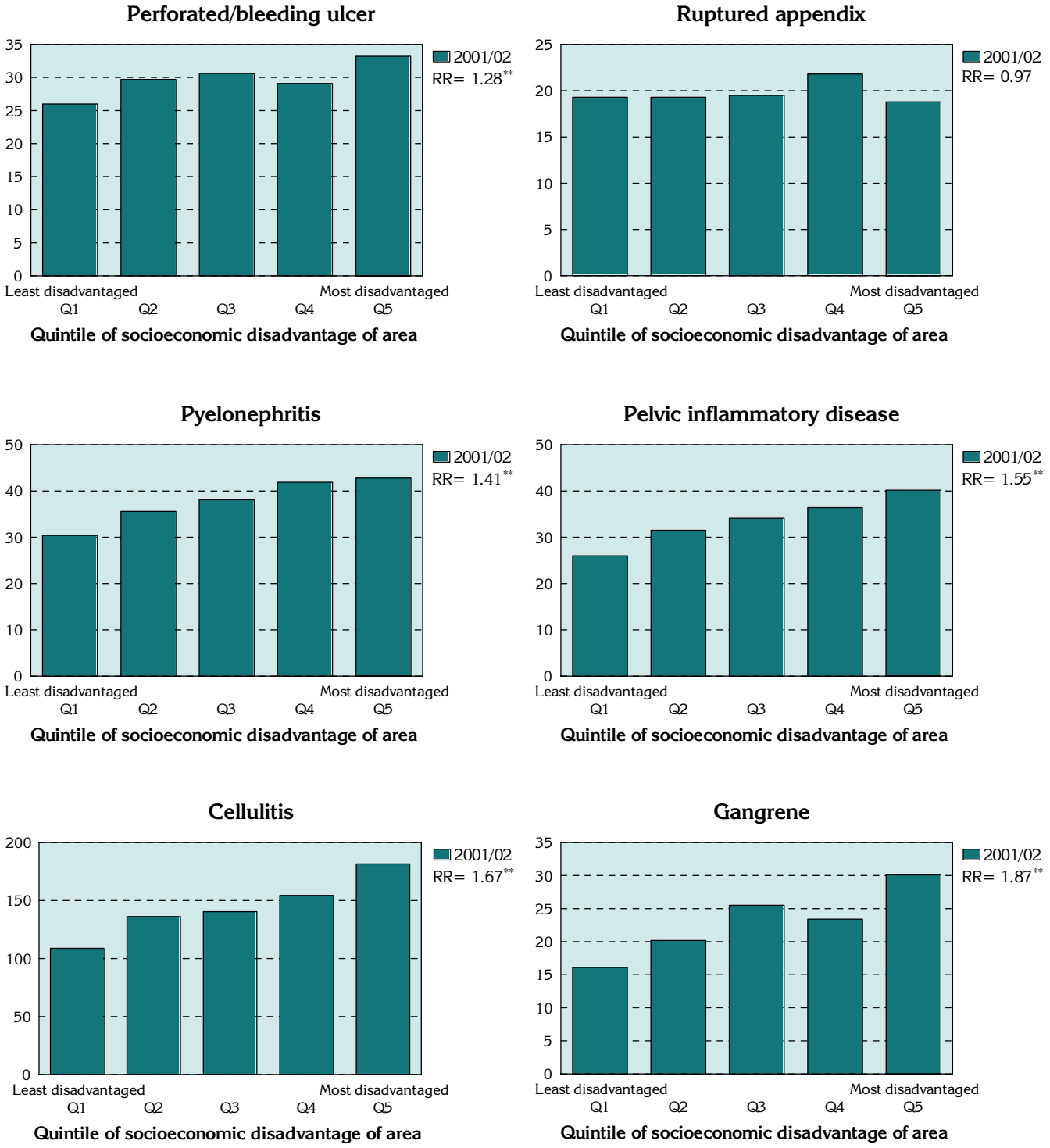
Rate per 100,000 population: note the different scales



[1] Admissions resulting from ACS conditions

Figure 3.19: Avoidable hospitalisations[1]: acute conditions by socioeconomic status, Australia, 2001/02 *... continued*

Rate per 100,000 population: note the different scales



[1] Admissions resulting from ACS conditions

Avoidable hospitalisations: socioeconomic status by State/ Territory

Figure 3.20 shows admissions for ambulatory care-sensitive conditions by socioeconomic status for each State and Territory.

While there is not a clear socioeconomic gradient for all States and Territories, the highest rates for avoidable hospitalisations in each case occur in the most disadvantaged areas.

Although there is no consistent socioeconomic gradient in the Northern Territory, it does have the largest differential in rates between Quintile 5 and Quintile 1, a rate ratio of 2.24**. This indicates that, in 2001/02, there was over twice the rate of avoidable hospitalisations of people living in the most disadvantaged areas of the Northern Territory, compared to those living in the least disadvantaged areas.

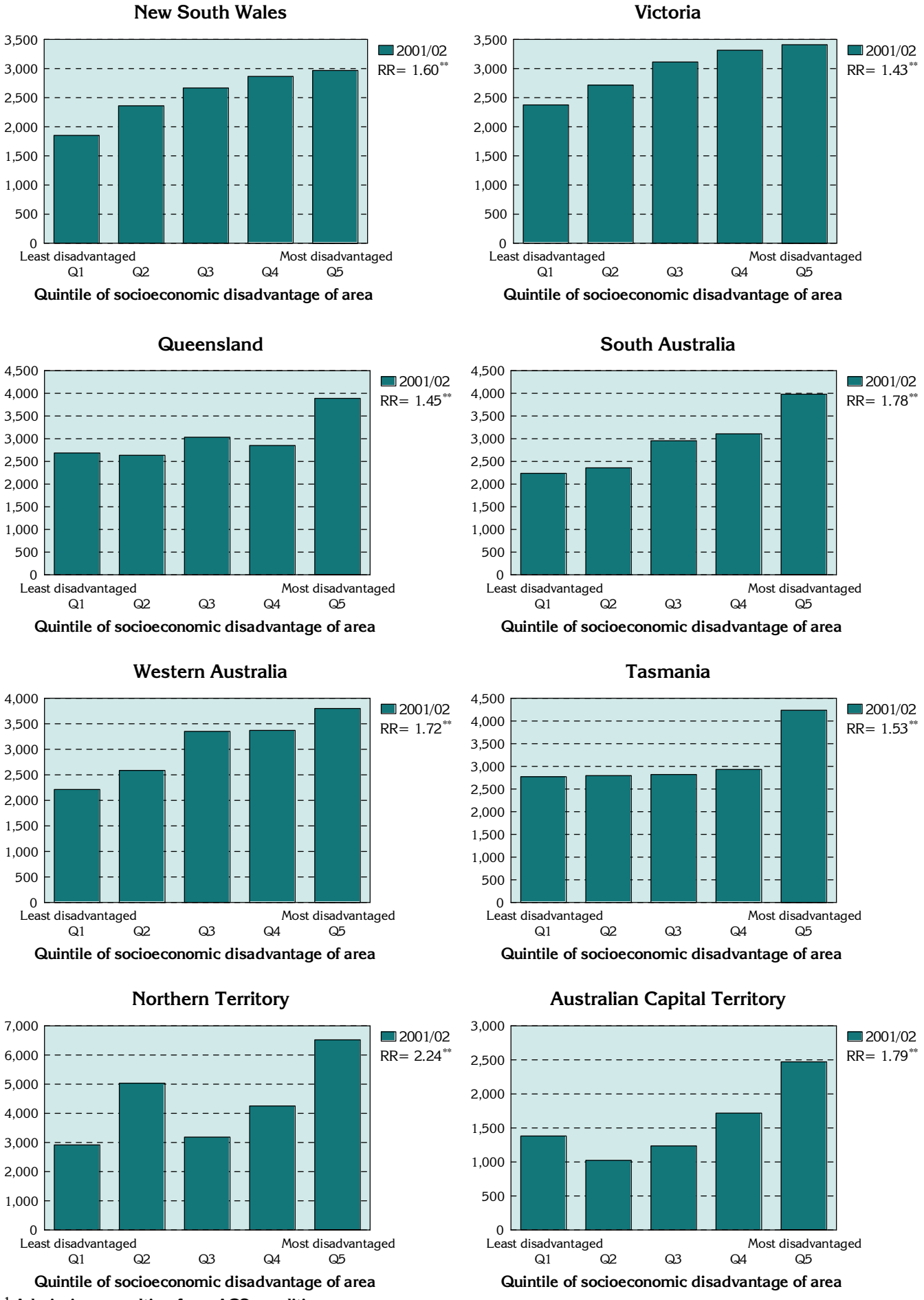
The Australian Capital Territory (with a rate ratio of 1.79**), South Australia (1.78**) and Western Australia (1.72**) also had very large differentials between the most disadvantaged and least disadvantaged areas in these regions, with around three quarters more avoidable hospitalisations from Quintile 5 (most disadvantaged) than from Quintile 1 (least disadvantaged).

There is a clear, step-wise socioeconomic pattern across the quintiles in both New South Wales and Victoria. New South Wales had 60.0% more admissions in the most disadvantaged areas, compared to the least disadvantaged areas, while in Victoria the differential was 43.0%.

Tasmania and Queensland also had strong differentials in rates between the most disadvantaged and the least disadvantaged areas, with 53.0% and 45.0% respectively; however, there was no consistent socioeconomic pattern in the gradient across the intervening quintiles.

Figure 3.20: Avoidable hospitalisations[1]: socioeconomic status by State/ Territory, Australia, 2001/02

Rate per 100,000 population: note the different scales



[1] Admissions resulting from ACS conditions

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Appendix

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Appendix 1.1: ICD codes

Table A1 details the ICD-10-AM codes and additional information used in the selection of the ambulatory care sensitive conditions which comprise avoidable hospitalisations.

Table A1: ICD codes and additional selection information for avoidable hospitalisations: hospital admissions resulting from ambulatory care sensitive conditions

Category	ICD-10-AM (2nd edition) codes	Additional selection information
Vaccine-preventable		
Influenza and pneumonia	J10, J11, J13, J14, J15.3, J15.4, J15.7, J15.9, J16.8, J18.1, J18.8	In any diagnosis field; exclude people under 2 months; ICD-10-AM: exclude cases with secondary diagnosis of D57
Other vaccine preventable	A35, A36, A37, A80, B05, B06, B16.1, B16.9, B18.0, B18.1, B26, G00.0, M01.4	In any diagnosis field
Chronic		
Diabetes complications	E10.1-E10.8, E11.0-E11.8, E13.0-E13.8, E14.0-E14.8	In any diagnosis field
Nutritional deficiencies	E40-E43, E55.0, E64.3	Principal diagnosis only
Iron deficiency anaemia	D50.1-D50.9	Principal diagnosis only
Hypertension	I10, I11.9	Principal diagnosis only; ICD-10-AM: exclude cases with procedures in blocks 600-693, 705-707, 717 and procedure codes 38721-00, 38721-01, 90226-00
Congestive heart failure	I11.0, I50, J81	Principal diagnosis only; ICD-10-AM: exclude cases with procedures in blocks 600-693, 705-707, 717 and procedure codes 38721-00, 38721-01, 90226-00
Angina	I20, I24.0, I24.8, I24.9	Principal diagnosis only; ICD-10-AM: exclude cases with procedure codes in blocks 1-1779
Chronic obstructive pulmonary disease	J41-J44, J47, (J20)	Principal diagnosis only; ICD-10-AM: J20 only with second diagnosis of J41, J42, J43, J44, J47
Asthma	J45, J46	Principal diagnosis only
Acute		
Dehydration and gastroenteritis	E86, K52.2, K52.8, K52.9	Principal diagnosis only
Convulsions and epilepsy	G40, G41, O15, R56	Principal diagnosis only
Ear, nose and throat infections	H66, H67, J02, J03, J06, J31.2	Principal diagnosis only
Dental conditions	A69.0, K02-K06, K08, K09.8, K09.9, K12, K13	Principal diagnosis only

… continued

Table A1: ICD codes and additional selection information for avoidable hospitalisations: hospital admissions resulting from ambulatory care sensitive conditions … *continued*

Category	ICD-10-AM (2nd edition) codes	Additional selection information
Acute … *continued*		
Perforated/bleeding ulcer	K25.0- K25.2, K25.4-K25.6, K26.0-K26.2, K26.4-K26.6, K27.0-K27.2, K27.4-K27.6, K28.0-K28.2, K28.4-K28.6	Principal diagnosis only
Ruptured appendix	K35.0	In any diagnosis field
Pyelonephritis	N10, N11, N12, N13.6	Principal diagnosis only
Pelvic inflammatory disease	N70, N73, N74	Principal diagnosis only
Cellulitis	L03, L04, L08.0, L08.8, L08.9, L88, L98.0, L98.3	ICD-10-AM: Include cases where L03, L04, L08.0, L08.8, L08.9, L88, L98.0, L98.3 is reported as the principal diagnosis AND there were either no procedures reported OR the procedures listed were only in blocks 1604-1606, 1608, 1820-2016 or the procedures 90660-00, 30207-00, 30676-00, 30679-00, 34530-01 and 47912-00 Additionally, check that the procedure is the only procedure when in the list: blocks 1604-1606, 1608, or the procedures are: 90660-00, 30207-00, 30676-00, 30679-00, 34530-01 and 47912-00]
Gangrene	R02	In any diagnosis field

Note: This list is based on the Australian work by Vic DHS and subsequent development by NSW Health: the method of simplifying the procedure exclusions in ICD-10 by the use of procedure code blocks was developed by NSW Health.

Appendix 1.2: Approaches to specification of ambulatory care sensitive conditions

Table A2 outlines the current differences between the ambulatory care sensitive condition lists and coding specifications used by the Victorian Department of Human Services (Vic DHS), New South Wales Department of Health (NSW Health) and the Australian Institute of Health & Welfare (AIHW).

Table A2: Differences in ambulatory care sensitive condition lists under ICD-10-AM: Vic DHS, NSW Health and AIHW, September 2006

Issue/ Condition	Vic DHS 2004; 2005	NSW Health 2004	AIHW 2006
Terminology	Ambulatory Care Sensitive Conditions (ACSC)	Hospitalisation for ambulatory care sensitive conditions	Potentially preventable hospitalisations
Sub-categories (vaccine-preventable; acute; chronic)	No vaccine-preventable; acute; chronic sub-categories included in the latest reports [*The Victorian ACSCs Study 2001/02* (Vic DHS 2004); *Your Health: A report on the health of Victorians 2005* (Vic DHS 2005)]	Include sub-categories (vaccine-preventable; acute; chronic), but also include analysis by individual conditions	Include sub-categories (vaccine-preventable; acute; chronic, including diabetes) – however for time series figures present vaccine-preventable; chronic (excluding diabetes) and acute – and present diabetes complications separately
Procedure codes/ procedure blocks[1]	Use procedure codes for conditions requiring procedure code exclusions	Developed procedure blocks for conditions requiring procedures code exclusions – presented in *The health of the people of NSW: Report of the Chief Health Officer 2004* (Population Health Division 2004)	Use procedure codes for conditions requiring procedure code exclusions
Diabetes complications	E10.1-E10.8, E11.0-E11.8, E13.0-E13.8, E14.0-E14.8 In any diagnosis field [Note: excludes diabetes without complications - E10.9, E11.9 etc.)	Same as Vic DHS	New codes for diabetes included in *Australian Hospital Statistics 2004/05* (AIHW 2006): E10-E14.9 as principal diagnoses and E10-E14.9 as additional diagnoses where the principal diagnosis was: - hypersmolarity (E87.0); acidosis (E87.2); transient ischaemic attack (G45); nerve disorders and neuropathies (G50-G64); cataracts and lens disorders (H25-H28); retinal disorders (H30-H36); glaucoma (H40-H42); myocardial infarction (I21-I22); other coronary heart diseases (I20, I23-I25; heart failure (I50); stroke and sequelae (I60-I64, I69.0-I69.4); peripheral vascular disease (I70-I74); gingivitis and periodontal disease (K05); kidney diseases (N00-N29) (including end-stage renal disease N17-N19); renal dialysis (Z49)

[1] **The changes in procedure codes between editions of ICD-10-AM has complicated the method of excluding procedure codes, in particular for the conditions congestive heart failure and hypertension. NSW Health developed a method of using procedure blocks to simplify the process and avoid some of the complications.**

… continued

Table A2: Differences in ambulatory care sensitive condition lists under ICD-10-AM: Vic DHS, NSW Health and AIHW, September 2006
… continued

Issue/ Condition	Vic DHS 2004; 2005	NSW Health 2004	AIHW 2006
Rheumatic heart disease	Not included	Not included	New chronic condition included in *Australian Hospital Statistics 2004/05* (AIHW 2006): I00 to I09 as principal diagnosis only (Note: includes acute rhematic fever)
Ruptured appendix	Condition excluded	Condition included (K35.0 in any diagnosis field)	Condition included, same as NSW Health (but termed 'Appendicitis with generalised peritonitis')
Pyelonephritis	Include urinary tract infection (UTI) code N39.0 [Terminology: the condition 'pyelonephritis' denotes kidney infection codes only. Note: some avoidable hospitalisations research does include the condition UTI, accordingly labelled UTI; or Kidney/Urinary infections where jointly included]	Pyelonephritis codes only included – N39.0 excluded	Same as Vic DHS
Cellulitis	Include all L08 (which includes LO8.1 - Erythrasma)	L08.1 excluded	Same as Vic DHS
Dental conditions	A69.0 excluded	A69.0 (Necrotising ulcerative stomatitis) included	Same as Vic DHS

Appendix 1.3: Geographic areas mapped

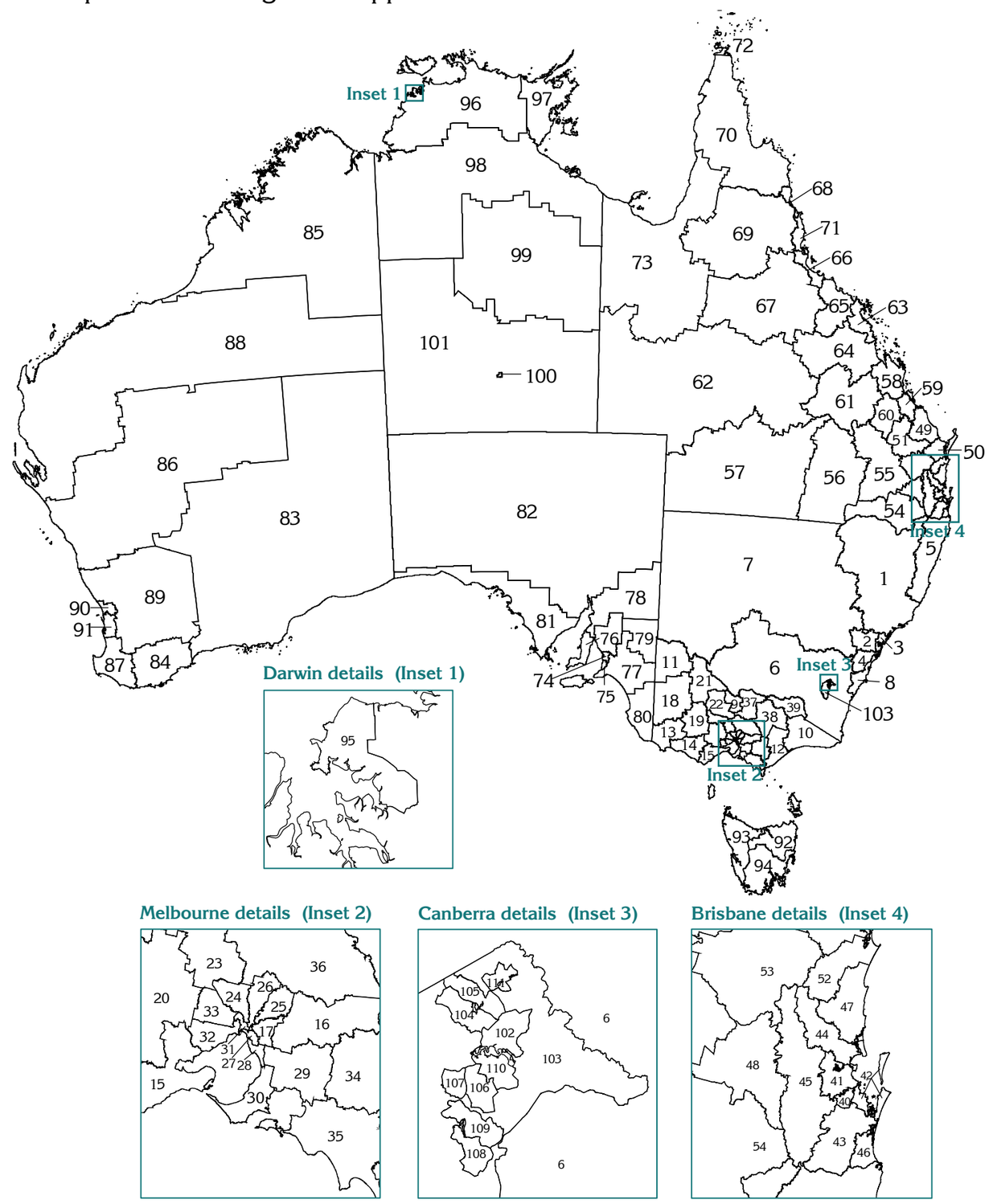
Key to health regions mapped for Australia

Alphabetical Key to State/Territory health regions, Australia, 2001

Area name	Map Ref.
New South Wales Area Health Services	
Greater Southern	6
Greater Western	7
Hunter/ New England	1
North Coast	5
Northern Sydney/ Central Coast	3
South Eastern Sydney/ Illawarra	8
Sydney South West	4
Sydney West	2
Victorian Primary Care Partnerships	
Banyule/Nillumbik	25
Barwon	15
Bendigo/Loddon	22
Brimbank/Melton	33
Campaspe	9
Central Grampians	19
Central Highlands	20
Central Hume	38
Central Victorian Health Alliance	23
Central West Gippsland	34
East Gippsland	10
Frankston/Mornington Peninsula	30
Goulburn Valley	37
Hume/Moreland	24
Inner East	17
Inner South East	27
Kingston/Bayside	28
Lower Hume Health & Community Services	36
Moonee Valley/Melbourne	31
North Central Metropolitan	26
Northern Mallee	11
Outer East	16
South Coast Health Service Consortium	35
South East	29
South West	14
Southern Grampians/Glenelg	13
Swan Hill-Gannawarra-Buloke	21
Upper Hume	39
Wellington	12
West Bay	32
Victoria…*continued*	
Wimmera	18
Queensland District Health Services	
Banana	60
Bayside	42
Bowen	65
Bundaberg	49
Cairns	68
Cape York	70
Central Highlands	61
Central West	62
Charleville	57
Charters Towers	67
Fraser Coast	50
Gladstone	59
Gold Coast	46
Gympie	52
Innisfail	71
Logan-Beaudesert	43
Mackay	63
Moranbah	64
Mt Isa	73
North Burnett	51
Northern Downs	55
Prince Charles Hospital & District	41
Queen Elizabeth II Hospital & District	40
Redcliffe-Caboolture	44
Rockhampton	58
Roma	56
South Burnett	53
Southern Downs	54
Sunshine Coast	47
Tablelands	69
Toowoomba	48
Torres	72
Townsville	66
West Moreton	45
South Australian Health Regions	
Central Northern Adelaide[1]	74
Eyre	81
Hills Mallee Southern	77
Mid North	78
South Australia…*continued*	
Northern & Far Western	82
Riverland	79
South East	80
Southern Adelaide[1]	75
Wakefield	76
Western Australian Health Regions	
Goldfields-South East Coastal	83
Great Southern	84
Kimberley	85
Midwest-Murchison	86
North Metro	90
Pilbara-Gascoyne	88
South Metro	91
South West	87
Wheatbelt	89
Tasmanian Regions	
North	92
North West	93
South	94
Northern Territory Health Services Areas	
Alice Springs Rural	101
Alice Springs Urban	100
Barkly	99
Darwin Rural	96
Darwin Urban	95
East Arnhem	97
Katherine	98
Australian Capital Territory Regions	
Australian Capital Territory (ACT)-Balance	103
Gungahlin-Hall	111
North & West Belconnen	105
North Canberra	102
North Tuggeranong	109
South Belconnen	104
South Canberra	110
South Tuggeranong	108
Weston Creek-Stromlo	107
Woden Valley	106

[1] Health Service

Map A1: Health regions mapped for Australia



Key to health regions mapped for Australia … *continued*

Numerical Key to State/Territory health regions, Australia, 2001

Area name	Map Ref.
New South Wales Area Health Services	
Hunter/ New England	1
Sydney West	2
Northern Sydney/ Central Coast	3
Sydney South West	4
North Coast	5
Greater Southern	6
Greater Western	7
South Eastern Sydney/ Illawarra	8
Victorian Primary Care Partnerships	
Campaspe	9
East Gippsland	10
Northern Mallee	11
Wellington	12
Southern Grampians/Glenelg	13
South West	14
Barwon	15
Outer East	16
Inner East	17
Wimmera	18
Central Grampians	19
Central Highlands	20
Swan Hill-Gannawarra-Buloke	21
Bendigo/Loddon	22
Central Victorian Health Alliance	23
Hume/Moreland	24
Banyule/Nillumbik	25
North Central Metropolitan	26
Inner South East	27
Kingston/Bayside	28
South East	29
Frankston/Mornington Peninsula	30
Moonee Valley/Melbourne	31
West Bay	32
Brimbank/Melton	33
Central West Gippsland	34
South Coast Health Service Consortium	35
Lower Hume Health & Community Services	36
Goulburn Valley	37
Central Hume	38
Victoria…*continued*	
Upper Hume	39
Queensland District Health Services	
Queen Elizabeth II Hospital & District	40
Prince Charles Hospital & District	41
Bayside	42
Logan-Beaudesert	43
Redcliffe-Caboolture	44
West Moreton	45
Gold Coast	46
Sunshine Coast	47
Toowoomba	48
Bundaberg	49
Fraser Coast	50
North Burnett	51
Gympie	52
South Burnett	53
Southern Downs	54
Northern Downs	55
Roma	56
Charleville	57
Rockhampton	58
Gladstone	59
Banana	60
Central Highlands	61
Central West	62
Mackay	63
Moranbah	64
Bowen	65
Townsville	66
Charters Towers	67
Cairns	68
Tablelands	69
Cape York	70
Innisfail	71
Torres	72
Mt Isa	73
South Australian Health Regions	
Central Northern Adelaide[1]	74
Southern Adelaide Health[1]	75
Wakefield	76
Hills Mallee Southern	77
South Australia…*continued*	
Mid North	78
Riverland	79
South East	80
Eyre	81
Northern & Far Western	82
Western Australian Health Regions	
Goldfields-South East Coastal	83
Great Southern	84
Kimberley	85
Midwest-Murchison	86
South West	87
Pilbara-Gascoyne	88
Wheatbelt	89
North Metro	90
South Metro	91
Tasmanian Regions	
North	92
North West	93
South	94
Northern Territory Health Services Areas	
Darwin Urban	95
Darwin Rural	96
East Arnhem	97
Katherine	98
Barkly	99
Alice Springs Urban	100
Alice Springs Rural	101
Australian Capital Territory Regions	
North Canberra	102
Australian Capital Territory (ACT) Balance	103
South Belconnen	104
North & West Belconnen	105
Woden Valley	106
Weston Creek-Stromlo	107
South Tuggeranong	108
North Tuggeranong	109
South Canberra	110
Gungahlin-Hall	111

[1] Health Service

Variations from State Health Regions

There are a number of differences between the health region boundaries used in this Atlas and the current government defined health regions for the State of Queensland and for the Northern Territory.

In Queensland, the government defined health regions split the Shire of Cook between the District Health Services of Cairns and Cape York. In this atlas, the Shire of Cook has been grouped only with the District Health Service of Cape York. Furthermore, the Shire of Carpentaria is assigned only to the Mount Isa District Health Service in this atlas; however the government boundaries indicate that it should be split, (north and south at the Gilbert River) between the Cape York and Mount Isa District Health Services.

In the Northern Territory, the SLA of Litchfield (S): Part A is defined as part of Darwin Urban Health Service, however in this atlas it is shown as being part of the Darwin Rural Health Service. The other variations are minor, and occur along the border between the Darwin Rural and Katherine Health Service areas, at the far eastern border of the Katherine and Barkly Health Service areas, and at the far eastern boundary between Barkly and Alice Springs Rural Health Service areas. These latter variations in the boundaries are small and affect minimal population numbers.

Avoidable hospitalisations represent a range of conditions for which hospitalisation should be able to be avoided because the disease or condition has been prevented from occurring, or because individuals have had access to timely and effective primary care. This report addresses the level and extent of regional variation in Australia in a sub-set of avoidable hospitalisations, namely those arising from ambulatory care-sensitive (ACS) conditions.