

## 6 Utilisation of health services

### Introduction

Aggregate rates of health service usage provide an important 'proxy' indicator of population health status. For example, the extent of the population's use of general medical practitioner (GP) services, or of episodes of hospitalisation, is likely to be indicative of overall levels of illness in the community. As discussed in Chapter 1, it has been known for some time that the

most disadvantaged groups make the most use of primary and secondary health services (especially when there is universal access to services) and make the least use of preventative services. It is also clear that their poorer health status largely explains their greater use. Details of some of the differentials evident in the Australian data are in **Table 6.1**.

**Table 6.1: Health service use by socioeconomic disadvantage of area and sex, Australia, late 1980s**  
**Note: First quintile is high socioeconomic status and fifth quintile is low socioeconomic status**

Age group (years) health status, health service use and risk measures	Rate/ratio for quintile of socioeconomic disadvantage of area			
	Males		Females	
	1st quintile	5th quintile	1st quintile	5th quintile
<b>Children (0 to 14 years)</b>				
hospital episodes	1.00	0.89	1.00	2.21
doctor visits	1.00	1.02	1.00	1.16*
dental visits	1.00	0.80**	1.00	0.59***
<b>Youth (15 to 24 years)</b>				
hospital episodes	1.00	1.30	1.00	1.16
doctor visits	1.00	1.25**	1.00	1.18**
dental visits	1.00	0.70***	1.00	1.01
<b>Adults (25 to 64 years)</b>				
hospital episodes	1.00	0.97	1.00	0.95
doctor visits	1.00	1.24***	1.00	1.04
dental visits	1.00	1.02	1.00	0.85**
<b>Older people (65 &amp; over)</b>				
hospital episodes	1.00	1.22	1.00	1.26
doctor visits	1.00	0.88*	1.00	1.28***
dental visits	1.00	1.36**	1.00	0.57***
<b>All ages</b>				
hospital episodes	1.00	1.05	1.00	1.16
doctor visits	1.00	1.10***	1.00	1.12***
dental visits	1.00	0.96	1.00	0.79***

**Statistical significance: the greater the number of \* the higher the level of significance: \* p < 0.05: \*\* p < 0.01: \*\*\* p < 0.001**

**Source: Mathers, C. Health Monitoring Series Nos. 1 to 4, Australian Institute of Health & Welfare, AGPS, Canberra, 1994**

It is possible, however, that despite higher rates of use, health or service needs are not fully met. This means that variations in rates between sub groups of the population (eg. for women, children, the aged, or for Indigenous Australians) may be indicating inequality of access, either physical access (which can be limited by factors such as lack of transport and cost, particularly the cost of services not covered by Medicare), or the quality of care provided (such as the level and quality of information provided as to the options for treatment, and alternatives which might otherwise reduce use of services).

### Data mapped

The health services described include the use of public and private hospitals, services provided by GPs and rates of immunisation of children at the age of 12 months. These are services for which data necessary for analysis at a small area level can be obtained: such data includes the age, sex and postcode or Statistical Local Area (SLA) of usual residence of the patient.

### Measure mapped

Age-sex standardised ratios have been calculated and mapped for admissions to hospital and services provided by GPs by place

of usual residence of the patient or client, to illustrate the extent of variation in health service use between the populations of these areas. A brief description of the technique of standardisation, its purposes, and method of calculation, is in Appendix 1.3.

### Variables mapped

The variables mapped represent only a selection of the full range of variables that could potentially be mapped from each data set. For example, admissions to hospital (see box on page 179 for the definition of admission) of patients with all types of cancer, and those with lung cancer specifically are mapped, but admissions resulting from cancer of the prostate are not mapped, as there were too few cases at the small area level from which to calculate reliable rates. The number of variables analysed and mapped was also constrained by the size of the atlas. Therefore the variables mapped are those that represent a significant proportion of the activity for the topic; are known to be more prevalent among a particular population group; or are known to have a distribution which varies regionally.

A comparison of the mapped distribution of these measures of health service use with the maps in the other chapters indicates

the extent of association at the small area level between health service use and socioeconomic status and health status. The extent of association is also indicated by the results of the correlation analysis in Chapter 8.

## Areas mapped

The hospital admission data are coded to the boundaries current at 1 July 1994, and the GP services and immunisation data to boundaries current at 1 July 1996. Between these dates the SLA of Wanneroo (C) was split into five parts; Wanneroo: Central Coastal, Wanneroo: North-East, Wanneroo: North-West, Wanneroo: South-East and Wanneroo: South-West. The hospital admissions data therefore refers only to Wanneroo (C), whereas the other data in this chapter refers to the five SLAs.

## Gaps and deficiencies in the data

### Data collections

The coverage and availability of data from nation-wide statistical collections describing health service provision *at the small area level* have changed little since the first edition of the atlas was published in 1992.

An important development is that hospital inpatient data at the small area level are now largely available from a single source (the Australian Institute of Health and Welfare (AIHW) National Hospital Morbidity Database). This contrasts with the situation in producing the first edition of the atlas when hospital data were collected directly from State and Territory health authorities. Further, only New South Wales, Queensland, South Australia and Western Australia had complete collections at that time<sup>1</sup>. There are, however, relatively small but significant deficiencies in the database. These deficiencies are described under *Deficiencies in the admissions data* (page 187).

As was the case in 1992, only the age and sex of the patients of GPs are available to be mapped. There is, for example, no information at a small area level of consultations with GPs which includes other client characteristics, such as reason for attendance (eg. patient is unwell and nature of illness, has an injury, or is seeking advice), type of services provided (eg. patient referred to other health practitioner, pharmaceutical drugs prescribed), or outcome (eg. patient referred to other health practitioner, course of treatment established). The lack of information on GP services represents a major gap in our ability to describe the work of these important primary health care providers, to understand the appropriateness of the services provided, and to assess the outcomes achieved.

Other major gaps in the availability of service usage data at the small area level are data describing:

- services provided to those using public hospital outpatient departments and accident and emergency clinics (a majority of these services are specialist medical consultations);
- services provided by specialist public psychiatric hospitals and other specialist mental health services;

- services provided through community based care (eg. community health services, including community mental health services), domiciliary care services and home based nursing and care services;
- health promotion and other public health programs, as well as information on community knowledge, attitudes and behaviours as to health, health status and health risks;
- the dispensing of prescribed pharmaceutical items, especially by type of medication; and
- terminations of pregnancy (see additional comments below).

Some of these issues are discussed elsewhere in this chapter and details on statistics for cancer incidence and screening are included. As regards the data for termination of pregnancy, terminations are undertaken both in hospitals and in clinics which are not hospitals. These clinics are not, therefore, included in the State and Territory hospital data collections. In an attempt to obtain a complete dataset, details of the age and area of residence of women undergoing a pregnancy termination other than in a hospital were obtained from Health Insurance Commission data and added to the hospitals' dataset. This combined dataset was compared with the data from States with complete coverage in their hospital collections, to see if it provided an accurate picture. Unfortunately the combined dataset was inconsistent with data from the other sources and therefore, this variable was not mapped.

### Other data issues

Similarly, due to inadequate identification of Indigenous Australians in hospital inpatient collections, admissions to hospital of Indigenous Australians remain understated and have not been mapped separately.

As discussed in Chapter 2, the lack of data items, such as income or education, in health statistics collections and the consequent inability to identify and analyse socioeconomic status directly is a major deficiency in the Australian data. Therefore, the socioeconomic status of the area of usual residence of the client or patient is used as a proxy for the socioeconomic status of the client or patient. The limitations of this approach are discussed in Chapter 2, *Methods* under the heading *Usual residence*.

An over-riding deficiency in the hospital inpatient data is the lack of a unique identifier to allow for the analysis of data for individuals rather than admissions. This is discussed in more detail under *Deficiencies in the admissions data* (page 187).

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<sup>1</sup>The data for the private hospital in the Northern Territory was not available for the year of analysis (1989), but data for 1987 (before the private hospital was established) was available and used.

# Admissions to hospitals

## Introduction

There were almost 4.8 million admissions (see the box below) to hospitals in Australia in 1995/96 (450,000 admissions in Western Australia), providing a major database of information for examining the more serious health problems faced by Australians, subject to the qualifications discussed below (*Deficiencies in the admissions data*, page 187)

Information available for admissions includes the age, sex, diagnoses and surgical and other procedures, as recorded in the patient's case notes at the time of discharge, transfer or death. Importantly for spatial analysis, the postcode or SLA of the address of usual residence of the patient is also recorded.

### Recording details for a hospital episode (admissions)

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

At the time of admission, the age, sex, address of usual residence and other personal details of the patient are recorded. At the end of the episode, at the time of separation from hospital, details of the episode itself are recorded, including the principal diagnosis (and other diagnoses), principal procedure (and other procedures), and the date, time and method (discharge, transfer or death) of separation. Consequently, hospital inpatient data collections are based on separations. In this atlas, the more commonly used term of 'admission' has been used. In an analysis such as this, which excludes long stay patients (other than the few long stay acute 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.

The maps in this chapter show the spatial patterns of admissions for a range of conditions, diseases and procedures. The following text describes some of the differences evident in the data in hospitalisation rates for specific population groups. Where available, comparisons are made with the data from the first edition of the atlas.

## Differences in admission rates for specific population groups

### Differences related to socioeconomic status

Those who are socioeconomically disadvantaged have higher admission rates than the population in general. Esterman et al. (1990) examined admissions by postcode of usual residence, and compared standardised admission rates of residents of postcodes categorised as low, medium and high income (based on household income). They found that when **Adelaide** postcodes were divided into three categories according to household income, hospital admissions were found to be 34 per cent more frequent for residents of the poorest than for the most affluent category. No condition showed a consistent upward trend in admission rates with increasing affluence, whereas the poorer areas had higher rates for a wide range of diseases and conditions, including ischaemic heart disease; infectious diseases; stroke; digestive system disorders; hypertension;

cancer; skin diseases; respiratory diseases; genito-urinary conditions; injuries; musculo-skeletal conditions; diabetes mellitus; nutritional, immunity and other endocrine disorders; perinatal disorders; and metabolic disorders.

Summary results of the analysis of the 1989-90 National Health Survey (noted above in **Table 6.1**) show variations in hospitalisation rates by socioeconomic status. A study by The Centre for South Australian Economic Studies (1993) estimated that the variation in admission rates between postcodes can be linked to socioeconomic effects was as high as 47 per cent.

### Differences for Aboriginal people

The Australian Bureau of Statistics and the Australian Institute of Health and Welfare have published age-standardised admission ratios for admissions of Indigenous Australians (ABS/AIHW 1999), highlighting the higher rates of admission of Indigenous people, both overall and for most specific causes (**Table 6.2**). For both men and women, the age-standardised admission rates were 1.7 times higher for Indigenous people than they were for other Australians (1.4 times when admissions for dialysis were excluded). The largest differentials in the rates for Indigenous Australians and other Australians were for admissions for dialysis (10.2 times higher for Indigenous females and 6.1 times higher for Indigenous males); diseases of the skin and subcutaneous tissue (3.2; 2.8); endocrine, nutritional and metabolic diseases and immunity disorders (both 2.8); infectious and parasitic diseases (2.2; 2.0); injury and poisoning (2.2; 1.7); and respiratory system diseases (2.3; 2.0). For Indigenous males, mental disorders were also recorded as a major cause of admission (2.5 times higher). It is likely that, given the low rate of identification of Indigenous people in the hospital admissions data, these statistics understate the extent of differentials in admission rates.

The higher admission rates of Indigenous Australians for individual causes are discussed in the introduction to each topic.

**Table 6.2: Admissions of Indigenous Australians to public acute and private hospitals<sup>1</sup>, by cause, Australia, 1996/97**

Cause	Admissions identified as Indigenous		Age-standardised admission ratio <sup>2</sup>		Proportion of total separations (%)	
	Males	Females	Males	Females	Males	Females
Infectious & parasitic diseases	2,286	2,253	2.0	2.2	3.6	2.8
Malignant neoplasms	1,040	1,396	0.7	0.7	1.7	1.7
Endocrine, nutritional & metabolic diseases & immunity disorders	1,259	1,531	2.8	2.8	2.0	1.9
Diseases of the blood & blood-forming organs	269	455	0.6	1.1	0.4	0.6
Mental Disorders	4,045	2,867	2.5	1.6	6.4	3.5
Diseases of the nervous system	3,197	2,695	1.4	1.3	5.1	3.3
Diseases of the circulatory system	3,143	2,742	1.7	2.0	5.0	3.4
Diseases of the respiratory system	7,665	7,073	2.0	2.3	12.2	8.7
Diseases of the digestive system	5,052	4,943	1.1	1.0	8.0	6.1
Diseases of the genitourinary system	1,558	4,548	1.1	1.2	2.5	5.6
Complications of pregnancy, childbirth and the puerperium	..	13,937	..	1.4	..	17.1
Diseases of the skin & subcutaneous tissue	2,382	2,303	2.8	3.2	3.8	2.8
Diseases of the musculoskeletal system & connective tissue	1,721	1,649	0.8	0.9	2.7	2.0
Congenital anomalies	338	300	0.5	0.6	0.5	0.4
Certain conditions originating in the perinatal period	980	850	0.8	0.9	1.6	1.0
Symptoms, signs & ill-defined conditions	3,459	3,879	1.5	1.5	5.5	4.8
Injury and poisoning	7,888	6,211	1.7	2.2	12.6	7.6
Other reasons for contact						
Dialysis	13,545	18,172	6.1	10.2	21.6	22.3
Other	2,876	3,755	0.8	0.9	4.6	4.6
<b>Total</b>	<b>16,421</b>	<b>21,927</b>	<b>2.9</b>	<b>3.7</b>	<b>26.1</b>	<b>26.9</b>
<b>All causes (excluding dialysis)</b>	<b>49,293</b>	<b>63,454</b>	<b>1.4</b>	<b>1.4</b>	<b>78.4</b>	<b>77.7</b>
<b>All causes (including dialysis)</b>	<b>62,838</b>	<b>81,626</b>	<b>1.7</b>	<b>1.7</b>	<b>100.0</b>	<b>100.0</b>

<sup>1</sup>Excludes admissions to the Darwin Private Hospital

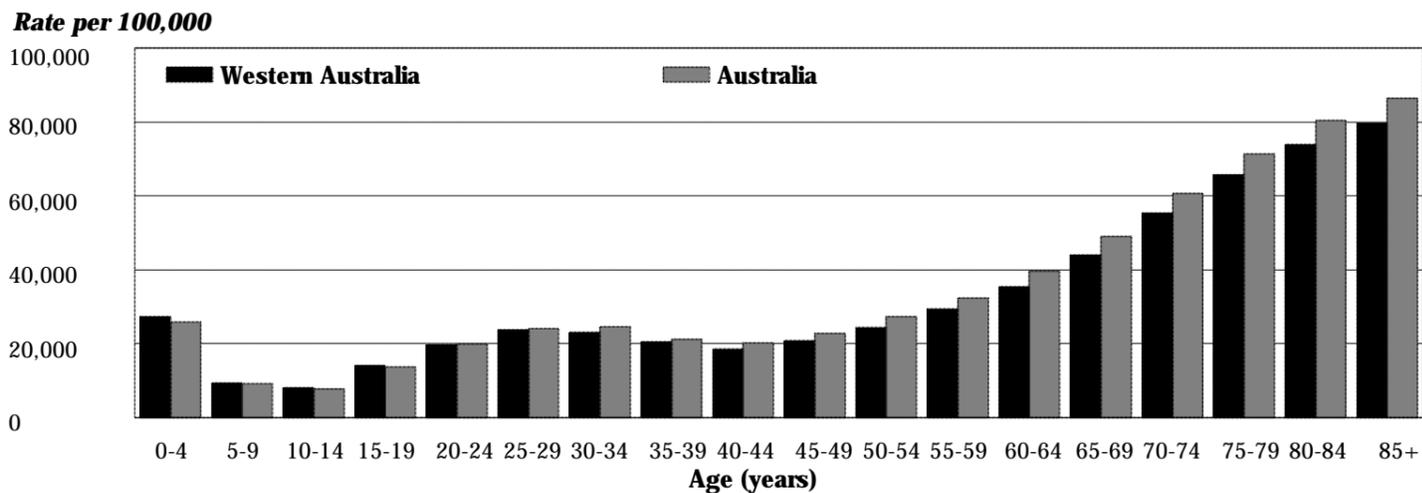
<sup>2</sup>Age-standardised hospital admission ratio is equal to hospital admissions identified as being of Indigenous people, divided by expected admissions, based on all-Australian rates

Source: ABS/AIHW, *The Health and Welfare of Australia's Aboriginal and Torres Strait Islander Peoples*, Table 7.19, pp 112, 1999

### Differences between Western Australia and Australia

Figure 6.1 shows the rates of admission per 100,000 population for residents of Western Australia and Australia for each five year age group. Admission rates for Western Australia and Australia are similar across the age groups, with Western Australian residents having higher rates in the youngest age groups.

**Figure 6.1: Admissions to public acute and private hospitals, by age, Western Australia and Australia, 1995/96**



Source: See Data sources, Appendix 1.3

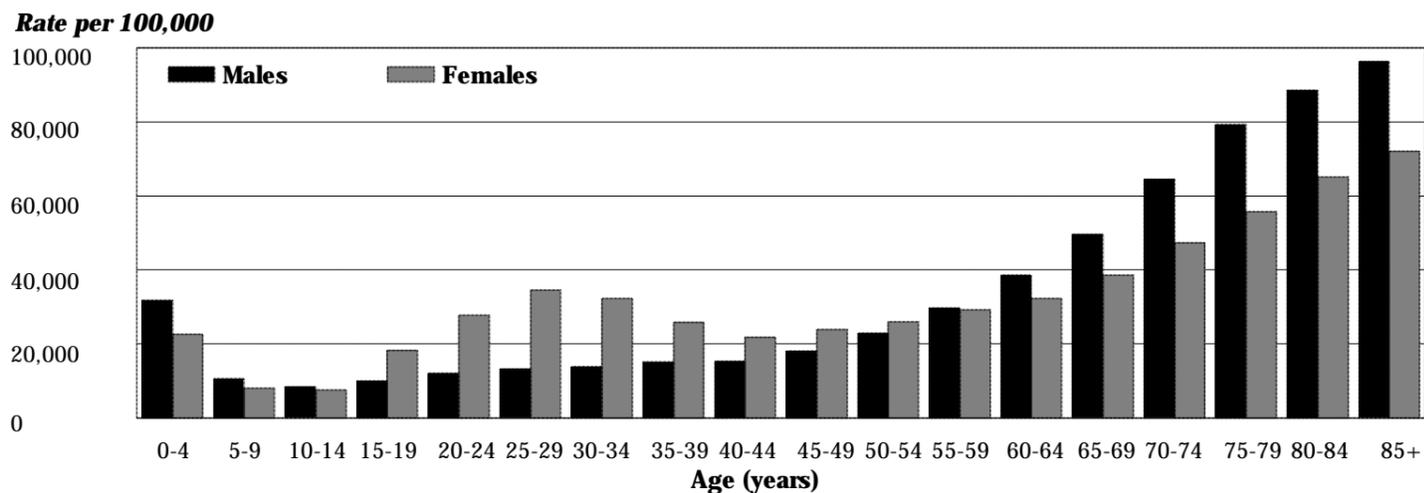
## Differences related to age, sex, and, hospital type

Figures 6.2 to 6.10 show, for a selection of the variables mapped, the rates of admission for each five year age group per 100,000 population for residents of Western Australia admitted to a hospital.

Females accounted for 54.5 per cent of admissions, 16.5 per cent more than males in 1995/96 (Figure 6.2). This pattern is not consistent across all age groups. The greatest divergence in admission rates (admissions per 100,000 population) for males and females occurs in the 25 to 29 year age group, with the

female rate two and a half times that for males. Female rates in the 20 to 24 (2.2 times), 30 to 34 (2.3 times) and 35 to 39 (1.7 times) year age were still well above those for males. These higher rates largely reflect episodes of hospitalisation for childbirth and associated admissions. The rates for males were higher than for females among those aged from 0 to 4 (1.4 times as high), and from age 55 (the greatest disparity being the rate for 75 to 79 year old males, 1.5 times higher than the corresponding female rate).

**Figure 6.2: Admissions to public acute and private hospitals, by age and sex, Western Australia, 1995/96**



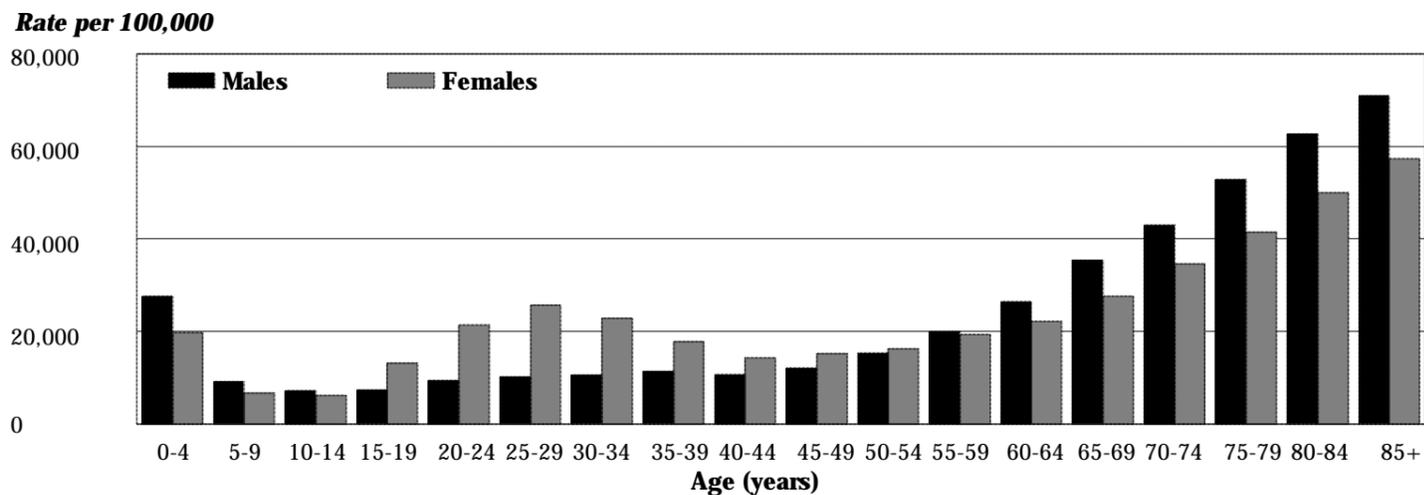
Source: See Data sources, Appendix 1.3

The profile of admissions to public acute hospitals (Figure 6.3) is markedly similar to that for all admissions (Figure 6.2). Higher rates of admissions of females are evident from the 15 to 19 year age group through to the 50 to 54 year age group. Male rates are higher at the youngest ages, and again from the 55 to 59 year age group onwards.

Overall, private hospitals accounted for 27.1 per cent of the admissions analysed for Western Australia. Females make greater use of private hospitals than do males, with admissions

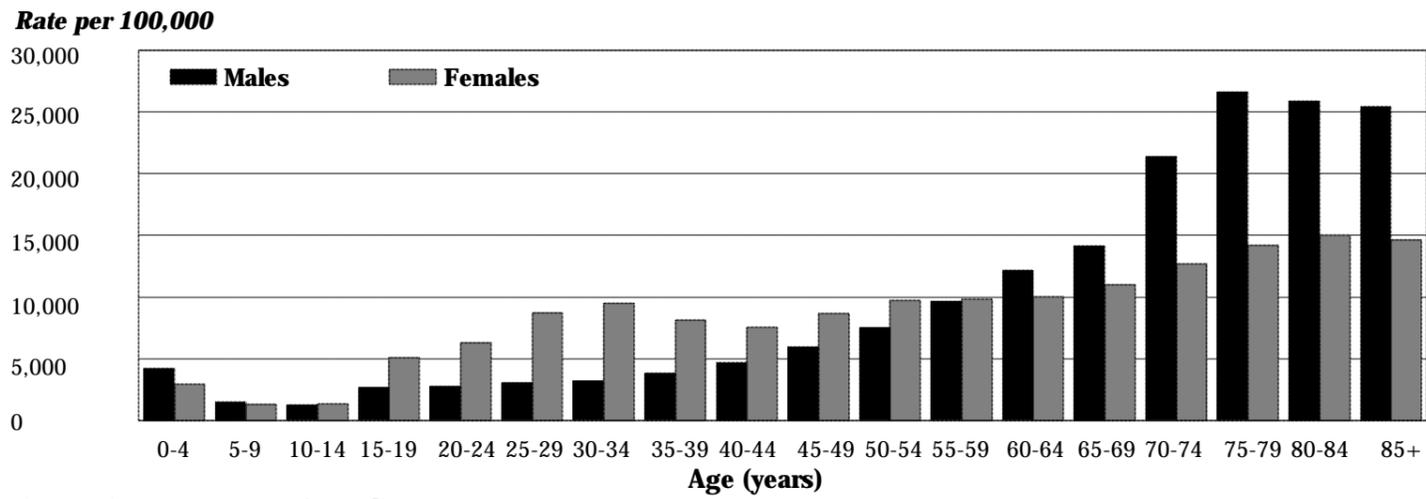
to private hospitals representing 27.5 per cent of all female admissions studied (compared with 26.5 per cent for males) and accounting for 56.1 per cent of private hospital admissions (53.8 per cent in public acute hospitals). The pattern of admissions to private hospitals by age and sex (Figure 6.4) is again similar to that in the previous graphs. The most noticeable differences are the lower overall rates of admission and the lower admission rates for males above 80 years of age.

**Figure 6.3: Admissions to public acute hospitals, by age and sex, Western Australia, 1995/96**



Source: See Data sources, Appendix 1.3

**Figure 6.4: Admissions to private hospitals, by age and sex, Western Australia, 1995/96**

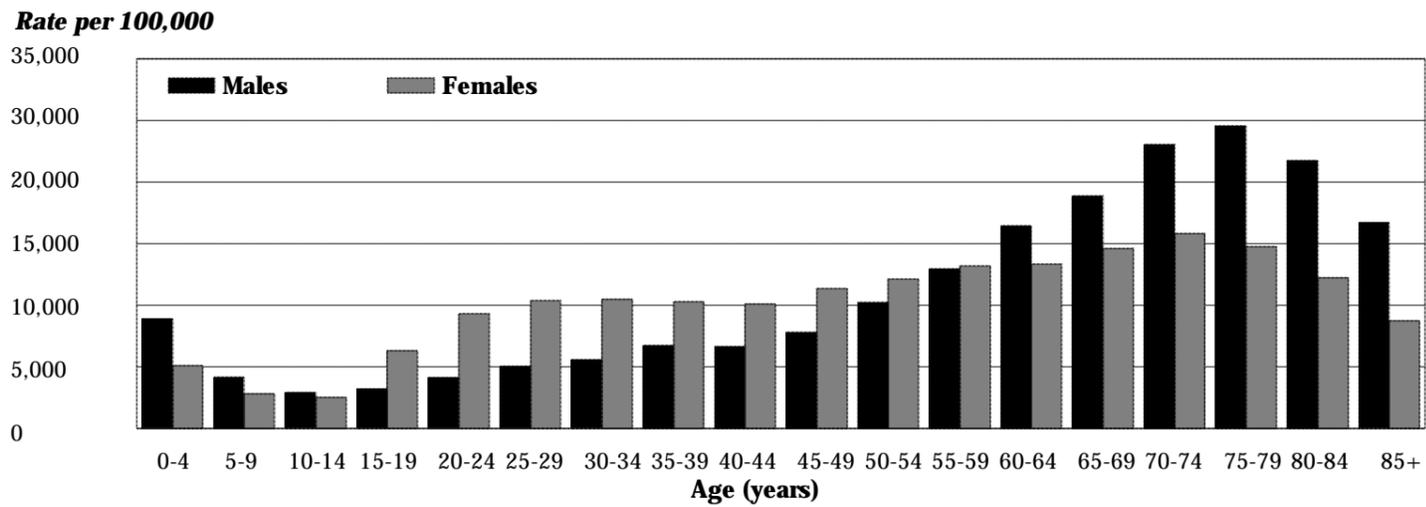


Source: See Data sources, Appendix 1.3

The general pattern of higher admission rates among females aged from 15 to 44 years and among males in the youngest and oldest age groups is also evident for same day admissions (Figure 6.5). However, there are some notable differences. From the age of 25 years, female rates remain reasonably

consistent, increasing marginally in the 45 to 49 age group before declining at the age of 75 years and over. Same day admission rates for males are similar to the rates recorded for total admissions until the 75 to 79 year group, from where they begin to decline.

**Figure 6.5: Same day admissions by age and sex, Western Australia, 1995/96**

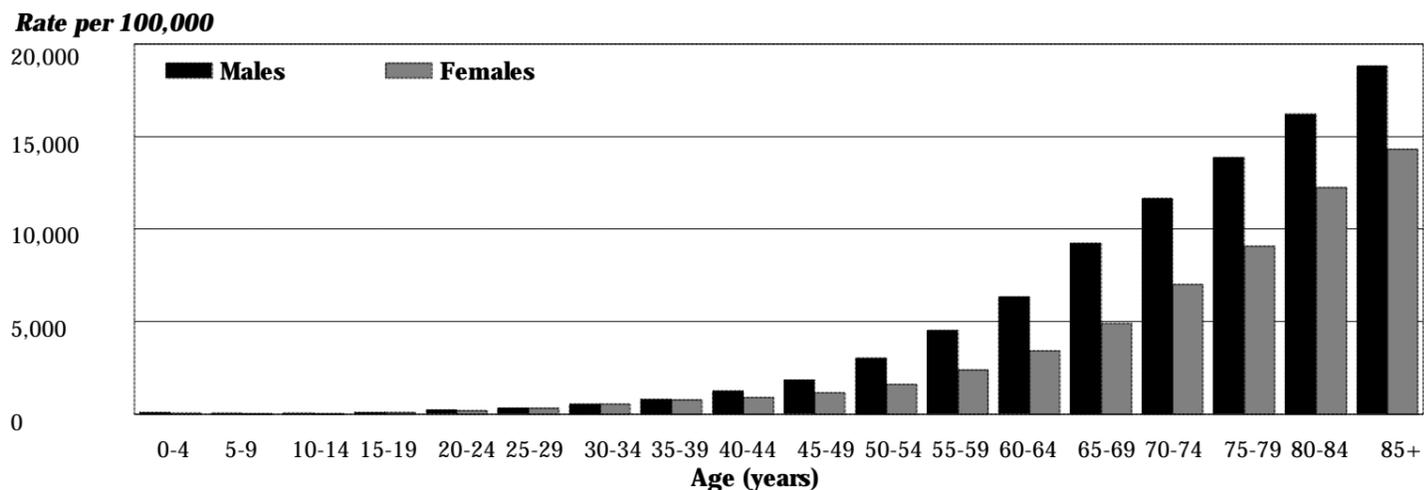


Source: See Data sources, Appendix 1.3

**Figure 6.6** and **Figure 6.7** show admissions for circulatory and respiratory system diseases, respectively. **Figure 6.6** highlights the steep rise in hospital admissions for circulatory system diseases from the age of 30 years, with males predominating across all age groups. Admission rates for respiratory system

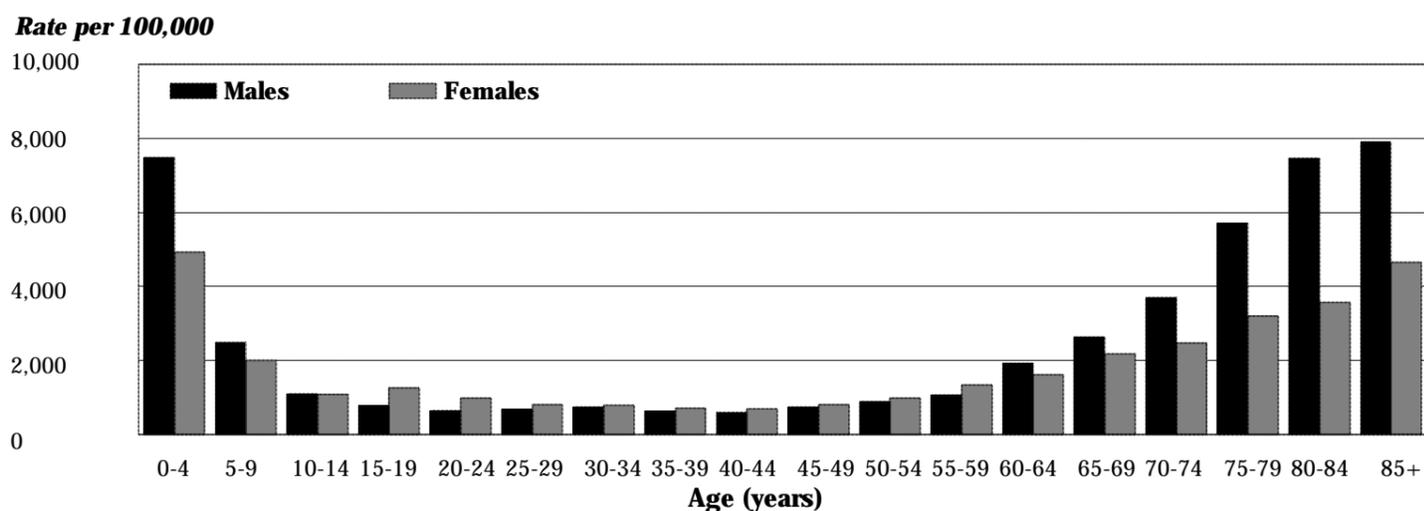
diseases were highest among children aged 0 to 4 years and people aged 75 years and over, with little difference between the age groups from 20 to 54 years (**Figure 6.7**): males predominate in each of these groups.

**Figure 6.6: Admissions for circulatory system diseases, by age and sex, Western Australia, 1995/96**



Source: See Data sources, Appendix 1.3

**Figure 6.7: Admissions for respiratory system diseases, by age and sex, Western Australia, 1995/96**

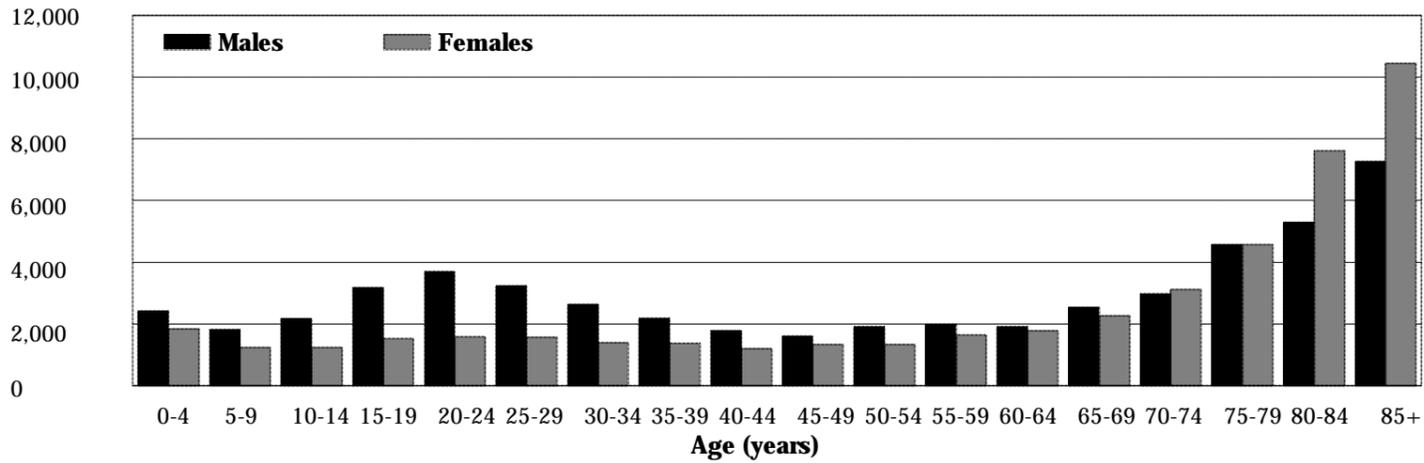


Source: See Data sources, Appendix 1.3

Male and female admission rates for accidents, poisonings and violence (**Figure 6.8**) are in direct contrast with the pattern for total admissions (**Figure 6.2**). Males predominate in all age groups up to and including the 75 to 79 year age group, with the largest differentials between the ages of 5 and 39 years. Female admission rates are consistent across most of the age groups until around the 75 to 79 year age group, after which the rates begin to increase steadily, and to eventually exceed those for males.

**Figure 6.8: Admissions from accidents, poisonings and violence, by age and sex, Western Australia, 1995/96**

**Rate per 100,000**



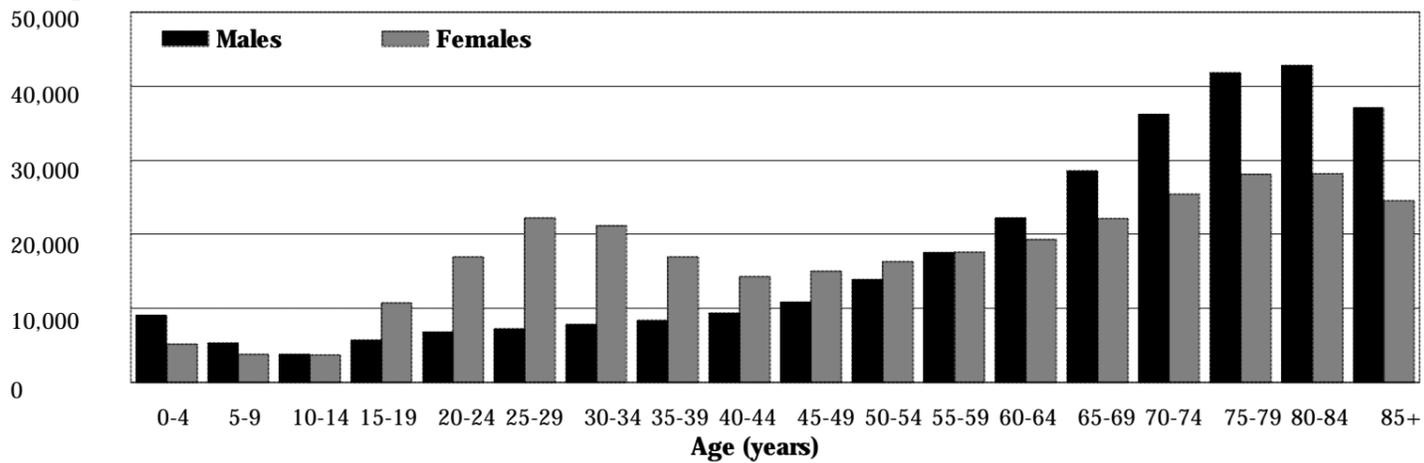
Source: See Data sources, Appendix 1.3

There is little variation in admission rates by either age or sex for admissions for a surgical procedure (Figure 6.9) and same day admissions for a surgical procedure (Figure 6.10), with the major difference occurring for females aged from 35 to 59 years.

Within this age group rates for same day admissions of females for a surgical procedure increased rather than decreased, as they did for total surgical admissions.

**Figure 6.9: Admissions for a surgical procedure, by age and sex, Western Australia, 1995/96**

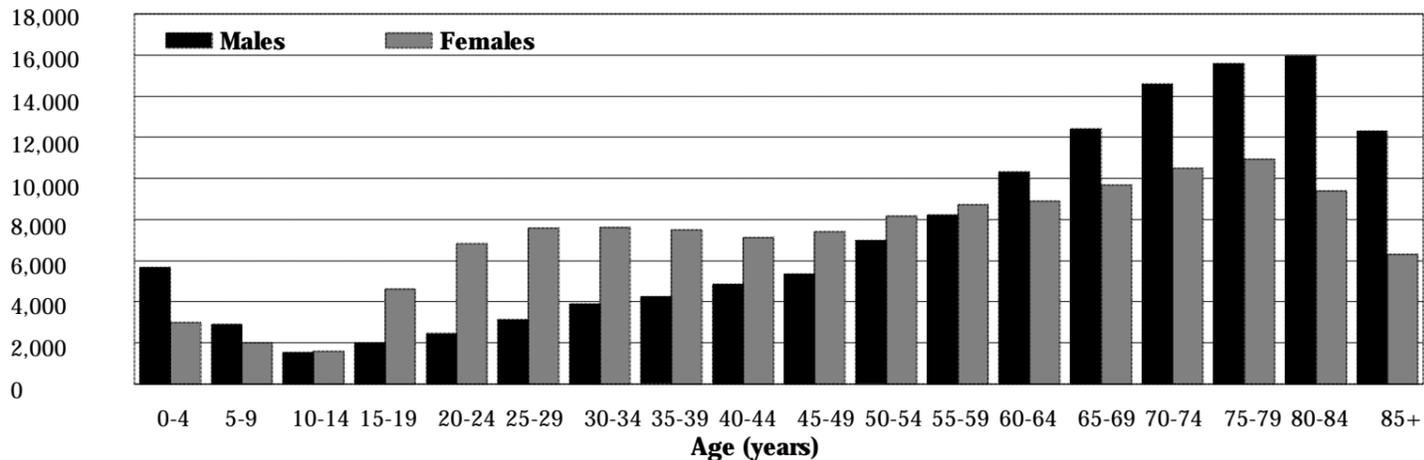
**Rate per 100,000**



Source: See Data sources, Appendix 1.3

**Figure 6.10: Same day admissions for a surgical procedure, by age and sex, Western Australia, 1995/96**

**Rate per 100,000**



Source: See Data sources, Appendix 1.3

## Differences related to area of residence

In addition to the differences noted above in relation to variations in admission rates between population groups, there are notable variations in admission rates between residents of the capital cities and the non-metropolitan areas. In many instances, admission rates are considerably higher for country residents than they are for city residents. Examples of these differences can be seen in many of the tables in this chapter. Some suggested reasons for the higher rates of admissions of residents of these non-metropolitan areas are given below. In some cases, these comments reiterate those for the population groups discussed above.

Some suggested reasons for the higher admission rates of residents of the non-metropolitan areas:

### *Isolation and distance*

Factors such as distance and isolation of people living in these, often remote, areas are important. In country areas, people are more likely to be admitted 'for observation' than be sent home if their homes are a significant distance from the hospital.

### *Higher risks faced*

A higher proportion of the population of these areas are engaged in activities in agriculture and the mining industry, which have relatively high rates of accidents and injuries, often leading to hospitalisation. Higher rates of motor vehicle traffic accidents for people living in rural and remote areas, who are driving longer distances and more often, are also a contributing factor.

### *Lack of, or inadequate, alternative options/services such as community based care and respite care services*

In the absence of community based care, respite care and other services, hospitals in country areas often have a 'surrogate' caring role. This includes, in some instances, admitting people who would otherwise go to specialist psychiatric hospitals; and providing the respite care found in other types of institutions in major urban centres for the aged and younger people with physical and intellectual disabilities. There are also occasions where the circumstances of individuals or families are such that they do not have adequate resources and/or support available which result in hospital admissions. For example, a child of a single parent, living in a country town where there are limited family or community support services, may be more likely to be admitted to hospital for a minor condition, or for observation. This type of situation is often referred to as a 'social admission'.

### *Ready availability of beds*

There is clear evidence that if there is a ready supply of hospital beds, they will be used: this is particularly likely to occur when linked with a lack of appropriate alternative services as mentioned above. Generally more beds are available in country than in city hospitals.

### *Higher rates of admission of Aboriginal people*

In addition to the greater burden of ill health among Indigenous people noted above on page 179, higher rates of hospitalisation for the Indigenous population in the non-metropolitan areas are also likely to reflect significantly larger proportions of Indigenous people resident in these areas.

## Explanatory notes

### Classification of hospitals

Hospitals can be classified as 'acute hospitals' or 'psychiatric hospitals'. Acute hospitals are those which

"provide at least minimal medical, surgical or obstetrical services for inpatients, and which provide round-the-clock comprehensive qualified nursing services as well as other necessary professional services. They must be licensed by the State health authority controlled by government departments. Most of the patients have acute conditions or temporary ailments and the average stay per admission is relatively short." (AIHW, 1998).

Acute hospitals are further classified as 'public' (those hospitals recognised under the Medicare agreement, plus Veterans' Affairs hospitals) or 'private'.

Psychiatric hospitals mainly provide treatment and care to patients with psychiatric, mental or behavioural disorders. Public psychiatric hospitals treat people with the most severe psychiatric conditions: this group tends to be mainly older people, and to have longer lengths of stay. Public acute and private acute hospitals and private psychiatric hospitals treat people with less severe psychiatric conditions<sup>2</sup>.

Data for public psychiatric hospitals are not available for all States and Territories in a standard format and were not able to be included.

### Coverage

Hospital admissions data presented in this atlas includes episodes of hospitalisation in public acute and private (acute and psychiatric) hospitals. To enhance consistency, admissions of long stay nursing home type patients (patients with a length of stay in hospital of 35 days or longer and not considered to be 'acute' patients) have been excluded because the proportion of these patients in public hospitals varies between, and within, the States and Territories. The majority (88.9 per cent) of bed days for patients in this category in Western Australia occurred in hospitals in the non-metropolitan areas, where there are fewer aged care facilities, and such patients are frequently cared for in an 'acute' hospital: the average across the non-metropolitan areas of Australia was 69.9 per cent.

All admissions, including admissions of same day patients, have been included with the exception of admissions for renal dialysis. Same day admissions for renal dialysis have been excluded as they cover many repeat visits by a relatively small number of patients, who may have several admissions in a week. Further, an examination of the data suggests that some patients have changed address to live close to the location of renal dialysis facilities, thus distorting the patterns of use by address of usual residence. It should be noted that the acute episodes analysed also include repeat admissions, although not to the extent

<sup>2</sup>Some larger acute public hospitals (generally teaching hospitals) have dedicated psychiatric units. However patients treated in public acute hospitals (but not in the psychiatric unit) and in private hospitals may also, at the end of their hospital episode, be given a diagnosis indicating their principal condition was a mental disorder. These cases are included in the data analysed and mapped here in this atlas.

occurring among same day patients (in particular those requiring chemotherapy or renal dialysis).

## Data issues

### Data mapped

The analysis of admissions has been restricted to examining admissions for all causes (separately for public acute and private hospitals, and for females and males), and selected diagnoses (based on the patient's principal diagnosis) and selected

procedures (based on the patient's principal procedure), which are major contributors to variations in the pattern of distribution of hospitalisation at the regional and small level, and are known to be associated with socioeconomic status. These admissions (**Table 6.3**) represent 94.3 per cent of the total acute admissions analysed for 1995/96.

Standardised admission ratios have been calculated for SLAs by indirect age-sex standardisation. A description of the technique of standardisation is in Appendix 1.3.

**Table 6.3: Public acute and private hospital admissions included in the analysis<sup>1</sup>, Western Australia, 1995/96**

Principal diagnosis/procedure	Same day		Overnight		Total	
	No.	% <sup>2</sup>	No.	% <sup>2</sup>	No.	% <sup>2</sup>
<b>Principal diagnosis</b>						
<b>Infectious and parasitic diseases</b>	1,728	1.1	6,290	2.3	8,018	1.9
<b>Cancer</b>						
lung cancer	216	0.1	1,007	0.4	1,223	0.3
cancer of the female breast	168	0.1	989	0.4	1,157	0.3
<b>Total cancer</b>	5,514	3.7	13,108	4.8	18,623	4.4
<b>Mental disorders</b>						
psychosis	3,705	2.5	5,347	2.0	9,052	2.1
neurotic, personality or other mental disorders	2,896	1.9	5,655	2.1	8,551	2.0
<b>Total mental disorders</b>	6,605	4.4	11,003	4.1	17,608	4.2
<b>Circulatory system diseases</b>						
ischaemic heart disease	2,401	1.6	9,304	3.4	11,705	2.8
<b>Total circulatory disease/disorders</b>	6,452	4.3	25,973	9.6	32,425	7.7
<b>Respiratory system diseases</b>						
bronchitis, emphysema or asthma	542	1.4	7,474	2.8	8,016	1.9
<b>Total respiratory diseases/disorders</b>						
0 to 4 year olds	900	1.6	6,934	2.6	7,834	1.9
all ages	2,471	1.6	26,376	9.7	28,847	6.8
<b>Accidents, poisonings and violence</b>	7,211	4.8	30,598	11.3	37,809	9.0
<b>All causes (excl. renal dialysis)</b>						
Females	80,793	53.7	151,783	56.1	232,576	55.2
Males	69,588	46.3	118,986	43.9	188,574	44.8
<b>Public acute hospitals (excl. renal dialysis)</b>	101,699	67.6	205,386	75.9	307,085	72.9
<b>Private acute &amp; psychiatric hospitals (excl. renal dialysis)</b>	48,682	32.4	65,384	24.1	114,066	27.1
<b>Total admissions (excl. renal dialysis)</b>	150,381	100.0	270,769	100.0	421,150	100.0
<b>Total admissions</b>						
Admissions for renal dialysis	25,429	14.5	26	0.0	25,455	5.7
All other admissions	150,381	85.5	270,769	100.0	421,150	94.3
<b>Total admissions (incl. renal dialysis)</b>	175,810	100.0	270,795	100.0	446,605	100.0
<b>Principal procedure</b>						
Tonsillectomy	15	0.01	3,008	2.32	3,023	1.31
Myringotomy	2,681	2.64	242	0.19	2,923	1.26
Caesarean section	4	0.00	4,276	3.30	4,280	1.85
Hysterectomy	1	0.00	3,191	2.46	3,192	1.38
Hip replacement	1	0.00	1,157	0.89	1,158	0.50
Lens insertion	3,536	3.48	3,099	2.39	6,635	2.87
Endoscopy	24,429	24.02	4,355	3.36	28,784	12.44
<b>Total (incl. all other) procedures</b>	101,705	100.0	129,759	100.0	231,465	100.0

<sup>1</sup>Excludes long stay nursing home type patients: includes admissions of residents of New South Wales, regardless of the State/Territory of the hospital to which they were admitted

<sup>2</sup>Percentage of Total admissions for Principal diagnosis and of Total procedures for Principal procedures

Source: See *Data sources*, Appendix 1.3

## Deficiencies in the admissions data

As noted above, the majority of hospital inpatient data at the small area level are now available from the Australian Institute of Health and Welfare National Hospital Morbidity Database. There are a number of deficiencies for small area analysis in this database.

For example, the database does not include the address of usual residence at the SLA level for admissions of people occurring outside their home State or Territory. These admissions are of particular significance in places such as the Gold Coast, with people from New South Wales (and in particular from Tweed Heads), being major users of Gold Coast hospitals. Other examples are cross-border flows between Albury (in New South Wales) and Wodonga (in Victoria), and between Canberra and Queanbeyan and other surrounding parts of New South Wales (see **Table 6.5**).

Secondly, the Queensland Health Department does not provide the usual residence of the patient to the AIHW by SLA (as do other States and Territories), instead only making the data available by Statistical Subdivision.

In both of these instances, the State and Territory authorities were approached and provided the necessary data to make the database complete to enable mapping at the SLA level.

A third shortcoming of the National Hospital Morbidity Database is that the Darwin Private Hospital is not included in the Northern Territory hospital inpatient collection. This is the only hospital of significant size (across Australia) that was not included in the 1995/96 database, and remains so. As it accounts for some 20 per cent of admissions occurring in the Northern Territory, it is essential that it be included in any analysis and mapping at the SLA level. Fortunately, the Manager of Patient Services at the Darwin Private Hospital arranged for the necessary details (of the age, sex, principal diagnosis, principal procedure and location of address (eg. suburb, town or locality) of each admission) to be provided to the atlas project. To maintain confidentiality of the hospital's data, admissions to the private hospital in the Northern Territory have not been mapped separately as they have for the other States and the Australian Capital Territory.

The lack of a unique patient identifier represents a major deficiency in analysing data for individuals rather than admissions. Although many hospitals have unique identifiers for patients within their hospitals, such identifiers do not exist between hospitals<sup>3</sup>. Thus the data includes repeat admissions and is, therefore, of limited value in describing patterns of hospitalisation for individuals. These issues also apply to many other collections of service utilisation data.

## Differences in data treatment between editions

In the first edition of the atlas all same day patients were excluded from the analysis, and were not mapped. The decision to exclude this group of patient episodes was based on a concern that the inclusion of such admissions could distort the patterns of

admission at the SLA level. This could occur because the measure mapped is the number of admissions, and not the number of individuals (for which data are not available). In any year an estimated 20 per cent of the population is admitted to hospital (ABS 1997) and most of those admitted have only one admission in any year. However, some conditions, because of their nature, require many repeat admissions. Admission rates for SLAs with above average proportions of such repeat admissions will be distorted. Examples of such admissions are those for renal dialysis and chemotherapy, which may require admission to hospital (or to a same day clinic) every few days, or even daily. It became evident from an examination of the patterns of distribution of admissions for same day patients that some people had moved residence to live in close proximity to the unit they attended for treatment. For this reason same day admissions were excluded from the analysis in the first edition.

Same day admissions have increased to comprise an even greater proportion of all admissions, and to cover a growing range of conditions and procedures, and this approach is no longer appropriate. Instead, the data analysed for this second edition includes all same day procedures with the exception of admissions for renal dialysis, as it is for these admissions that it appears likely that people may have moved residence. The exclusion of admissions for renal dialysis resulted in the exclusion of 25,455 admissions in 1995/96, 5.7 per cent of all admissions (**Table 6.3**). In this way the major distorting influence is removed, but the large number of other same day admissions is included. It should be noted that the admissions for renal dialysis excluded were admissions specifically for dialysis (ie. for continuous ambulatory dialysis). Admissions during which renal dialysis was undertaken as an integral component of the episode are included.

In hindsight, it might have been more appropriate to have used this approach in the first edition of the atlas. Had this been done, a major differential evident between the standardised ratios for many of the variables for New South Wales in relation to those for the other States could well have been explained (and, at least in part, removed). For example, in 1989-90, the standardised admission ratio (SAR) for both male and female residents of New South Wales was 80. The equivalent ratios for South Australians were 104 for males and 102 for females. For both males and females this represents a differential of just over 25 per cent.

In 1989-90, same day patients accounted for some 27.8 per cent of all admissions in New South Wales and a lower 22.7 per cent in South Australia (1989) (**Table 6.4**)<sup>4</sup>. It is likely that the inclusion of the same day figures in the analysis for the first edition may have reduced, or eliminated, the differentials reported. It is interesting to note that the differential in the proportion of admissions represented by same day patients in these two States has declined substantially, from 22.5 per cent in 1989, to 7.1 per cent in 1995/96. A similar narrowing has occurred across all of the States.

<sup>3</sup>Although potentially useful as an identifier, the Medicare number is not always included on inpatient records. Nor is it a unique identifier, with some individuals having more than one number.

<sup>4</sup>The comparison in **Table 6.4** has been limited to these two States out of the four mapped in the first edition because of the ready availability of the data for the earlier period shown: they were also the States with the greatest differentials in standardised ratios.

**Table 6.4: Public acute and private hospital admissions, by type of admission: Comparison between editions<sup>1</sup>**

Admission type	1989 <sup>2</sup>		1995/96	
	Number	Per cent	Number	Per cent
<b>South Australia</b>				
Same day				
Renal dialysis	13,927	3.9	34,766	7.6
Other	67,881	18.8	144,725	31.6
Total same day	81,808	22.7	179,491	39.2
Overnight stay	278,521	77.3	278,437	60.8
Total admissions	360,329	100.0	457,928	100.0
<b>New South Wales</b>				
Same day				
Renal dialysis	60,022	4.8	111,065	6.3
Other	289,489	23.0	627,508	35.7
Total same day	349,511	27.8	738,573	42.0
Overnight stay	904,099	72.2	1,017,892	58.0
Total admissions	1,253,610	100.0	1,756,465	100.0

<sup>1</sup>The comparison in this table has been limited to these two States out of the four mapped in the first edition of the atlas because of the ready availability of the data for the earlier period shown: they were also the States with the greatest differentials in standardised ratios

<sup>2</sup>1989-90 for New South Wales

Source: See *Data sources*, Appendix 1.3

There were 418,892 admissions to hospital of residents of Western Australia in 1995/96, of which 99.5 per cent were admissions to hospitals within the State, 0.14 per cent were to hospitals in New South Wales, 0.11 per cent were to Victorian hospitals and 0.10 were to hospitals in the Northern Territory (Table 6.5).

Variations in the proportions of residents of Western Australia admitted to hospitals outside of the State are largely related to the location of their residence. Note that it is the residential location of the person admitted to hospital that is mapped in this atlas, irrespective of the location of the hospital.

**Table 6.5: Admissions of residents of Western Australia by State/Territory of location of hospital, 1995/96**

	Location of hospital							Total	
	NSW	Vic	Qld	SA	WA	Tas	NT		ACT
Number	606	468	344	336	418,892	48	431	25	421,150
Per cent	0.14	0.11	0.08	0.08	99.46	0.01	0.10	0.01	100.00

Source: See *Data sources*, Appendix 1.3

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# Admissions to public acute hospitals and private hospitals, 1995/96

## Capital city comparison (Australia as the Standard)

The admissions included in this analysis are described in detail on page 185. In brief, they include acute admissions to hospitals in Australia, including admissions of same day patients (other than for renal dialysis), whether to a hospital or to a same day surgical unit. The area for which admissions are mapped relates to the address of usual residence recorded in the hospital's administrative records.

The low standardised admission ratios (SARs) in **Canberra** (70\*\*) and **Perth** (88\*\*) provided the largest variation from the *All capitals* ratio of 97\*\*, with only **Hobart** (102\*\*), **Adelaide** (101\*\*) and **Darwin** (101) recording ratios above the level expected from the Australian rates. The main difference evident in standardised admission ratios between the two periods shown in **Table 6.6** was the substantially lower differential (from the Australian rates) in the SAR recorded for **Sydney** in 1995/96. The higher SAR in this later period suggests an increase (relative to the Australian rates) in admission rates between the periods analysed. A similar, although substantially smaller, increase occurred in **Darwin**, while there was a small decrease (relative to the Australian rates) for admissions of residents of **Adelaide** and **Perth**.

**Table 6.6: Admissions to public acute hospitals and private<sup>1</sup> hospitals, capital cities**  
*Age-sex standardised admission ratios*

	Sydney	Melbourne	Brisbane	Adelaide	Perth	Hobart	Darwin	Canberra <sup>2</sup>	All capitals
1995/96 <sup>3</sup>	99**	97**	98**	101**	88**	102**	101	70**	97**
1989 <sup>4</sup>	80**	..	98*	103	93*	..	100*	..	89**

<sup>1</sup>Includes acute and psychiatric hospitals and day surgery facilities

<sup>2</sup>Includes Queanbeyan (C)

<sup>3</sup>Includes same day admissions, other than for renal dialysis

<sup>4</sup>Excludes same day admissions: for Sydney the period is 1989/90 and for Darwin it is 1987

Source: See *Data sources*, Appendix 1.3

Statistical significance: \* significance at 5 per cent; \*\* significance at 1 per cent

## Perth (Western Australia as the Standard)

There were 289,530 admissions to public acute and private hospitals of residents of **Perth** in 1995/96, seven per cent fewer admissions than were expected from the State rates (an SAR of 93\*\*). Females accounted for 55.6 per cent of the admissions.

The overall pattern of distribution of standardised admission ratios is relatively flat, with no SLAs with ratios in the highest range mapped, and two thirds (67.7 per cent) of SLAs with ratios in the middle range (**Map 6.1**).

Ratios were elevated by ten per cent or more above the level expected from the State rates in Cockburn (with an SAR of 120\*\*), Vincent (114\*\*) and Gosnells (110\*\*). Relatively high ratios were also recorded in Bassendean (an SAR of 107\*\*), Kwinana (106\*\*) and Belmont and Stirling: Central (both 105\*\*). With few exceptions, the highest SARs ratios were found in the middle and outer suburbs.

The lowest ratios were located in SLAs of relatively high socioeconomic status, extending from Stirling: South-Eastern, west to Cottesloe on the north bank of the Swan River, and to Melville on the south bank. Within this group of SLAs, Stirling: South-Eastern (with an SAR of 45\*\*), the City of Perth (57\*\*), Canning (67\*\*), Melville (75\*\*) and Nedlands (77\*\*) had the lowest rates.

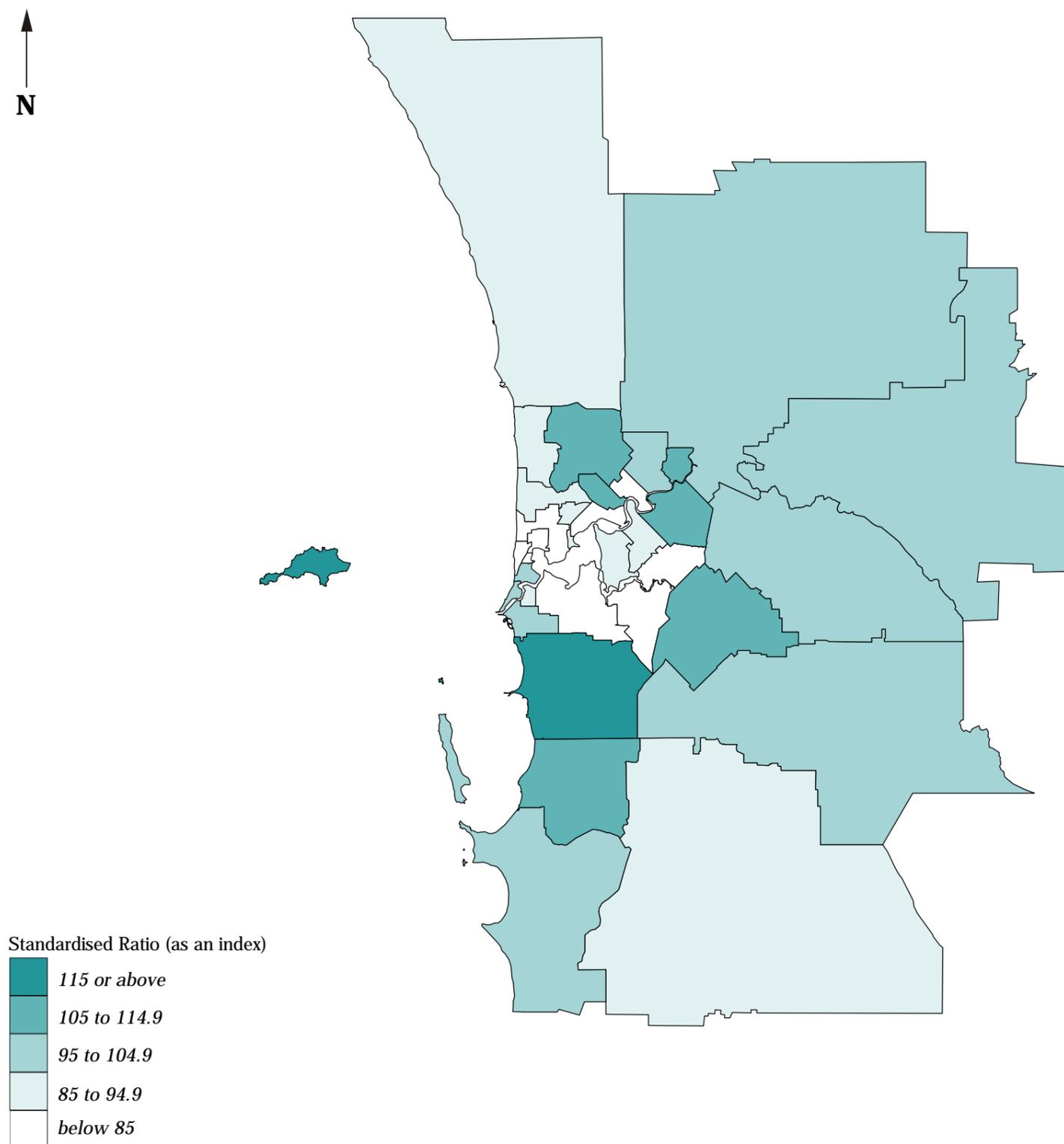
There were more than 15,000 admissions of residents from each of Wanneroo (42,690 admissions), Stirling: Central (28,736), Gosnells (18,608), Melville (17,714) and Cockburn (15,662).

There were correlations of meaningful significance at the SLA level with the variables for unskilled and semi-skilled workers (0.60), early school leavers (0.56), children aged 0 to 4 years (0.51) and Indigenous people (0.50). There were inverse correlations with the variables for managers and administrators, and professionals (-0.55), high income families (-0.52) and female labour force participation (-0.49). These results, together with the inverse correlation of meaningful significance with the IRSD (-0.54), indicate an association at the SLA level between high rates of admissions and socioeconomic disadvantage.

## Map 6.1

### Admissions to public acute hospitals and private hospitals, Perth, 1995/96

Standardised Ratio: number of admissions in each Statistical Local Area compared with the number expected\*



\*Expected numbers were derived by indirect age-sex standardisation, based on WA totals

Source: See Data sources, Appendix 1.3

Details of map boundaries are in Appendix 1.2  
National Social Health Atlas Project, 1999

# Admissions to public acute hospitals and private hospitals, 1995/96

## State/Territory comparison (Australia as the Standard)

The admissions in this chapter include all acute admissions to hospitals in Australia, as well as including admissions of same day patients (other than for renal dialysis), whether to a hospital or to a same day surgical unit.

The most highly elevated standardised admission ratios (SARs) for residents of the non-metropolitan areas were those for the Northern Territory (123\*\*) and South Australia (118\*\*), with elevated SARs in all but Tasmania (**Table 6.7**). The notes on page 185, under the heading *Some suggested reasons for the higher rates of hospitalisation in country areas*, are of relevance in understanding these high admission rates. At the *Whole of State/Territory* level, the Northern Territory had the highest SAR in 1995/96 for this dataset (an SAR of 113\*\*), followed by South Australia (105\*\*) and Queensland (103\*\*).

In all of the States and Territories for which data are available for both periods, SARs were lower in the later period. The main differences are the substantially lower differentials (from the Australian rates) in the SARs recorded for the Northern Territory, Western Australia and South Australia in 1995/96. The lower SARs in this later period suggest a reduction (relative to the Australian rates) in admission rates for non-metropolitan residents between the periods analysed.

**Table 6.7: Admissions to public acute hospitals and private<sup>1</sup> hospitals, State/Territory**  
**Age-sex standardised admission ratios**

	NSW	Vic	Qld	SA	WA	Tas	NT	ACT	Total
<b>1995/96<sup>2</sup></b>									
Capital city	99**	97**	98**	101**	88**	102**	101	70**	97**
Other major urban centres <sup>3</sup>	94**	83**	97**	..	..	..	..	.. <sup>4</sup>	94**
Rest of State/Territory	107**	105**	111**	118**	112**	92**	123**	..	108**
Whole of State/Territory	101**	99**	103**	105**	95**	96**	113**	69**	100
<b>1989<sup>5</sup></b>									
Rest of State/Territory	118**	..	123**	136**	151**	..	172**	..	127**

<sup>1</sup>Includes acute and psychiatric hospitals and day surgery facilities

<sup>2</sup>Includes same day admissions, other than for renal dialysis

<sup>3</sup>Includes Newcastle and Wollongong (NSW); Geelong (Vic); and Gold Coast-Tweed Heads and Townsville-Thuringowa (Qld)

<sup>4</sup>Data unreliable: included with ACT total

<sup>5</sup>Excludes same day admissions: for New South Wales the period is 1989/90 and for Northern Territory it is 1987

Source: See *Data sources*, Appendix 1.3

Statistical significance: \* significance at 5 per cent; \*\* significance at 1 per cent

## Rest of State (Western Australia as the Standard)

There were 131,620 admissions of residents of the non-metropolitan areas of Western Australia to public acute and private hospitals in 1995/96, 18 per cent more than were expected from the State rates (an SAR of 118\*\*). The elevated ratio is in contrast to the below average rate of admissions of **Perth** residents. Females accounted for 54.3 per cent of these admissions.

Three quarters of the State's SLAs had more admissions than were expected, with only three areas mapped in the lowest range. SLAs with ratios elevated by 30 per cent or more were situated throughout much of the State (**Map 6.2**).

The most highly elevated ratios were recorded in Menzies (just over three times the number expected from the State rates, an SAR of 308\*\* and 174 admissions), Halls Creek (235\*\*; 1,350 admissions), Wiluna (223\*\*; 201 admissions), Derby-West Kimberley (220\*\*; 3,261 admissions), Wyndham-East Kimberley (210\*\*; 2,672 admissions), Trayning (206\*\*; 269 admissions) and Mount Marshall (203\*\*; 338 admissions).

Residents of Sandstone (with an SAR of 39\*\*), Exmouth (64\*\*), Mount Magnet (71\*\*) and Dardanup (77\*\*) had the lowest ratios for this variable. Relatively low ratios were also recorded in Wickpin (with an SAR of 80\*\*), Chittering (81\*\*), Gingin (84\*\*), Jerramungup (85\*\*), Williams (87\*\*), Greenough (88\*\*) and Chapman Valley (88).

Of the towns mapped, all except Mandurah (with an SAR of 92\*\*) had elevated ratios. The highest ratios were in Broome (an SAR of 159\*\*), Kalgoorlie/Boulder (144\*\*), Port Hedland (138\*\*) and Geraldton (122\*\*).

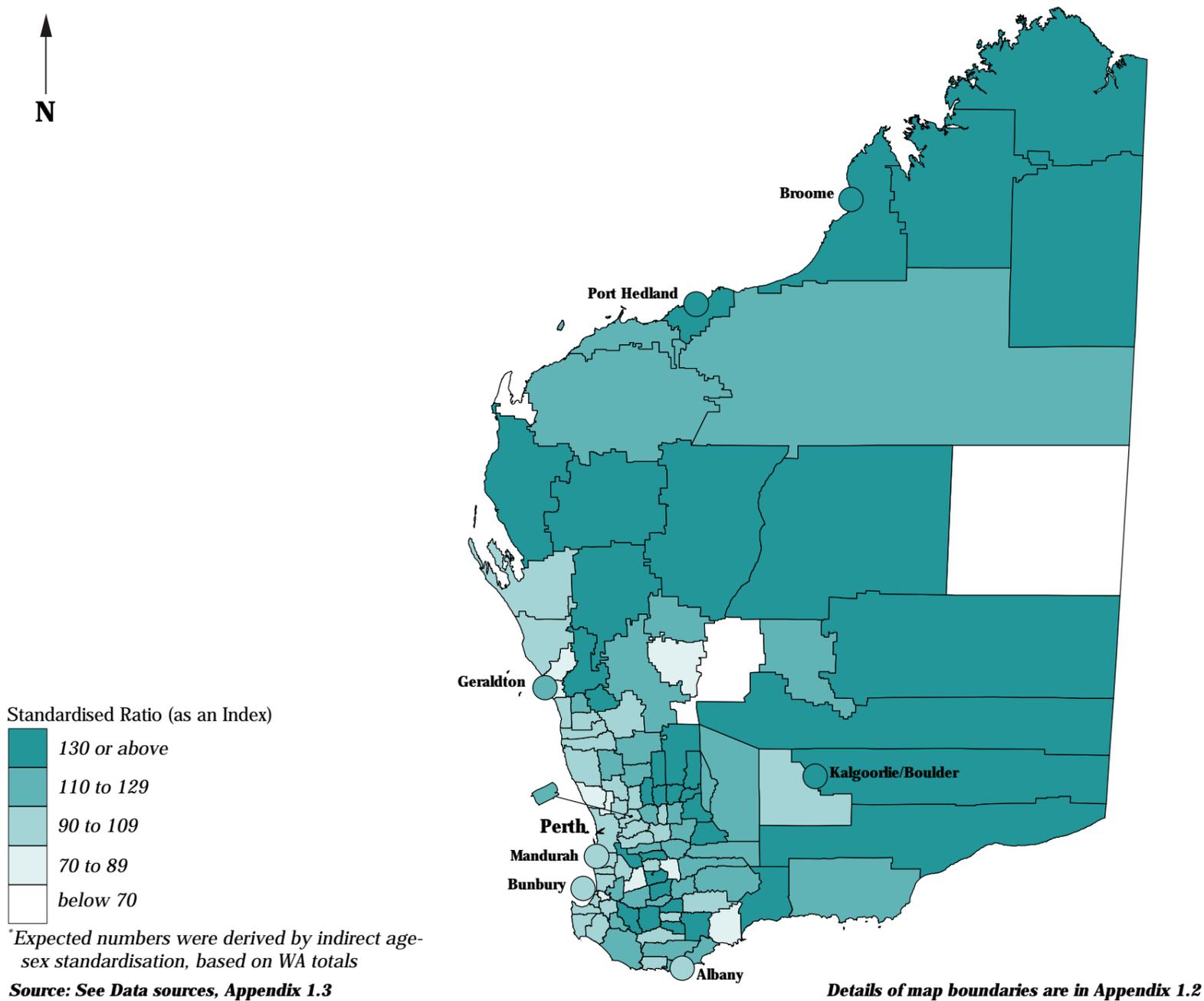
The largest numbers of admissions were recorded for residents of Mandurah (9,548 admissions), Kalgoorlie/Boulder (8,932), Bunbury (7,297), Geraldton (6,294), Albany (4,575) and Busselton (4,533). There were no admissions recorded for people living in Ngaanyatjaraku.

The correlation analysis revealed a weak association at the SLA level with the indicators of socioeconomic disadvantage. These included weak correlations with the variables for the Indigenous population (0.49) and dwellings without a motor vehicle (0.36). These results, together with the weak inverse correlation with the IRSD (-0.22), suggest the existence of an association at the SLA level between high rates of admissions to hospital and socioeconomic disadvantage.

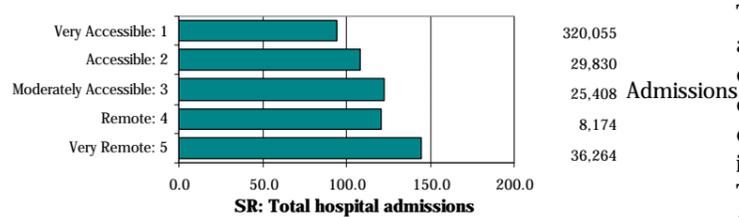
## Map 6.2

### Admissions to public acute hospitals and private hospitals, Western Australia, 1995/96

Standardised Ratio: number of admissions in each Statistical Local Area compared with the number expected\*



### Accessibility/Remoteness Index of Australia



There is an increase in standardised admission ratios (SARs) for admissions to public acute and private hospitals of more than fifty per cent (54.2 per cent), from an SAR of 94 in the Very Accessible ARIA category to 145 in the Very Remote category. SARs in the three middle categories were also elevated, by 8 per cent in the Accessible, 22 per cent in the Moderately Accessible and 21 per cent in the Remote categories. The pattern seen in the earlier chapters for the Very Remote areas to have the second highest numbers of cases is again evident.

Source: Calculated on ARIA classification, DHAC  
National Social Health Atlas Project, 1999

# Admissions to public acute hospitals, 1995/96

## Capital city comparison (Australia as the Standard)

The admissions in this analysis are acute admissions to public acute hospitals (see page 185 for a definition of this hospital type) in Australia, including admissions of same day patients (other than for renal dialysis), whether to a hospital or to a same day surgical unit.

Residents of the capital cities have lower rates of admission than do residents of the non-metropolitan areas of Australia. This is evident from the standardised admission ratios (SARs) in **Table 6.8**, which vary from a high of 99\*\* in **Sydney** to a low of 79\*\* in **Hobart** and 81\*\* in **Canberra**.

**Table 6.8: Admissions to public acute hospitals<sup>1</sup>, capital cities, 1995/96**  
*Age-sex standardised admission ratios*

Sydney	Melbourne	Brisbane	Adelaide	Perth	Hobart	Darwin	Canberra <sup>2</sup>	All capitals
99**	86**	89**	93**	88**	79**	87**	81**	92**

<sup>1</sup>Includes same day admissions other than for renal dialysis

<sup>2</sup>Includes Queanbeyan (C)

Source: See *Data sources*, Appendix 1.3

Statistical significance: \* significance at 5 per cent; \*\* significance at 1 per cent

Admissions to public acute hospitals (excluding public psychiatric hospitals) accounted for 72.9 per cent of the State's admissions in 1995/96. The remaining 27.1 per cent of admissions were to private (acute or psychiatric) hospitals. For metropolitan residents, the proportion was 67.7 per cent and for non-metropolitan residents, it was a substantially higher 84.4 per cent, reflecting both the higher rates of admissions of country residents and the greater availability of public hospitals and the lack of private hospitals.

The age profile for female (55.2 per cent of inpatient admissions) and male admissions is graphed in **Figure 6.3**, page 181. The most notable features are the higher admission rates for males at the youngest ages and from the mid-fifties, and the high admission rates for females from ages 15 to 49 years.

## Perth (Western Australia as the Standard)

There were 195,949 admissions to public acute hospitals of residents of **Perth** in 1995/96, 13 per cent fewer than expected from the State rates (an SAR of 87\*\*).

The pattern of distribution of standardised admission ratios at the SLA level (**Map 6.3**) is similar to that of the indicators of socioeconomic disadvantage shown in the maps in Chapter 3. It also shows a clear divergence between areas with high and those with low rates of use of public hospitals. Slightly more than half (51.6 per cent) of the SLAs in **Perth** had ratios below the level expected from the State rates. Of these, more than two thirds were high socioeconomic status SLAs.

The highest ratios were recorded in Bassendean (with an SAR of 121\*\*), Kwinana (116\*\*), Belmont (114\*\*), Gosnells (112\*\*) and Vincent (111\*\*). There were also elevated SARs in Rockingham (an SAR of 107\*\*), Kalamunda (106\*\*), Armadale (104\*\*), Stirling: Central and Cockburn (both 101).

The lowest ratios were in Cottesloe (with an SAR of 46\*\*), Nedlands and Peppermint Grove (both 47\*\*) and Stirling: South-Eastern (49\*\*), all with fewer than half the number of admissions expected from the State rates.

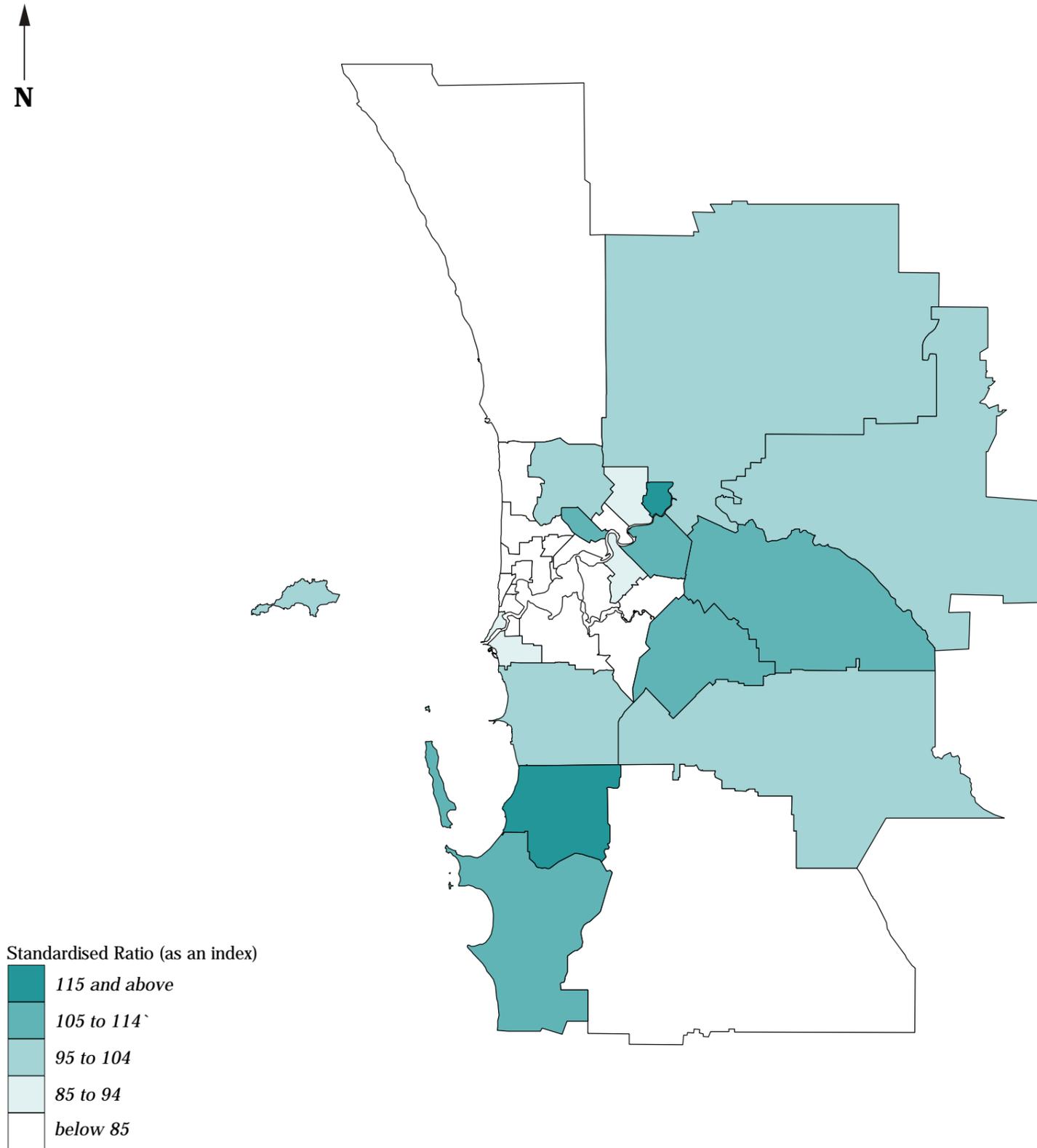
More than 10,000 admissions were recorded for residents of Wanneroo (27,997 admissions), Stirling: Central (19,989), Gosnells (13,862), Rockingham (11,320) and Swan (11,315).

There were correlations of substantial significance between high rates of admission to public acute hospitals and the variables for unskilled and semi-skilled workers (0.87), early school leavers (0.85) and Indigenous people (0.73). Inverse correlations of substantial significance were recorded with high income families (-0.86) and managers and administrators, and professionals (-0.85). These results, together with the inverse correlation of substantial significance with the IRSD (-0.85), indicate the existence of an association between high rates of admission to public acute hospitals and socioeconomic disadvantage.

### Map 6.3

### Admissions to public acute hospitals, Perth, 1995/96

Standardised Ratio: number of admissions in each Statistical Local Area compared with the number expected\*



Source: See Data sources, Appendix 1.3

Details of map boundaries are in Appendix 1.2  
National Social Health Atlas Project, 1999

# Admissions to public acute hospitals, 1995/96

## State/Territory comparison (Australia as the Standard)

The most highly elevated standardised admission ratios (SARs) for admissions to public acute hospitals of residents of the non-metropolitan areas of Australia were in the Northern Territory (159\*\*), South Australia (149\*\*) and Western Australia (139\*\*): ratios were elevated by more than 20 per cent also in New South Wales and Victoria. Only in Tasmania were there fewer admissions of residents of the non-metropolitan areas than expected from the Australian rates (**Table 6.9**), although details of admissions to private hospitals (page 200 and **Table 6.11**) are also relevant.

At the *Whole of State/Territory* level, the Northern Territory had the highest SAR for admissions to public acute hospitals in 1995/96 (an SAR of 126\*\*), followed by South Australia (108\*\*) and New South Wales (105\*\*).

**Table 6.9: Admissions to public acute hospitals<sup>1</sup>, State/Territory, 1995/96**  
*Age-sex standardised admission ratios*

	NSW	Vic	Qld	SA	WA	Tas	NT	ACT	Total
Capital city	99**	86**	89**	93**	88**	79**	87**	81**	92**
Other major urban centres <sup>2</sup>	93**	89**	73**	..	..	..	..	..	86**
Rest of State/Territory	123**	122**	110**	149**	139**	80**	159**	- <sup>3</sup>	121**
Whole of State/Territory	105**	96**	96**	108**	102**	80**	126**	78**	100

<sup>1</sup>Includes same day admissions, other than for renal dialysis

<sup>2</sup>Includes Newcastle and Wollongong (NSW); Geelong (Vic); and Gold Coast-Tweed Heads and Townsville-Thuringowa (Qld)

<sup>3</sup>Data unreliable: included with ACT total

Source: See *Data sources*, Appendix 1.3

Statistical significance: \* significance at 5 per cent; \*\* significance at 1 per cent

## Rest of State (Western Australia as the Standard)

The relative availability of public acute hospitals and the lack of private hospitals throughout the non-metropolitan areas of Western Australia, is evident from the high rate of use of public compared with private hospitals. Residents outside **Perth** had 36 per cent more admissions to public acute hospitals than expected from the State rates (an SAR of 136\*\*). In contrast, there were 31 per cent fewer admissions to private hospitals than were expected. Some comments to the possible reasons for the substantially higher non-metropolitan rates, compared with those in **Perth**, are described on page 185.

Given the relatively high overall ratio for the non-metropolitan areas of Western Australia, it is not surprising that only 17 SLAs had ratios below the level expected (**Map 6.4**). Of these, the lowest ratios were recorded for residents from Sandstone (with an SAR of 49\*\*), Dardanup (60\*\*), Mount Magnet (75\*\*), Capel (84\*\*), Chittering (85\*\*), Gingin (87\*\*), Bunbury (88\*\*) and Coorow (88). There were no admissions to public hospitals recorded for residents of Ngaanyatjaraku.

The highest ratios were recorded in Menzies, with more than four times the number of admissions expected from the State rates (an SAR of 418\*\* and 170 admissions), Halls Creek (310\*\*; 1,337), Derby-West Kimberley (292\*\*; 3,220), Wiluna (276\*\*; 184), Wyndham-East Kimberley (270\*\*; 2,594), Trayning (259\*\*; 243) and Dundas (250\*\*; 705). In Ravensthorpe (with an SAR of 234\*\* and 577 admissions), Mount Marshall (232\*\*; 284), Upper Gascoyne (217\*\*; 83), Morawa (211\*\*; 373), Broome (207\*\*; 2,969), Wyalkatchem (207\*\*; 220), Mullewa (205\*\*; 423), Meekatharra (201\*\*; 619) and Murchison (200\*\*; 46), SARs for admissions to public acute hospitals were also elevated by more than twice the level expected.

The highest ratios in the towns mapped were in Broome (with an SAR of 207\*\*), Port Hedland (174\*\*), Kalgoorlie/Boulder (173\*\*) and Albany (139\*\*). In Mandurah, admissions were at the level expected (an SAR of 100), while in Bunbury (88\*\*), there were 12 per cent fewer admissions than expected from the State rates.

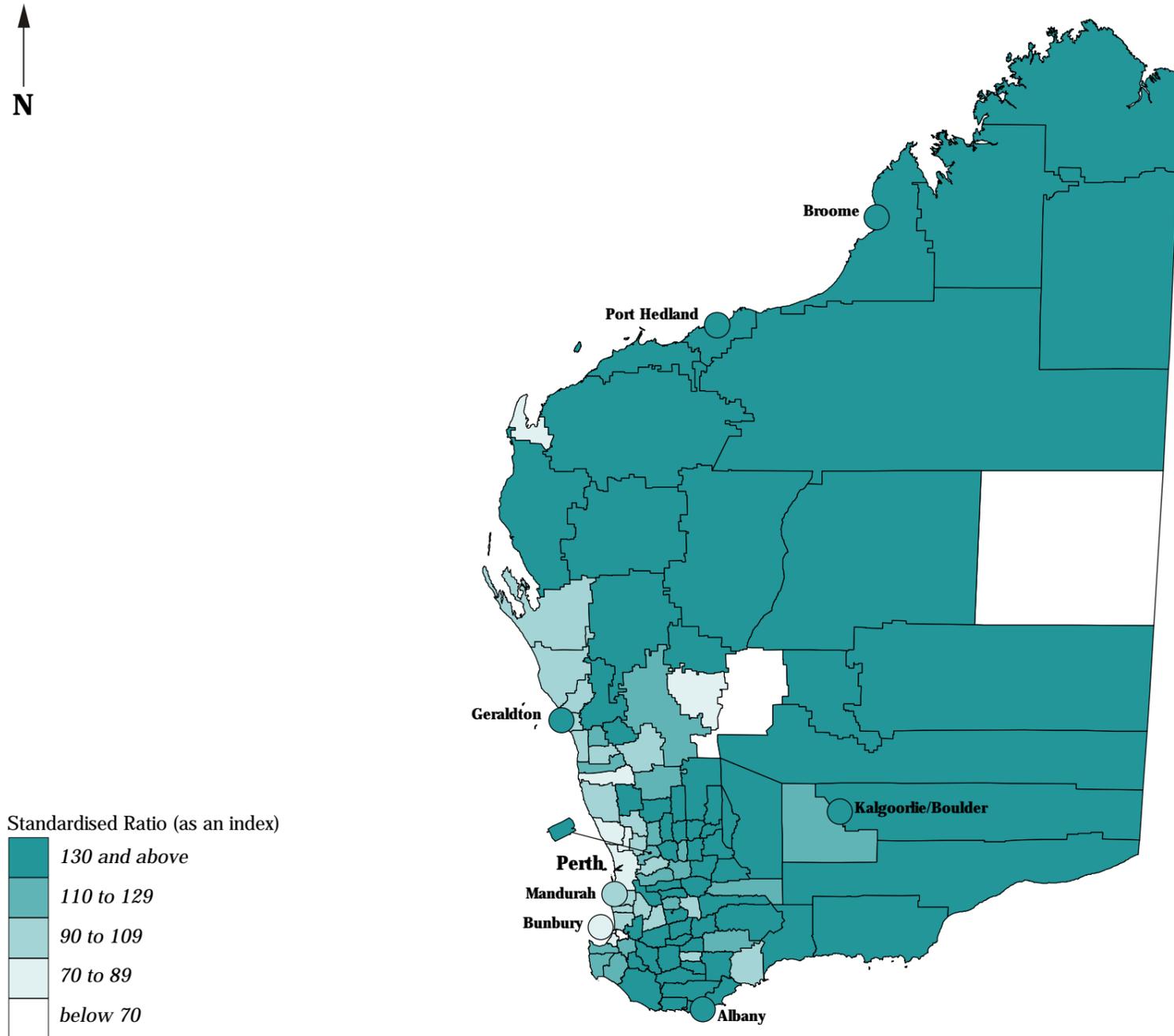
The largest numbers of admissions were recorded for residents in the towns of Kalgoorlie/Boulder (7,987 admissions), Mandurah (7,468), Geraldton (5,018), Bunbury (4,499) and Albany (4,317).

The correlation analysis revealed a similar (albeit marginally stronger) association at the SLA level with the indicators of socioeconomic disadvantage to that reported for total admissions. These included a correlation of meaningful significance with the variable for the Indigenous population (0.54) and weaker correlations with dwellings without a motor vehicle (0.41) and housing authority rented dwellings (0.32). The weak inverse correlation with the IRSD (-0.29) supports the existence of an association at the SLA level between high rates of admission to public acute hospitals and socioeconomic disadvantage.

## Map 6.4

### Admissions to public acute hospitals, Western Australia, 1995/96

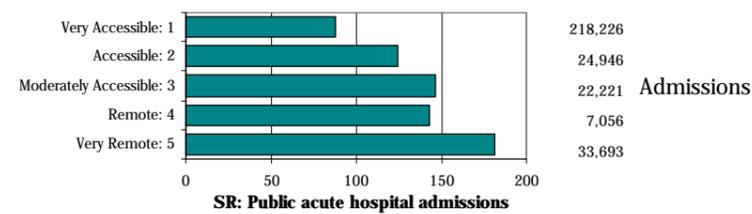
Standardised Ratio: number of admissions in each Statistical Local Area compared with the number expected\*



Source: See Data sources, Appendix 1.3

Details of map boundaries are in Appendix 1.2

### Accessibility/Remoteness Index of Australia



Standardised admission ratios for admissions to public acute hospitals increase more markedly between the ARIA categories than do those for total admissions, cover a wider range and have a higher overall ratio for residents of areas in the Very Remote category, an SAR of 181. The lowest ratio is in the Very Accessible category (an SAR of 88), with SARs elevated by between 24 and 46 per cent in the three middle categories.

Source: Calculated on ARIA classification, DHAC

National Social Health Atlas Project, 1999

# Admissions to private hospitals, 1995/96

## Capital city comparison (Australia as the Standard)

The admissions included in this analysis are acute admissions to private hospitals in Australia (both private acute and private psychiatric hospitals: see page 185 for a definition of these hospital types). Admissions of same day patients (other than for renal dialysis) are included, whether to a hospital or to a same day surgical unit.

As most private hospitals are located in the capital cities, residents of these cities generally have higher rates of admission to private hospitals than does the population living in the non-metropolitan areas of Australia. This is evident from the standardised admission ratios (SARs) in **Table 6.10**, which are generally higher in the capital cities than expected from the Australian rates. The low level of provision of private hospital facilities in **Perth** and **Canberra** is reflected in the low ratios for these two capital cities. Details of admissions to public acute hospitals (page 194, **Table 6.8**) and levels of provisions of private hospitals (Chapter 7) are also relevant.

**Table 6.10: Admissions to private<sup>1</sup> hospitals, capital cities, 1995/96**  
*Age-sex standardised admission ratios*

Sydney	Melbourne	Brisbane	Adelaide	Perth	Hobart	Darwin	Canberra <sup>2</sup>	All capitals
98**	121**	116**	116**	89**	150**	133**	46**	108**

<sup>1</sup>Includes acute and psychiatric hospitals and day surgery facilities, including same day admissions, other than for renal dialysis

<sup>2</sup>Includes Queanbeyan (C)

Source: See *Data sources*, Appendix 1.3

Statistical significance: \* significance at 5 per cent; \*\* significance at 1 per cent

Admissions to private hospitals account for 27.1 per cent of all admissions (excluding those in public psychiatric hospitals, same day patients and long stay nursing home type patients) in 1995/96. The remaining 72.9 per cent were admissions to public acute hospitals. For metropolitan residents, the proportion was higher, at 32.3 per cent, and for non-metropolitan residents, it was a substantially lower 15.6 per cent.

Females make greater use of private hospitals than males, with admissions to private hospitals representing 32.9 per cent of all female admissions studied (compared with 31.5 per cent for males) and accounting for 56.7 per cent of private hospital admissions (55.1 per cent in public acute hospitals).

The age profile for admissions of females and males is graphed in **Figure 6.4**, page 182. The most notable features are the higher admission rates for females from age 15 years through the child-bearing years to the mid-fifties.

## Perth (Western Australia as the Standard)

Reflecting the largely metropolitan location of private hospitals, there were 11 per cent more admissions of residents of **Perth** to a private hospital than expected from the State rates (an SAR of 111\*\*).

Just as the use of public hospitals had a distribution strongly associated with the location of residents of lower socioeconomic status, so private hospital admissions are generally higher in areas of higher socioeconomic status; that is, in areas where residents are more likely to have health insurance to meet the costs of private hospital treatment (**Map 6.5**). However, relatively few areas have very low admission ratios, and some low socioeconomic status SLAs have mid-level ratios.

Just under half (48.4 per cent) of SLAs had ratios elevated by 15 per cent or more. The most highly elevated of these ratios were in Peppermint Grove (with an SAR of 176\*\*), Cottesloe (173\*\*) and Cockburn (170\*\*). Relatively high ratios were also recorded in Claremont (163\*\*), Nedlands (159\*\*) and Mosman Park (159\*\*).

The lowest ratios were recorded for residents from Stirling: South-Eastern (with an SAR of 33\*\*), with 67 per cent fewer admissions to a private hospital than expected from the State rates. Lower than expected ratios were also found in the City of Perth (with an SAR of 56\*\*), Bassendean (72\*\*), Kwinana (79\*\*), Belmont, Shepperton (now known as Victoria Park) and Canning (all with SARs of 82\*\*) and Armadale and Kalamunda (both with SARs of 84\*\*).

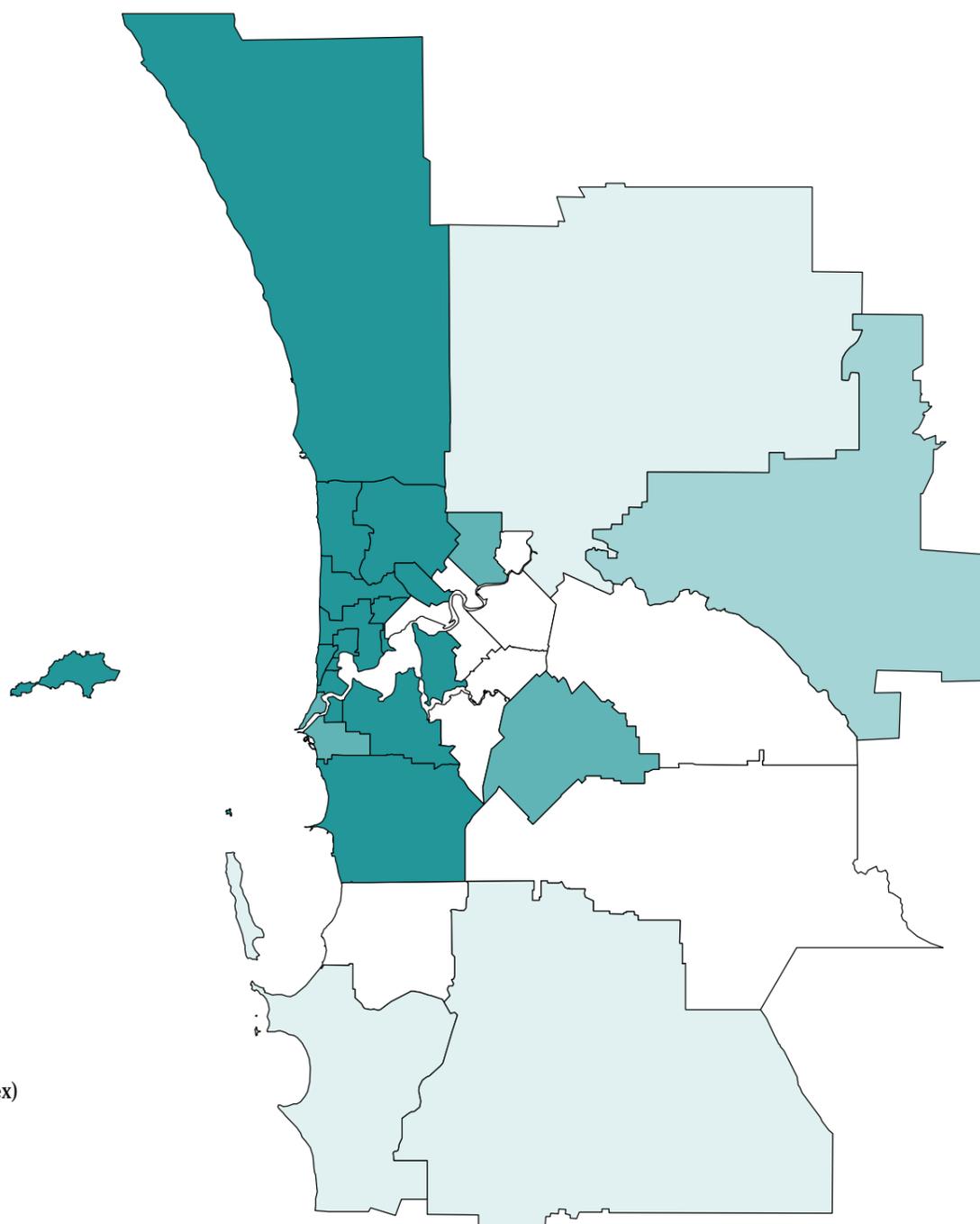
There were 14,692 admissions to private hospitals of residents from the large northern Wanneroo SLA, with other large numbers of admissions from Stirling: Central (8,747 admissions), Melville (8,441), Cockburn (5,964) and Stirling: West (5,271).

There were correlations of meaningful significance with the variables for high income families (0.70), and managers and administrators, and professionals (0.65). Inverse correlations of meaningful significance were recorded with the variables for early school leavers (-0.64), low income families (-0.63) and unskilled and semi-skilled workers (-0.60). These results, together with the correlation of meaningful significance with the IRSD (0.67), indicate an association at the SLA level between high rates of admissions to private hospitals and high socioeconomic status.

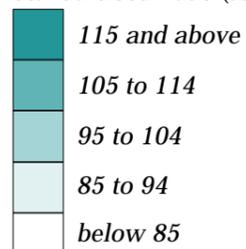
## Map 6.5

### Admissions to private hospitals, Perth, 1995/96

Standardised Ratio: number of admissions in each Statistical Local Area compared with the number expected\*



Standardised Ratio (as an index)



*Expected numbers were derived by indirect age-sex standardisation, based on WA totals*

**Source: See Data sources, Appendix 1.3**

**Details of map boundaries are in Appendix 1.2  
National Social Health Atlas Project, 1999**

# Admissions to private hospitals, 1995/96

## State/Territory comparison (Australia as the Standard)

The most highly elevated standardised admission ratios (SARs) for admissions to private hospitals of residents of the non-metropolitan areas of Australia were in Tasmania (118\*\*) and Queensland (113\*\*). Ratios in all of the other States and the Northern Territory were substantially lower than expected from the Australian rates (**Table 6.11**). The lowest were in the Northern Territory (39\*\*), South Australia and Western Australia (both with SARs of 55\*\*). Details of admissions to public acute hospitals (page 196, **Table 6.9**) and levels of provisions of private hospitals (Chapter 7) are also relevant.

At the *Whole of State/Territory* level, Tasmania had the highest SAR for admissions to private hospitals in 1995/96 (an SAR of 131\*\*), followed by Queensland (119\*\*) and Victoria (106\*\*).

**Table 6.11: Admissions to private<sup>1</sup> hospitals, State/Territory, 1995/96**  
*Age-sex standardised admission ratios*

	NSW	Vic	Qld	SA	WA	Tas	NT	ACT	Total
Capital city	98**	121**	116**	116**	89**	150**	133**	46**	108**
Other major urban centres <sup>2</sup>	96**	72**	147**	..	..	..	..	..	113**
Rest of State/Territory	73**	69**	113**	55**	55**	118**	39**	- <sup>3</sup>	81**
Whole of State/Territory	91**	106**	119**	100	80**	131**	84**	48**	100

<sup>1</sup>Includes acute and psychiatric hospitals and day surgery facilities, including same day admissions, other than for renal dialysis

<sup>2</sup>Includes Newcastle and Wollongong (NSW); Geelong (Vic); and Gold Coast-Tweed Heads and Townsville-Thuringowa (Qld)

<sup>3</sup>Data unreliable: included with ACT total

Source: See *Data sources*, Appendix 1.3

Statistical significance: \* significance at 5 per cent; \*\* significance at 1 per cent

## Rest of State (Western Australia as the Standard)

The lack of private hospitals and the relatively ready availability of public hospitals throughout the non-metropolitan areas of Western Australia are evident from the low rate of use of private compared with public hospitals. Country residents had 31 per cent fewer admissions (an SAR of 69\*\*) to private hospitals than expected from the State rates (and 36 per cent more admissions to public acute hospitals). Overall, there were 20,485 admissions to private hospitals.

With almost one third fewer than the expected number of admissions of residents of the non-metropolitan areas of Western Australia to private hospitals, only 17 SLAs (15.0 per cent) had elevated standardised admission ratios (**Map 6.6**). Of these, ten had at least ten per cent more admissions than expected from the State rates, with the highest ratios recorded for residents of Bunbury (with an SAR of 148\*\*), Capel (133\*\*), Koorda (132) and Dowerin (132\*\*) Dardanup (125\*\*) and Mount Marshall (122).

In almost one third of SLAs, rates of admission to private hospitals were at least 50 per cent lower than expected from the State rates. Excluding SLAs with fewer than 20 admissions, the lowest ratios were recorded in Derby-West Kimberley (with an SAR of 11\*\*), Broome (18\*\*), the town of Albany (22\*\*) and Wyndham-East Kimberley (25\*\*). Halls Creek, with just 12 admissions and an SAR of 8\*\*, and Laverton, with 18 admissions and an SAR of 21\*\*, also had very low ratios, while there were no admissions recorded for residents of Ngaanyatjaraku.

Of the towns mapped, only Bunbury (with an SAR of 148\*\*) had more admissions than expected, with very low ratios recorded for the towns of Broome (18\*\*), Albany (22\*\*), Port Hedland (32\*\*) and Kalgoorlie/Boulder (59\*\*).

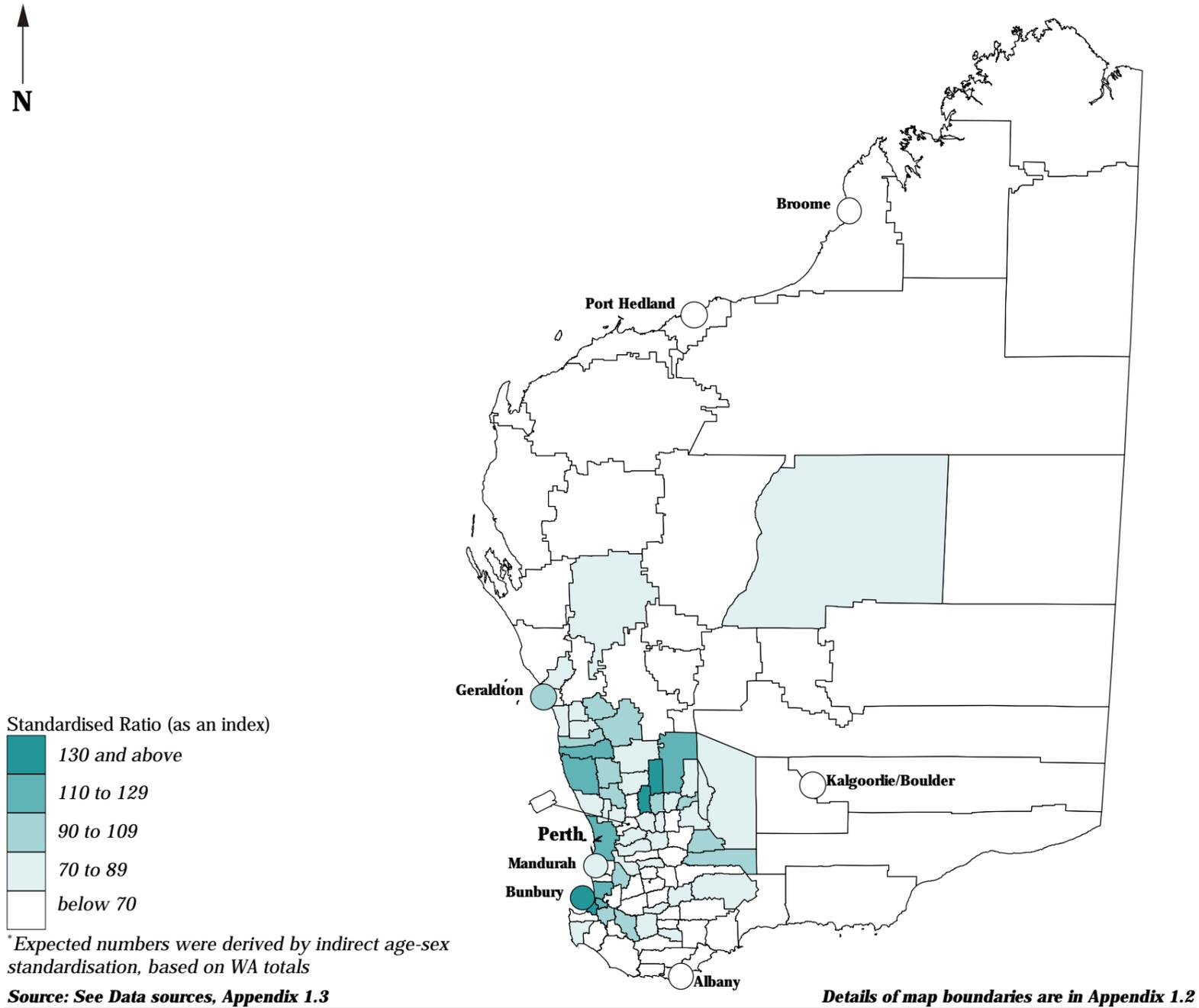
Only in Bunbury (2,797 admissions), Mandurah (2,080), Geraldton (1,276) and Harvey (1,106) were there more than 1,000 admissions in 1995/96.

There were weak inverse correlations with the variables for the Indigenous population (-0.44) and single parent families (-0.40). These results, together with the correlation with the IRSD (0.42), suggest the existence of an association at the SLA level between low rates of admission to private hospitals and socioeconomic disadvantage.

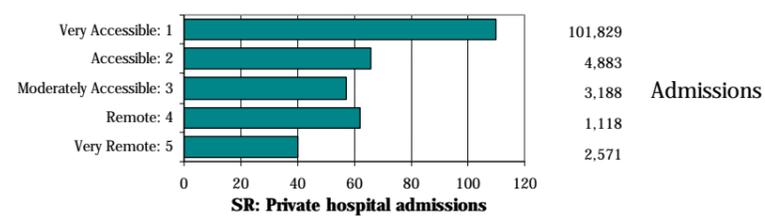
## Map 6.6

### Admissions to private hospitals, Western Australia, 1995/96

Standardised Ratio: number of admissions in each Statistical Local Area compared with the number expected\*



### Accessibility/Remoteness Index of Australia



Residents of the Very Accessible areas under the ARIA classification accounted for the majority of admissions to private hospitals (89.6 per cent) and had the only elevated standardised admission ratio (110), reflecting the greater availability of these facilities in **Perth**. Ratios in the other categories were all lower, dropping to an SAR of 40 in the Very Remote ARIA category. Private hospital beds were largely confined to the Very Accessible areas, with small numbers in the two other 'accessible' categories (see Chapter 7).

Source: Calculated on ARIA classification, DHAC  
National Social Health Atlas Project, 1999

## Admissions of males, 1995/96

### Capital city comparison (Australia as the Standard)

The admissions in this chapter are of acute admissions to hospitals in Australia, including admissions of same day patients (other than for renal dialysis), whether to a hospital or to a same day surgical unit.

Males in **Hobart** had the highest standardised admission ratio (SAR) with two per cent more admissions than expected from the Australian rates, followed by **Sydney**, **Adelaide** and **Darwin** with one per cent more admissions than expected from the Australian rates. As for all admissions, the lowest ratios were recorded for residents of **Canberra** (68\*\*) and **Perth** (89\*\*).

The main difference evident in admission rates between the two periods shown in **Table 6.12** was the substantially lower differential (from the Australian rates) in the SAR recorded for **Sydney** in 1995/96. The higher SAR in this later period suggests an increase (relative to the Australian rates) in admission rates between the periods analysed. There was a small reduction (relative to the Australian rates) in admission rates for male residents of **Brisbane**, **Adelaide**, **Perth** and **Darwin**.

**Table 6.12: Admissions of males, capital cities**  
*Standardised admission ratios*

	Sydney	Melbourne	Brisbane	Adelaide	Perth	Hobart	Darwin	Canberra <sup>1</sup>	All capitals
1995/96 <sup>2</sup>	101**	96**	98**	101*	89**	102**	101	68**	97**
1989 <sup>3</sup>	80**	..	101**	104**	91**	..	103*	..	89**

<sup>1</sup>Includes Queanbeyan (C)

<sup>2</sup>Includes admissions to public acute hospitals, private hospitals and day surgery facilities, including admissions of same day patients, other than for renal dialysis

<sup>3</sup>Excludes same day admissions: for Sydney the period is 1989/90 and for Darwin it is 1987

Source: See *Data sources*, Appendix 1.3

Statistical significance: \* significance at 5 per cent; \*\* significance at 1 per cent

Males account for 44.8 per cent of all admissions of Western Australian residents (which includes admissions to public acute and private hospitals, private psychiatric hospitals and same day surgery facilities, but excludes admissions of same day patients for renal dialysis and long stay nursing home type patients). For metropolitan residents the proportion was similar, at 44.4 per cent of admissions.

### Perth (Western Australia as the Standard)

There were 128,454 admissions of males resident in **Perth** in 1995/96, six per cent fewer than expected from the State rates (an SAR of 94\*\*).

The distribution of standardised admission ratios for males (**Map 6.7**) produces a pattern consistent with that of many measures of low socioeconomic status (Chapter 3).

Males in almost one third (32.3 per cent) of SLAs had more admissions than expected from the State rates. The highest ratios were recorded for males from Vincent (an SAR of 133\*\*) and Cockburn (123\*\*), with other ratios elevated by five per cent or more in Kwinana (an SAR of 112\*\*), Belmont (111\*\*), Stirling: Central (110\*\*), Mosman Park (106) and Gosnells (105\*\*). Elevated ratios were also recorded in the SLAs of Rockingham, Bassendean and Fremantle.

Generally, the lowest ratios were confined to older SLAs relatively close to the city centre. In this group were Stirling: South-Eastern (with an SAR of 48\*\*), the City of Perth (71\*\*), Melville and Nedlands (both 76\*\*), Cottesloe (83\*\*), Claremont (86\*\*) and Peppermint Grove (87). Although Canning (66\*\*) and Serpentine-Jarrahdale (82\*\*) were outside this region, they also recorded low SARs of statistical significance.

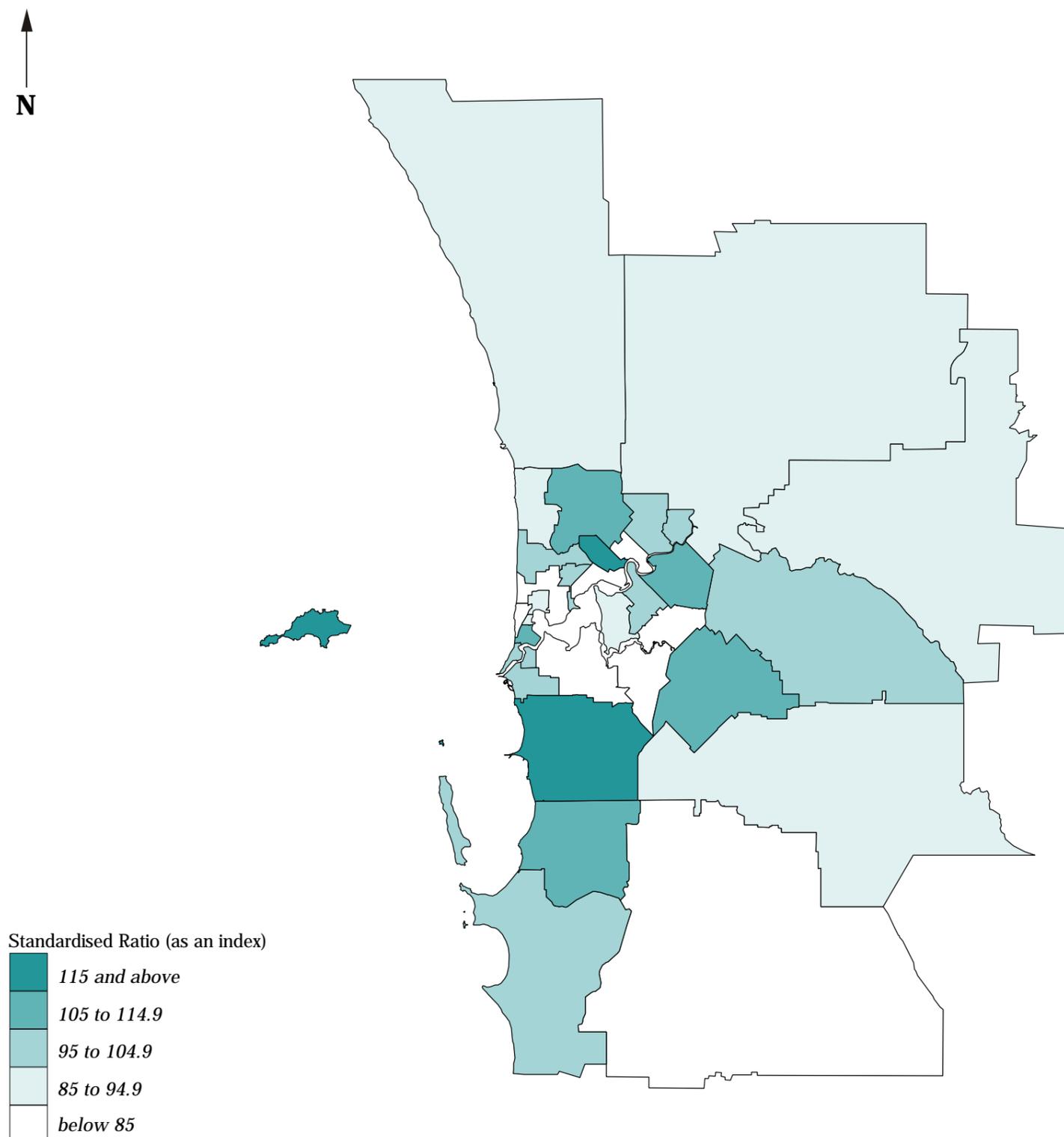
The largest numbers of admissions were recorded for males from Wanneroo (18,707 admissions), Stirling: Central (12,946), Gosnells (7,910), Melville (7,902) and Cockburn (7,136).

There was a correlation of meaningful significance with the variable for housing authority rented dwellings (0.50), and weaker correlations with unskilled and semi-skilled workers (0.46), single parent families and Indigenous people (both 0.42), and low income families and early school leavers (both 0.41). These results, together with the inverse correlation with the IRSD (-0.47), suggest an association at the SLA level between high rates of admissions of males and socioeconomic disadvantage.

## Map 6.7

### Admissions of males, Perth, 1995/96

Standardised Ratio: number of admissions in each Statistical Local Area compared with the number expected\*



\*Expected numbers were derived by indirect age standardisation, based on WA totals

Source: See Data sources, Appendix 1.3

Details of map boundaries are in Appendix 1.2  
National Social Health Atlas Project, 1999

# Admissions of males, 1995/96

## State/Territory comparison (Australia as the Standard)

The admissions in this chapter are of all acute admissions to hospitals in Australia, including admissions of same day patients (other than for renal dialysis), whether to a hospital or to a same day surgical unit.

The most highly elevated standardised admission ratios (SARs) for male residents of the non-metropolitan areas were those in the Northern Territory (120\*\*), South Australia (116\*\*) and Queensland (113\*\*). Only in Tasmania were there fewer admissions than expected from the Australian rates (**Table 6.13**). Overall, the Northern Territory had the highest SAR in 1995/96 for this dataset (an SAR of 111\*\*), followed by South Australia (105\*\*) and Queensland (104\*\*).

In all of the States and Territories for which data are available for both periods, SARs were lower in the later period. The main differences are the substantially lower differential (from the Australian rates) in the SARs recorded for the Northern Territory, Western Australia and South Australia in 1995/96. The lower SARs in this later period suggest a reduction (relative to the Australian rates) in admission rates for males between the years analysed.

**Table 6.13: Admissions of males, State/Territory**  
**Standardised admission ratios**

	NSW	Vic	Qld	SA	WA	Tas	NT	ACT	Total
<b>1995/96<sup>1</sup></b>									
Capital city	101**	96**	98**	101*	89**	102**	101	68**	97**
Other major urban centres <sup>2</sup>	93**	81**	99*	..	..	..	..	..	94**
Rest of State/Territory	106**	102**	113**	116**	108**	90**	120**	- <sup>3</sup>	107**
Whole of State/Territory	101**	98**	104**	105**	94**	95**	111**	67**	100
<b>1989<sup>4</sup></b>									
Rest of State/Territory	116**	..	123**	134**	142**	..	176**	..	124**

<sup>1</sup>Includes admissions to public acute hospitals, private hospitals and day surgery facilities, including admissions of same day patients, other than for renal dialysis

<sup>2</sup>Includes Newcastle and Wollongong (NSW); Geelong (Vic); and Gold Coast-Tweed Heads and Townsville-Thuringowa (Qld)

<sup>3</sup>Data unreliable: included with ACT total

<sup>4</sup>Excludes same day admissions: for New South Wales the period is 1989/90 and for Northern Territory it is 1987

Source: See *Data sources*, Appendix 1.3

Statistical significance: \* significance at 5 per cent; \*\* significance at 1 per cent

## Rest of State (Western Australia as the Standard)

There were 60,120 admissions of males resident in the non-metropolitan areas of Western Australia, 15 per cent more admissions than were expected from the State rates (an SAR of 115\*\*). Males accounted for 45.7 per cent of all admissions outside **Perth**. The elevated ratio is in contrast to the low ratio for city residents. Some comments as to the possible reasons for the generally higher standardised admission ratios for residents of country areas are on page 185.

Almost two thirds (61.9 per cent) of the SLAs had elevated ratios for admissions of males. They were located in a number of remote areas, in particular in the far north, central and eastern regions (**Map 6.8**), as well as being scattered throughout the south-west of the State.

The highest ratios, all with more than twice the number of admissions of males than expected from the State rates, were recorded in Menzies (with an SAR of 258\*\*) and Wiluna (239\*\*), Halls Creek (223\*\*), Derby-West Kimberley (210\*\*), Ravensthorpe (209\*\*), Wyndham-East Kimberley (205\*\*) and Dundas (201\*\*). Relatively high ratios, elevated by 50 per cent or more above the level expected, were recorded in Mount Marshall (an SAR of 178\*\*), Upper Gascoyne (176\*\*), Morawa (166\*\*), Broome (164\*\*), Wyalkatchem and Meekatharra (both with 160\*\*), Dowerin (154\*\*) and Carnarvon (151\*\*).

Excluding SLAs with fewer than 20 admissions, the lowest ratios were in Exmouth (with an SAR of 60\*\*), Mount Magnet (62\*\*), Dardanup (73\*\*) and Chittering (74\*\*). There were no admissions recorded for residents of Ngaanyatjaraku.

Of the towns mapped, the highest ratios were in Broome (an SAR of 164\*\*), Kalgoorlie/Boulder (147\*\*), Port Hedland (133\*\*) and Geraldton (123\*\*). Only Mandurah (92\*\*) had fewer admissions than expected.

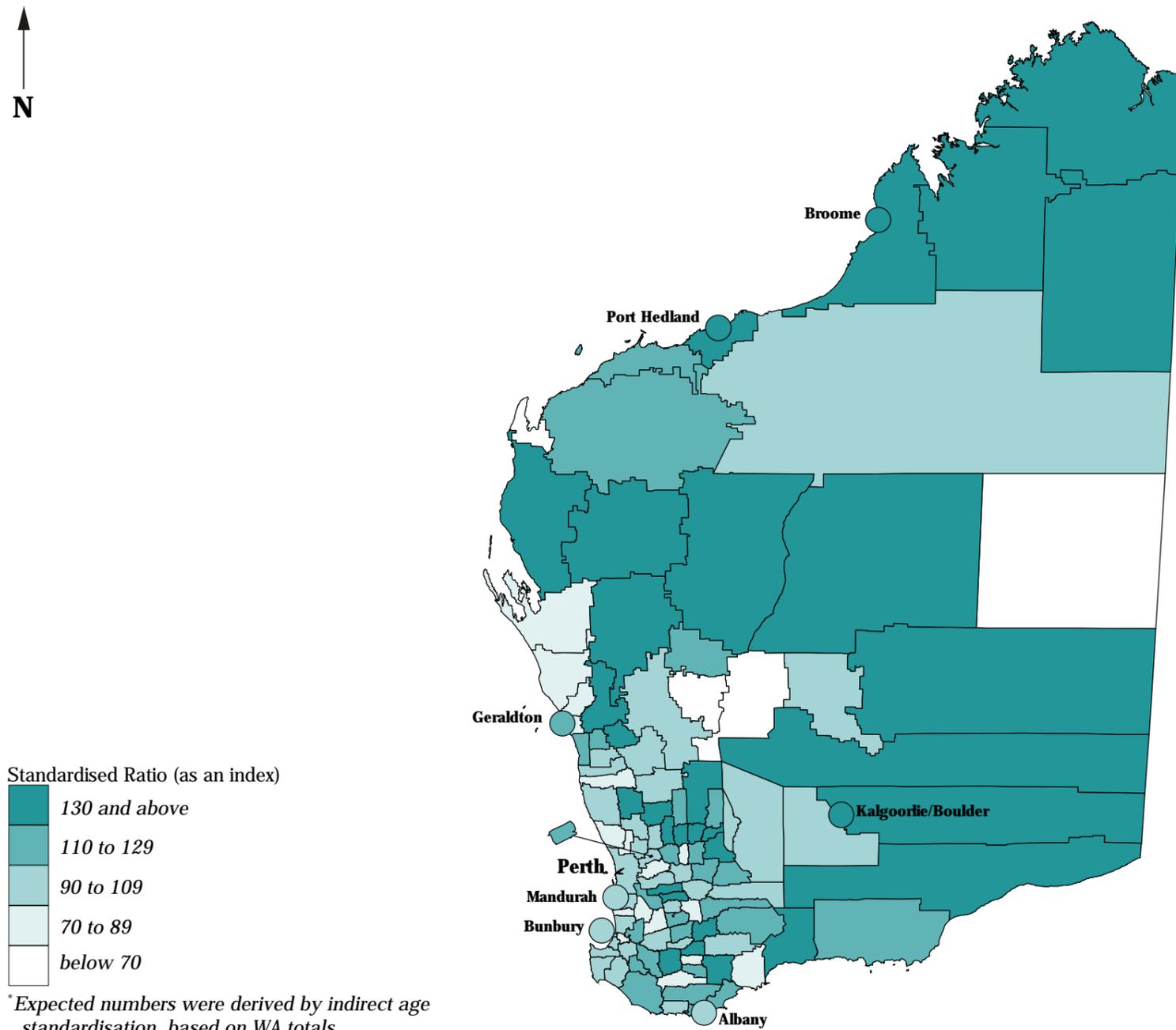
There were more than 2,000 admissions of male residents of the towns of Mandurah (4,486 admissions), Kalgoorlie/Boulder (4,171), Bunbury (3,181), Geraldton (2,896) and Albany (2,023).

There were weak correlations with the variables for the Indigenous population (0.49), dwellings without a motor vehicle (0.38), housing authority rented dwellings (0.35) and single parent families (0.28). These results, together with the weak inverse correlation with the IRSD (-0.26), suggest the existence of an association at the SLA level between high rates of admissions of males and socioeconomic disadvantage.

## Map 6.8

### Admissions of males, Western Australia, 1995/96

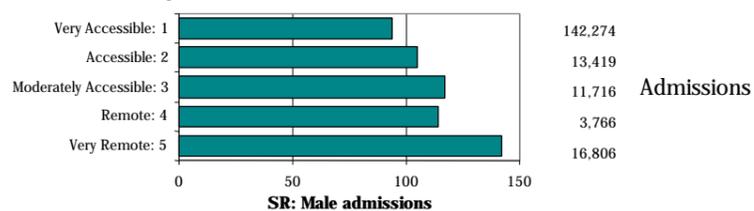
Standardised Ratio: number of admissions in each Statistical Local Area compared with the number expected\*



Source: See Data sources, Appendix 1.3

Details of map boundaries are in Appendix 1.2

### Accessibility/Remoteness Index of Australia



Standardised admission ratios (SARs) for males closely follow the pattern evident for total admissions, with a ratio of 94 in the Very Accessible category; ratios of 105, 117 and 114 in the three middle categories; and increasing to an SAR of 142 in the Very Remote category.

Source: Calculated on ARIA classification, DHAC National Social Health Atlas Project, 1999

## Admissions of females, 1995/96

### Capital city comparison (Australia as the Standard)

The admissions in this chapter are of acute admissions to hospitals in Australia, including admissions of same day patients (other than for renal dialysis), whether to a hospital or to a same day surgical unit.

With the exception of lower ratios in **Canberra** and, to a lesser extent, **Perth**, there was little variation across the capital cities in standardised admission ratios (SARs) for females (**Table 6.14**).

As was the case for males, the main difference evident in admission rates between the two periods shown in **Table 6.12** was the substantially lower differential (from the Australian rates) in the SAR recorded for **Sydney** in 1995/96. The higher SAR in this later period suggests an increase (relative to the Australian rates) in admission rates between the periods analysed. A similar, although substantially smaller, increase occurred in **Brisbane** and **Darwin**, while there was a small reduction (relative to the Australian rates) in admission rates for residents of **Adelaide** and **Perth**.

**Table 6.14: Admissions of females, capital cities**  
*Standardised admission ratios*

	Sydney	Melbourne	Brisbane	Adelaide	Perth	Hobart	Darwin	Canberra <sup>1</sup>	All capitals
1995/96 <sup>2</sup>	98**	98**	98**	101**	88**	103**	102	71**	97**
1989 <sup>3</sup>	80**	..	95**	102**	95**	..	97*	..	89**

<sup>1</sup>Includes Queanbeyan (C)

<sup>2</sup>Includes admissions to public acute hospitals, private hospitals and day surgery facilities, including admissions of same day patients, other than for renal dialysis

<sup>3</sup>Excludes same day admissions: for Sydney the period is 1989/90 and for Darwin it is 1987

Source: See *Data sources*, Appendix 1.3

Statistical significance: \* significance at 5 per cent; \*\* significance at 1 per cent

Females accounted for 55.6 per cent of all admissions of residents of **Perth** and for 54.3 per cent of admissions of non-metropolitan residents. Overall, females had higher admission rates than males: 24,780 admissions per 100,000 population for females, compared with 20,290 admissions per 100,000 population for males.

### Perth (Western Australia as the Standard)

There were 161,077 admissions of females resident in **Perth** in 1995/96, seven per cent fewer than expected from the State rates (an SAR of 93\*\*).

The distribution of standardised admission ratios for females across **Perth** (**Map 6.9**) produces a pattern consistent with that of many measures of low socioeconomic status (Chapter 3).

Almost one third of the SLAs had elevated standardised admission ratios. Of these, the highest ratios were recorded for females in Cockburn (with an SAR of 118\*\*), Gosnells (114\*\*) and Bassendean (112\*\*). Other SLAs with elevated ratios of statistical significance were Armadale, Kalamunda and Rockingham (each with an SAR of 104\*\*).

Ratios were more than 30 per cent lower than expected in Stirling: South-Eastern (with an SAR of 42\*\*), the City of Perth (45\*\*) and Canning (68\*\*).

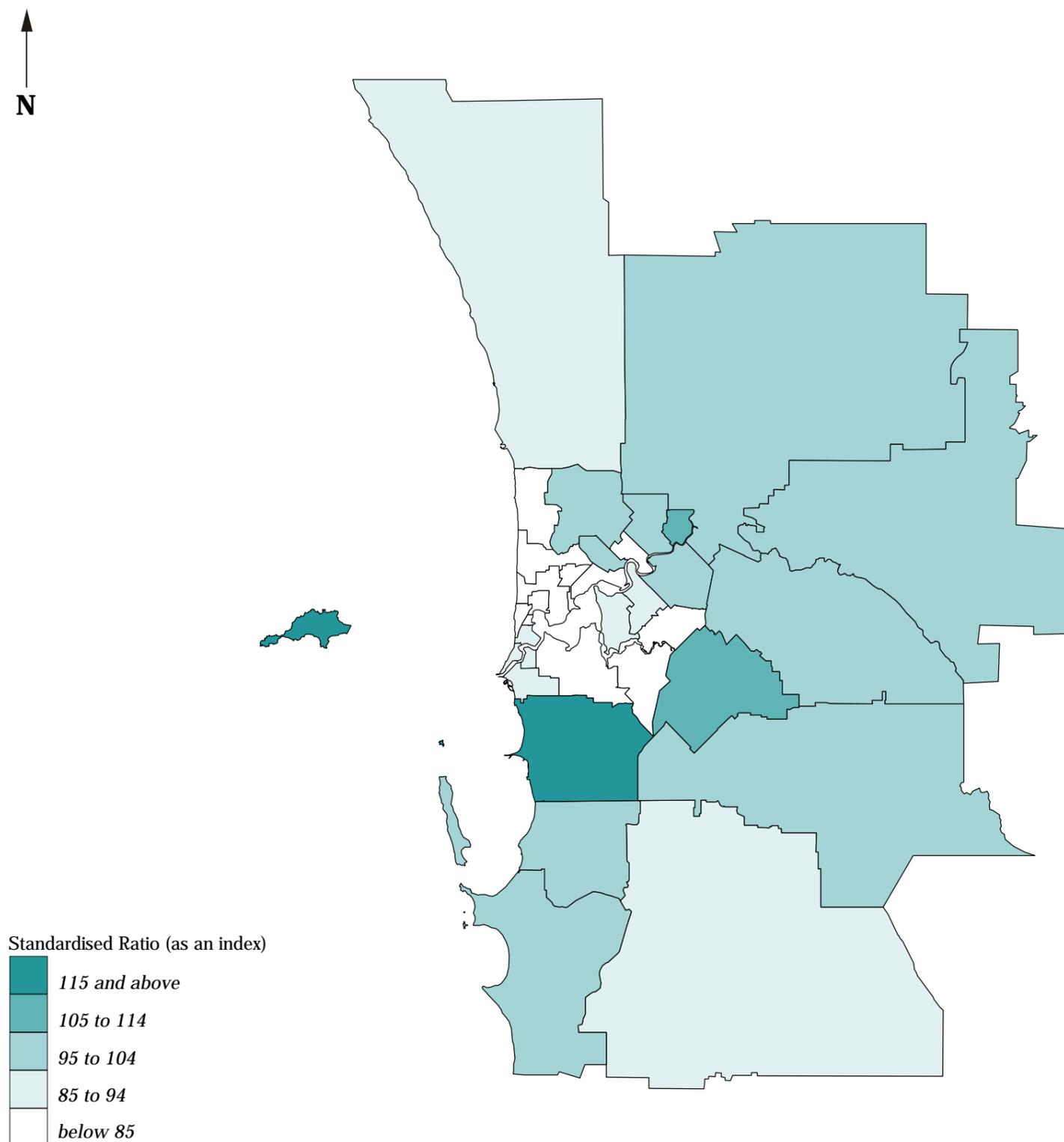
There were more than 8,000 admissions of females from seven of **Perth's** SLAs, with the highest numbers of admissions from Wanneroo (23,982 admissions), Stirling: Central (15,790), Gosnells (10,698), Melville (9,812) and Swan (8,737).

There were correlations of meaningful significance with the variables for unskilled and semi-skilled workers (0.66), early school leavers (0.63) and the Indigenous population (0.52); and inverse correlations of meaningful significance with the variables for managers and administrators, and professionals (-0.63) high income families (-0.56) and female labour force participation (-0.51). These results, together with the inverse correlation of meaningful significance with the IRSD (-0.54), indicate an association at the SLA level between high rates of admissions of females and socioeconomic disadvantage.

## Map 6.9

### Admissions of females, Perth, 1995/96

Standardised Ratio: number of admissions in each Statistical Local Area compared with the number expected\*



\*Expected numbers were derived by indirect age standardisation, based on WA totals

Source: See Data sources, Appendix 1.3

Details of map boundaries are in Appendix 1.2  
National Social Health Atlas Project, 1999

# Admissions of females, 1995/96

## State/Territory comparison (Australia as the Standard)

The admissions in this chapter are of all acute admissions to hospitals in Australia, including admissions of same day patients (other than for renal dialysis), whether to a hospital or to a same day surgical unit.

The most highly elevated standardised admission ratios (SARs) for female residents of the non-metropolitan areas were those in the Northern Territory (126\*\*), South Australia (121\*\*) and Western Australia (116\*\*). Only in Tasmania were there fewer admissions than expected from the Australian rates (**Table 6.15**). At the *Whole of State/Territory* level, the Northern Territory had the highest SAR in 1995/96 for this dataset (an SAR of 114\*\*), followed by South Australia (106\*\*) and Queensland (102\*\*).

In all of the States and Territories for which data are available for both periods, SARs were lower in the later period. The main differences are the substantially lower differential (from the Australian rates) in the SARs recorded for the Northern Territory, Western Australia, South Australia and Queensland in 1995/96. The lower SARs in this later period suggest a reduction (relative to the Australian rates) in admission rates for females between the years analysed.

**Table 6.15: Admissions of females, State/Territory**  
**Standardised admission ratios**

	NSW	Vic	Qld	SA	WA	Tas	NT	ACT	Total
<b>1995/96<sup>1</sup></b>									
Capital city	98**	98**	98**	101**	88**	103**	102	71**	97**
Other major urban centres <sup>2</sup>	95**	85**	96**	..	..	..	..	..	94**
Rest of State/Territory	108**	107**	109**	121**	116**	94**	126**	- <sup>3</sup>	109**
Whole of State/Territory	100	100	102**	106**	95**	98**	114**	70**	100
<b>1989<sup>4</sup></b>									
Rest of State/Territory	120**	..	124**	138**	159**	..	169**	..	128**

<sup>1</sup>Includes admissions to public acute hospitals, private hospitals and day surgery facilities, including admissions of same day patients, other than for renal dialysis

<sup>2</sup>Includes Newcastle and Wollongong (NSW); Geelong (Vic); and Gold Coast-Tweed Heads and Townsville-Thuringowa (Qld)

<sup>3</sup>Data unreliable: included with ACT total

<sup>4</sup>Excludes same day admissions: for New South Wales the period is 1989/90 and for Northern Territory it is 1987

Source: See *Data sources*, Appendix 1.3

Statistical significance: \* significance at 5 per cent; \*\* significance at 1 per cent

## Rest of State (Western Australia as the Standard)

There were 71,500 admissions of female residents of the non-metropolitan areas of Western Australia, 22 per cent more than expected from the State rates (an SAR of 122\*\*). Females accounted for 54.3 per cent of all admissions outside **Perth**. Some comments on the possible reasons for the generally higher SARs for residents of country areas are on page 185.

There were elevated rates of admissions of females in a majority (79.6 per cent) of non-metropolitan SLAs, especially in the far north, central and eastern parts of the State, but also along the eastern margin of the wheat belt (**Map 6.10**). The highest ratio was recorded for females in Menzies, with nearly four times the number of admissions expected from the State rates (an SAR of 378\*\*). Ratios elevated by more than twice the level expected were also recorded in Trayning (282\*\*), Halls Creek (244\*\*), Derby-West Kimberley and Mount Marshall (both 229\*\*), Murchison (222\*\*), Wyndham-East Kimberley (214\*\*), Wiluna (209\*\*), Koorda and Mullewa (both 203\*\*), and Morawa (202\*\*). Apart from these extremely high ratios, ratios elevated by more than 50 per cent were recorded for admissions of females from a further 15 SLAs.

The lowest ratios were recorded for females from Sandstone (an SAR of 37\*\*), Exmouth (67\*\*), Mount Magnet (79') and Wickpin (80'). There were no admissions recorded for females from Ngaanyatjarraku.

Of the towns mapped, the highest ratios were in Broome (with an SAR of 154\*\*), Port Hedland (142\*\*), Kalgoorlie/Boulder (141\*\*) and Geraldton (120\*\*). Only Mandurah (93\*\*) recorded fewer admissions than expected.

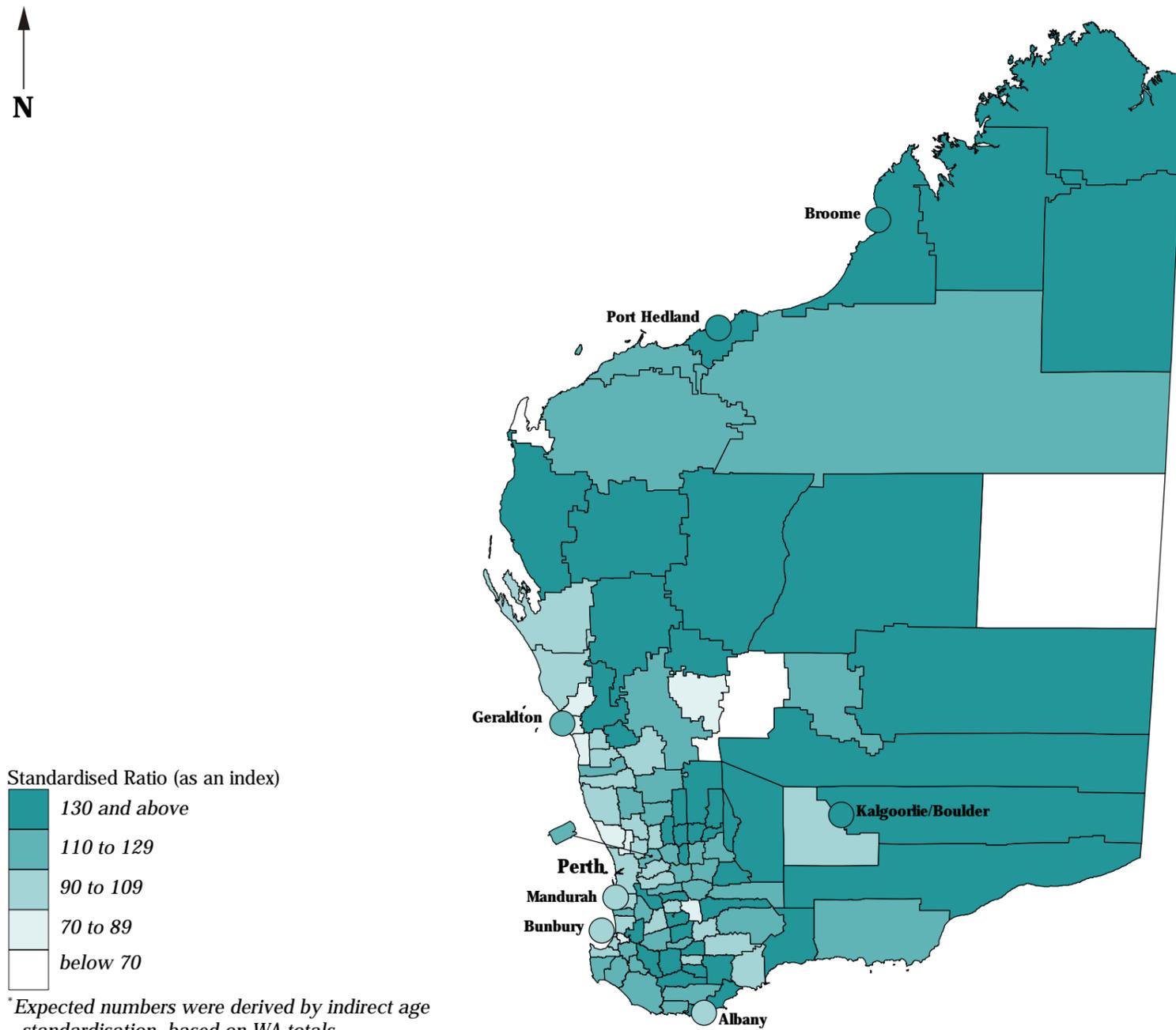
There were more than 2,000 admissions of females resident in each of Mandurah (5,061 admissions), Kalgoorlie/Boulder (4,762), Bunbury (4,115), Geraldton (3,398), the town of Albany (2,552), Busselton (2,542), Harvey (2,111) and Albany Shire (2,027).

There were weak correlations with a number of the indicators of socioeconomic disadvantage, the strongest being with the variables for the Indigenous population (0.44) and dwellings without a motor vehicle (0.32). These results, together with the weak inverse correlation with the IRSD (-0.18), suggest the existence of an association at the SLA level between high rates of admissions of females and socioeconomic disadvantage.

## Map 6.10

### Admissions of females, Western Australia, 1995/96

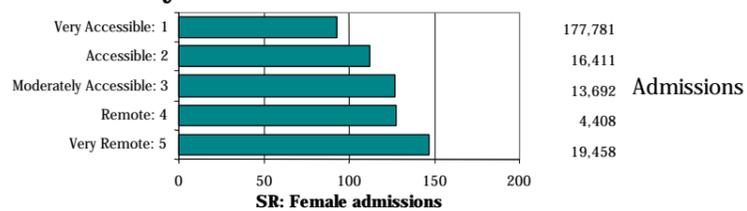
Standardised Ratio: number of admissions in each Statistical Local Area compared with the number expected\*



Source: See Data sources, Appendix 1.3

Details of map boundaries are in Appendix 1.2

### Accessibility/Remoteness Index of Australia



Standardised admission ratios for females also closely follow the pattern evident for total admissions, with a ratio of 93 in the Very Accessible category; ratios of 112, 127 and 128 in the three middle categories; and increasing to an SAR of 147 in the Very Remote category. The number of admissions is higher in each category than those for males, and ratios in all but the Very Accessible category are also higher.

Source: Calculated on ARIA classification, DHAC

National Social Health Atlas Project, 1999

## Same day admissions, 1995/96

### Capital city comparison (Australia as the Standard)

The same day admissions in this analysis include admissions of same day patients (other than for renal dialysis), whether to a public acute hospital, a private (acute or psychiatric) hospital or to a same day surgical unit. Patients admitted on a same day basis for renal dialysis have been excluded, due to their frequent repeat visits for treatment which distorts the patterns of hospitalisation (see page 185).

There is a wide variation in standardised admission ratios (SARs) between the capital cities, from elevated ratios of 115\*\* in **Melbourne**, 109\*\* in **Sydney** and 108\*\* in **Brisbane**, to a low of 62\*\* in **Canberra** and 65\*\* in **Darwin** (Table 6.16). This information was not collected for the first edition of the atlas (see page 187).

**Table 6.16: Same day admissions<sup>1</sup>, capital cities, 1995/96**  
*Age-sex standardised admission ratios*

Sydney	Melbourne	Brisbane	Adelaide	Perth	Hobart	Darwin	Canberra <sup>2</sup>	All capitals
109**	115**	108**	97**	91**	96**	65**	62**	106**

<sup>1</sup>Includes same day admissions to public acute hospitals, private hospitals and day surgery facilities: excludes admissions for renal dialysis

<sup>2</sup>Includes Queanbeyan (C)

Source: See *Data sources*, Appendix 1.3

Statistical significance: \* significance at 5 per cent; \*\* significance at 1 per cent

Same day admissions accounted for 35.7 per cent of all admissions in 1995/96 of Western Australian residents, with similar percentages recorded for males (36.9 per cent) and females (34.7 per cent). Same day admissions represented a higher proportion of all admissions in **Perth** (39.6 per cent) than in the rest of State (27.1 per cent).

### Perth (Western Australia as the Standard)

In 1995/96, there were 114,722 same day admissions of residents of **Perth** (39.6 per cent of all admissions of **Perth** residents). This was four per cent more admissions than expected from the State rates (an SAR of 104\*\*). Females accounted for 54.1 per cent of these admissions.

The distribution of elevated standardised admission ratios is most concentrated in the newer northern and north-eastern suburbs, as well as in the southern and south-eastern suburbs (**Map 6.11**). Low ratios dominated in the older established suburbs between the coast and the city, and in the outer suburbs to the east of the city.

The highest ratios were in Vincent (with an SAR of 136\*\*), Cockburn (129\*\*), Bassendean and Stirling: Central (both 122\*\*), Gosnells (118\*\*), Bayswater (114\*\*), and Kalamunda and Cambridge (both 110\*\*).

The lowest ratios were recorded for residents of Stirling: South-Eastern (with an SAR of 53\*\*), the City of Perth (64\*\*), Canning (73\*\*) and Serpentine-Jarrahdale (79\*\*).

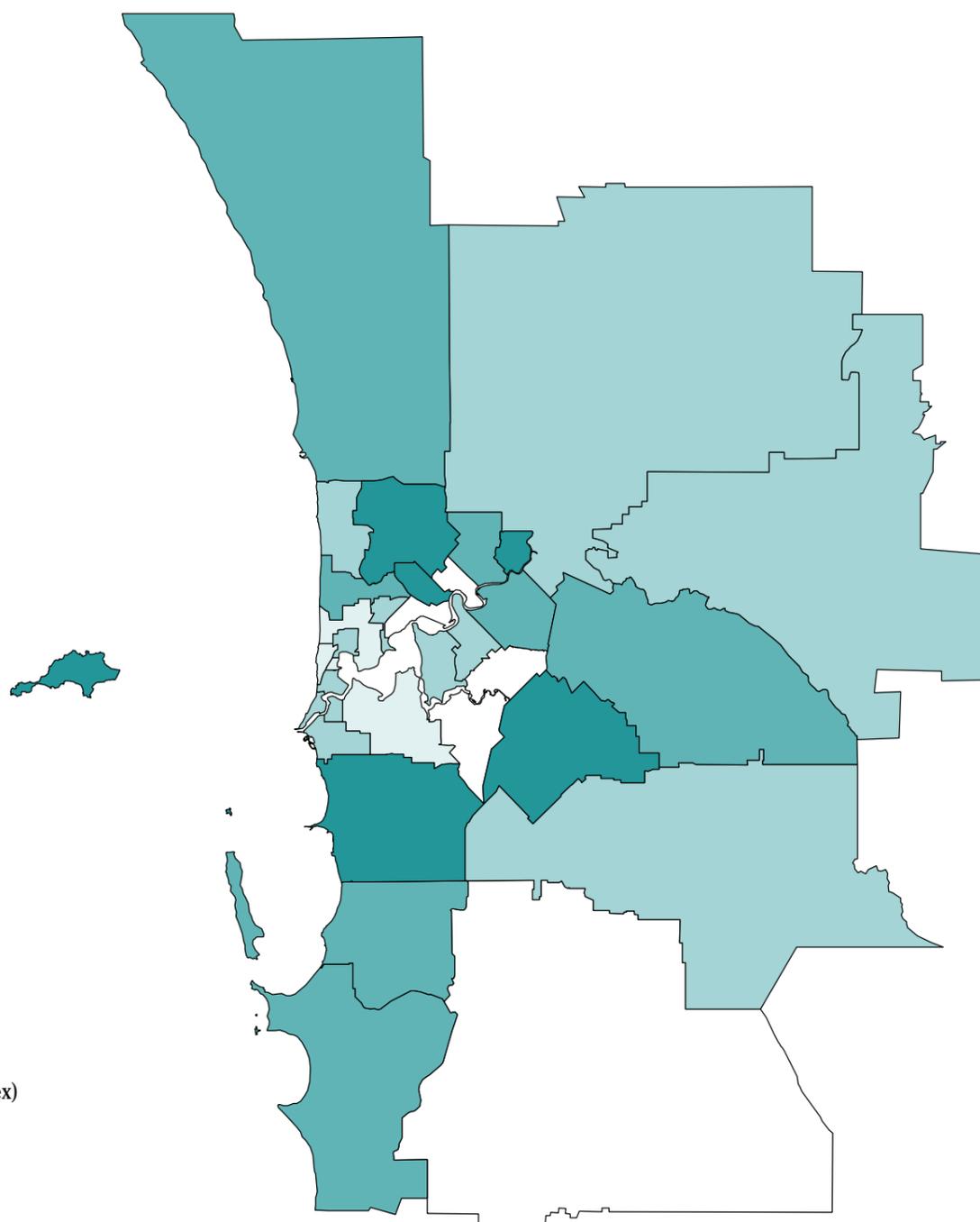
The largest numbers of same day admissions were of people from Wanneroo (18,049 same day admissions), Stirling: Central (11,768), Melville (7,371), Gosnells (7,228) and Cockburn (6,141).

The strongest correlations were with the variables for unskilled and semi-skilled workers (0.38) and early school leavers (0.38); and the strongest inverse correlations were with managers and administrators, and professionals (-0.39) and high income families (-0.37). These results, together with the weak inverse correlation with the IRSD (-0.36), suggest the existence of an association at the SLA level between high rates of same day admissions and socioeconomic disadvantage.

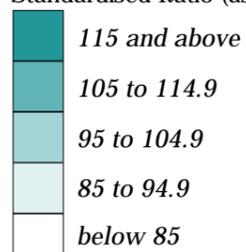
## Map 6.11

### Same day admissions, Perth, 1995/95

Standardised Ratio: number of admissions in each Statistical Local Area compared with the number expected\*



Standardised Ratio (as an index)



\*Expected numbers were derived by indirect age-sex standardisation, based on WA totals

Source: See Data sources, Appendix 1.3

Details of map boundaries are in Appendix 1.2  
National Social Health Atlas Project, 1999

## Same day admissions, 1995/96

### State/Territory comparison (Australia as the Standard)

The same day admissions in this analysis include admissions of same day patients (other than for renal dialysis), whether to a public acute hospital, a private (acute or psychiatric) hospital or to a same day surgical unit. See the comments on the previous text page and on page 185 for reasons for the exclusion of same day admissions for renal dialysis.

In all cases, there are relatively more admissions of same day patients who were residents of the capital cities than of the non-metropolitan areas (**Table 6.17**). This pattern is a reflection of the location of these facilities which is predominantly in the capital cities, making them less available to residents of the non-metropolitan areas of Australia. There is less variation evident across the non-metropolitan areas than was evident for the capital cities, with standardised admission ratios (SARs) varying from a high of 97\*\* in Queensland to a low of 58\*\* in the Northern Territory. All of these SARs are lower than expected from the Australian rates.

**Table 6.17: Same day admissions<sup>1</sup>, State/Territory, 1995/96**  
**Age-sex standardised admission ratios**

	NSW	Vic	Qld	SA	WA	Tas	NT	ACT	Total
Capital city	109**	115**	108**	97**	91**	96**	65**	62**	106**
Other major urban centres <sup>2</sup>	97**	71**	103**	..	..	..	..	..	97**
Rest of State/Territory	84**	94**	97**	89**	79**	77**	58**	- <sup>3</sup>	89**
Whole of State/Territory	101**	108**	102**	95**	88**	85**	62**	61**	100

<sup>1</sup>Includes same day admissions to public acute hospitals, private hospitals and day surgery facilities: excludes admissions for renal dialysis

<sup>2</sup>Includes Newcastle and Wollongong (NSW); Geelong (Vic); and Gold Coast-Tweed Heads and Townsville-Thuringowa (Qld)

<sup>3</sup>Data unreliable: included with ACT total

Source: See *Data sources*, Appendix 1.3

Statistical significance: \* significance at 5 per cent; \*\* significance at 1 per cent

### Rest of State (Western Australia as the Standard)

There were 35,659 same day admissions of residents of the non-metropolitan areas of Western Australia (27.1 per cent of all non-metropolitan admissions), ten per cent fewer than were expected from the State rates (an SAR of 90\*\*). Females accounted for just over half (52.5 per cent) of the admissions.

The distribution of standardised admission ratios for same day admissions is highly regionalised, and clearly reflects the location of these centres (**Map 6.12**). Only 16 SLAs recorded an elevated SAR (ie. greater than 100).

The highest ratios were recorded for people in Ravensthorpe (with an SAR of 182\*\*) and Dundas (153\*\*), with 82 per cent and 53 per cent respectively more same day admissions than expected from the State rates. Ratios were also elevated by more than ten per cent in the SLAs of Kalgoorlie/Boulder (119\*\*), Albany Shire (116\*\*), Upper Gascoyne (116), Denmark (113\*) and Plantagenet (111\*).

Excluding those SLAs with fewer than 20 admissions, the lowest ratios were recorded in Exmouth and Mount Magnet (both with an SAR of 40\*\*), Goomalling (45\*\*), Three Springs (49\*\*) and Kondinin and Perenjori (both 54\*\*).

Of the towns mapped, only Kalgoorlie/Boulder (with an SAR of 119\*\*), Geraldton (107\*\*) and Albany (106\*) had elevated ratios. The lowest ratios were in Mandurah (84\*\*) and Broome (80\*\*).

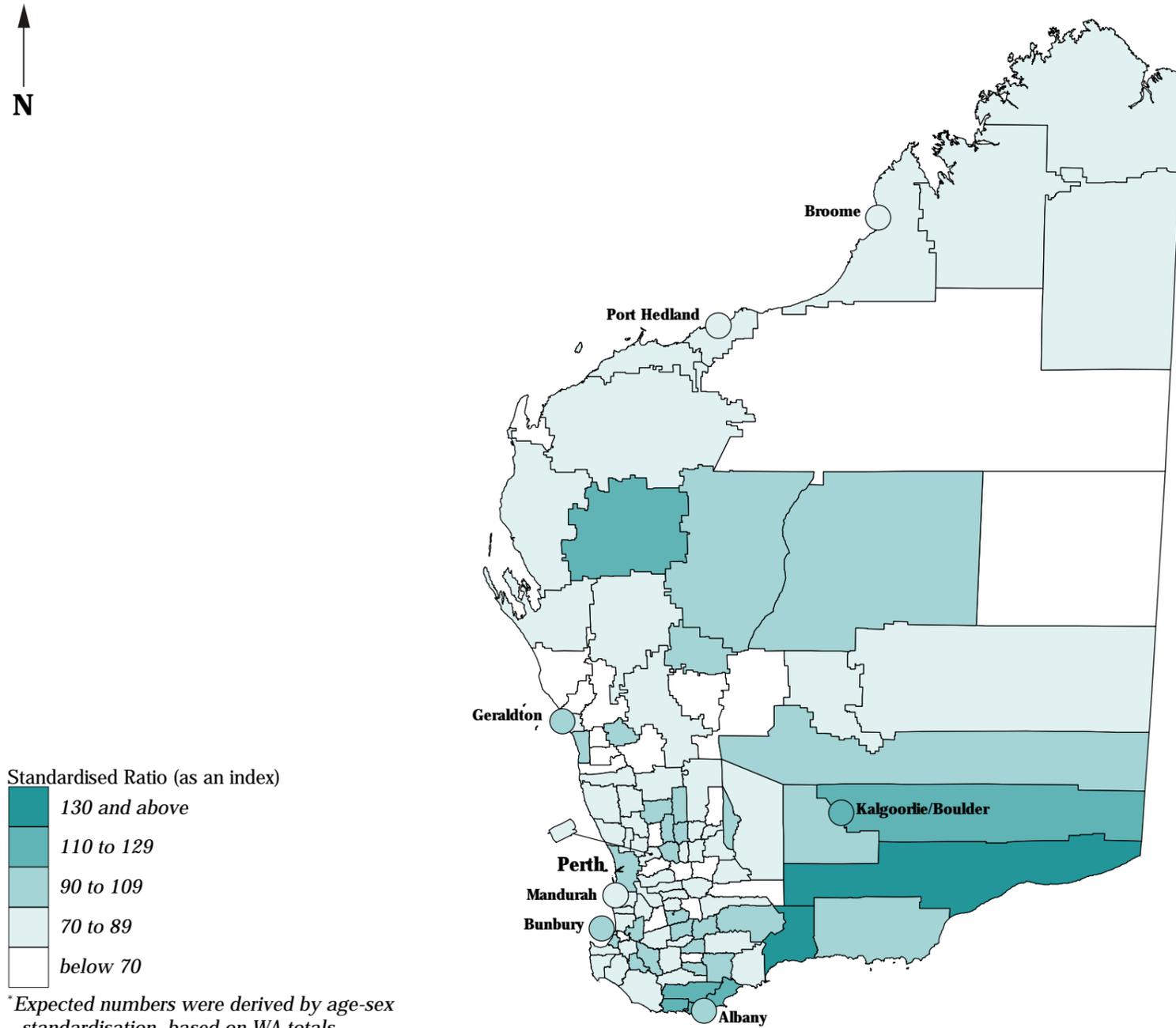
The largest numbers of same day admissions were recorded in the SLAs of Mandurah (3,082 admissions), Kalgoorlie/Boulder (2,622), Bunbury (2,402), Geraldton (1,961), Albany (the town, with 1,555 admissions; and the Shire, with 1,249 admissions), Busselton (1,157) and Harvey (1,100). No other SLAs recorded more than 1,000 same day admissions.

There was no consistent evidence in the correlation analysis of an association at the SLA level in the non-metropolitan areas of Western Australia between same day admissions and socioeconomic status.

## Map 6.12

### Same day admissions, Western Australia, 1995/96

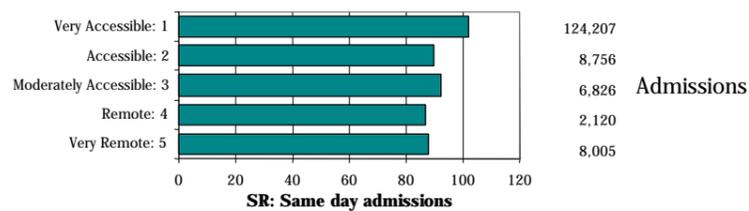
Standardised Ratio: number of admissions in each Statistical Local Area compared with the number expected\*



Source: See Data sources, Appendix 1.3

Details of map boundaries are in Appendix 1.2

### Accessibility/Remoteness Index of Australia



Standardised admission ratios (SARs) for same day admissions are above the level expected from the State rates only in the Very Accessible areas (an SAR of 102), with ratios around 10 per cent lower than expected from the State rates in the remaining ARIA categories. This pattern is likely to reflect the greater availability of, and ease of access to, these facilities in Perth.

Source: Calculated on ARIA classification, DHAC  
National Social Health Atlas Project, 1999

# Admissions for infectious and parasitic diseases, 1995/96

## Capital city comparison (Australia as the Standard)

Standardised admission ratios (SARs) for admissions for infectious and parasitic diseases (described below) varied widely between the capital cities, from a high of 116\*\* in **Sydney**, to a low of 66\*\* in **Canberra**. **Adelaide** (108\*\*) and **Darwin** (106) were the only other capital cities with elevated ratios (**Table 6.18**). Both **Sydney** and **Darwin** had substantially higher ratios in the later period shown in **Table 6.18**, suggesting an increase (relative to the Australian rates) in admissions for these diseases. The increase for **Sydney** was substantial.

**Table 6.18: Admissions with a principal diagnosis of infectious and parasitic diseases, capital cities**  
*Age-sex standardised admission ratios*

	Sydney	Melbourne	Brisbane	Adelaide	Perth	Hobart	Darwin	Canberra <sup>1</sup>	All capitals
1995/96 <sup>2</sup>	116**	71**	84**	108**	78**	75**	106	66**	92**
1989 <sup>3</sup>	69**	..	85**	90**	77**	..	84*	..	76**

<sup>1</sup>Includes Queanbeyan (C)

<sup>2</sup>Includes admissions to public acute hospitals and private hospitals, including admissions of same day patients.

<sup>3</sup>Excludes same day admissions: for Sydney the period is 1989/90 and for Darwin it is 1987

Source: See *Data sources*, Appendix 1.3

Statistical significance: \* significance at 5 per cent; \*\* significance at 1 per cent

In the early part of the century, infectious and parasitic diseases were a major cause of disease and death. Reductions in deaths from these causes were a "significant factor in reducing death rates between 1921 and the early 1960s ..., particularly among infants and young children." (AIH 1990). They are still an important cause of hospital admission, in particular for viral diseases and intestinal infections. Children aged 0 to 4 years had the highest rate for these admissions (35.2 admissions per thousand population for males and 32.9 for females), with the next highest rates being in the 75 years and over age group. In 1996/97, the category 'infectious and parasitic diseases' accounted for about twice as many admissions for Indigenous people as expected based on all-Australian rates (ABS/AIHW 1999).

High rates of admission for infectious and parasitic diseases also occur among those who are socioeconomically disadvantaged. Esterman et al. (1990) found that admissions of people from lower socioeconomic status postcodes in **Adelaide** (socioeconomic status based on household income) were 6 per cent higher in the middle and 47 per cent higher in the lower income areas, for all infectious and parasitic diseases in aggregate, than in the more affluent areas. This is consistent with the higher notification rates found in the poorer areas for a wide range of communicable diseases.

Hospital admissions for infectious and parasitic diseases accounted for 1.9 per cent of all admissions of Western Australian residents.

## Perth (Western Australia as the Standard)

There were 4,519 admissions of residents of **Perth** for infectious and parasitic diseases in 1995/96, 21 per cent fewer than were expected from the State rates (an SAR of 79\*\*). Just over half (52.6 per cent) of these admissions were males.

Only five SLAs in **Perth** had elevated standardised admission ratios for infectious and parasitic diseases, and none were of statistical significance (**Map 6.13**). They were Serpentine-Jarrahdale (with an SAR of 118), Kwinana (113), Vincent (110), Shepperton (106) and Bassendean (104).

In contrast, more than half the SLAs with low rates of admission had statistically significant ratios. The lowest of these was in Stirling: South-Eastern, with 69 per cent fewer admissions for infectious and parasitic diseases than expected from the State rates (an SAR of 31\*\*). Other very low ratios were also recorded in Canning (49\*\*), Melville (55\*\*) and Nedlands (59\*\*).

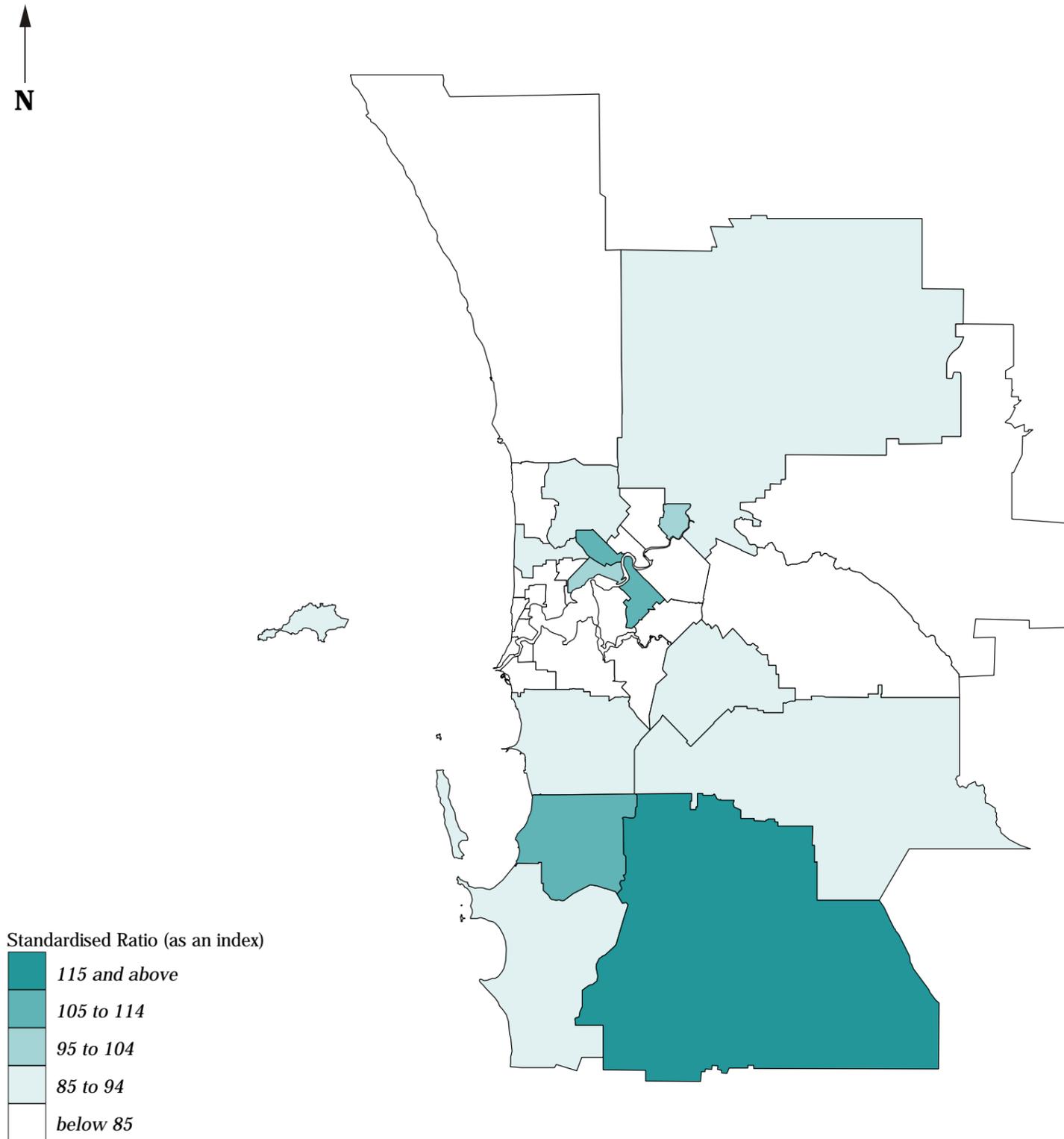
The large outer SLAs had the largest numbers of admissions, with 711 admissions of residents of Wanneroo, 408 from Stirling: Central, 307 from Swan and 303 from Gosnells. There were more than 200 admissions from each of Armadale, Melville, Rockingham and Cockburn.

There were correlations of meaningful significance with the variables for early school leavers (0.57) and unskilled and semi-skilled workers (0.56), and a weaker correlation with the Indigenous population (0.49). These results, together with the inverse correlations of meaningful significance with female labour force participation (-0.54) and the IRSD (-0.50), support the existence of an association at the SLA level between high rates of admission for infectious and parasitic diseases and socioeconomic disadvantage.

### Map 6.13

## Admissions for infectious and parasitic diseases, Perth, 1995/96

Standardised Ratio: number of admissions in each Statistical Local Area compared with the number expected\*



\*Expected numbers were derived by indirect age-sex standardisation, based on WA totals

Source: See Data sources, Appendix 1.3

Details of map boundaries are in Appendix 1.2  
National Social Health Atlas Project, 1999

# Admissions for infectious and parasitic diseases, 1995/96

## State/Territory comparison (Australia as the Standard)

With the exception of Tasmania and Victoria, standardised admission ratios (SARs) for admissions for infectious and parasitic diseases (described on the previous text page) of residents of the non-metropolitan areas were all highly elevated (**Table 6.19**). The most highly elevated ratios were in the non-metropolitan areas of the Northern Territory (305\*\*), Western Australia (153\*\*), South Australia (134\*\*) and Queensland (126\*\*).

The ratios for the non-metropolitan areas for each of the States named above declined (and some declined substantially) between the periods shown in **Table 6.19** with the largest change being that for the Northern Territory. These lower ratios suggest a decline (relative to the Australian rates) in admissions for these diseases.

**Table 6.19: Admissions with a principal diagnosis of infectious and parasitic diseases, State/Territory**  
*Age-sex standardised admission ratios*

	NSW	Vic	Qld	SA	WA	Tas	NT	ACT	Total
<b>1995/96<sup>1</sup></b>									
Capital city	116**	71**	84**	108**	78**	75**	106	66**	92**
Other major urban centres <sup>2</sup>	73**	83**	93**	..	..	..	..	..	81**
Rest of State/Territory	118**	93**	126**	134**	153**	85**	305**	- <sup>3</sup>	121**
Whole of State/Territory	111**	77**	103**	115**	99	81**	219**	66**	100
<b>1989<sup>4</sup></b>									
Rest of State/Territory	147**	..	162**	136**	170**	..	547**	..	164**

<sup>1</sup>Includes admissions to public acute hospitals and private hospitals, including admissions of same day patients

<sup>2</sup>Includes Newcastle and Wollongong (NSW); Geelong (Vic); and Gold Coast-Tweed Heads and Townsville-Thuringowa (Qld)

<sup>3</sup>Data unreliable: included with ACT total

<sup>4</sup>Excludes same day admissions: for New South Wales the period is 1989/90 and for Northern Territory it is 1987

Source: See *Data sources*, Appendix 1.3

Statistical significance: \* significance at 5 per cent; \*\* significance at 1 per cent

## Rest of State (Western Australia as the Standard)

There were 3,499 admissions for infectious and parasitic diseases of residents of the non-metropolitan areas of Western Australia, 54 per cent more admissions than expected from the State rates (an SAR of 154\*\*). This represents a substantial difference in the rate of hospitalisation for these diseases between residents of the non-metropolitan areas and those in **Perth**. Females accounted for 51.2 per cent of the admissions.

Elevated standardised admission ratios were recorded in three quarters of the SLAs in which 20 or more admissions were recorded, with the highest ratios in the State's far north, in the Geraldton hinterland and in the south (**Map 6.14**).

Ratios elevated by more than five times the level expected from the State rates were recorded in Derby-West Kimberley (with an SAR of 524\*\*) and Mullewa (516\*\*). Highly elevated ratios were also recorded in the SLAs of Kojonup (with an SAR of 393\*\*), Morawa (385\*\*), Halls Creek (379\*\*), Wyndham-East Kimberley (313\*\*), Katanning (276\*\*), Broome (275\*\*), Dundas (266\*\*) and Port Hedland (254\*\*). There were six other SLAs with ratios of above 200.

Of SLAs with 20 or more admissions, the lowest SARs were in Murray (with an SAR of 77), Mandurah (81), Capel (82) and the towns of Busselton and Northam (both 88).

Of the towns mapped, the highest admission ratios were in Broome (with an SAR of 275\*\*), Port Hedland (254\*\*) and Kalgoorlie/Boulder (206\*\*), with admissions for infectious and parasitic diseases of more than twice the level expected from the State rates. Only Mandurah (81) and Bunbury (98) had fewer admissions for infectious and parasitic diseases than expected.

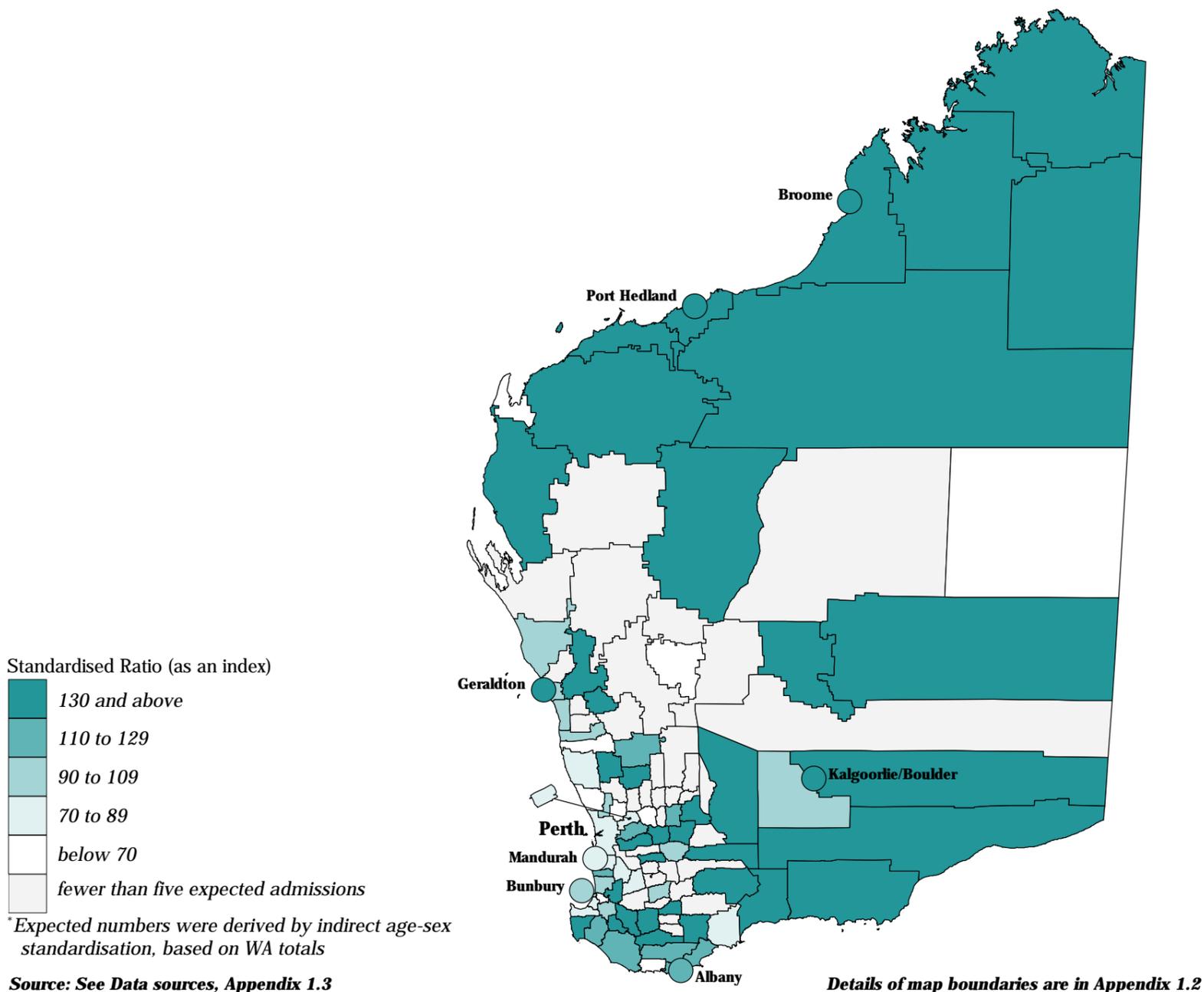
Admissions for infectious and parasitic diseases of residents of the non-metropolitan areas of Western Australia were highest in Kalgoorlie/Boulder (298 admissions), Derby-West Kimberley (193), Port Hedland (156), Geraldton (152), Mandurah (144), Roebourne (142) and Broome (132).

The correlation analysis was not undertaken as there were too many SLAs with small numbers of cases.

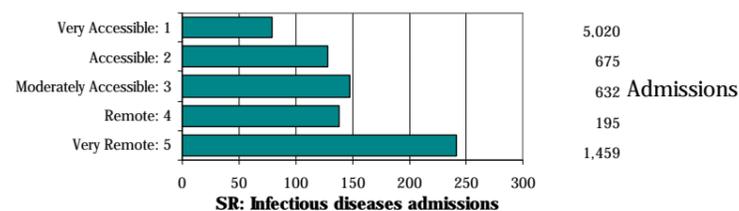
## Map 6.14

### Admissions for infectious and parasitic diseases, Western Australia, 1995/96

Standardised Ratio: number of admissions in each Statistical Local Area compared with the number expected\*



### Accessibility/Remoteness Index of Australia



Standardised admission ratios for infectious diseases increase markedly across the ARIA categories. There is a very low ratio of 79 in the Very Accessible areas (31 per cent fewer admissions for infectious diseases than expected from the State rates); elevated ratios in the Accessible (an SAR of 128), Moderately Accessible (148) and Remote (138) categories; and a highly elevated ratio of 241 in the Very Remote category. This highly elevated rate of admissions (more than twice the number of admissions for infectious diseases expected from the State rates) is likely to reflect the high rates of admissions of the Indigenous population.

Source: Calculated on ARIA classification, DHAC  
National Social Health Atlas Project, 1999

# Admissions for cancer, 1995/96

## Capital city comparison (Australia as the Standard)

Standardised admissions ratios (SARs) for admissions for cancer (described below) varied between the capital cities, from a high of 121\*\* in **Brisbane**, to a low of 78\*\* in **Canberra**. **Hobart** (87\*\*), **Perth** (89\*\*) and **Sydney** (95\*\*) also had fewer than expected admissions for these diseases (**Table 6.20**).

There was relatively little change in the ratios between the periods shown in **Table 6.20**, with the largest change being an increase in the admission ratio for **Darwin**, suggesting an increase (relative to the Australian rates) in admissions for these diseases.

**Table 6.20: Admissions with a principal diagnosis of cancer, capital cities**  
*Age-sex standardised admission ratios*

	Sydney	Melbourne	Brisbane	Adelaide	Perth	Hobart	Darwin	Canberra <sup>1</sup>	All capitals
1995/96 <sup>2</sup>	95**	103**	121**	105**	89**	87**	106	78**	101*
1989 <sup>3</sup>	90**	..	121**	104**	99	..	98	..	99**

<sup>1</sup>Includes Queanbeyan (C)

<sup>2</sup>Includes admissions to public acute hospitals and private hospitals, including admissions of same day patients

<sup>3</sup>Excludes same day admissions: for Sydney the period is 1989/90 and for Darwin it is 1987

Source: See *Data sources*, Appendix 1.3

Statistical significance: \* significance at 5 per cent; \*\* significance at 1 per cent

Admissions to hospital for cancer (malignant neoplasms) accounted for 4.4 per cent of all the admissions for Western Australian residents; 4.8 per cent of residents of **Perth** and 3.5 per cent in the non-metropolitan areas.

Esterman et al. (1990), reporting on hospital admissions for cancers, noted a 21 per cent higher hospital admission rate for males compared with females in South Australia in 1988. They commented on differences in admission rates and incidence of various cancers related to differences in socioeconomic status. They found that admission rates for malignant neoplasms were 14 per cent higher for the middle and 20 per cent higher for the lower than those for the upper income category (based on household incomes in postcodes). They also reported that South Australian Cancer Registry data showed that the poorer areas have a higher incidence of cancers of the following anatomical sites: lung, pancreas, larynx, liver, pleura, cervix, and stomach. It is likely that these cancers would have contributed to the higher admission rates.

Just as people from middle and lower socioeconomic status postcodes have higher rates of incidence of some cancers, so too do people from higher socioeconomic status postcodes. Those cancers are reported by Esterman et al. (1988) as being of the female breast, uterus (body), prostate, testis, skin (melanoma), and colon. Overall, however, residents of middle and lower socioeconomic status postcodes had more admissions for cancers than did those from higher socioeconomic status postcodes.

## Perth (Western Australia as the Standard)

There were 14,032 admissions of residents of **Perth** for cancer, one per cent more than expected from the State rates (an SAR of 101). Males accounted for over half (55.1 per cent) of the admissions.

SLAs in **Perth** with high standardised admission ratios for cancer formed a crescent extending from Kalamunda to Vincent and Subiaco, around to East Fremantle, and south to Rockingham (**Map 6.15**). The highest SARs within this group were in Cockburn (with an SAR of 138\*\*), East Fremantle (134\*\*) and

Belmont (132\*\*). Relatively high ratios were also recorded for residents from Vincent (with an SAR of 124\*\*), Kalamunda (121\*\*), Rockingham (118\*\*) and Subiaco (115).

Typically, low ratios were recorded in higher socioeconomic status areas. The lowest ratios were in Stirling: South-Eastern (with an SAR of 50\*\*), the City of Perth (50\*\*), Serpentine-Jarrahdale (72\*\*) and Nedlands (82\*\*). Other SLAs with relatively low ratios were Claremont (86), Canning (86\*\*) and Peppermint Grove and Cottesloe (both 87).

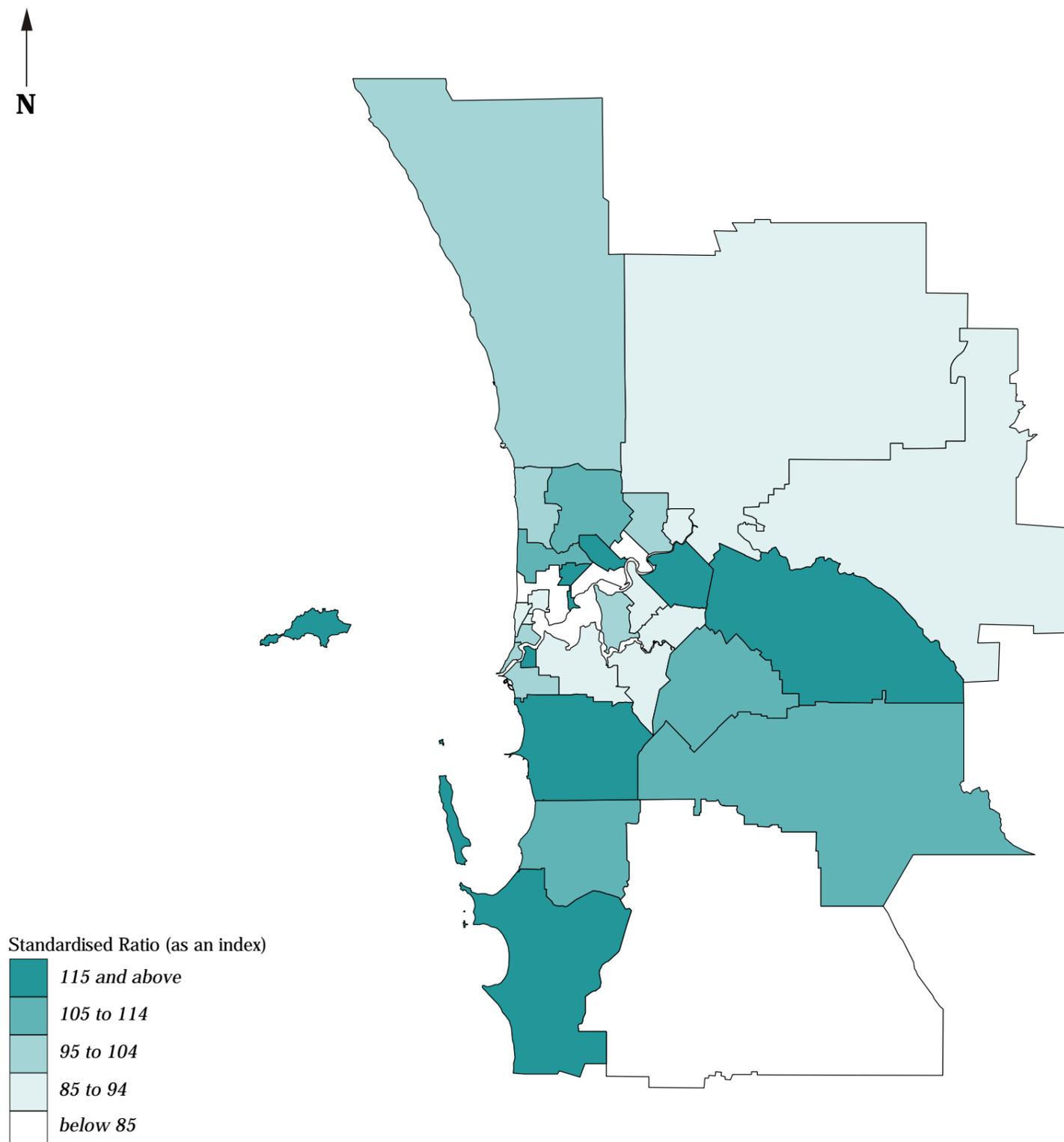
There were more than 1,000 admissions for cancer of residents from each of Wanneroo (1,665 admissions), Stirling: Central (1,414) and Melville (1,053).

The strongest correlations were with the variables for housing authority rented dwellings (0.39), single parent families (0.37) and unskilled and semi-skilled workers (0.35); weak inverse correlations were also recorded with the variables for high socioeconomic disadvantage. These results, together with the weak inverse correlation with the IRSD (-0.34), suggest the existence of an association at the SLA level between high rates of admission for cancer and socioeconomic disadvantage.

## Map 6.15

### Admissions for cancer, Perth, 1995/96

Standardised Ratio: number of admissions in each Statistical Local Area compared with the number expected\*



\*Expected numbers were derived by indirect age-sex standardisation, based on WA totals

Source: See Data sources, Appendix 1.3

Details of map boundaries are in Appendix 1.2  
National Social Health Atlas Project, 1999

## Admissions for cancer, 1995/96

### State/Territory comparison (Australia as the Standard)

Standardised admission ratios (SARs) for admissions for cancer (described on the previous text page) of residents of the non-metropolitan areas were relatively uniform across the States and Territories (**Table 6.21**). The most highly elevated ratio was in Queensland (109\*\*), and the lowest in the Northern Territory (79\*\*) and Western Australia (84\*\*).

There was relatively little change in the ratios for the non-metropolitan areas between the periods shown in **Table 6.21**, with the largest changes being for New South Wales, Western Australia and the Northern Territory. These lower ratios suggest a decline (relative to the Australian rates) in admissions for these diseases.

**Table 6.21: Admissions with a principal diagnosis of cancer, State/Territory**  
*Age-sex standardised admission ratios*

	NSW	Vic	Qld	SA	WA	Tas	NT	ACT	Total
<b>1995/96<sup>1</sup></b>									
Capital city	95**	103**	121**	105**	89**	87**	106	78**	101*
Other major urban centres <sup>2</sup>	90**	87**	106**	..	..	..	..	..	95**
Rest of State/Territory	99	99	109**	104**	84**	90**	79**	- <sup>3</sup>	100
Whole of State/Territory	96**	102**	114**	104**	88**	89**	92**	77**	100
<b>1989<sup>4</sup></b>									
Rest of State/Territory	107**	..	107**	105**	91**	..	73**	..	..

<sup>1</sup>Includes admissions to public acute hospitals and private hospitals, including admissions of same day patients

<sup>2</sup>Includes Newcastle and Wollongong (NSW); Geelong (Vic); and Gold Coast-Tweed Heads and Townsville-Thuringowa (Qld)

<sup>3</sup>Data unreliable: included with ACT total

<sup>4</sup>Excludes same day admissions: for New South Wales the period is 1989/90 and for Northern Territory it is 1987

Source: See *Data sources*, Appendix 1.3

Statistical significance: \* significance at 5 per cent; \*\* significance at 1 per cent

### Rest of State (Western Australia as the Standard)

There were 4,590 admissions of residents of the non-metropolitan areas of Western Australia for cancer, four per cent fewer than expected from the State rates (an SAR of 96\*\*). Males accounted for over half (58.0 per cent) of the admissions.

Despite an overall low standardised ratio, there were ten SLAs with ratios elevated by 30 per cent or more (excluding SLAs with fewer than 20 admissions). As **Map 6.16** shows, these were scattered throughout the State. The highest ratio was in Trayning (an SAR of 309\*\*), where there were 22 admissions for cancer, three times the number of admissions expected for a population of this size and age-sex composition. Other highly elevated ratios were recorded for the populations in Cunderdin (with an SAR of 285\*\* and 42 admissions), Shark Bay (219\*\*; 25 admissions) and Morawa (209\*\*; 22 admissions), Dundas (198\*\*; 27 admissions), Nannup (194\*\*; 24 admissions), Kojonup (145\*; 39 admissions), Corrigin (139; 22 admissions), Ravensthorpe (137; 20 admissions) and Albany Shire (131\*\*; 171 admissions).

Excluding SLAs with fewer than 20 admissions, the lowest ratios were recorded in Merredin (52\*\*), Augusta-Margaret River (61\*\*), Plantagenet (70\*), Dardanup (72\*) and Toodyay (73).

Of the towns mapped, only Port Hedland (with an SAR of 128\* and 84 admissions) and Geraldton (124\*\*; 275 admissions) had elevated SARs for cancer. Broome, Kalgoorlie/Boulder and Mandurah had the expected numbers of admissions for towns of their size and population mix, while in Albany (97) and Bunbury (86\*), there were fewer admissions than expected from the State rates.

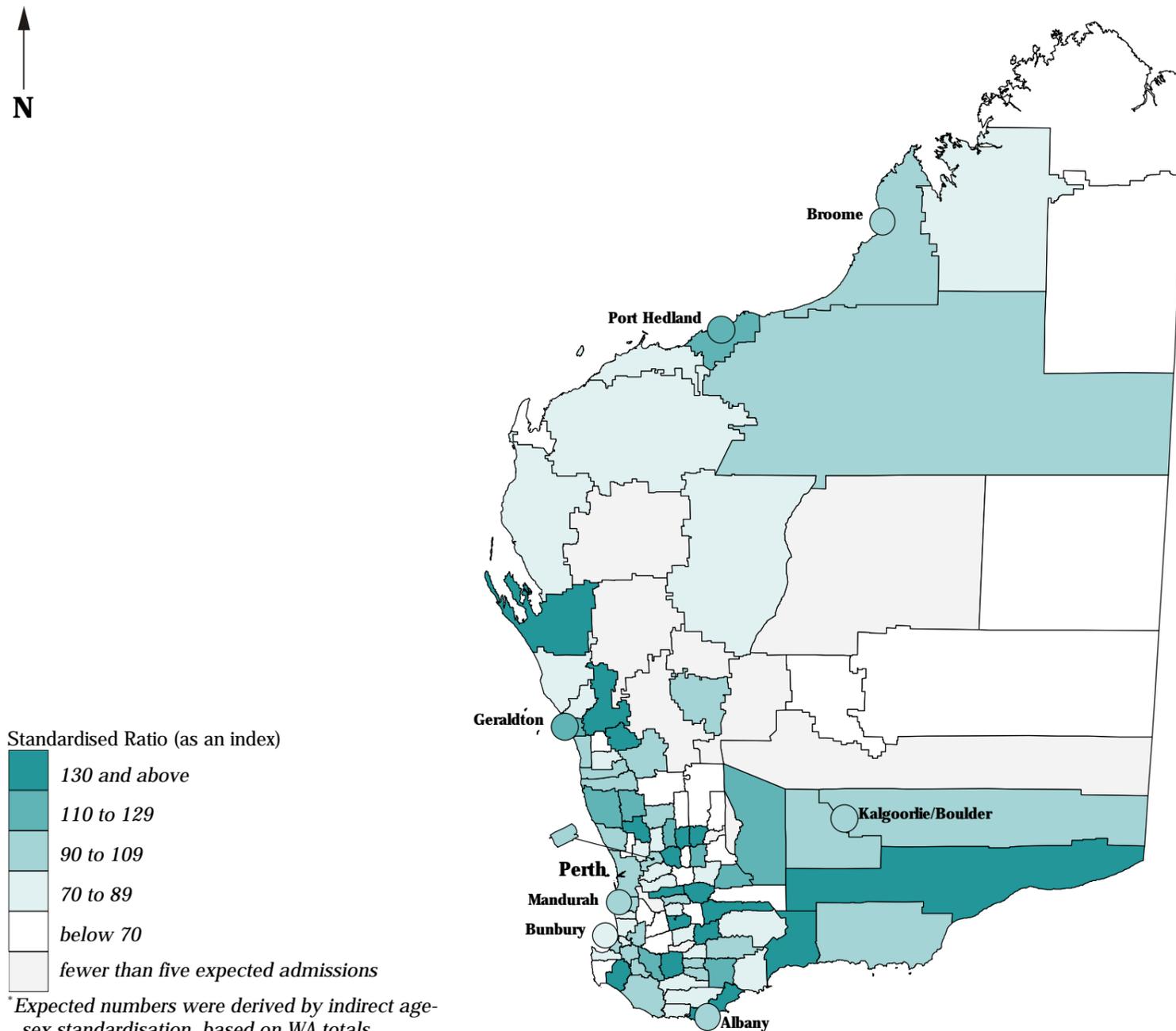
The largest numbers of admissions for cancer were of residents of the towns of Mandurah (562 admissions), Bunbury (279), Geraldton (275) and Albany (216). The SLAs of Kalgoorlie/Boulder, Busselton and Albany Shire all had more than 150 admissions.

There was no consistent evidence in the correlation analysis of an association at the SLA level in the non-metropolitan areas of Western Australia between admissions for cancer and socioeconomic status.

## Map 6.16

### Admissions for cancer, Western Australia, 1995/96

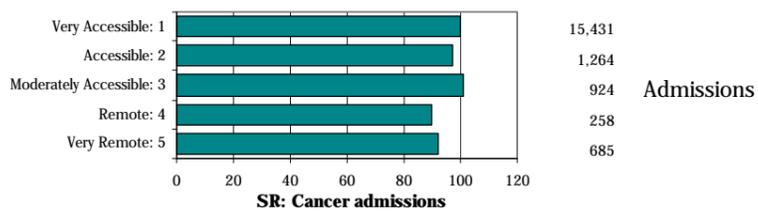
Standardised Ratio: number of admissions in each Statistical Local Area compared with the number expected\*



Source: See Data sources, Appendix 1.3

Details of map boundaries are in Appendix 1.2

### Accessibility/Remoteness Index of Australia



Standardised admission ratios (SARs) for cancer varied only marginally across the three 'accessible' ARIA categories, from an SAR of 101 in the Moderately Accessible areas to an SAR of 97 in the Accessible areas. Lower than expected ratios were recorded in the Remote (and SAR of 90) and Very Remote (92) categories. These two 'remote' categories had the smallest numbers of admissions.

Source: Calculated on ARIA classification, DHAC  
National Social Health Atlas Project, 1999

## Admissions for lung cancer, 1995/96

### Capital city comparison (Australia as the Standard)

Standardised admission ratios (SARs) for admissions for lung cancer (described below) varied between the capital cities, from a high of 121\*\* in **Brisbane** and **Adelaide**, to a very low 54\*\* in **Canberra**. **Sydney** (88\*\*) also had a relatively low standardised admission ratio (**Table 6.22**).

Between the two periods shown in **Table 6.22**, the ratios for **Brisbane** and **Darwin** fell, suggesting a decline (relative to the Australian rates) in admissions for these diseases. The increases evident for the ratios in **Perth** and **Sydney** suggest an increase (relative to the Australian rates) in admissions for lung cancer, although both ratios remain below the level expected from the Australian rates.

**Table 6.22: Admissions with a principal diagnosis of lung cancer, capital cities**  
*Age-sex standardised admission ratios*

	Sydney	Melbourne	Brisbane	Adelaide	Perth	Hobart	Darwin	Canberra <sup>1</sup>	All capitals
1995/96 <sup>2</sup>	88**	99	121**	121**	89**	95	100	54**	98
1989 <sup>3</sup>	82**	..	154**	119**	77**	..	162**	..	100

<sup>1</sup>Includes Queanbeyan (C)

<sup>2</sup>Includes admissions to public acute hospitals and private hospitals, including admissions of same day patients

<sup>3</sup>Excludes same day admissions: for Sydney the period is 1989/90 and for Darwin it is 1987

Source: See *Data sources*, Appendix 1.3

Statistical significance: \* significance at 5 per cent; \*\* significance at 1 per cent

Hospital admissions for lung cancer, which includes cancers of the trachea, bronchus and lung, accounted for 6.6 per cent of all admissions for cancer in 1995/96. However, lung cancer accounted for only 0.3 per cent of all admissions analysed for Western Australian residents.

As noted in the commentary to the map for all cancers (page 218), incidence rates for some cancers are higher among people from poorer areas. Esterman et al. (1990) estimated the differential for lung cancer in the poorest areas compared with the most affluent areas to be approximately fifty per cent, that is the highest of all the cancers studied. In both SA and the NT, a higher than expected incidence of lung cancer has been observed among Indigenous people (ABS/AIHW 1999).

### Perth<sup>5</sup> (Western Australia as the Standard)

There were 903 admissions of residents of **Perth** for lung cancer, the number expected from the Western Australian rates (an SAR of 100). Males accounted for almost three quarters (71.4 per cent) of these admissions.

SLAs with the highest standardised admission ratios were located in the south and south-east, north-east and western suburbs (**Map 6.17**).

Excluding SLAs with fewer than 20 admissions, the highest ratio was recorded in Belmont, with more than twice the number of admissions expected from the State rates (an SAR of 232\*\* and 61 admissions). Other SLAs with relatively high admission ratios were Gosnells (with an SAR of 147\*\*; 60), Rockingham (132\*; 62) and Stirling: Central (123\*; 112). Although not statistically significant, Armadale, Bayswater, Fremantle, Vincent and Cockburn also had SARs elevated by more than five per cent.

The lowest ratios were recorded in Canning (with an SAR of 63\*), Melville (63\*\*) and Kalamunda (79).

Only Stirling: Central, with 112 admissions, had more than 100 admissions for lung cancer. There were also 97 admissions of residents of Wanneroo for lung cancer, 62 from Rockingham, 61 from Belmont and 60 from Gosnells.

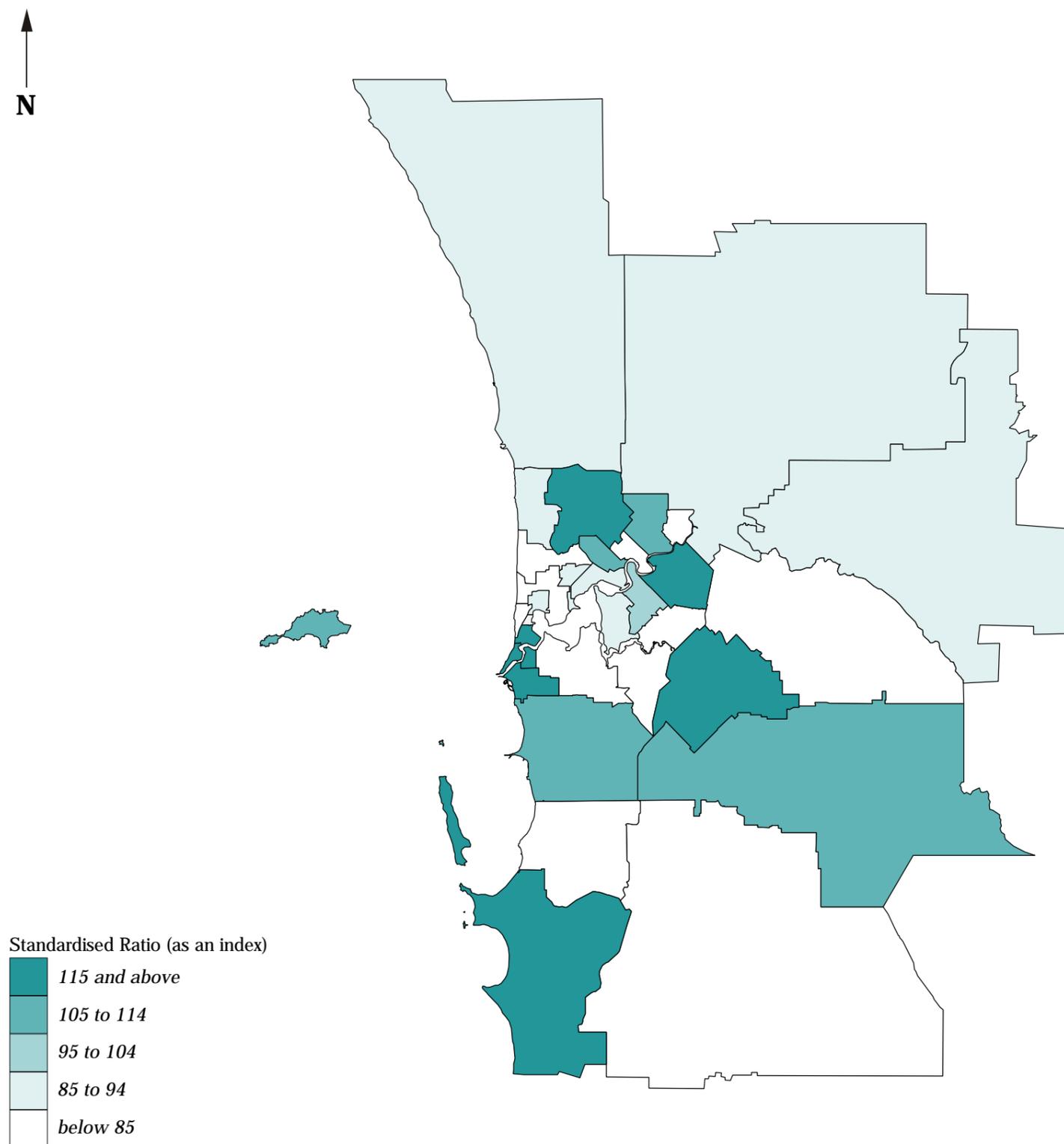
There was a correlation of meaningful significance at the SLA level with the variable for single parent families (0.59), and of lesser significance with housing authority rented dwellings (0.42) and low income families (0.40). The inverse correlation with the IRSD (-0.34) supports the existence of a weak relationship between high rates of admission for lung cancer and socioeconomic disadvantage.

<sup>5</sup>As there were relatively few areas with sufficient cases to analyse for this variable in the non-metropolitan areas of Western Australia, the data have not been mapped. A summary of the main features is on page 289.

## Map 6.17

### Admissions for lung cancer, Perth, 1995/96

Standardised Ratio: number of admissions in each Statistical Local Area compared with the number expected\*



\*Expected numbers were derived by indirect age-sex standardisation, based on WA totals

Source: See Data sources, Appendix 1.3

Details of map boundaries are in Appendix 1.2  
National Social Health Atlas Project, 1999

# Admissions of females aged 40 years and over for breast cancer, 1995/96

## Capital city comparison (Australia as the Standard)

Standardised admission ratios (SARs) for admissions of females aged 40 years and over from breast cancer were relatively uniform across the capital cities, with the exception of higher ratios in **Darwin** and **Melbourne** and lower ratios in **Hobart** and **Perth** (Table 6.23).

The SARs in **Sydney** have remained consistent for both periods shown in Table 6.23 and have declined in **Brisbane**, **Adelaide**, **Perth** and **Darwin** (where, despite a substantial decline, the ratio remains well above the level expected). The lower ratios in the later period suggest a decline (relative to the Australian rates) in admissions for these diseases.

**Table 6.23: Admissions of females aged 40 years and over<sup>1</sup> with a principal diagnosis of breast cancer, capital cities**  
*Age-sex standardised admission ratios*

	Sydney	Melbourne	Brisbane	Adelaide	Perth	Hobart	Darwin	Canberra <sup>2</sup>	All capitals
1995/96 <sup>3</sup>	97	125**	93*	94*	81**	71**	129	90	102
1989 <sup>4</sup>	96	..	108*	102	87**	..	182**	..	98

<sup>1</sup>Data for '1989' is of females of all ages

<sup>2</sup>Includes Queanbeyan (C)

<sup>3</sup>Includes admissions to public acute hospitals and private hospitals, including admissions of same day patients

<sup>4</sup>Excludes same day admissions: for Sydney the period is 1989/90 and for Darwin it is 1987

Source: See *Data sources*, Appendix 1.3

Statistical significance: \* significance at 5 per cent; \*\* significance at 1 per cent

Breast cancer is the most common cancer notified for females in Western Australia. Incidence rates for some cancers are higher among people from the most affluent areas (Esterman et al. 1990).

In 1995/96, hospital admissions for breast cancer accounted for 0.3 per cent of all admissions analysed and 6.2 per cent of admissions for cancer of Western Australian residents.

The data mapped are for females aged 40 years and older, as very few females at younger ages are admitted to hospital for this disease.

## Perth<sup>6</sup> (Western Australia as the Standard)

There were 823 admissions for cancer of the female breast recorded for female residents of **Perth** aged 40 years and over in 1995/96, three per cent more admissions than expected from the State rates (an SAR of 103).

SLAs with high ratios for breast cancer were concentrated in three main locations: one comprising small SLAs in the vicinity of Fremantle, another extending from Cockburn eastwards through Canning, Gosnells and into Armadale; and the third located on the north bank of the Swan River, to the west of the city centre (Map 6.18).

Twelve SLAs in **Perth** had standardised admission ratios for breast cancer elevated by 15 per cent or more, although in two of these (Peppermint Grove and East Fremantle) fewer than five admissions were expected. The highest ratios were in Rockingham (with an SAR of 143\*\* and 52 admissions), Cockburn (139\* and 42 admissions), Kalamunda (139\* and 41 admissions) and Gosnells (132\* and 52 admissions). Relatively high ratios were also recorded in Nedlands (128), Bayswater (123), Fremantle (122) and Armadale (118).

Excluding SLAs where fewer than five admissions were expected (based on the number and age of women in the SLA, in relation to the State rates), the lowest ratios were recorded for females residents in Swan (with an SAR of 66 and 21 admissions), Canning (77 and 35 admissions) and South Perth (82 and 21 admissions).

There were 104 admissions of residents of the large northern Wanneroo SLA, and more than 50 admissions from each of Stirling: Central (74 admissions), Melville (70) and Rockingham and Gosnells (both with 52 admissions).

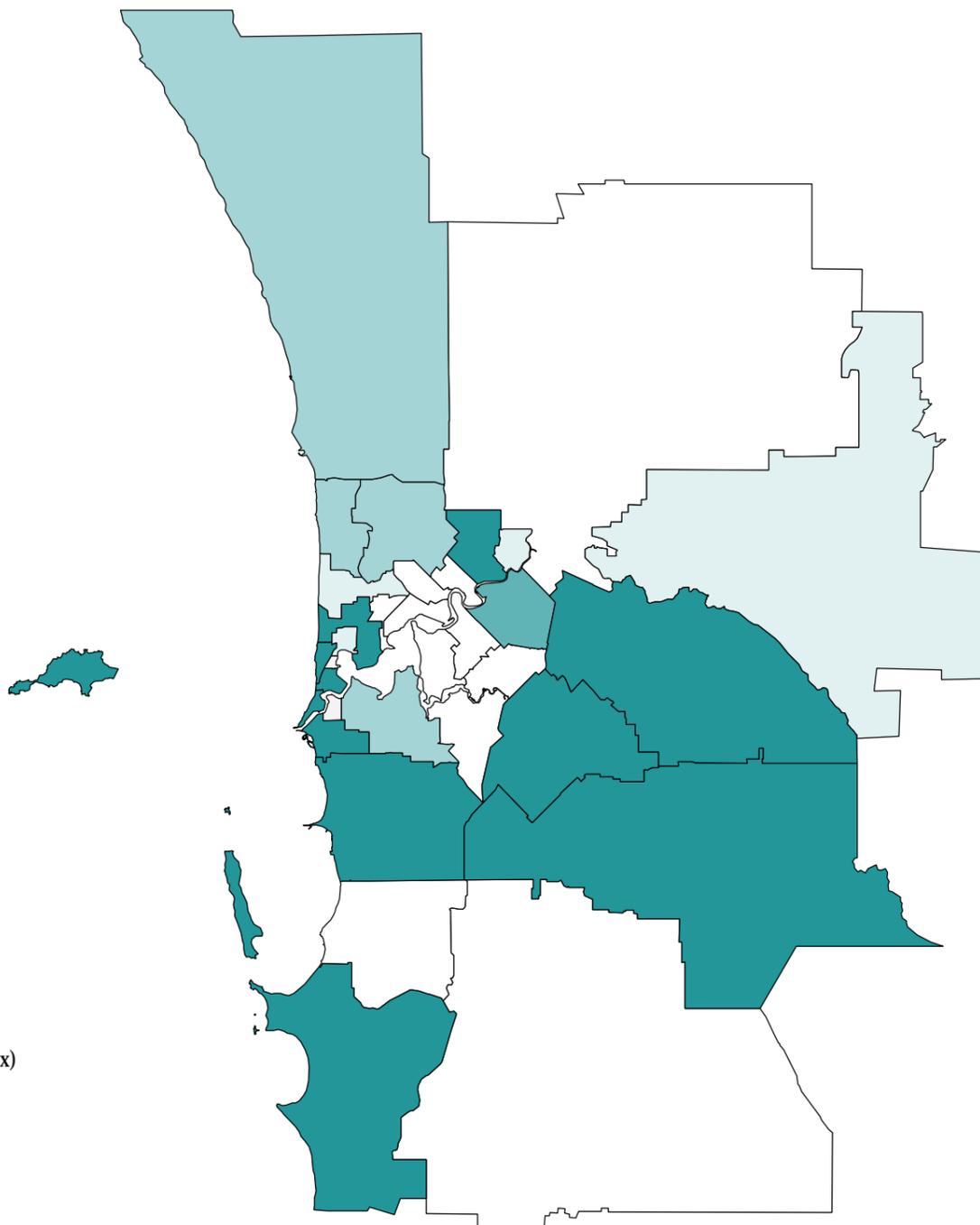
There were weak correlations with the variables for high income families, managers and administrators, and professionals, and the IRSD, and similarly weak inverse correlations with low income families, unskilled and semi-skilled workers and unemployment. These results suggest the existence of an association at the SLA level between high rates of admission of females for breast cancer and high socioeconomic status.

<sup>6</sup>As there were relatively few areas with sufficient cases to analyse for this variable in the non-metropolitan areas of Western Australia, the data have not been mapped. A summary of the main features is on page 290.

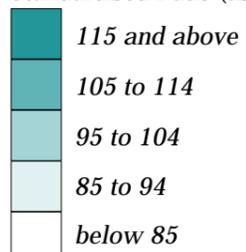
### Map 6.18

## Admissions of females aged 40 years and over for breast cancer, Perth, 1995/96

Standardised Ratio: number of admissions in each Statistical Local Area compared with the number expected\*



Standardised Ratio (as an index)



\*Expected numbers were derived by indirect age standardisation, based on WA totals

Source: See Data sources, Appendix 1.3

Details of map boundaries are in Appendix 1.2  
National Social Health Atlas Project, 1999

# Admissions for psychosis, 1995/96

## Capital city comparison (Australia as the Standard)

Standardised admission ratios (SARs) for admissions for psychosis (described below) varied widely between the capital cities (Table 6.24). **Brisbane** and **Adelaide** (each with an SAR of 139\*\*) had highly elevated SARs, with a ratio of less than half of this level in **Canberra** (64\*\*). The SARs in **Melbourne** and **Darwin** (both 83\*\*) were also much lower than the *All capitals* rate of 110\*\*.

**Table 6.24 Admissions<sup>1</sup> with a principal diagnosis of psychosis, capital cities, 1995/96**  
*Age-sex standardised admission ratios*

Sydney	Melbourne	Brisbane	Adelaide	Perth	Hobart	Darwin	Canberra <sup>2</sup>	All capitals
114**	83**	139**	139**	119**	112**	83**	64**	110**

<sup>1</sup>Includes admissions to public acute hospitals and private hospitals, including admissions of same day patients

<sup>2</sup>Includes Queanbeyan (C)

Source: See *Data sources*, Appendix 1.3

Statistical significance: \* significance at 5 per cent; \*\* significance at 1 per cent

Mental illness is a major cause of disability, particularly among the high risk groups of people who are unemployed, alcoholic, homeless, and others suffering a major life loss such as divorce, or death of a close friend or family member.

Mental disorder is classified as being psychosis, neurotic, personality or other mental disorder, or mental retardation. The variable mapped opposite is of people diagnosed with psychosis. Psychosis is a major mental disorder in which a person's ability to think, respond emotionally, remember, communicate, interpret reality and behave appropriately is impaired and insight is usually absent. It includes people exhibiting a range of behaviours, from violent behaviour, to hallucination, to those who are withdrawn and immobile, schizophrenia is included in this category.

In this, and the following map, admissions analysed include inpatients with the appropriate disease code as a principal diagnosis in public acute hospitals and private acute and psychiatric hospitals, regardless of whether they were in a specialist psychiatric unit within these hospitals.

Hospital admissions for psychosis accounted for 2.1 per cent of all admissions analysed for Western Australian residents, with similar proportions recorded for males (2.0 per cent and a rate of 430.2 per 100,000 population) and females (2.3 per cent and a rate of 606.5 per 100,000 population).

## Perth (Western Australia as the Standard)

There were 7,334 admissions of residents of **Perth** in 1995/96 for psychosis, nine per cent more admissions of residents of **Perth** than were expected from the State rates (an SAR of 109\*\*). Females accounted for 60.4 per cent of these admissions.

The spatial distribution of patient addresses for this illness can be affected by the location of hostels, boarding houses and shelters providing accommodation for people with a chronic psychiatric disability. These premises cater for people who may have several admissions in a year for mental disorders, including admissions to a public acute hospital. It is perhaps timely to reiterate that the data presented here are of the number of admissions, not the number of individuals. These admissions are also likely to include numbers of homeless people, including those who live largely 'on the street'.

There were highly elevated ratios of residents from Vincent (with an SAR of 416\*\* and 506 admissions), Bassendean (236\*\*), the City of Perth (194\*\*) and Cambridge and Shepperton (both with an SAR of 192\*\*). Relatively high ratios were also recorded in Kalamunda (189\*\*), East Fremantle (184\*\*), Stirling: Central (163\*\*) and Fremantle (160\*\*). SARs were elevated in a further eight metropolitan SLAs (Map 6.19).

The lowest ratios were in Claremont (with an SAR of 41\*\* and 23 admissions), Rockingham (43\*\*; 126 admissions), Serpentine-Jarrahdale (45\*\*; 21 admissions), Nedlands (51\*\*; 63 admissions), Wanneroo (56\*\*; 574 admissions) and Mundaring (57\*\*; 91 admissions).

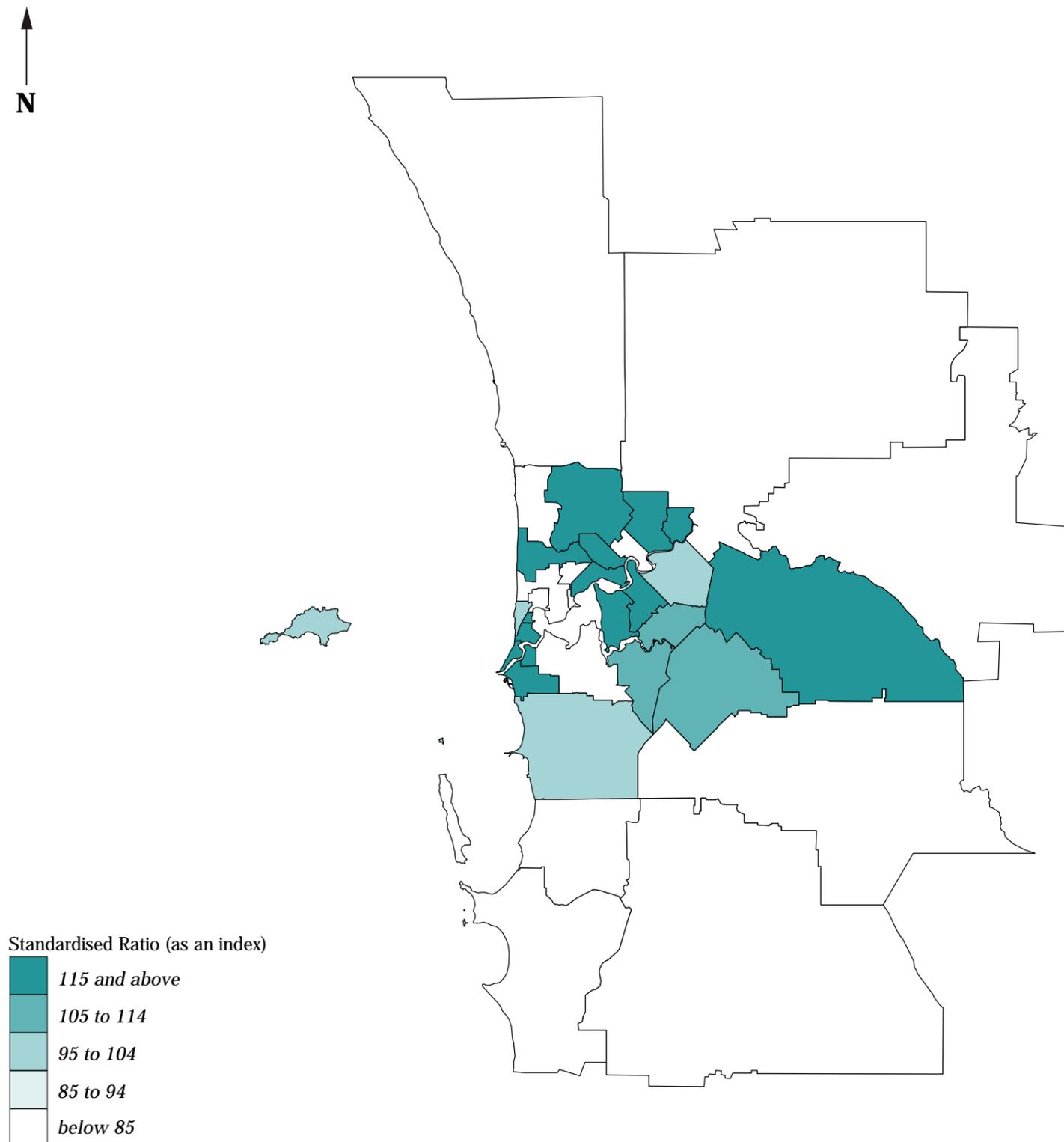
The largest numbers of admissions for psychosis were of residents from Stirling: Central (954 admissions), Wanneroo (574) and Vincent (506), Kalamunda (454), Gosnells (420) and Melville (417). No other SLA had more than 400 admissions.

There was no consistent evidence in the correlation analysis of an association at the SLA level between high rates of admission for psychosis and socioeconomic status.

## Map 6.19

### Admissions for psychosis, Perth, 1995/96

Standardised Ratio: number of admissions in each Statistical Local Area compared with the number expected\*



\*Expected numbers were derived by indirect age-sex standardisation, based on WA totals

Source: See Data sources, Appendix 1.3

Details of map boundaries are in Appendix 1.2  
National Social Health Atlas Project, 1999

## Admissions for psychosis, 1995/96

### State/Territory comparison (Australia as the Standard)

In all cases, there were relatively more admissions for psychosis of people who were residents of the capital cities than of the non-metropolitan areas, with the widest variations being in Tasmania, Queensland and Western Australia (**Table 6.25**). The SAR of 118\*\* in the non-metropolitan areas of South Australia was 40 per cent higher than the next highest SAR (in New South Wales).

**Table 6.25: Admissions<sup>1</sup> with a principal diagnosis of psychosis, State/Territory, 1995/96**  
*Age-sex standardised admission ratios*

	NSW	Vic	Qld	SA	WA	Tas	NT	ACT	Total
Capital city	114**	83**	139**	139**	119**	112**	83**	64**	110**
Other major urban centres <sup>2</sup>	89**	103	82**	..	..	..	..	..	88**
Rest of State/Territory	83**	70**	81**	118**	80**	69**	74**	- <sup>3</sup>	81**
Whole of State/Territory	103**	80**	108**	133**	109**	87**	79**	64**	100

<sup>1</sup>Includes admissions to public acute hospitals and private hospitals, including admissions of same day patients

<sup>2</sup>Includes Newcastle and Wollongong (NSW); Geelong (Vic); and Gold Coast-Tweed Heads and Townsville-Thuringowa (Qld)

<sup>3</sup>Data unreliable: included with ACT total

Source: See *Data sources*, Appendix 1.3

Statistical significance: \* significance at 5 per cent; \*\* significance at 1 per cent

### Rest of State (Western Australia as the Standard)

In 1995/96, there were 1,718 admissions for psychosis of residents of the non-metropolitan areas of Western Australia, 27 per cent fewer admissions than were expected from the State rates (an SAR of 73\*\*). There were similar numbers of admissions for females (851 admissions) and males (867).

Data for around thirty per cent of SLAs have not been mapped for this variable, as there were considered to be too few cases from which to calculate reliable rates (**Map 6.20**). As the overall number of admissions for this variable is particularly low, care should be taken to refer to the absolute numbers in Volume 6.1, as well as to the relative values.

Standardised admission ratios for psychosis were elevated by more than twice the expected levels in Jerramungup (with an SAR of 232\*\* and 15 admissions), Wyndham-East Kimberley (230\*\* and 65 admissions) and Goomalling (212\*\* and 11 admissions). Other highly elevated ratios were also recorded in Gnowangerup (195\*\*; 17 admissions), Derby-West Kimberley (187\*\*; 61 admissions), Morawa (174; nine admissions), Narembeen (169; nine admissions) and Broome (164\*\*; 70 admissions).

Excluding SLAs with fewer than 20 admissions, the lowest ratios were recorded for residents of Greenough (with an SAR of 46\*\*), Busselton (48\*\*) and Port Hedland and Manjimup (both 54\*\*).

Of the towns mapped, the highest ratios were recorded in Broome (an SAR of 164\*\*) and Albany (104). No other towns had more admissions than expected. The lowest ratios were in Port Hedland (an SAR of 54\*\*), Mandurah (67\*\*) and Geraldton (71\*\*).

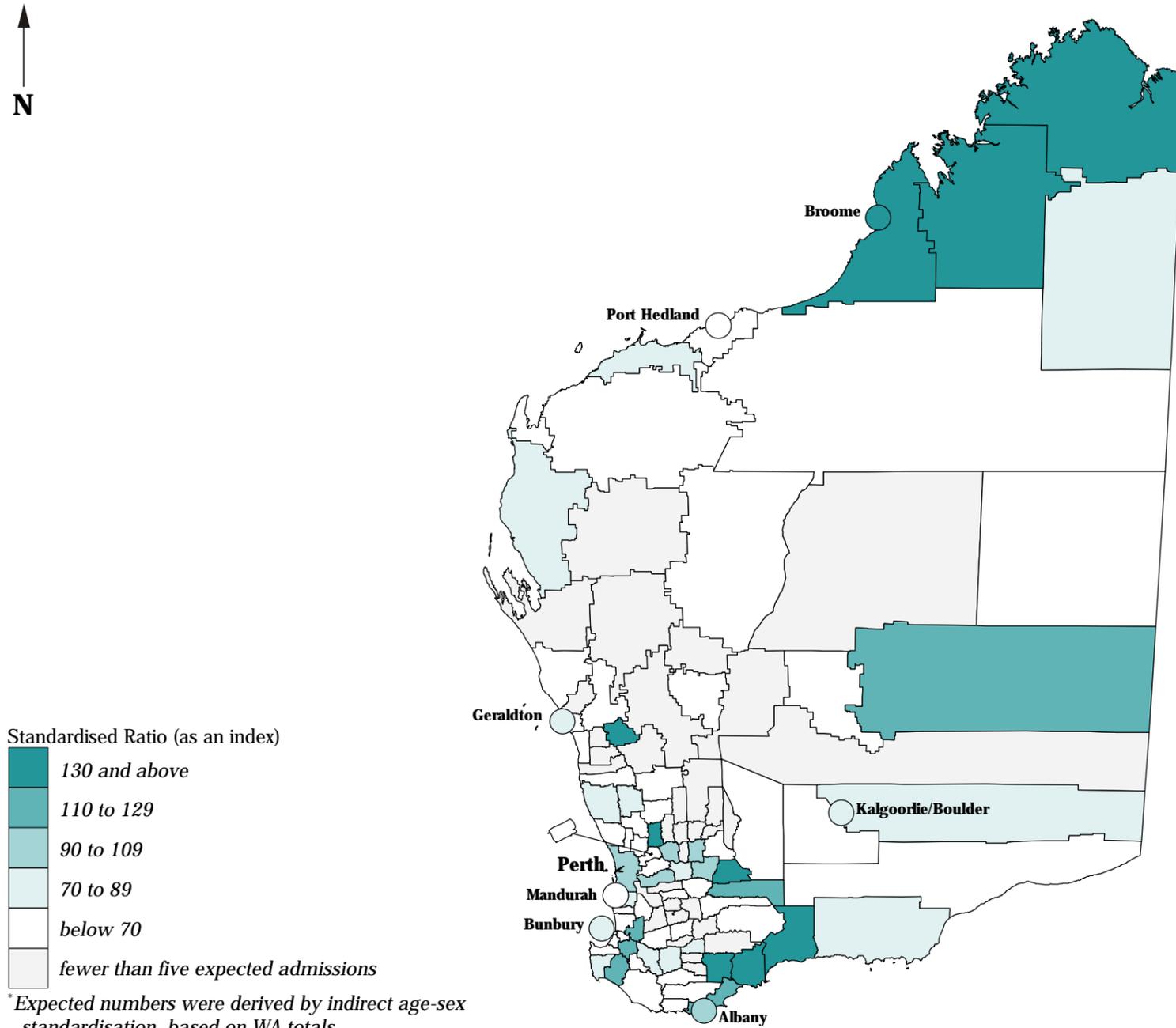
Only Mandurah (133 admissions), Bunbury (123) and Kalgoorlie/Boulder (121) had more than 100 admissions for psychosis.

The correlation analysis was not undertaken as there were too many SLAs with small numbers of cases.

## Map 6.20

### Admissions for psychosis, Western Australia, 1995/96

Standardised Ratio: number of admissions in each Statistical Local Area compared with the number expected\*



Standardised Ratio (as an index)

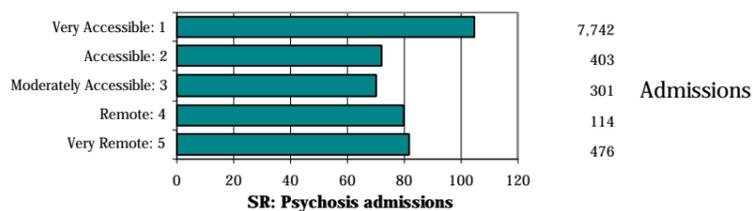
- 130 and above
- 110 to 129
- 90 to 109
- 70 to 89
- below 70
- fewer than five expected admissions

\*Expected numbers were derived by indirect age-sex standardisation, based on WA totals

Source: See Data sources, Appendix 1.3

Details of map boundaries are in Appendix 1.2

### Accessibility/Remoteness Index of Australia



Standardised admission ratios for psychosis dropped from an SAR of 105 in the Very Accessible category to lows of 70 in the Moderately Accessible and 72 in the Accessible categories, before increasing to ratios of 80 and 82 in the Remote and Very Remote categories, respectively. Although the numbers of admissions outside of the Very Accessible areas are quite low, those in the Very Remote areas are the second highest.

Source: Calculated on ARIA classification, DHAC  
National Social Health Atlas Project, 1999

# Admissions for neurotic, personality or other mental disorders, 1995/96

## Capital city comparison (Australia as the Standard)

As was the case for admissions for psychosis, standardised admission ratios (SARs) for admissions for neurotic, personality or other mental disorders (described below) varied widely between the capital cities (**Table 6.26**). The pattern of variation was, however, somewhat different, in particular the ratios in **Adelaide** and **Canberra** were substantially lower, whereas SARs in the other capital cities were substantially higher. **Sydney** (with an SAR of 140\*\*), **Hobart** (135\*\*), **Brisbane** (122\*\*) and **Perth** (103\*) all had elevated SARs, with a ratio of around one third this level in **Canberra** (44\*\*).

**Table 6.26: Admissions<sup>1</sup> with a principal diagnosis of neurotic, personality or other mental disorders, capital cities, 1995/96**  
*Age-sex standardised admission ratios*

Sydney	Melbourne	Brisbane	Adelaide	Perth	Hobart	Darwin	Canberra <sup>2</sup>	All capitals
140**	61**	122**	86**	103*	135**	59**	44**	103**

<sup>1</sup>Includes admissions to public acute hospitals and private hospitals, including admissions of same day patients

<sup>2</sup>Includes Queanbeyan (C)

Source: See *Data sources*, Appendix 1.3

Statistical significance: \* significance at 5 per cent; \*\* significance at 1 per cent

The introduction to the previous variable (psychosis) refers to the coverage of the data and other background information of relevance.

The variable under discussion here includes admissions of people diagnosed as having a neurotic, personality or other mental disorder. They are distinguished from those with psychosis (see page 226) by the fact that a neurosis arises as a result of stresses and anxieties in the person's environment. The most common are anxiety states, reactive depression and obsessive-compulsive disorders.

Females had a higher overall rate of admissions for neurotic personality or other mental disorders than did males (518.1 admissions per 100,000 population compared with 460.8) and higher rates at almost all ages, in particular from 10 through to 34 years of age. Admissions to hospital for neurotic, personality or other mental disorders accounted for 2.0 per cent of all the admissions analysed for Western Australian residents (2.1 per cent of admissions for residents of **Perth**).

## Perth (Western Australia as the Standard)

There were 6,143 admissions of residents of **Perth** for neurotic, personality or other mental disorders, two per cent fewer than expected from the State rates (an SAR of 98). There were almost equal proportions of females (51.3 per cent) and males (48.7 per cent) for this variable.

The distribution of SLAs with high ratios for these disorders is essentially linear, extending from the Bassendean and Belmont area into Vincent and the City of Perth, and then west along the north bank of the Swan River to Cambridge, Claremont, Fremantle and Cockburn (**Map 6.21**).

Almost half (45.2 per cent) of the SLAs in **Perth** had elevated ratios for admissions for neurotic, personality or other mental disorders. The highest ratio was in Vincent, with nearly four times more admissions than expected from the State rates (with an SAR of 379\*\* and 404 admissions). Relatively high ratios were also recorded for residents of Stirling: South-Eastern (with an SAR of 204\*\*), Bassendean (186\*\*), Claremont (184\*\*) and Cambridge (162\*\*). In Cockburn, Stirling: Central, Belmont, Shepperton, the City of Perth and Fremantle, ratios were elevated by between 20 per cent and 30 per cent.

The lowest ratios were in Kalamunda (with an SAR of 49\*\*), Canning (51\*\*), Kwinana (64\*\*) and East Fremantle (68).

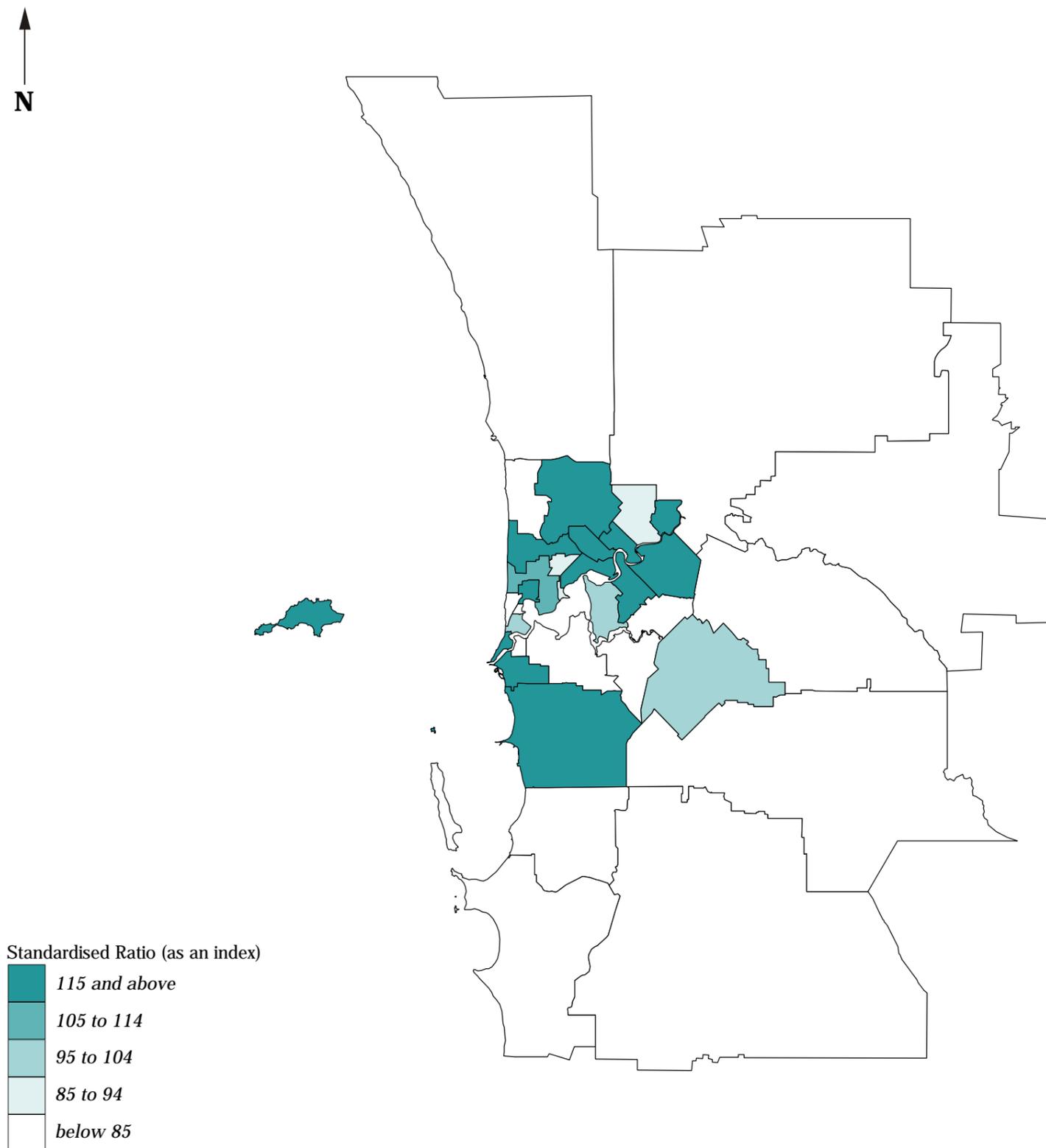
In 1995/96, the largest numbers of admissions for neurotic, personality or other mental disorders were recorded for residents of Wanneroo (796 admissions), Stirling: Central (639), Vincent (404), Gosnells (374) and Cockburn and Melville (both 333).

There was no consistent evidence in the correlation analysis of an association at the SLA level in the non-metropolitan areas of Western Australia between admissions for neurotic, personality or other mental disorders and socioeconomic status.

## Map 6.21

### Admissions for neurotic, personality or other mental disorders, Perth, 1995/96

Standardised Ratio: number of admissions in each Statistical Local Area compared with the number expected\*



\*Expected numbers were derived by indirect age-sex standardisation, based on WA totals

Source: See Data sources, Appendix 1.3

Details of map boundaries are in Appendix 1.2  
National Social Health Atlas Project, 1999

# Admissions for neurotic, personality or other mental disorders, 1995/96

## State/Territory comparison (Australia as the Standard)

There was no consistent pattern for admissions for neurotic, personality or other mental disorders (described below) in the standardised admission ratios (SARs) between residents of the capital cities and of the non-metropolitan areas (Table 6.27). In New South Wales, Queensland and Tasmania capital city ratios were higher, with the reverse applying in South Australia, Western Australia, Victoria and the Northern Territory.

**Table 6.27: Admissions<sup>1</sup> with a principal diagnosis of neurotic, personality or other mental disorders, State/Territory, 1995/96**  
*Age-sex standardised admission ratios*

	NSW	Vic	Qld	SA	WA	Tas	NT	ACT	Total
Capital city	140**	61**	122**	86**	103*	135**	59**	44**	103**
Other major urban centres <sup>2</sup>	81**	60**	84**	..	..	..	..	..	80**
Rest of State/Territory	104**	70**	107**	130**	112**	79**	67**	- <sup>3</sup>	98**
Whole of State/Territory	124**	63**	111**	98	105**	102	64**	42**	100

<sup>1</sup>Includes admissions to public acute hospitals and private hospitals, including admissions of same day patients

<sup>2</sup>Includes Newcastle and Wollongong (NSW); Geelong (Vic); and Gold Coast-Tweed Heads and Townsville-Thuringowa (Qld)

<sup>3</sup>Data unreliable: included with ACT total

Source: See *Data sources*, Appendix 1.3

Statistical significance: \* significance at 5 per cent; \*\* significance at 1 per cent

## Rest of State (Western Australia as the Standard)

There were 2,408 admissions for neurotic, personality or other mental disorders of residents of the non-metropolitan areas of Western Australia, six per cent more than expected from the State rates (an SAR of 106\*\*). Females accounted for 56.2 per cent of the admissions.

Elevated SARs for neurotic, personality or other mental disorders were recorded in almost half (45 per cent) of SLAs (excluding SLAs with fewer than five expected admissions) (Map 6.22). Ratios elevated by more than twice the level expected from the State rates were recorded in Pingelly (an SAR of 288\*\* and 16 admissions), Gnowangerup (257\*\*; 22 admissions), Kojonup (210\*\*; 23 admissions) and Carnarvon (206\*\*; 66 admissions). Ratios elevated by more than 50 per cent were recorded in a further 13 SLAs. Among these SLAs, the highest ratios were in Moora (an SAR of 196\*\*; 26 admissions), Merredin (194\*\*; 34 admissions), Ravensthorpe (187; 13 admissions), the town of Northam (186\*\*; 58 admissions), Narrogin (177\*\*; 40 admissions), Laverton (176; 16 admissions) and Wyndham-East Kimberley (175\*\*; 55 admissions).

Excluding SLAs with fewer than 20 admissions, the lowest ratios for neurotic, personality or other mental disorders were in East Pilbara (with an SAR of 49\*\*), Harvey (56\*\*), Busselton (57\*\*), Bunbury (65\*\*) and Dardanup (65).

SARs for neurotic, personality or other mental disorders were elevated in all but two of the towns mapped. The most highly elevated ratios were in Geraldton (an SAR of 168\*\*), Broome (131\*) and Kalgoorlie/Boulder (123\*\*). The lowest ratios were recorded for residents from Bunbury (65\*\*) and Mandurah (96).

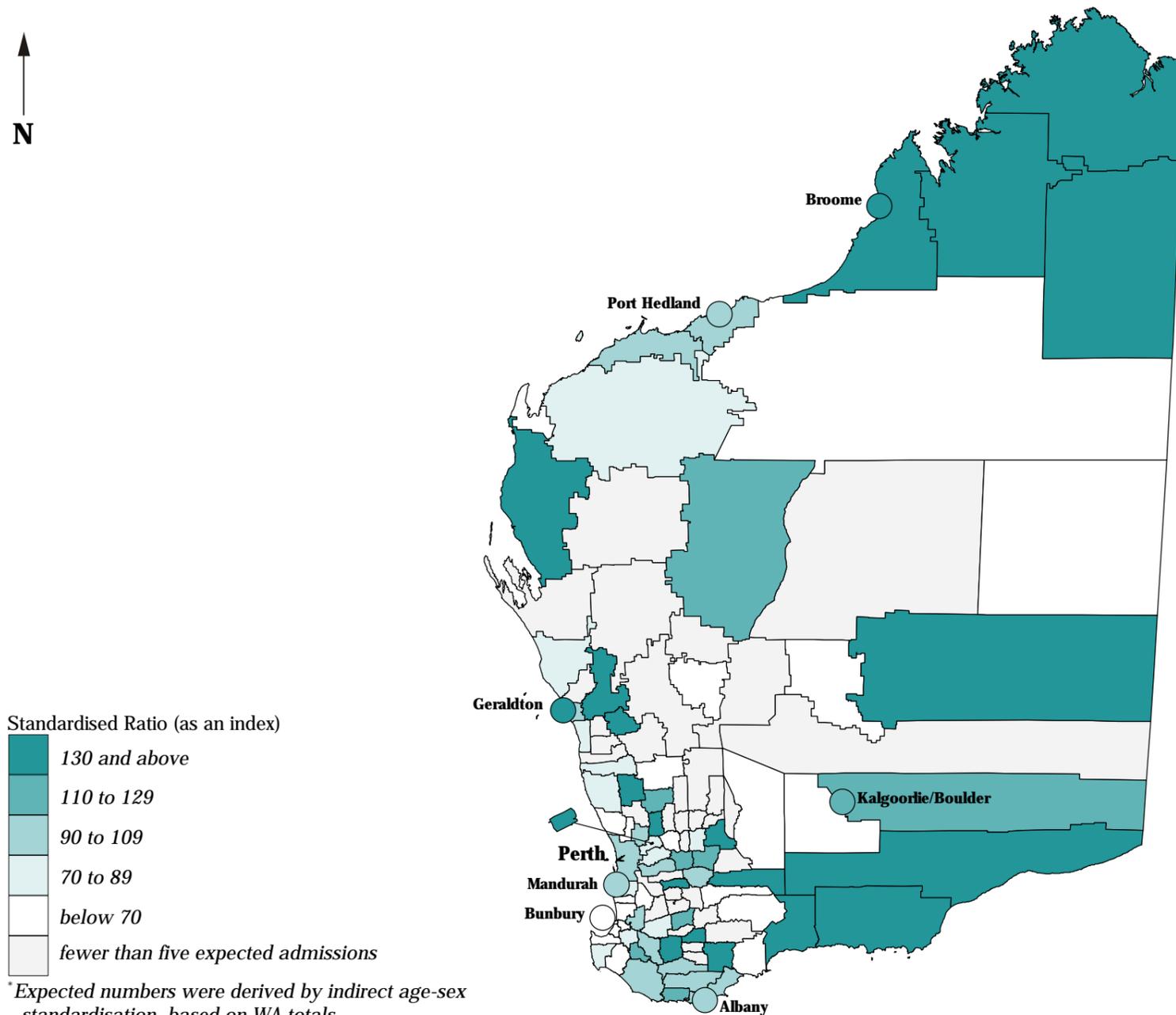
The largest numbers of admissions in 1995/96 were of residents of Kalgoorlie/Boulder (180 admissions), Geraldton (174) and Mandurah (170), Esperance (97), Bunbury (89), the town of Albany (78) and Roebourne (77).

The correlation analysis was not undertaken as there were too many SLAs with small numbers of cases.

### Map 6.22

## Admissions for neurotic, personality or other mental disorders, Western Australia, 1995/96

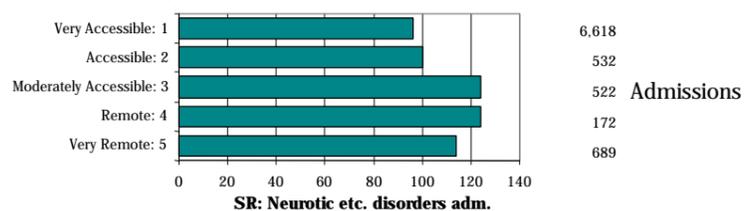
Standardised Ratio: number of admissions in each Statistical Local Area compared with the number expected\*



Source: See Data sources, Appendix 1.3

Details of map boundaries are in Appendix 1.2

### Accessibility/Remoteness Index of Australia



Standardised admission ratios for neurotic, personality or other mental disorders show two distinct patterns across the ARIA categories. The first includes the Very Accessible (with a near expected ratios, an SAR of 96) and Accessible (100) areas and the second includes the Moderately Accessible and Remote areas (both with an elevated ratio of 124) and the Very Remote areas (with a lower ratio of 114).

Source: Calculated on ARIA classification, DHAC National Social Health Atlas Project, 1999

# Admissions for circulatory system diseases, 1995/96

## Capital city comparison (Australia as the Standard)

Standardised admission ratios (SARs) for admissions for diseases of the circulatory system (described below) varied little between the capital cities, with the exception of relatively low ratios in **Canberra** (80\*\*) and **Perth** (84\*\*) (Table 6.28).

Both **Brisbane** and **Perth** had lower ratios in the later period shown in Table 6.28, suggesting a decline (relative to the Australian rates) in admissions for these diseases. The SARs in **Sydney** and **Darwin** increased, suggesting an increase (relative to the Australian rates) in admissions over this period.

**Table 6.28: Admissions with a principal diagnosis of circulatory system diseases, capital cities**  
*Age-sex standardised admission ratios*

	Sydney	Melbourne	Brisbane	Adelaide	Perth	Hobart	Darwin	Canberra <sup>1</sup>	All capitals
1995/96 <sup>2</sup>	99**	94**	92**	102**	84**	97*	94	80**	95**
1989 <sup>3</sup>	88**	..	104**	102**	91**	..	60**	..	93**

<sup>1</sup>Includes Queanbeyan (C)

<sup>2</sup>Includes admissions to public acute hospitals and private hospitals, including admissions of same day patients

<sup>3</sup>Excludes same day admissions: for Sydney the period is 1989/90 and for Darwin it is 1987

Source: See *Data sources*, Appendix 1.3

Statistical significance: \* significance at 5 per cent; \*\* significance at 1 per cent

Admissions for circulatory system diseases in Western Australia accounted for 7.7 per cent of admissions in this analysis. They include admissions for ischaemic heart disease, other forms of heart disease and cerebrovascular disease.

Admission rates from these causes are affected by age and sex, socioeconomic status, race and country of birth. Esterman et al. (1990) report that in **Adelaide**, there was a pronounced upward gradient in admission rates for all circulatory system diseases with lowering income status. Residents of the poorest areas had a rate 34 per cent higher than for the wealthiest areas. The corresponding elevation was 47 per cent for ischaemic heart disease, 15 per cent for stroke and 143 per cent for hypertension.

For 1996/97, age-standardised admission ratios for Indigenous men for diseases of the circulatory system were 1.7 times higher, and for Indigenous women, twice the admission ratios for non-Indigenous people (ABS/AIHW 1999).

## Perth (Western Australia as the Standard)

There were 22,900 admissions for circulatory system diseases of residents of **Perth** in 1995/96, five per cent fewer admissions than were expected from the State rates (an SAR of 95\*\*). Males accounted for over half (56.9 per cent) of the admissions.

The spatial distribution of standardised admission ratios shows that the highest ratios were concentrated in a group of southern SLAs, and the lowest ratios were generally located in higher socioeconomic status SLAs (Map 6.23).

Only nine of the SLAs in **Perth** had elevated ratios for circulatory system diseases. The most highly elevated ratio was in Cockburn (with an SAR of 145\*\*), with 45 per cent more admissions than expected from the State rates. Ratios elevated by more than ten per cent were also recorded in Kwinana (with an SAR of 122\*\*), Gosnells (120\*\*), Vincent (116\*\*) and Rockingham (114\*\*).

The lowest ratios were in Stirling: South-Eastern (with an SAR of 42\*\*), the City of Perth (62\*\*) and Claremont and Nedlands (both 70\*\*). Cottesloe, Stirling: West, Serpentine-Jarrahdale, Melville, Canning and Cambridge also had low ratios, of between 75 and 82.

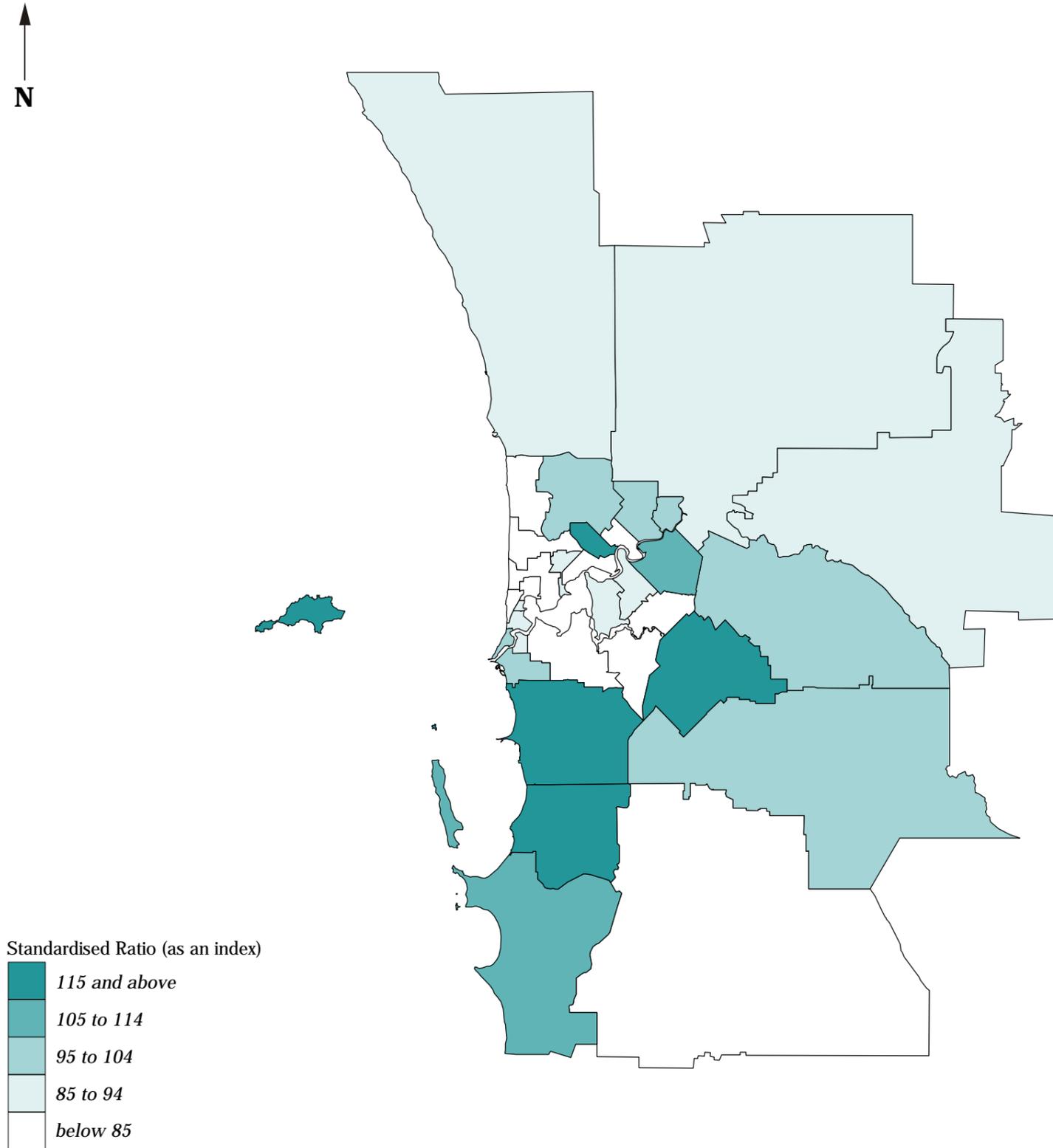
The largest numbers of admissions were of residents of Wanneroo (2,692 admissions) and Stirling: Central (2,450), with more than 1,000 admissions from each of Melville, Gosnells, Rockingham, Cockburn and Stirling: West.

There were correlations of meaningful significance with the variables for unskilled and semi-skilled workers (0.67), early school leavers (0.60) and the Indigenous population (0.55). Inverse correlations were recorded with the variables for managers and administrators, and professionals (-0.61), female labour force participation (-0.59) and high income families (-0.53). These results, together with the inverse correlation of meaningful significance with the IRSD (-0.57), indicate the existence of an association at the SLA level between high rates of admission for circulatory system diseases and socioeconomic disadvantage.

### Map 6.23

## Admissions for circulatory system diseases, Perth, 1995/96

Standardised Ratio: number of admissions in each Statistical Local Area compared with the number expected\*



\*Expected numbers were derived by indirect age-sex standardisation, based on WA totals

Source: See Data sources, Appendix 1.3

Details of map boundaries are in Appendix 1.2  
National Social Health Atlas Project, 1999

## Admissions for circulatory system diseases, 1995/96

### State/Territory comparison (Australia as the Standard)

Standardised admission ratios (SARs) for admissions for diseases of the circulatory system (described on the previous text page) of residents of the non-metropolitan areas were, with the exception of Tasmania (with an SAR of 95\*\*), relatively uniform across the States and Territories (**Table 6.29**). The most highly elevated ratios were in New South Wales (116\*\*), South Australia (115\*\*) and Victoria (113\*\*).

There was relatively little change in the ratios for the non-metropolitan areas between the periods shown in **Table 6.29** with the greatest change being the decrease shown for Western Australia.

**Table 6.29: Admissions with a principal diagnosis of circulatory system diseases, State/Territory**  
*Age-sex standardised admission ratios*

	NSW	Vic	Qld	SA	WA	Tas	NT	ACT	Total
<b>1995/96<sup>1</sup></b>									
Capital city	99**	94**	92**	102**	84**	97*	94	80**	95**
Other major urban centres <sup>2</sup>	97**	91**	99	..	..	..	..	.. <sup>3</sup>	97**
Rest of State/Territory	116**	113**	106**	115**	103**	95**	108**	..	111**
Whole of State/Territory	104**	100	98**	105**	89**	96**	101	78**	100
<b>1989<sup>4</sup></b>									
Rest of State/Territory	118**	..	110**	117**	113**	..	102	..	115**

<sup>1</sup>Includes admissions to public acute hospitals and private hospitals, including admissions of same day patients

<sup>2</sup>Includes Newcastle and Wollongong (NSW); Geelong (Vic); and Gold Coast-Tweed Heads and Townsville-Thuringowa (Qld)

<sup>3</sup>Data unreliable: included with ACT total

<sup>4</sup>Excludes same day admissions: for New South Wales the period is 1989/90 and for Northern Territory it is 1987

Source: See *Data sources*, Appendix 1.3

Statistical significance: \* significance at 5 per cent; \*\* significance at 1 per cent

### Rest of State (Western Australia as the Standard)

There were 9,525 admissions of residents of the non-metropolitan areas of Western Australia for circulatory system diseases in 1995/96, 16 per cent more than expected from the State rates (an SAR of 116\*\*). Males accounted for 58.1 per cent of these admissions.

SLAs with elevated standardised admission ratios were scattered throughout the State (**Map 6.24**); many of these SLAs had relatively large populations of Indigenous people.

Ratios were elevated by more than twice the expected levels in Meekatharra (an SAR of 224\*\* and 51 admissions), Narrogin Shire (223\*\*; 20 admissions) and Mount Marshall (221\*\*; 26 admissions), and elevated by more than 90 per cent in Ravensthorpe (197\*\*; 51 admissions), Narembeen (196\*\*; 37 admissions), Halls Creek (194\*\*; 57 admissions), Morawa (192\*\*; 34 admissions) and Trayning (191\*\*; 22 admissions). Similarly high ratios were also recorded in Dundas (with an SAR of 182\*\*) and Derby-West Kimberley (181\*\*).

Excluding SLAs where fewer than five admissions were expected from the State rates, the lowest ratios were in Gingin (with an SAR of 56\*\*), Murray (75\*\*), Toodyay (81), Dardanup (86) and Greenough, Roebourne and Chittering (all 87).

Of the towns mapped, only Geraldton (with an SAR of 98) and Mandurah (97) had fewer admissions for circulatory system diseases than expected from the State rates. The highest ratios were in Broome (with an SAR of 171\*\*), Kalgoorlie/Boulder (151\*\*), Port Hedland (147\*\*) and Bunbury (116\*\*).

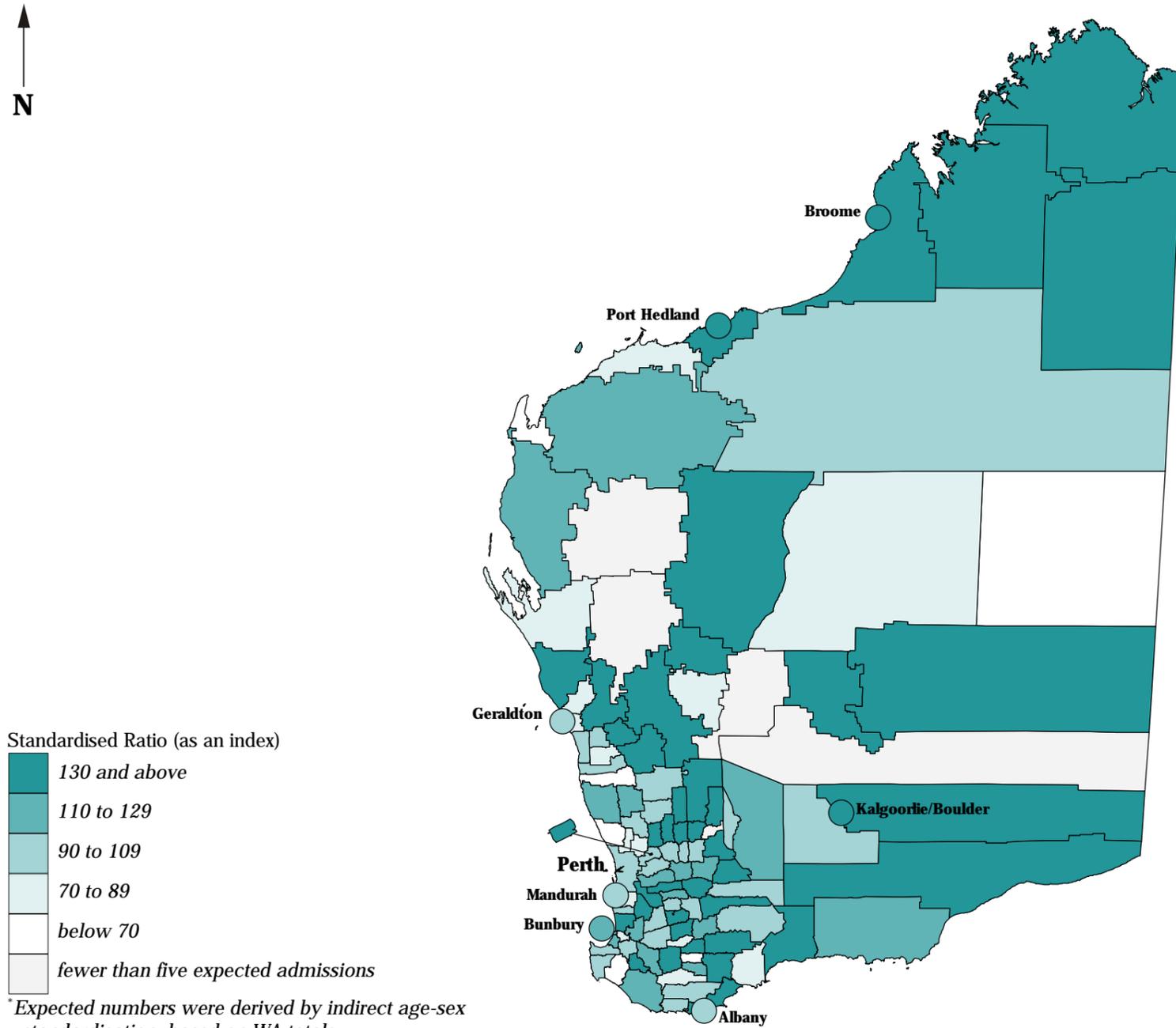
The largest numbers of admissions for circulatory system diseases in the non-metropolitan areas of Western Australia were recorded in the towns of Mandurah (947 admissions), Bunbury (667), Kalgoorlie/Boulder (517), Busselton (458) and Albany (400).

There was no consistent evidence in the correlation analysis of an association at the SLA level in the non-metropolitan areas of Western Australia between admissions for circulatory system diseases and socioeconomic status.

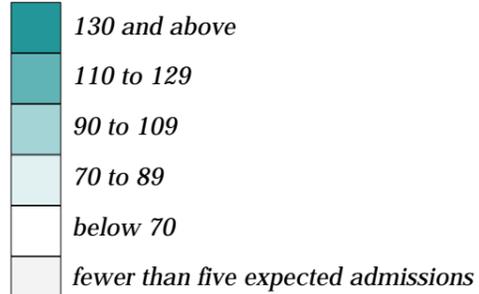
## Map 6.24

### Admissions for circulatory system diseases, Western Australia, 1995/96

Standardised Ratio: number of admissions in each Statistical Local Area compared with the number expected\*



Standardised Ratio (as an index)

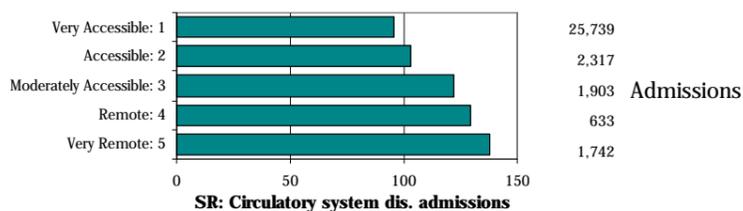


\*Expected numbers were derived by indirect age-sex standardisation, based on WA totals

Source: See Data sources, Appendix 1.3

Details of map boundaries are in Appendix 1.2

### Accessibility/Remoteness Index of Australia



Standardised admission ratios for circulatory system diseases are just below the level expected from the State rates in the Very Accessible ARIA category (with an SAR of 96) and just above in the Accessible areas (103). The other ARIA categories all have more highly elevated ratios, rising through SARs of 122 and 129 and 112 in the Moderately Accessible and Remote areas to an SAR of 138 in the Very Remote category.

Source: Calculated on ARIA classification, DHAC  
National Social Health Atlas Project, 1999

# Admissions for ischaemic heart disease, 1995/96

## Capital city comparison (Australia as the Standard)

Standardised admission ratios (SARs) for admissions for ischaemic heart disease (described below) varied over a relatively narrow range, from the highest ratio in **Hobart** (105<sup>\*</sup>) to the lowest in **Perth** (86<sup>\*\*</sup>) (**Table 6.30**).

**Brisbane**, **Adelaide** and **Perth** each had lower ratios in the later period shown in **Table 6.30**, suggesting a decline (relative to the Australian rates) in admissions for this disease. The SARs in **Sydney** and **Darwin** increased, suggesting an increase (relative to the Australian rates) in admissions for ischaemic heart disease over this period.

**Table 6.30: Admissions with a principal diagnosis of ischaemic heart disease, capital cities**

	<i>Age-sex standardised admission ratios</i>								
	Sydney	Melbourne	Brisbane	Adelaide	Perth	Hobart	Darwin	Canberra <sup>1</sup>	All capitals
1995/96 <sup>2</sup>	103 <sup>**</sup>	93 <sup>**</sup>	93 <sup>**</sup>	98 <sup>*</sup>	86 <sup>**</sup>	105 <sup>*</sup>	87 <sup>*</sup>	91 <sup>**</sup>	96 <sup>**</sup>
1989 <sup>3</sup>	95 <sup>**</sup>	..	105 <sup>**</sup>	106 <sup>**</sup>	90 <sup>**</sup>	..	44 <sup>**</sup>	..	98 <sup>**</sup>

<sup>1</sup>Includes Queanbeyan (C)

<sup>2</sup>Includes admissions to public acute hospitals and private hospitals, including admissions of same day patients

<sup>3</sup>Excludes same day admissions: for Sydney the period is 1989/90 and for Darwin it is 1987

Source: See *Data sources*, Appendix 1.3

Statistical significance: \* significance at 5 per cent; \*\* significance at 1 per cent

Ischaemic heart disease results from poor blood supply to the heart and leads to heart attacks and angina. Hospital admissions for ischaemic heart disease accounted for 2.8 per cent of all admissions of Western Australian residents and 36.1 per cent of admissions for all circulatory system diseases.

As for all circulatory system diseases, higher admissions rates occur among those who are socioeconomically disadvantaged.

## Perth (Western Australia as the Standard)

There were 8,594 admissions of residents of **Perth** in 1995/96 for ischaemic heart disease, one per cent fewer than expected from the State rates (an SAR of 99). Nearly two thirds (64.7 per cent) of the admissions were males.

The pattern of distribution of SARs was similar to that for all circulatory system diseases, with the highest ratios tending to be associated with industrial areas and nearby residential suburbs, and areas with low ratios typically in higher socioeconomic status areas (**Map 6.25**).

There were nine SLAs in **Perth** with elevated ratios, the most highly elevated of which were located to the south-west of the city. The highest of these were Cockburn, with 73 per cent more admissions for ischaemic heart disease than expected from the State rates (an SAR of 173<sup>\*\*</sup>) and Kwinana (150<sup>\*\*</sup>). Other elevated ratios were recorded in Gosnells (with an SAR of 133<sup>\*\*</sup>), Rockingham (121<sup>\*\*</sup>) Vincent (113), Armadale (108) and Stirling: Central (108<sup>\*</sup>).

Of the eight SLAs with ratios of at least 25 per cent lower than expected from the State rates, all but one was situated on the north bank of the Swan River. The lowest ratios were recorded in Stirling: South-Eastern (with an SAR of 44<sup>\*\*</sup>), Claremont (55<sup>\*\*</sup>), Nedlands (62<sup>\*\*</sup>) and East Fremantle (64<sup>\*\*</sup>). The City of Perth, Peppermint Grove, Cottesloe and Mosman Park had SARs of between 26 per cent and 29 per cent lower than expected.

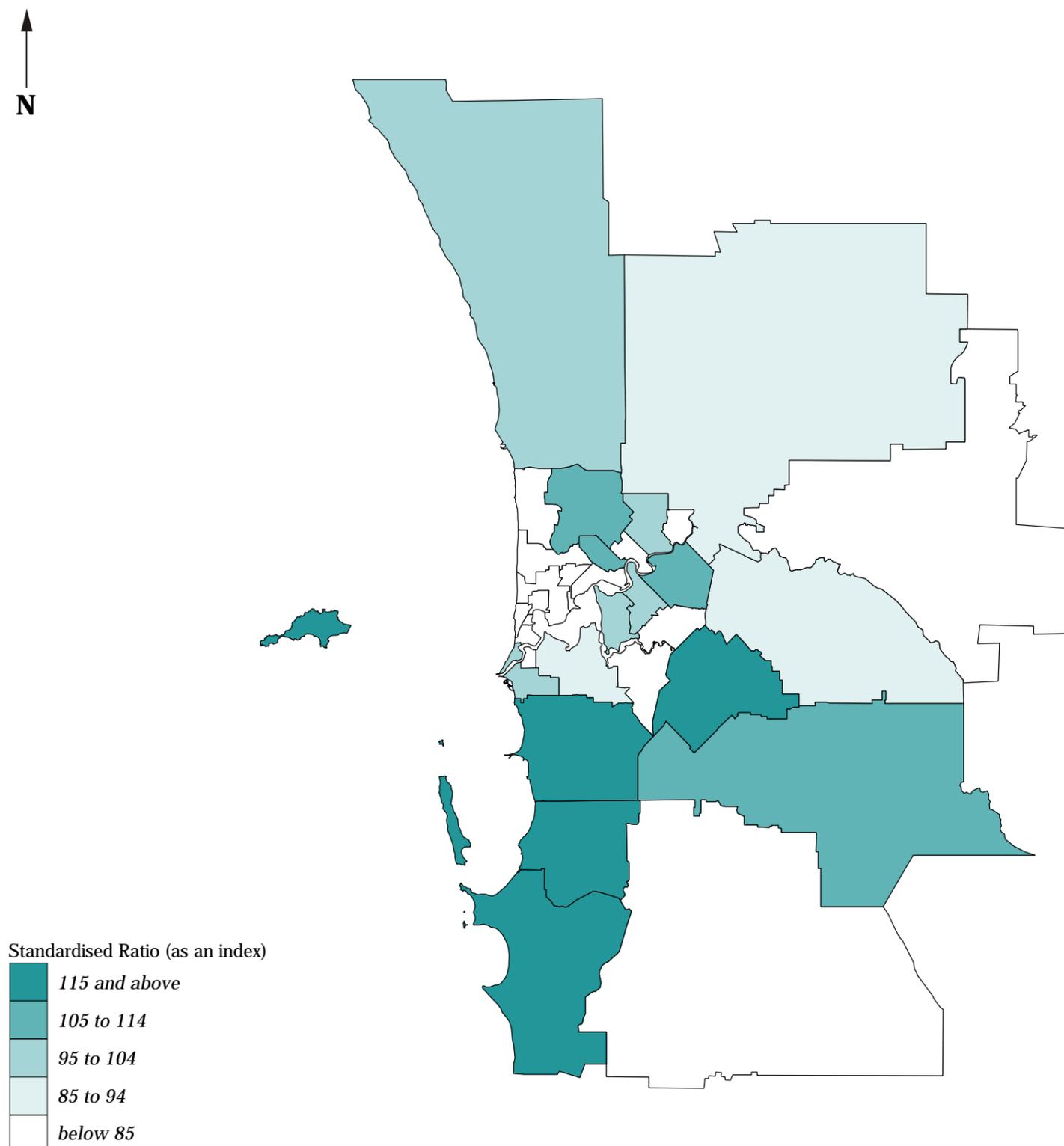
The largest numbers of admissions for ischaemic heart disease were recorded for residents of Wanneroo (995 admissions), Stirling: Central (927), Melville (675), Cockburn (545), Gosnells (533) and Rockingham (515).

There were correlations of meaningful significance with the variables for unskilled and semi-skilled workers (0.73), early school leavers (0.69) and the Indigenous population (0.61). Inverse correlations were recorded with the variables for managers and administrators, and professionals (-0.70), high income families (-0.61) and female labour force participation (-0.62). These results, together with the inverse correlation of meaningful significance with the IRSD (-0.66), indicate the existence of an association between high rates of admissions for ischaemic heart disease and socioeconomic disadvantage.

## Map 6.25

### Admissions for ischaemic heart disease, Perth, 1995/96

Standardised Ratio: number of admissions in each Statistical Local Area compared with the number expected\*



\*Expected numbers were derived by indirect age-sex standardisation, based on WA totals

Source: See Data sources, Appendix 1.3

Details of map boundaries are in Appendix 1.2  
National Social Health Atlas Project, 1999

# Admissions for ischaemic heart disease, 1995/96

## State/Territory comparison (Australia as the Standard)

As was the case for circulatory system diseases, standardised admission ratios (SARs) for admissions for ischaemic heart disease (described on the previous text page) were, with the exception of Tasmania (with an SAR of 95<sup>\*</sup>) and Northern Territory (87<sup>\*</sup>), higher for residents of the non-metropolitan areas than in the capital cities (**Table 6.31**). The most highly elevated ratios were in New South Wales (112<sup>\*\*</sup>) and Victoria (111<sup>\*\*</sup>).

There was relatively little change in the ratios for the non-metropolitan areas between the periods shown in **Table 6.31** with the exception of the Northern Territory. The higher ratios in the later period shown suggests an increase (relative to the Australian rates) in admissions over this period. It should be noted, however, that the Western Australian and Northern Territory ratios remained below the Australian rate.

**Table 6.31: Admissions with a principal diagnosis of ischaemic heart disease, State/Territory**  
*Age-sex standardised admission ratios*

	NSW	Vic	Qld	SA	WA	Tas	NT	ACT	Total
<b>1995/96<sup>1</sup></b>									
Capital city	103 <sup>**</sup>	93 <sup>**</sup>	93 <sup>**</sup>	98 <sup>*</sup>	86 <sup>**</sup>	105 <sup>*</sup>	87 <sup>*</sup>	91 <sup>**</sup>	96 <sup>**</sup>
Other major urban centres <sup>2</sup>	114 <sup>**</sup>	95	101	..	..	..	..	..	108 <sup>**</sup>
Rest of State/Territory	112 <sup>**</sup>	111 <sup>**</sup>	99	108 <sup>**</sup>	90 <sup>**</sup>	95 <sup>*</sup>	87 <sup>*</sup>	- <sup>3</sup>	106 <sup>**</sup>
Whole of State/Territory	107 <sup>**</sup>	98 <sup>**</sup>	96 <sup>**</sup>	101	87 <sup>**</sup>	99	87 <sup>**</sup>	89 <sup>**</sup>	100
<b>1989<sup>4</sup></b>									
Rest of State/Territory	111 <sup>**</sup>	..	95 <sup>**</sup>	100	86 <sup>**</sup>	..	53 <sup>**</sup>	..	101 <sup>*</sup>

<sup>1</sup>Includes admissions to public acute hospitals and private hospitals, including admissions of same day patients

<sup>2</sup>Includes Newcastle and Wollongong (NSW); Geelong (Vic); and Gold Coast-Tweed Heads and Townsville-Thuringowa (Qld)

<sup>3</sup>Data unreliable: included with ACT total

<sup>4</sup>Excludes same day admissions: for New South Wales the period is 1989/90 and for Northern Territory it is 1987

Source: See *Data sources*, Appendix 1.3

Statistical significance: \* significance at 5 per cent; \*\* significance at 1 per cent

## Rest of State (Western Australia as the Standard)

Admissions for ischaemic heart disease accounted for almost one third (32.7 per cent) of all admissions for circulatory system diseases of non-metropolitan residents in Western Australia. There were 3,111 admissions, four per cent more than were expected from the States rate (an SAR of 104<sup>\*</sup>). Over two thirds (66.8 per cent) of the admissions were males.

As was the case with the distribution at the SLA level of SARs for circulatory system diseases, the highest ratios for admissions for ischaemic heart disease were scattered throughout the State (**Map 6.26**). The highest ratios were recorded in Meekatharra (with an SAR of 236<sup>\*\*</sup> and 19 admissions), Broome (223<sup>\*\*</sup>; 72), Boddington (176<sup>\*</sup>; 12), Dundas (158; 14), Narembeen (158; 11), Port Hedland (154<sup>\*\*</sup>; 56) and Gnowangerup (150; 17).

Excluding SLAs where fewer than five admissions were expected from the State rates, the lowest ratios were recorded were in Dardanup and Denmark, (both with an SAR of 63<sup>\*</sup>), Greenough (69<sup>\*</sup>), East Pilbara (69), Murray (75<sup>\*</sup>) and Geraldton (81<sup>\*</sup>).

Of the seven towns mapped, four had elevated ratios for admissions for ischaemic heart disease. In Broome, there were more than twice the number of admissions expected from the State rates (an SAR of 223<sup>\*\*</sup>), while highly elevated ratios were also recorded in Port Hedland (154<sup>\*\*</sup>) and Kalgoorlie/Boulder (130<sup>\*\*</sup>). The lowest ratio was in Geraldton (an SAR of 81<sup>\*</sup>).

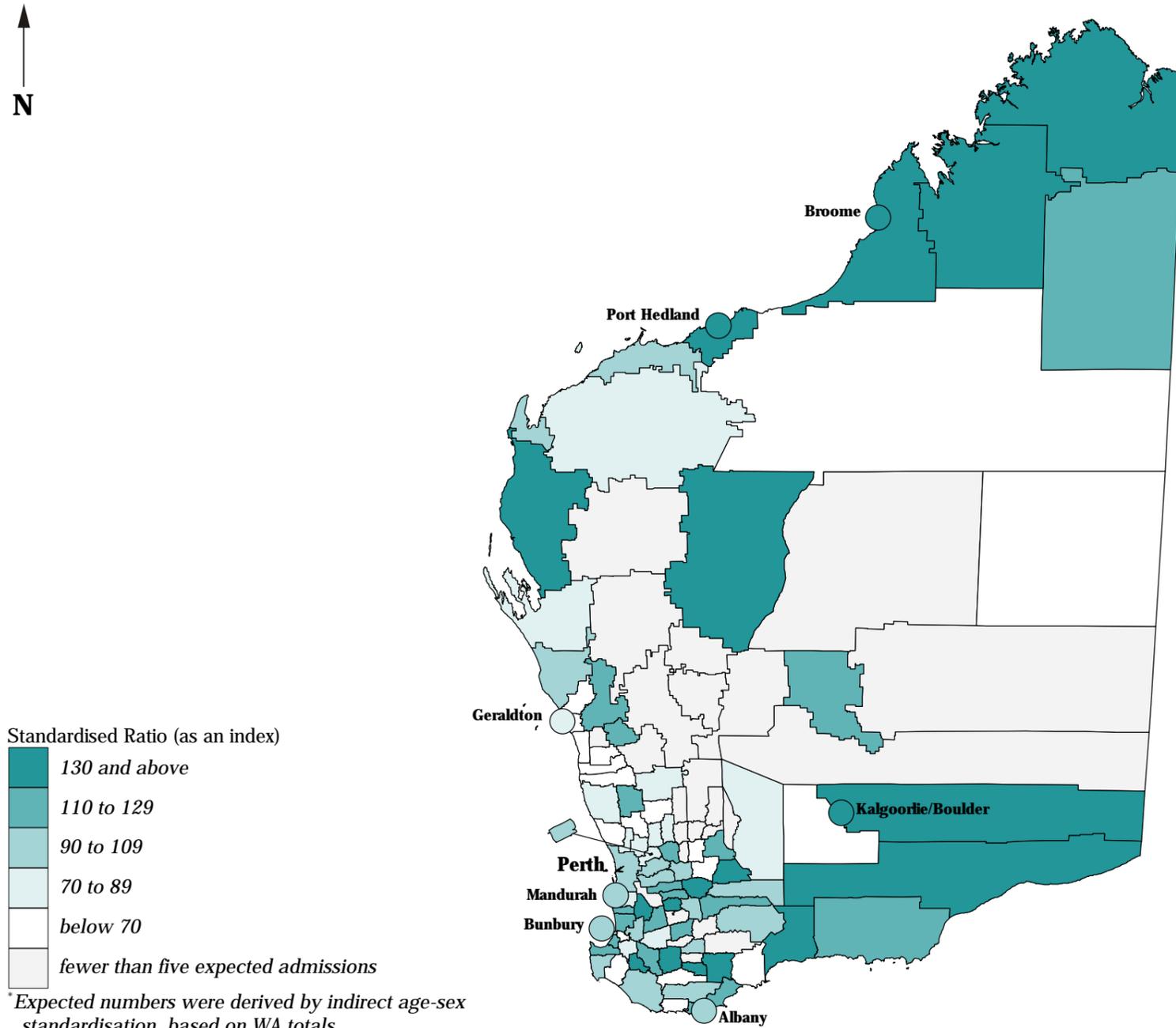
The largest numbers of admissions for ischaemic heart disease were generally recorded in the towns, including Mandurah (with 379 admissions), Bunbury (201), Busselton (185), Kalgoorlie/Boulder (149) and Albany (132). The only other SLAs with 100 or more admissions were Harvey (117 admissions), Geraldton (112) and Albany Shire (100).

The correlation analysis was not undertaken as there were too many SLAs with small numbers of cases.

## Map 6.26

### Admissions for ischaemic heart disease, Western Australia, 1995/96

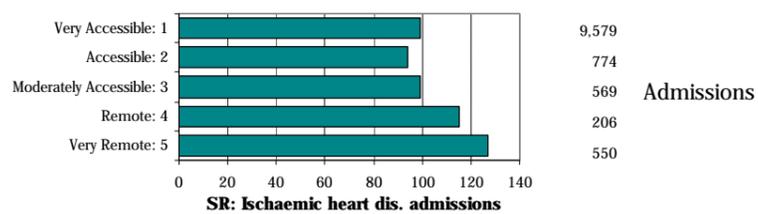
Standardised Ratio: number of admissions in each Statistical Local Area compared with the number expected\*



Source: See Data sources, Appendix 1.3

Details of map boundaries are in Appendix 1.2

### Accessibility/Remoteness Index of Australia



Standardised admission ratios for ischaemic heart disease vary across the ARIA categories, from the lowest ratio in the Accessible areas (an SAR of 94), to elevated ratios of 115 and 127 in the Remote and Very Remote areas. The Very Accessible and Moderately Accessible areas both had ratios of 99.

Source: Calculated on ARIA classification, DHAC National Social Health Atlas Project, 1999

## Admissions for respiratory system diseases, 1995/96

### Capital city comparison (Australia as the Standard)

Standardised admission ratios (SARs) for admissions for respiratory system diseases (described below) varied widely between the capital cities (Table 6.32). The only elevated ratios were in **Adelaide** (an SAR of 114\*\*) and **Darwin** (102) and the lowest ratio was in **Canberra** (67\*\*).

The SAR for **Darwin** almost doubled, increasing from 53\*\* in 1987 to 102 in 1995/96, suggesting an increase (relative to the Australian rates) in admissions over this period.

**Table 6.32: Admissions with a principal diagnosis of respiratory system diseases, capital cities**  
*Age-sex standardised admission ratios*

	Sydney	Melbourne	Brisbane	Adelaide	Perth	Hobart	Darwin	Canberra <sup>1</sup>	All capitals
1995/96 <sup>2</sup>	91**	87**	92**	114**	83**	77**	102	67**	91**
1989 <sup>3</sup>	69**	..	93**	108**	82**	..	53**	..	81**

<sup>1</sup>Includes Queanbeyan (C)

<sup>2</sup>Includes admissions to public acute hospitals and private hospitals, including admissions of same day patients

<sup>3</sup>Excludes same day admissions: for Sydney the period is 1989/90 and for Darwin it is 1987

Source: See *Data sources, Appendix 1.3*

Statistical significance: \* significance at 5 per cent; \*\* significance at 1 per cent

Respiratory system diseases include the diseases of pneumonia, influenza, bronchitis, emphysema and asthma. This category includes people with chronic obstructive pulmonary disease – a persistent obstruction of bronchial air flow, manifesting as asthma, chronic bronchitis, and chronic emphysema – as well as acute respiratory infections. Admissions from these diseases represented 6.9 per cent of all admissions analysed for Western Australian residents; 5.9 per cent in **Perth** and 8.9 per cent in the non-metropolitan areas.

For 1996/97, age-standardised admission ratios for Indigenous women for diseases of the respiratory system were 2.3 times higher, and for Indigenous men, twice the admission ratios for non-Indigenous people (ABS/AIHW 1999).

### Perth (Western Australia as the Standard)

There were 17,162 admissions for respiratory system diseases recorded for residents of **Perth**, 17 per cent fewer admissions than expected from the State rates (an SAR of 83\*\*). Males accounted for just over half (53.7 per cent) of these admissions.

The four SLAs with elevated ratios were located in a group in the industrialised coastal area to the south-west of the city (Map 6.27). In Kwinana (117\*\*), there were 17 per cent more admissions for respiratory system diseases than expected from the State rates, with elevated ratios also in Fremantle (109), Cockburn (109\*\*) and Rockingham (106\*).

Of SLAs with ratios of more than 20 per cent lower than expected, the lowest ratios were recorded in Stirling: South-Eastern (with an SAR of 32\*\*), the City of Perth (43\*\*), Nedlands (57\*\*), Canning (58\*\*) and Cambridge (59\*\*). Relatively low ratios were also recorded in Melville (an SAR of 63\*\*), Claremont (70\*\*), Stirling: West (71\*\*) and Subiaco (73\*\*).

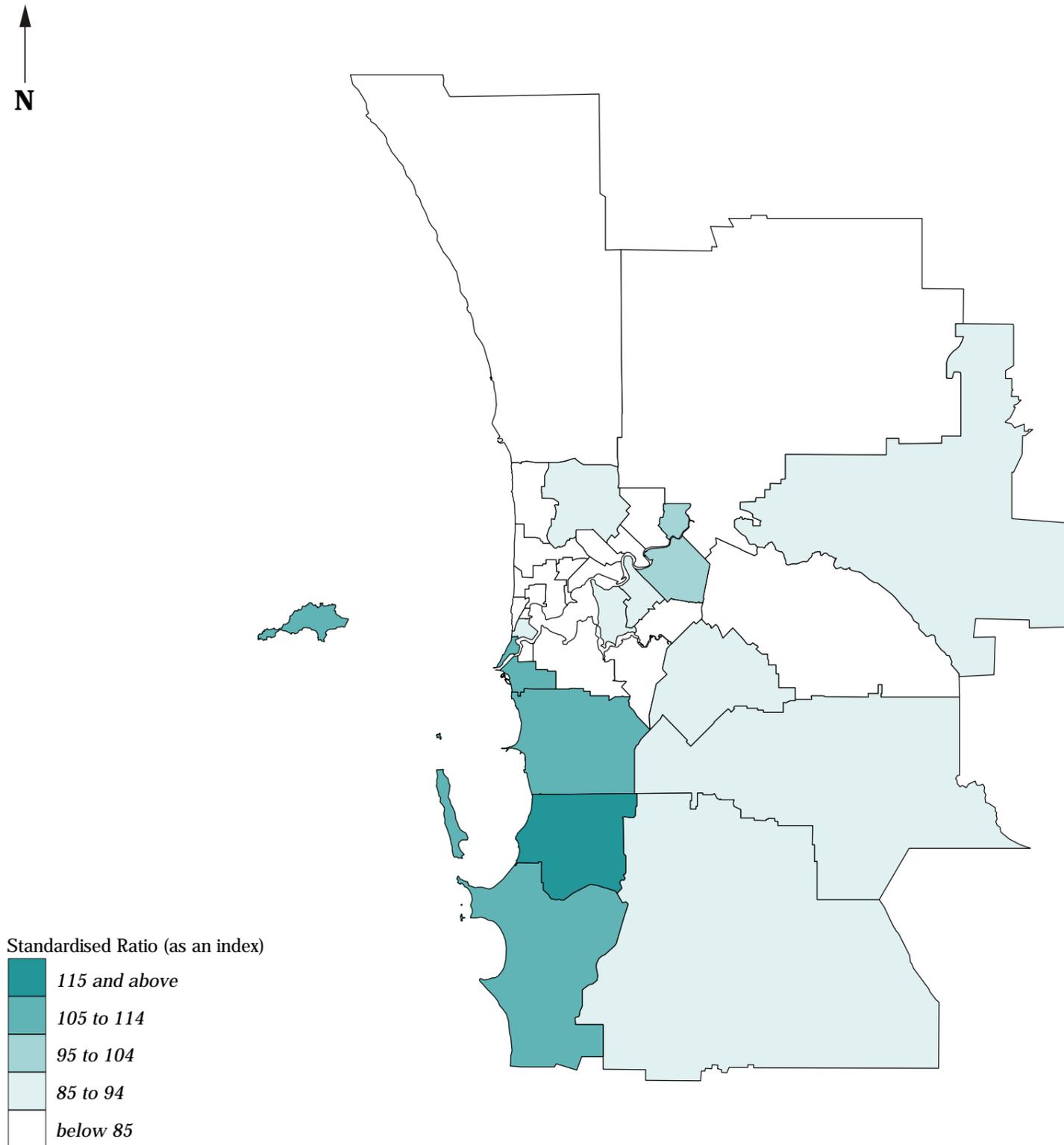
There were more than 1,000 admissions for respiratory system diseases from five SLAs – Wanneroo (2,578 admissions), Stirling: Central (1,566), Gosnells (1,114), Rockingham (1,100) and Cockburn (1,025).

There were correlations of meaningful significance with unskilled and semi-skilled workers (0.66), early school leavers (0.59), the Indigenous population (0.56) and housing authority rented dwellings (0.51). Inverse correlations of meaningful significance were recorded with the variables for female labour force participation (-0.60), high income families (-0.57) and managers and administrators, and professionals (-0.56). These results, together with the inverse correlation of meaningful significance with the IRSD (-0.60), indicate the existence of an association at the SLA level between high rates of admission for respiratory system diseases and socioeconomic disadvantage.

### Map 6.27

## Admissions for respiratory system diseases, Perth, 1995/96

Standardised Ratio: number of admissions in each Statistical Local Area compared with the number expected\*



\*Expected numbers were derived by indirect age-sex standardisation, based on WA totals

Source: See Data sources, Appendix 1.3

Details of map boundaries are in Appendix 1.2  
National Social Health Atlas Project, 1999

# Admissions for respiratory system diseases, 1995/96

## State/Territory comparison (Australia as the Standard)

Standardised admission ratios (SARs) for admissions for respiratory system diseases (described on the previous text page) were higher, and often substantially higher, for residents of the non-metropolitan areas than of the capital cities (Table 6.33). The most highly elevated ratios were in the Northern Territory (an SAR of 180\*\*), South Australia (156\*\*) and Western Australia (147\*\*). Only in Tasmania was the ratio below the Australian rate.

The SARs for the non-metropolitan areas in each of the four States, for which data were analysed for both periods, declined between the two periods (Table 6.33). The lower ratios in the later period suggest a decline (relative to the Australian rates) in admissions of non-metropolitan residents over this period. However, the ratios recorded for the Northern Territory increased (relative to the Australian rates) between the two periods, rising from 164\*\* in 1987 to 180\*\* in 1995/96.

**Table 6.33: Admissions with a principal diagnosis of respiratory system diseases, State/Territory**  
*Age-sex standardised admission ratios*

	NSW	Vic	Qld	SA	WA	Tas	NT	ACT	Total
<b>1995/96<sup>1</sup></b>									
Capital city	91**	87**	92**	114**	83**	77**	102	67**	91**
Other major urban centres <sup>2</sup>	82**	85**	86**	..	..	..	..	..	84**
Rest of State/Territory	123**	116**	115**	156**	147**	80**	180**	- <sup>3</sup>	123**
Whole of State/Territory	99**	95**	101	125**	101	79**	146**	66**	100
<b>1989<sup>4</sup></b>									
Rest of State/Territory	135**	..	130**	169**	176**	..	164**	..	143**

<sup>1</sup>Includes admissions to public acute hospitals and private hospitals, including admissions of same day patients

<sup>2</sup>Includes Newcastle and Wollongong (NSW); Geelong (Vic); and Gold Coast-Tweed Heads and Townsville-Thuringowa (Qld)

<sup>3</sup>Data unreliable: included with ACT total

<sup>4</sup>Excludes same day admissions: for New South Wales the period is 1989/90 and for Northern Territory it is 1987

Source: See Data sources, Appendix 1.3

Statistical significance: \* significance at 5 per cent; \*\* significance at 1 per cent

## Rest of State (Western Australia as the Standard)

There were 11,686 admissions of residents of the non-metropolitan areas of Western Australia for respiratory system diseases in 1995/96. This was a substantial 45 per cent more than expected from the State rates (an SAR of 145\*\*) and comprised 8.9 per cent of all admissions of non-metropolitan residents. Males accounted for 53.5 per cent of these admissions.

More than three quarters (76.9 per cent) of the SLAs from which data was mapped had elevated standardised admission ratios. The most highly elevated of these ratios were in SLAs characterised by a significant population of Indigenous people, including Wiluna (431\*\* and 27 admissions), Trayning (536\*\*; 49), Dundas (301\*\*; 91), Halls Creek (313\*\*; 155), Mullewa (343\*\*; 80), Mount Marshall (361\*\*; 46), Wyalkatchem (366\*\*; 38) and Derby-West Kimberley (388\*\*; 463). A further 14 SLAs had ratios elevated by more than twice the level expected from the State rates.

Excluding SLAs with fewer than 20 admissions, the lowest standardised admission ratios were recorded for residents from Gingin (an SAR of 51\*\*), Irwin (54\*\*), Exmouth (57\*\*), Denmark (67\*\*), Dandaragan (70), Coolgardie (77\*\*) and Chittering (79).

Of the towns mapped, Broome (with an SAR of 200\*\*) had twice the number of admissions for respiratory system diseases expected from the State rates, while elevated ratios were also recorded in Geraldton (174\*\*), Kalgoorlie/Boulder (173\*\*) and Port Hedland (163\*\*). Only Mandurah (89\*\*) had fewer than the expected number of admissions.

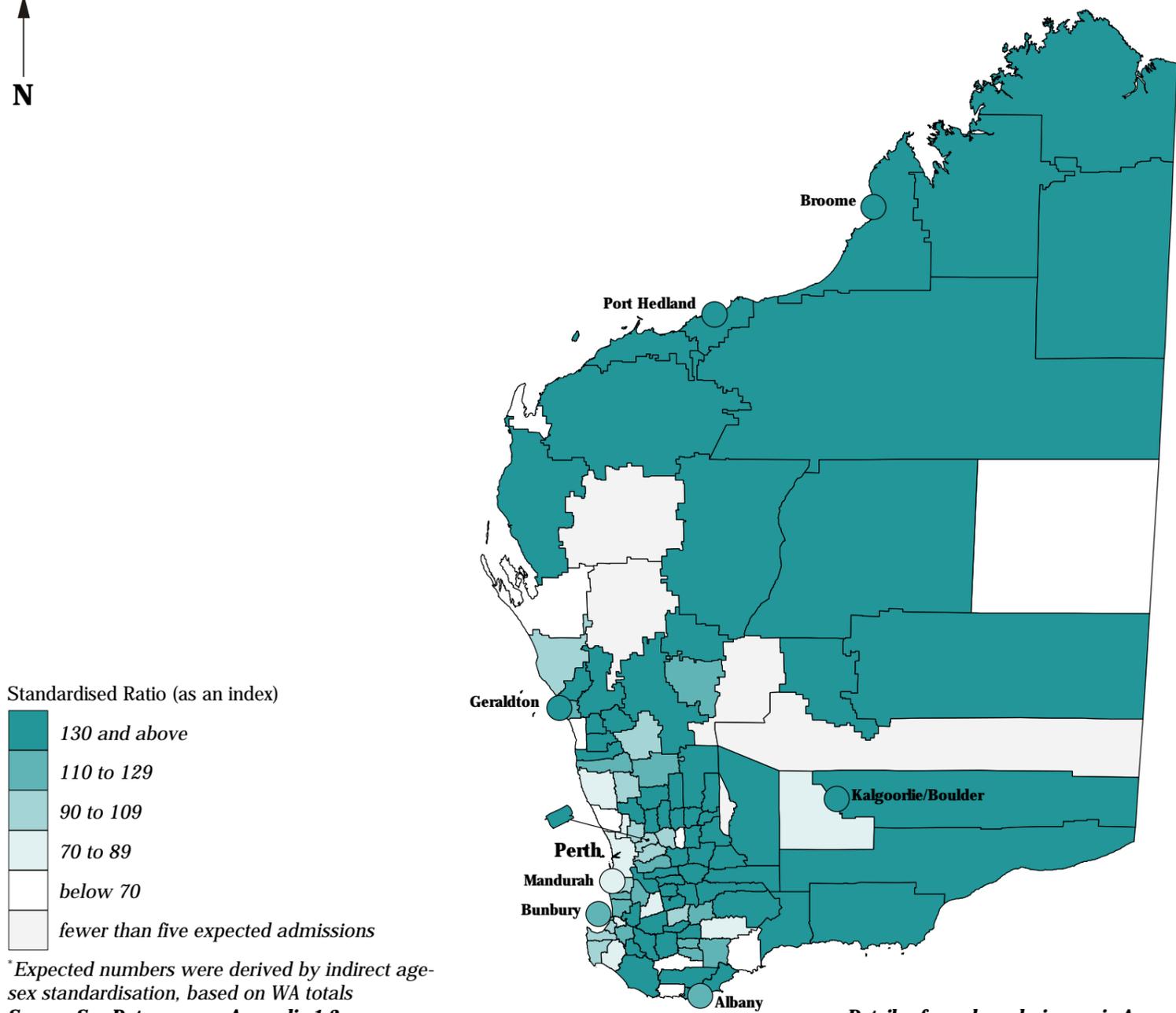
The largest numbers of admissions were recorded in Kalgoorlie/Boulder, with 811 admissions; Geraldton, 655 admissions; Mandurah, 623 admissions and Bunbury, 615 admissions.

There was no consistent evidence in the correlation analysis of an association at the SLA level in the non-metropolitan areas of Western Australia between admissions for respiratory system diseases and socioeconomic status.

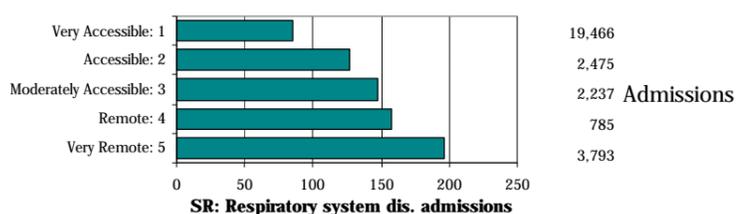
## Map 6.28

### Admissions for respiratory system diseases, Western Australia, 1995/96

Standardised Ratio: number of admissions in each Statistical Local Area compared with the number expected\*



### Accessibility/Remoteness Index of Australia



Standardised admission ratios for respiratory system diseases show a strong relationship with remoteness. The ratios more than double (increase by 130.6 per cent), from an SAR of 85 in the Very Accessible areas to an SAR of 196 in the Very Remote areas. The other ratios are 127 in the in the Accessible areas, 147 in the Moderately Accessible and 158 in the Remote categories, respectively. The highly elevated rate of admissions of residents of the Very Remote areas is likely to reflect admissions of the Indigenous population.

**Source: Calculated on ARIA classification, DHAC National Social Health Atlas Project, 1999**

# Admissions of children aged 0 to 4 years for respiratory system diseases, 1995/96

## Capital city comparison (Australia as the Standard)

As was the case for people of all ages, standardised admission ratios (SARs) for admissions of children aged from 0 to 4 years from respiratory system diseases (described below) varied widely between the capital cities (**Table 6.34**). The most highly elevated ratio was in **Adelaide** (118\*\*) and the lowest in **Melbourne** (68\*\*).

The increase in the SAR for **Darwin**, from 38\* in 1987 to 88\* in 1995/96, suggests an increase (relative to the Australian rates) in admissions over this period; however, the ratio remains below the *All capitals* rate. Similar, albeit smaller, increases were recorded for children in **Sydney**, **Perth** and **Brisbane**, whereas the ratio for **Adelaide** declined, from a high 123\*\* to 118\*\*.

**Table 6.34: Admissions of 0 to 4 year olds with a principal diagnosis of respiratory system diseases, capital cities**  
*Age-sex standardised admission ratios*

	Sydney	Melbourne	Brisbane	Adelaide	Perth	Hobart	Darwin	Canberra <sup>1</sup>	All capitals
1995/96 <sup>2</sup>	95**	68**	99	118**	91**	71**	88*	80**	89**
1989 <sup>3</sup>	67**	..	90**	123**	79**	..	38**	..	80**

<sup>1</sup>Includes Queanbeyan (C)

<sup>2</sup>Includes admissions to public acute hospitals and private hospitals, including admissions of same day patients

<sup>3</sup>Data is for 0 to 14 year olds and excludes same day admissions: for Sydney the period is 1989/90 and for Darwin it is 1987

Source: See *Data sources*, Appendix 1.3

Statistical significance: \* significance at 5 per cent; \*\* significance at 1 per cent

Diseases of the respiratory system are a major cause of admission to hospital for children. As children also comprise a relatively large proportion (27.2 per cent) of admissions of all ages with respiratory system diseases, they were mapped separately. The major causes included in this group of diseases are chronic obstructive lung disease (which includes cystic fibrosis, chronic bronchitis, emphysema and asthma), acute respiratory infections and chronic diseases of tonsils and adenoids.

## Perth (Western Australia as the Standard)

There were 4,304 admissions for respiratory system diseases of residents of **Perth** aged from 0 to 4 years, 20 per cent fewer than expected from the State rates (an SAR of 80\*\*). Males comprised almost two thirds (63.1 per cent) of these admissions.

Despite the overall low SAR for admissions of 0 to 4 year olds in **Perth**, a distinctive pattern of distribution of ratios was evident at the SLA level. The most striking feature is the concentration of SLAs with elevated ratios in the south-west of the metropolitan area, and to the east of the city centre. Low ratios tended to be concentrated in the higher socioeconomic, older, areas to the north of the Swan River.

SAR elevated by more than 40 per cent above the levels expected from the State rates were recorded for residents in Fremantle (with an SAR of 143\*\*), Kwinana (141\*\*) and Serpentine-Jarrahdale (134\*), while there were also relatively high ratios in Claremont (118) and Rockingham (117\*\*).

The lowest ratios in the metropolitan area were recorded in Stirling: South-Eastern (an SAR of 20\*\*), Cottesloe (38\*\*) and the City of Perth (50\*), all with fewer than 20 admissions. Among SLAs with 20 or more admissions, the lowest ratios were in Canning (an SAR of 51\*\*), Vincent (55\*\*), Stirling: West (57\*\*), and Cambridge and Nedlands (both 59\*\*).

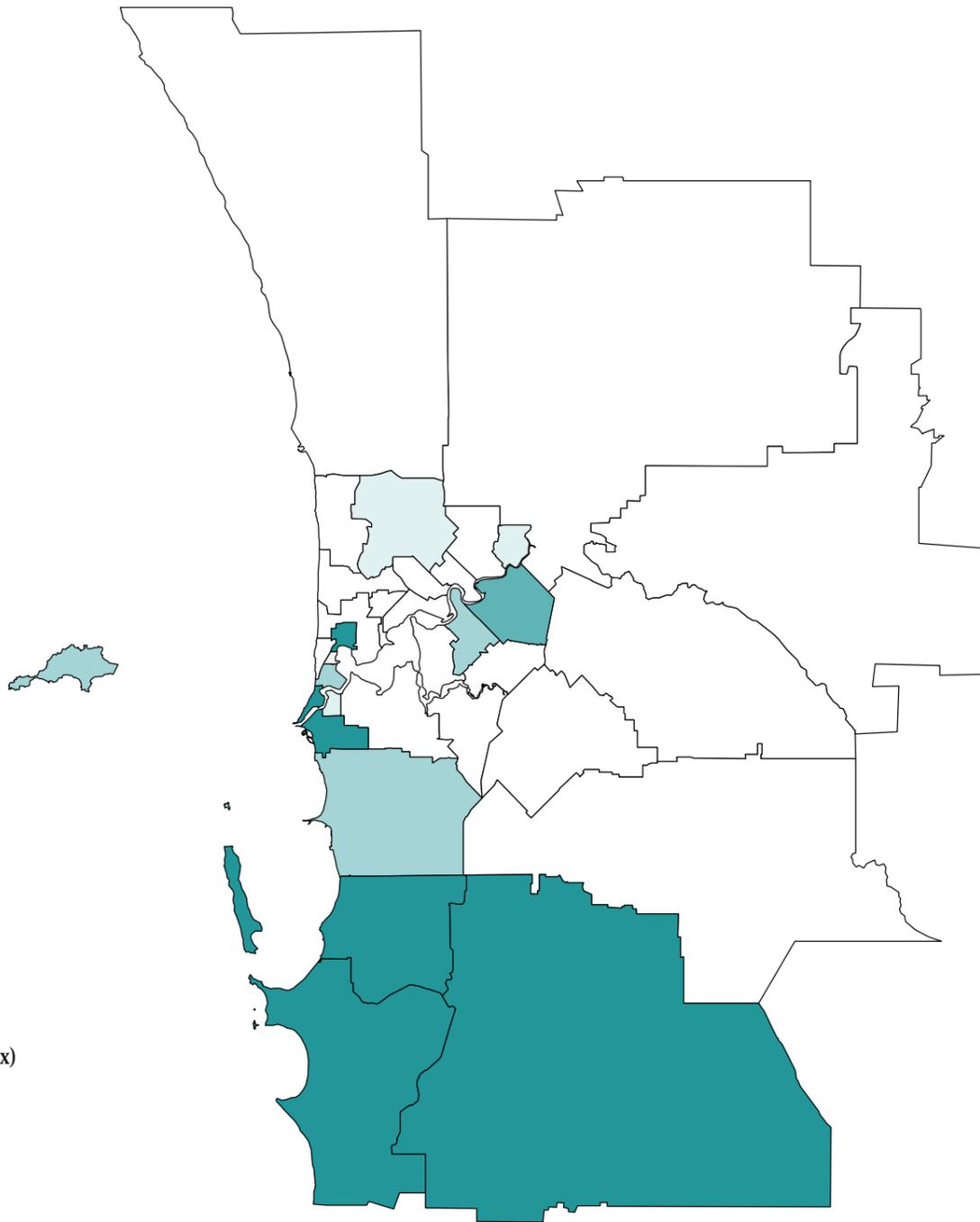
The largest numbers of admissions for respiratory system diseases of children aged from 0 to 4 years were in Wanneroo (722 admissions) and Stirling: Central (380). There were more than 300 admissions in only three other SLAs – Rockingham (359 admissions), Gosnells (306) and Cockburn (305).

Correlations of meaningful significance were recorded with the variables for low income families and unskilled and semi-skilled workers (both 0.50). Inverse correlations of meaningful significance were recorded with female labour force participation (-0.59) and high income families (-0.50). These results, together with the inverse correlation of meaningful significance with the IRSD (-0.52), suggest the existence at the SLA level of an association between high rates of admission of young children for respiratory system diseases and socioeconomic disadvantage

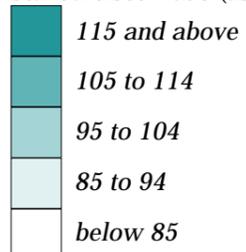
**Map 6.29**

**Admissions of children aged 0 to 4 years for respiratory system diseases, Perth, 1995/96**

Standardised Ratio: number of admissions in each Statistical Local Area compared with the number expected\*



Standardised Ratio (as an index)



\*Expected numbers were derived by indirect age-sex standardisation, based on WA totals

**Source: See Data sources, Appendix 1.3**

**Details of map boundaries are in Appendix 1.2  
National Social Health Atlas Project, 1999**

# Admissions of children aged 0 to 4 years for respiratory system diseases, 1995/96

## State/Territory comparison (Australia as the Standard)

With the exception of Tasmania, standardised admission ratios (SARs) for admissions for respiratory system diseases (described on the previous text page) were higher, in most cases substantially so, for residents of the non-metropolitan areas than in the capital cities (**Table 6.35**). The most highly elevated ratios were in the Northern Territory (212\*\*), Western Australia (165\*\*), South Australia (146\*\*) and New South Wales (132\*\*).

The SARs for the non-metropolitan areas in each of the four States for which data were analysed for both periods, declined between the two periods, with the largest declines in South Australia and Western Australia (**Table 6.35**). The lower ratios in the later period suggest a decline (relative to the Australian rates) in admissions of non-metropolitan residents over this period. SARs in the Northern Territory, however, increased over this period, from 163\*\* in 1987 to 212\*\* in 1995/96.

**Table 6.35: Admissions of 0 to 4 year olds with a principal diagnosis of respiratory system diseases, State/Territory Age-sex standardised admission ratios**

	NSW	Vic	Qld	SA	WA	Tas	NT	ACT	Total
<b>1995/96<sup>1</sup></b>									
Capital city	95**	68**	99	118**	91**	71*	88*	80**	89**
Other major urban centres <sup>2</sup>	81**	92	85**	..	..	..	..	..	83**
Rest of State/Territory	132**	103*	116**	146**	165**	68**	212**	- <sup>3</sup>	125**
Whole of State/Territory	104**	78**	105**	126**	114**	69**	162**	81**	100
<b>1989<sup>4</sup></b>									
Rest of State/Territory	138**	..	121**	180**	177**	..	163**	..	142**

<sup>1</sup>Includes admissions to public acute hospitals and private hospitals, including admissions of same day patients

<sup>2</sup>Includes Newcastle and Wollongong (NSW); Geelong (Vic); and Gold Coast-Tweed Heads and Townsville-Thuringowa (Qld)

<sup>3</sup>Data unreliable: included with ACT total

<sup>4</sup>Data is for 0 to 14 year olds and excludes same day admissions: for New South Wales the period is 1989/90 and for Northern Territory it is 1987

Source: See *Data sources*, Appendix 1.3

Statistical significance: \* significance at 5 per cent; \*\* significance at 1 per cent

## Rest of State (Western Australia as the Standard)

Children aged from 0 to 4 years accounted for 30.2 per cent of admissions of non-metropolitan residents (of all ages) from respiratory system diseases in 1995/96. There were 3,530 admissions, 45 per cent more than was expected from the State rates, an SAR of 145\*\*. Males comprised 59.7 per cent of these admissions.

Of the SLAs in the non-metropolitan areas of Western Australia for which data was mapped, more than two thirds (67.5 per cent) had elevated standardised admission ratios. As was the case for admissions for respiratory system diseases at all ages, the most highly elevated of these ratios were in SLAs with significant Indigenous populations. In Derby-West Kimberley (with an SAR of 389\*\* and 181 admissions), Morawa (383\*\*; 24), Mullewa (343\*\*; 28) and Halls Creek (319\*\*; 61), there were more than three times the number of admissions expected from the State rates. Highly elevated ratios were also recorded in Katanning (with an SAR of 298\*\* and 78 admissions), Wyndham-East Kimberley (266\*\*; 132), Laverton (235\*\*; 21), Meekatharra (234\*\*; 27), Kojonup (233\*\*; 31), Esperance (217\*\*; 135), Pingelly (202\*\*; 14), Victoria Plains (202\*\*; 10) and Carnarvon (201\*\*; 79). Admissions were 50 per cent or more above expected levels in a further 12 SLAs shown on **Map 6.30**.

Excluding SLAs with fewer than 20 admissions, the lowest standardised admission ratios were recorded in Murray (62), Dardanup (74), Coolgardie (77), Augusta-Margaret River (79) and Mandurah (79\*\*).

Standardised admission ratios for children from aged 0 to 4 years with respiratory system diseases were elevated by more than 40 per cent in all the towns mapped, with the exception of Mandurah (79\*\*), where there were 21 per cent fewer admissions than expected from the State rates. The most highly elevated ratios were in Geraldton (with an SAR of 187\*\*), Broome (170\*\*) and Bunbury and Kalgoorlie/Boulder (both 144\*\*).

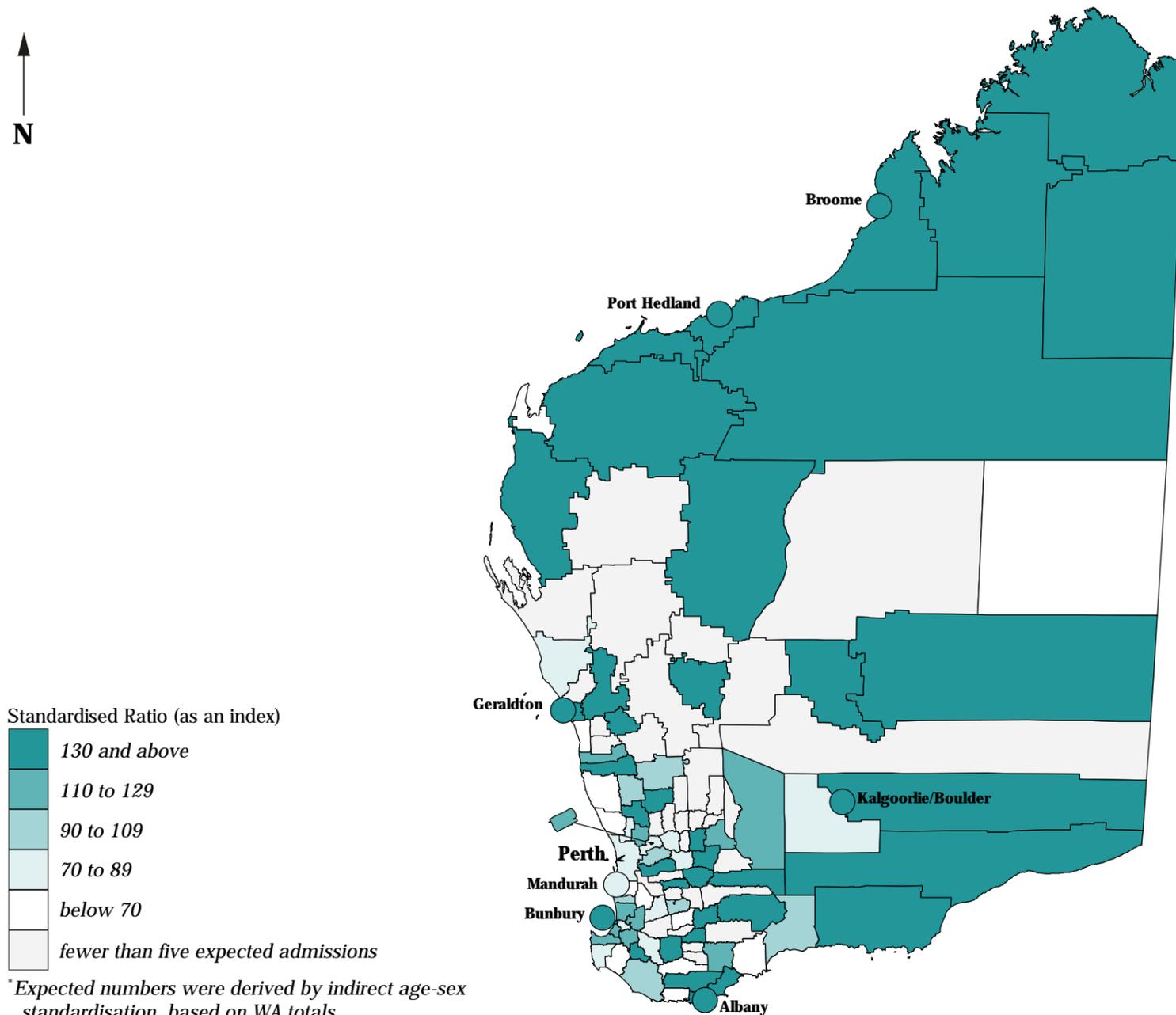
The largest numbers of admissions for respiratory system diseases of young children were recorded for Kalgoorlie/Boulder, with 248 admissions; Geraldton, with 227 admissions; Derby-West Kimberley, with 181 admissions; and Bunbury with 180.

The correlation analysis was not undertaken as there were too many SLAs with small numbers of cases.

### Map 6.30

## Admissions of children aged 0 to 4 years for respiratory system diseases, Western Australia, 1995/96

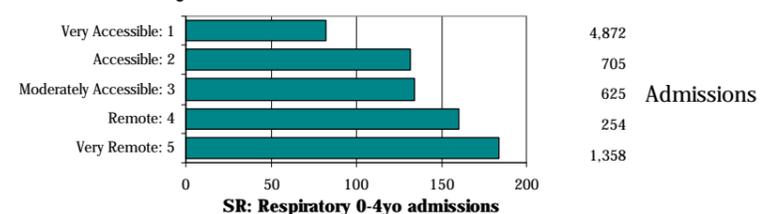
Standardised Ratio: number of admissions in each Statistical Local Area compared with the number expected\*



Source: See Data sources, Appendix 1.3

Details of map boundaries are in Appendix 1.2

### Accessibility/Remoteness Index of Australia



Standardised admission ratios for respiratory system diseases among young children (aged from 0 to 4 years) show a similar relationship with remoteness to that evident for the previous variable. The ratios more than double, from an SAR of 82 in the Very Accessible areas to an SAR of 184 in the Very Remote areas. The second highest ratio is in the Remote areas (160), with ratios of 132 and 134 in the Accessible and Moderately Accessible categories, respectively.

Source: Calculated on ARIA classification, DHAC National Social Health Atlas Project, 1999

# Admissions for bronchitis, emphysema or asthma, 1995/96

## Capital city comparison (Australia as the Standard)

As was the case for admissions for all respiratory system diseases, standardised admission ratios (SARs) for admissions for bronchitis, emphysema or asthma (described below) varied widely between the capital cities (Table 6.36). Only **Adelaide** (123\*\*) and **Brisbane** (105\*\*) had elevated ratios. The lowest SARs were recorded for residents of **Canberra** (60\*\*), **Hobart** and **Melbourne** (both 70\*\*).

The SAR for **Darwin** increased from 44\*\* in 1987 to 80\*\* in 1995/96 and for **Sydney** from 67\* to 99, suggesting an increase (relative to the Australian rates) in admissions over this period. A similar, albeit smaller, increase was recorded for **Perth**.

**Table 6.36: Admissions with a principal diagnosis of bronchitis, emphysema or asthma, capital cities**  
*Age-sex standardised admission ratios*

	Sydney	Melbourne	Brisbane	Adelaide	Perth	Hobart	Darwin	Canberra <sup>1</sup>	All capitals
1995/96 <sup>2</sup>	99	70**	105**	123**	90**	70**	80**	60**	91**
1989 <sup>3</sup>	67**	..	103*	103*	81**	..	44**	..	81**

<sup>1</sup>Includes Queanbeyan (C)

<sup>2</sup>Includes admissions to public acute hospitals and private hospitals, including admissions of same day patients

<sup>3</sup>Excludes same day admissions: for Sydney the period is 1989/90 and for Darwin it is 1987

Source: See *Data sources*, Appendix 1.3

Statistical significance: \* significance at 5 per cent; \*\* significance at 1 per cent

Bronchitis, emphysema and asthma are grouped together as chronic obstructive pulmonary diseases in the International Classification of Diseases (ICD-9), which is used to code causes of admissions. However, although they are of a similar nature, they are distinct conditions, affecting different age groups in the population. Admissions for asthma and bronchitis occur at all ages, more frequently among children and older people, whereas those from emphysema (contributing the smallest numbers to this group) are almost exclusively of older people, more frequently males. For example, almost one quarter (20.6 per cent) of admissions for cystic fibrosis, bronchitis, emphysema or asthma in 1995/96 were of children aged from 0 to 4 years. Males had substantially higher admission rates in the age groups under 10 years, and marginally higher rates from 30 years (but substantially higher among those aged 85 years and over), while females had slightly higher rates in the other age groups.

Other reasons for grouping these conditions are because the allocation of diagnoses between asthma and bronchitis (particularly in children) is not always consistent and also to ensure that there were sufficient cases for analysis.

Admissions for bronchitis, emphysema or asthma comprised 27.8 per cent of admissions for all respiratory system diseases of Western Australian residents; 27.2 per cent in **Perth** and 28.7 per cent in the non-metropolitan areas.

## Perth (Western Australia as the Standard)

As was the case for all respiratory system diseases, there were fewer admissions for this group of diseases for residents of **Perth** than expected from the State rates (19 per cent fewer, an SAR of 81\*\*). There were 4,666 admissions for these causes, of which 2,351 were males and 2,315 were females.

As **Map 6.31** shows, there is no real geographic pattern associated with the distribution of high ratios in the metropolitan area. Instead, the six SLAs with elevated ratios are distributed in three isolated clusters. On the other hand, there is a tighter grouping of SLAs with low ratios, in particular SLAs with the very lowest ratios, which are confined to older areas, located relatively close to the city centre and the Swan River.

The highest standardised admission ratio was recorded for residents in Kwinana (an SAR of 123\*), with 23 per cent more admissions than expected from the State rates. SARs in Belmont, Cottesloe, Peppermint Grove and Bassendean, were elevated by more than five per cent, but none were statistically significant.

The lowest standardised admission ratios were recorded in the City of Perth (with an SAR of 35\*\*), Stirling: South-Eastern (41\*\*), Canning (51\*\*), and Melville and Nedlands (both 56\*\*).

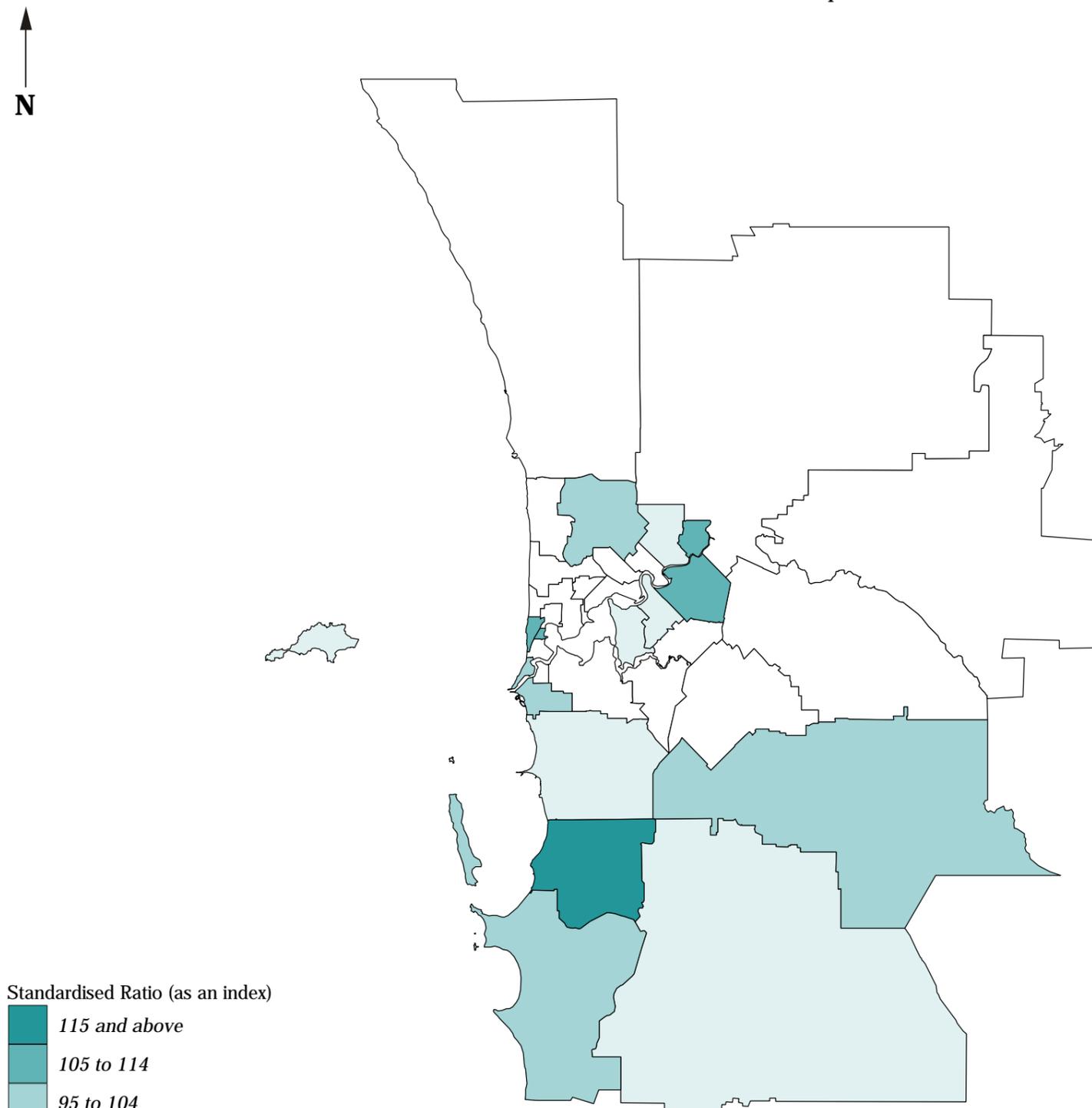
There were 700 admissions of residents from Wanneroo and 488 from Stirling: Central. Lower numbers of admissions were recorded in Rockingham (294), Gosnells (276) and Swan (253).

There were correlations of meaningful significance with the variables for Indigenous people (0.53) and female labour force participation (an inverse correlation of -0.52), and of lesser significance with the other indicators of socioeconomic disadvantage. These results, together with the weaker inverse correlation with the IRSD (-0.41), suggest the existence at the SLA level of an association between high rates of admissions for bronchitis, emphysema or asthma and socioeconomic disadvantage.

### Map 6.31

## Admissions for bronchitis, emphysema or asthma, Perth, 1995/96

Standardised Ratio: number of admissions in each Statistical Local Area compared with the number expected\*



Standardised Ratio (as an index)

- 115 and above
- 105 to 114
- 95 to 104
- 85 to 94
- below 85

\*Expected numbers were derived by indirect age-sex standardisation, based on WA totals

Source: See Data sources, Appendix 1.3

Details of map boundaries are in Appendix 1.2  
National Social Health Atlas Project, 1999

# Admissions for bronchitis, emphysema or asthma, 1995/96

## State/Territory comparison (Australia as the Standard)

With the exception of Tasmania, standardised admission ratios (SARs) for admissions for bronchitis, emphysema or asthma (described on the previous text page) were higher (and often substantially so) for residents of the non-metropolitan areas than in the capital cities (**Table 6.37**). The most highly elevated ratios were in South Australia (182\*\*) and Western Australia (167\*\*).

The SARs for the non-metropolitan areas of Queensland and New South Wales declined between the two periods shown in **Table 6.37**. The lower ratios in the later period suggest a decline (relative to the Australian rates) in admissions of non-metropolitan residents over this period. The higher ratios in the later period shown for Western Australia and the Northern Territory suggest an increase (relative to the Australian rates) in admissions over this period.

**Table 6.37: Admissions with a principal diagnosis of bronchitis, emphysema or asthma, State/Territory**  
*Age-sex standardised admission ratios*

	NSW	Vic	Qld	SA	WA	Tas	NT	ACT	Total
<b>1995/96<sup>1</sup></b>									
Capital city	99	70**	105**	123**	90**	70**	80**	60**	91**
Other major urban centres <sup>2</sup>	76**	74**	77**	..	..	..	..	..	76**
Rest of State/Territory	121**	117**	111**	182**	167**	62**	98	- <sup>3</sup>	123**
Whole of State/Territory	102**	83**	104**	139**	112**	65**	90	60**	100
<b>1989<sup>4</sup></b>									
Rest of State/Territory	130**	..	145**	181**	157**	..	83**	..	142**

<sup>1</sup>Includes admissions to public acute hospitals and private hospitals, including admissions of same day patients

<sup>2</sup>Includes Newcastle and Wollongong (NSW); Geelong (Vic); and Gold Coast-Tweed Heads and Townsville-Thuringowa (Qld)

<sup>3</sup>Data unreliable: included with ACT total

<sup>4</sup>Excludes same day admissions: for New South Wales the period is 1989/90 and for Northern Territory it is 1987

Source: See *Data sources*, Appendix 1.3

Statistical significance: \* significance at 5 per cent; \*\* significance at 1 per cent

## Rest of State (Western Australia as the Standard)

Almost one third (28.7 per cent) of the admissions for respiratory system diseases of residents of the non-metropolitan areas of Western Australia were for the diseases of bronchitis, emphysema or asthma. This was 50 per cent more admissions than were expected from the State rates, an SAR of 150\*\*. Admissions of females accounted for just over half (52.2 per cent) of all admissions.

Of the SLAs for which data was mapped (**Map 6.32**), three quarters (75.0 per cent) had elevated standardised admission ratios. The most highly elevated ratios, more than three times above the level expected from the State rates, were in Derby-West Kimberley (an SAR of 331\*\* and 109 admissions), Mullewa (316\*\*; 21) and Wyndham-East Kimberley (315\*\*; 95). In a further 11 SLAs, ratios were elevated by more than twice the expected levels. Within this group, the highest ratios were recorded in Laverton (an SAR of 250\*\* and 15 admissions), Wongan-Ballidu (244\*\*; 19), Roebourne (241\*\*; 149), Kellerberrin (240; 16) and Merredin (238\*\*; 45).

Excluding SLAs with fewer than 20 admissions, the lowest ratios were in Augusta-Margaret River (with an SAR of 94), Capel (83) and Dardanup (74). There were no admissions of residents of the SLA of Ngaanyatjaraku.

Standardised admission ratios for bronchitis, emphysema and asthma were elevated by more than 25 per cent in all of the towns mapped other than Mandurah, where the SAR was 101. The highest ratios were in Geraldton (with an SAR of 201), Broome (189\*\*) and Albany (170\*\*).

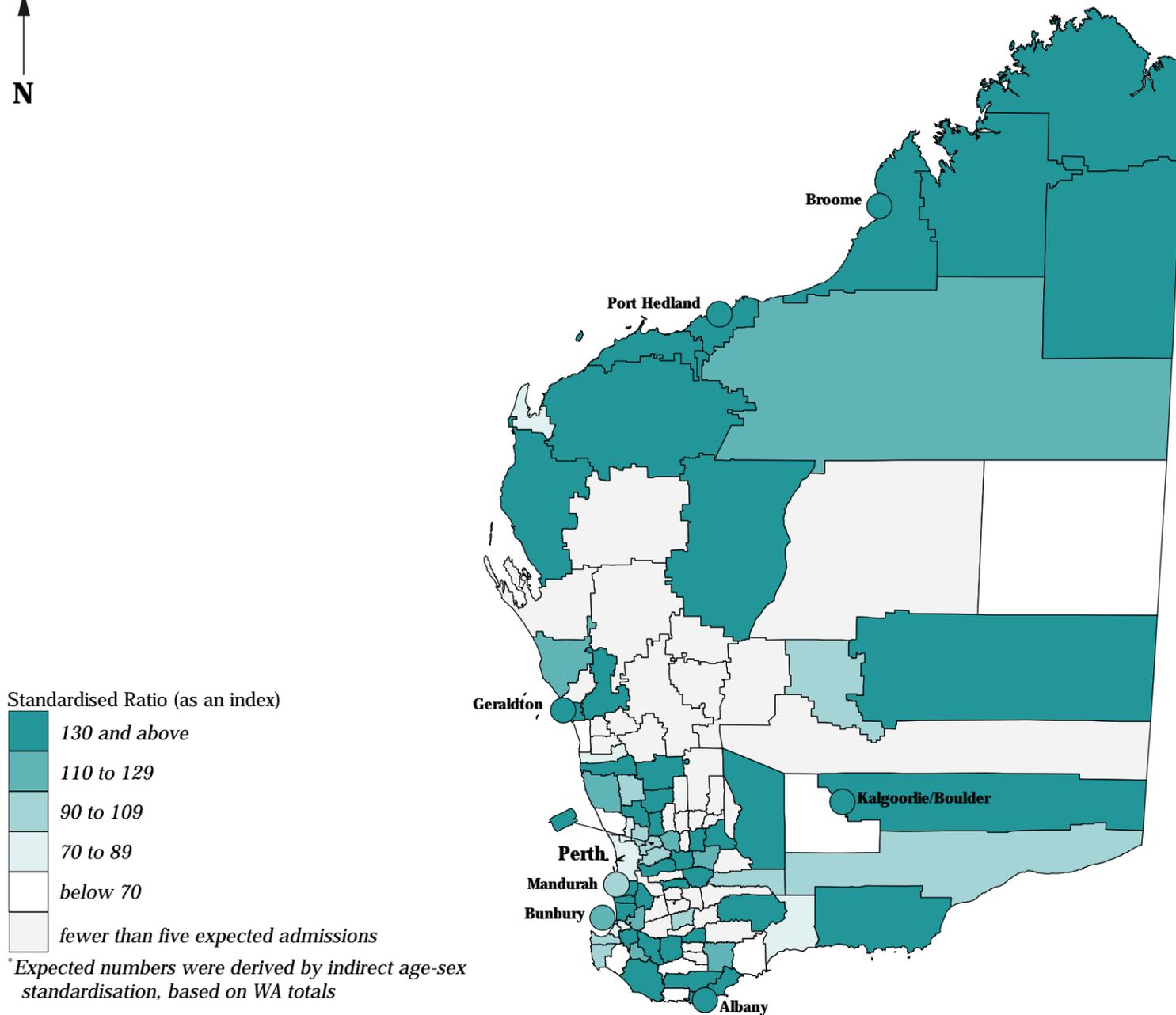
There were more than 200 admissions for bronchitis, emphysema and asthma of residents from Geraldton (212 admissions) and Mandurah (202), with 175 from Kalgoorlie/Boulder, 170 from Bunbury and 149 from Roebourne.

The correlation analysis was not undertaken as there were too many SLAs with small numbers of cases.

### Map 6.32

## Admissions for bronchitis, emphysema or asthma, Western Australia, 1995/96

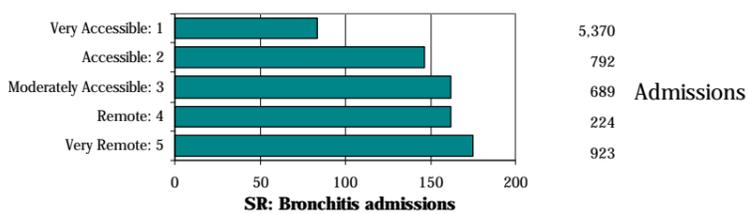
Standardised Ratio: number of admissions in each Statistical Local Area compared with the number expected\*



Source: See Data sources, Appendix 1.3

Details of map boundaries are in Appendix 1.2

### Accessibility/Remoteness Index of Australia



Standardised admission ratios (SARs) for bronchitis, emphysema or asthma also show a strong relationship with remoteness. The ratios more than double from an SAR of 84 in the Very Accessible category to an SAR of 175 in the Very Remote category, with similarly highly elevated ratios in the Moderately Accessible and Remote areas (both with a ratio of 162). There were almost fifty per cent more admissions for bronchitis, emphysema or asthma than expected from the State rates in the areas in the Accessible category (an SAR of 146).

Source: Calculated on ARIA classification, DHAC

National Social Health Atlas Project, 1999

# Admissions from accidents, poisonings and violence, 1995/96

## Capital city comparison (Australia as the Standard)

Standardised admission ratios (SARs) for admissions from the external causes of accidents, poisonings and violence (described below) varied between the capital cities, from a high of 112\*\* in **Hobart** to a low of 60\*\* in **Canberra** (Table 6.38).

Both **Adelaide** and **Perth** had substantially lower ratios in the later period shown in Table 6.38, suggesting a decline (relative to the Australian rates) in admissions from these combined causes. The SARs in **Sydney**, **Brisbane** and **Darwin** increased, suggesting an increase (relative to the Australian rates) in admissions over this period.

**Table 6.38: Admissions with an external cause of accidents, poisonings and violence, capital cities**  
*Age-sex standardised admission ratios*

	Sydney	Melbourne	Brisbane	Adelaide	Perth	Hobart	Darwin	Canberra <sup>1</sup>	All capitals
1995/96 <sup>2</sup>	92**	84**	95**	94**	86**	112**	111**	60**	90**
1989 <sup>3</sup>	78**	..	85**	114**	101	..	101	..	88**

<sup>1</sup>Includes Queanbeyan (C)

<sup>2</sup>Includes admissions to public acute hospitals and private hospitals, including admissions of same day patients

<sup>3</sup>Excludes same day admissions: for Sydney the period is 1989/90 and for Darwin it is 1987

Source: See *Data sources*, Appendix 1.3

Statistical significance: \* significance at 5 per cent; \*\* significance at 1 per cent

Accidents, poisonings and violence are a major cause of hospitalisation, accounting for nine per cent of all admissions analysed for Western Australian residents; 11.7 per cent of male admissions and 6.8 per cent of female admissions. Admissions arising from accidents, poisonings and violence are classified according to the external cause, that is, according to the circumstances of the accident or violence that produced the injury, as well as by the nature of the injury.

Accidents accounted for 90.2 per cent of admissions from these external causes, and were largely accidental falls (19.3 per cent of all admissions from these external causes) and motor vehicle traffic accidents (5.6 per cent). Admission rates for males were substantially higher for motor vehicle traffic accidents and injury purposely inflicted by another person; and for females, admission rates were higher for accidental falls and attempted suicide or self-inflicted injury.

Esterman et al. (1990) found that admission rates from these external causes are affected by socioeconomic status. They reported that, for postcode areas in Adelaide, "compared with the highest income areas, admission rates were 10% higher in the middle category and 26% higher in the poorest areas."

In 1996/97, intentional injury (ie. injury inflicted purposely by others) accounted for more hospital admissions for Indigenous people than transport accidents and accidental falls combined. There were almost seven times more hospital admissions for intentional injury than expected among Indigenous men and about twenty times more than expected for Indigenous women (based on all-Australian rates). Almost half (46%) of all admissions for females for intentional injury in Australia in 1996/97 were of women identified as Indigenous (ABS/AIHW 1999).

## Perth (Western Australia as the Standard)

There were 23,342 admissions of residents of **Perth** from the combined causes of accidents, poisonings and violence, 16 per cent fewer than expected from the State rates (an SAR of 84\*\*). Males accounted for over half (57.3 per cent) of the admissions.

There were only six SLAs with elevated ratios, three of which were located immediately to the east of the city centre (**Map 6.33**). The lowest ratios were recorded in SLAs located on the north bank of the Swan River, and between the city and the coast.

The highest standardised admission ratio was recorded in Vincent (an SAR of 121\*\*), with 21 per cent more admissions than expected from the State rates. The other elevated ratios were considerably lower, and were in Belmont (with an SAR of 108), Peppermint Grove (104), Bassendean (103), Cockburn (102) and Mundaring (101). In Fremantle, the number of admissions was at the level expected from the State rates.

The majority of SLAs in **Perth** had standardised admission ratios for accidents, poisonings and violence of between 85 and 100.

The lowest ratios were recorded in Stirling: South-Eastern (with an SAR of 49\*\*), Melville (58\*\*), Canning (61\*\*), the City of Perth (70\*\*), Wanneroo (74\*\*), and Serpentine-Jarrahdale and Stirling: West (both 81\*\*).

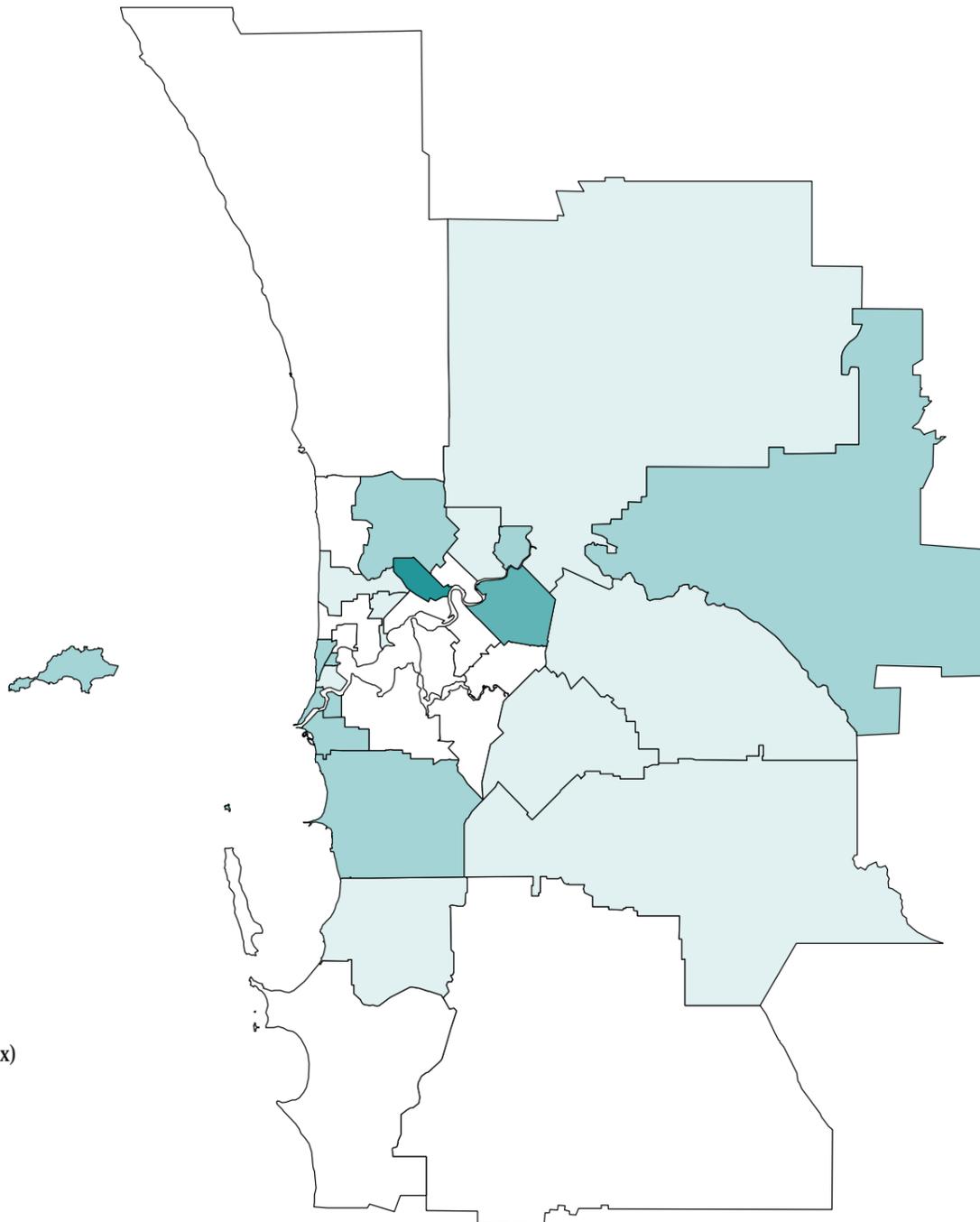
The largest numbers of admissions from accidents, poisonings and violence were recorded for residents of Wanneroo (3,156 admissions), Stirling: Central (2,276), Gosnells (1,455) and Swan (1,291). Cockburn, Rockingham, Stirling: West and Armadale also recorded more than 1,000 admissions.

There were weak correlations with the variables for the Indigenous population (0.30) and housing authority rented dwellings (0.27), and a weak inverse correlation with female labour force participation (-0.28). These results, together with the weak inverse correlation with the IRSD (-0.15), suggest the existence of an association at the SLA level between high rates of admissions for accident, poisonings and violence and socioeconomic disadvantage.

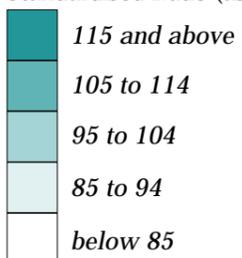
### Map 6.33

## Admissions from accidents, poisonings and violence, Perth, 1995/96

Standardised Ratio: number of admissions in each Statistical Local Area compared with the number expected\*



Standardised Ratio (as an index)



\*Expected numbers were derived by indirect age-sex standardisation, based on WA totals

Source: See Data sources, Appendix 1.3

Details of map boundaries are in Appendix 1.2  
National Social Health Atlas Project, 1999

# Admissions from accidents, poisonings and violence, 1995/96

## State/Territory comparison (Australia as the Standard)

With the exception of Tasmania, standardised admission ratios (SARs) for admissions from the external causes of accidents, poisonings and violence (described on the previous text page) were higher, and often substantially higher, for residents of the non-metropolitan areas than of the capital cities (**Table 6.39**). The most highly elevated ratios were in the Northern Territory (166\*\*), Queensland (147\*\*), Western Australia (146\*\*) and South Australia (138\*\*).

The SARs for the non-metropolitan areas of the Northern Territory and Western Australia declined between the two periods shown in **Table 6.39**, with the largest decline in the Northern Territory. The lower ratios in the later period suggest a decline (relative to the Australian rates) in admissions of non-metropolitan residents over this period. The higher ratio in the later period shown for Queensland suggests an increase (relative to the Australian rates) in admissions over this period.

**Table 6.39: Admissions with an external cause of accidents, poisonings and violence, State/Territory**  
*Age-sex standardised admission ratios*

	NSW	Vic	Qld	SA	WA	Tas	NT	ACT	Total
<b>1995/96<sup>1</sup></b>									
Capital city	92**	84**	95**	94**	86**	112**	111**	60**	90**
Other major urban centres <sup>2</sup>	89**	87**	96**	..	..	..	..	..	91**
Rest of State/Territory	114**	106**	147**	138**	146**	86**	166**	- <sup>3</sup>	124**
Whole of State/Territory	98**	90**	117**	106**	102**	97**	141**	60**	100
<b>1989<sup>4</sup></b>									
Rest of State/Territory	112**	..	128**	139**	171**	..	204**	..	129**

<sup>1</sup>Includes admissions to public acute hospitals and private hospitals, including admissions of same day patients

<sup>2</sup>Includes Newcastle and Wollongong (NSW); Geelong (Vic); and Gold Coast-Tweed Heads and Townsville-Thuringowa (Qld)

<sup>3</sup>Data unreliable: included with ACT total

<sup>4</sup>Excludes same day admissions: for New South Wales the period is 1989/90 and for Northern Territory it is 1987

Source: See *Data sources*, Appendix 1.3

Statistical significance: \* significance at 5 per cent; \*\* significance at 1 per cent

## Rest of State (Western Australia as the Standard)

There were 14,467 admissions of residents of the non-metropolitan areas of Western Australia from the combined causes of accidents, poisonings and violence, 43 cent more than expected from the State rates (an SAR of 143\*\*). The relatively higher rates of hospitalisation of people from the non-metropolitan areas in general and from these causes are discussed on page 185. In addition, the higher rates of hospitalisation of Indigenous people from these causes (see comments on page 179) may be an influence in the high standardised admission ratios recorded for some of the more remote areas. Males accounted for 59.7 per cent of the admissions.

As many of the ratios in **Map 6.34** are very high, the ranges mapped have been changed to enhance the pattern of differentiation in the map. The highest and lowest ranges have been set at 30 per cent variation from the standard, rather than 15 per cent as in the map of **Perth** for this variable. More than three quarters (78.4 per cent) of the SLAs for which data was mapped had elevated ratios (**Map 6.34**).

In Wiluna (with an SAR of 423\*\* and 36 admissions) and Halls Creek (422\*\*; 246) there were more than four times the number of admissions expected from the State rates, while in Derby-West Kimberley (357\*\*; 521), Wyndham-East Kimberley (344\*\*; 448), Upper Gascoyne (312\*\*; 17) and Laverton (300\*\*; 107), ratios were elevated by three times or more above the expected levels. A further 12 SLAs had ratios of above 200, with the highest in Meekatharra (an SAR of 298\*\* and 125 admissions), Broome (245\*\*; 450), Morawa (239\*\*; 52) and Dundas (231\*\*; 80).

Excluding SLAs with fewer than 20 admissions, the lowest ratios were recorded for residents in Dardanup (an SAR of 72\*\*), Exmouth (73), Chittering (76), Toodyay (77), Cunderdin (86) and Mandurah (86\*\*).

Of the towns mapped, the highest ratios were recorded in Broome (with an SAR of 245\*\*), Kalgoorlie/Boulder (194\*\*) and Port Hedland (168\*\*). Only Bunbury (94) and Mandurah (86\*\*) had fewer admissions from accidents, poisonings and violence than expected from the State rates.

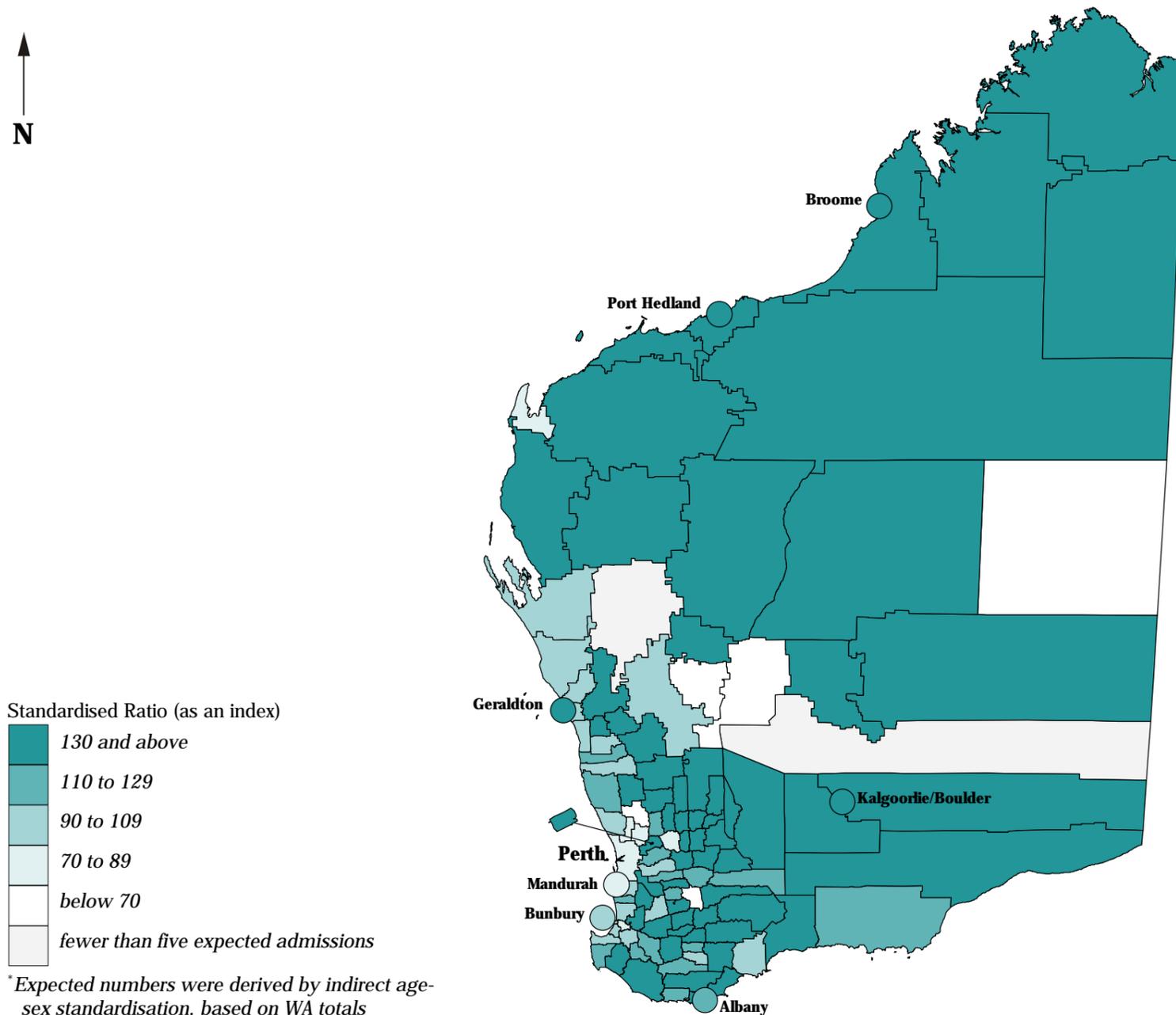
There were 1,188 admissions of residents of Kalgoorlie/Boulder for accidents, poisonings or violence, 739 from Mandurah, 635 from Geraldton, 597 from Bunbury, 545 from Roebourne and 521 from Derby-West Kimberley.

There were correlations of meaningful significance with the variables for the Indigenous population (0.64) and dwellings without a motor vehicle (0.50), and weaker correlations with housing authority rented dwellings (0.42) and single parent families (0.38). These results, together with the weak inverse correlation with the IRSD (-0.33), support the existence of an association at the SLA level between high ratios of admissions from accidents, poisonings and violence and socioeconomic disadvantage.

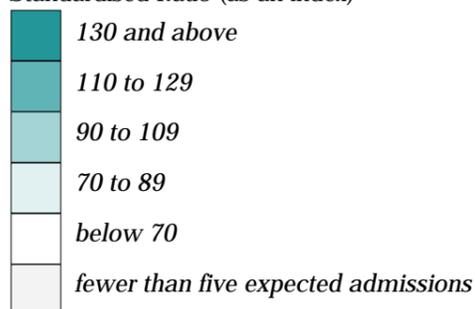
### Map 6.34

## Admissions from accidents, poisonings and violence, Western Australia, 1995/96

Standardised Ratio: number of admissions in each Statistical Local Area compared with the number expected\*



Standardised Ratio (as an index)

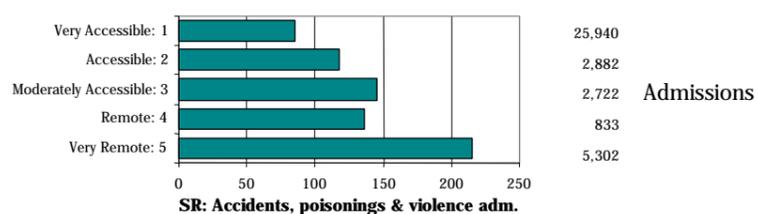


\*Expected numbers were derived by indirect age-sex standardisation, based on WA totals

Source: See Data sources, Appendix 1.3

Details of map boundaries are in Appendix 1.2

### Accessibility/Remoteness Index of Australia



Standardised admission ratios for admissions from the external causes of accidents, poisonings and violence increase across the ARIA categories in a step wise fashion. Ratios increase from a low SAR of 85 in the Very Accessible areas; to middle level ratios of 118, 145 and 136 in the Accessible, Moderately Accessible and Remote areas, respectively; and then increase by around fifty per cent, to an SAR of 215 in the areas in the Very Remote category.

Source: Calculated on ARIA classification, DHAC National Social Health Atlas Project, 1999

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# Principal procedures for admitted patients

## Introduction

There are variations in the rate at which particular procedures<sup>7</sup> are undertaken, both between the States and Territories and at a regional level within the States and Territories. Variations at a small area level can point to differences in health status, in access to and availability of services, and in clinical opinion and practice. They may also, in some instances, raise concerns as to possible over servicing.

## Data mapped

Details are presented in the following pages of a number of procedures. Some of these are periodically reported on at the State and Territory level as 'sentinel' procedures. Sentinel procedures are common, mostly elective, and considered to be discretionary: that is, there are often conservative or non-surgical alternatives (AIHW 1997). **Table 6.40** lists a number of sentinel procedures for which data have been published over some years. All but three of these procedures (coronary artery bypass graft,

<sup>7</sup>A procedure is an intervention that is surgical in nature, carries a procedural risk, carries an anaesthetic risk, requires specialised training, or requires special facilities or equipment only available in an acute setting (National Health Data Committee 1997).

angioplasty and cholecystectomy) are mapped in the following pages. The variable for myringotomy is not one of the nationally published sentinel procedures but has been included in this analysis because rates vary widely at the spatial level.

Descriptions of the procedures for which details are mapped are included in the text accompanying the maps.

In the majority of cases, the procedure is the principal procedure, that is the most significant procedure for treatment of the principal diagnosis. The exception is the variable for lens insertion, for which all recorded procedures were examined, as the extraction of the old lens is often the principal procedure.

Western Australia has a standardised admission rate lower than the average of the other States for about two thirds of these procedures, with the rates for coronary artery bypass graft, cholecystectomy and endoscopy being well below the *Other States*' rate (**Table 6.40**).

**Table 6.40: Admission rates for selected sentinel procedures, public and private hospitals, 1996/1997**

Sentinel procedure	Standardised admission rates <sup>1</sup>		
	Western Australia	Other States	Difference
Appendectomy	1.50	1.41	6.0**
Coronary artery bypass graft	0.53	0.94	-43.1**
Angioplasty	0.77	0.72	7.1*
Caesarean section	2.70	2.80	-3.3*
Cholecystectomy	1.78	2.23	-20.2**
Endoscopy	20.60	24.33	-15.3**
Hip replacement	1.02	1.00	2.4
Hysterectomy	1.84	1.84	0.0
Lens insertion	4.94	5.06	-2.4*
Myringotomy	2.11	2.32	-9.0**
Tonsillectomy	1.81	1.86	-2.7

<sup>1</sup>Admission rates have been produced by direct standardisation

Indicates difference is significant at the 5 per cent (\*) and 1 per cent (\*\*) levels

Source: Australian Hospital Statistics, AIHW, June 1998

## Earlier studies

Renwick and Sadkowsky (1991) reported on age sex standardised ratios for a number of surgical procedures using data from 1986. Those procedures for which comparable data are also available for 1996/97 are shown in **Table 6.41**. Standardised admission ratios in Western Australia were higher (relative to the Australian rates) in 1996/97 than they were in 1986 for all of the procedures shown in the table, with the exception of Caesarean section.

**Table 6.41: Standardised admission ratios<sup>1</sup> for selected surgical procedures, Western Australia**

Procedure	1986	1996/97
Appendectomy	110.0	104.9
Caesarean section	95.4	96.8
Cholecystectomy	91.8	81.7
Hip replacement	121.7	102.0
Hysterectomy	116.9	100.0
Lens insertion	109.6	97.8
Tonsillectomy	107.4	97.3

<sup>1</sup>Admission ratios are age- and sex-standardised to the Australian population

Source: 1986 data from Renwick, M. & Sadkowsky, K. *Variations in surgery rates*, Australian Institute of Health & Welfare: 1996/97 data based on Australian Hospital Statistics, Australian Institute of Health & Welfare, June 1998

## Context

### Australia

There were 2,593,937 admissions to public acute and private hospitals (including day surgery facilities) in Australia at which at least one surgical procedure was performed. These 2.5 million admissions represented 54.3 per cent of all admissions studied in this project (which includes all acute admissions, other than for renal dialysis). Nearly two thirds (63.0 per cent) of the admissions involving a procedure were of residents of the capital cities (which comprise 62.8 per cent of Australia's population).

A further 7.2 per cent were of residents of the other major urban centres and 29.8 per cent were of residents of the non-metropolitan areas. Females accounted for 57.3 per cent of admissions, varying from 58.2 per cent of admissions of residents of the capital cities to 55.7 of non-metropolitan residents. Less than half (46.3 per cent) of these principal procedures were performed on a same day basis, with males having slightly more procedures on a same day basis (47.2 per cent of all male principal procedures, compared with 45.6 per cent for females).

### Western Australia

In 1995/96, there were 231,465 admissions of residents of Western Australia to public acute and private hospitals (including day surgery facilities), 8.9 per cent of all admissions in Australia, at which at least one surgical procedure was performed. These admissions involving a procedure represented 55.0 per cent of all admissions of residents of Western Australia in this analysis (which includes all acute admissions, other than for renal dialysis). Almost three quarters (73.7 per cent) of the admissions were for residents of **Perth** (which comprises 72.1 per cent of the State's population) and 26.3 per cent were of residents of the non-metropolitan areas of Western Australia. Females accounted for 57.1 per cent of the admissions, varying from 57.3 per cent of admissions of residents of **Perth** to 56.5 of non-metropolitan residents. Less than half (43.9 per cent) of the procedures were performed on a same day basis, with males having slightly more principal procedures on a same day basis (45.8 per cent of all male principal procedures compared with 42.5 per cent for females).

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# Admissions for surgical procedures, 1995/96

## Capital city comparison (Australia as the Standard)

There were 1,636,292 admissions of residents of the capital cities (and an additional 186,672 admissions of residents of other major urban centres) to public acute and private hospitals (including day surgery facilities) at which at least one surgical procedure was performed. Although the *All capitals* average was at the level expected from the Australian rates, standardised admission ratios (SARs) for the individual capitals varied from eight per cent more admissions (than expected from the Australian rates) for a surgical procedure in **Darwin**, to 30 per cent fewer admissions in **Canberra**.

**Table 6.42: Admissions<sup>1</sup> for surgical procedures, capital cities, 1995/96**  
**Standardised separation ratios**

Sydney	Melbourne	Brisbane	Adelaide	Perth	Hobart	Darwin	Canberra <sup>2</sup>	All capitals
99**	101**	101**	107**	95**	107**	108**	70**	100

<sup>1</sup>Includes admissions to public acute hospitals, private hospitals and day surgery facilities, including admissions of same day patients

<sup>2</sup>Includes Queanbeyan (C)

Source: See *Data sources*, Appendix 1.3

Statistical significance: \* significance at 5 per cent; \*\* significance at 1 per cent

Just over a half (55.0 per cent) of the admissions to acute hospitals of residents of Western Australia in 1995/96 involved a surgical procedure. Females accounted for 57.1 per cent of such admissions, and males for 42.9 per cent. For females, admission rates were highest in the 20 to 39 year age groups, while for males, rates were most common among those aged from their late fifties, increasing with each age group (**Figure 6.9**, page 184).

## Perth (Western Australia as the Standard)

In 1995/96, there were 170,517 admissions of residents of **Perth** for surgical procedures; this was at the level expected from the State rates (an SAR of 100). Females accounted for over half (57.3 per cent) of these admissions.

Most SLAs had standardised admission ratios in the middle range mapped (**Map 6.35**). The highest ratio was recorded for residents in Cockburn (an SAR of 133\*\* and 9,559 admissions), with 33 per cent more admissions for a surgical procedure than were expected from the State rates. Elevated ratios were also recorded in Gosnells (with an SAR of 120\*\* and 11,129 admissions), Kwinana (114\*\*; 2,951), Stirling: Central (111\*\*; 16,663), Rockingham (111\*\*; 8,784), Belmont (107\*\*; 4,272), Kalamunda (106\*\*; 6,619), Vincent (105\*\*; 3,092) and Wanneroo (105\*\*; 26,566).

The lowest ratio was recorded in Stirling: South-Eastern (an SAR of 41\*\*), with other low ratios in the City of Perth (50\*\*), Canning (71\*\*) and Melville (82\*\*).

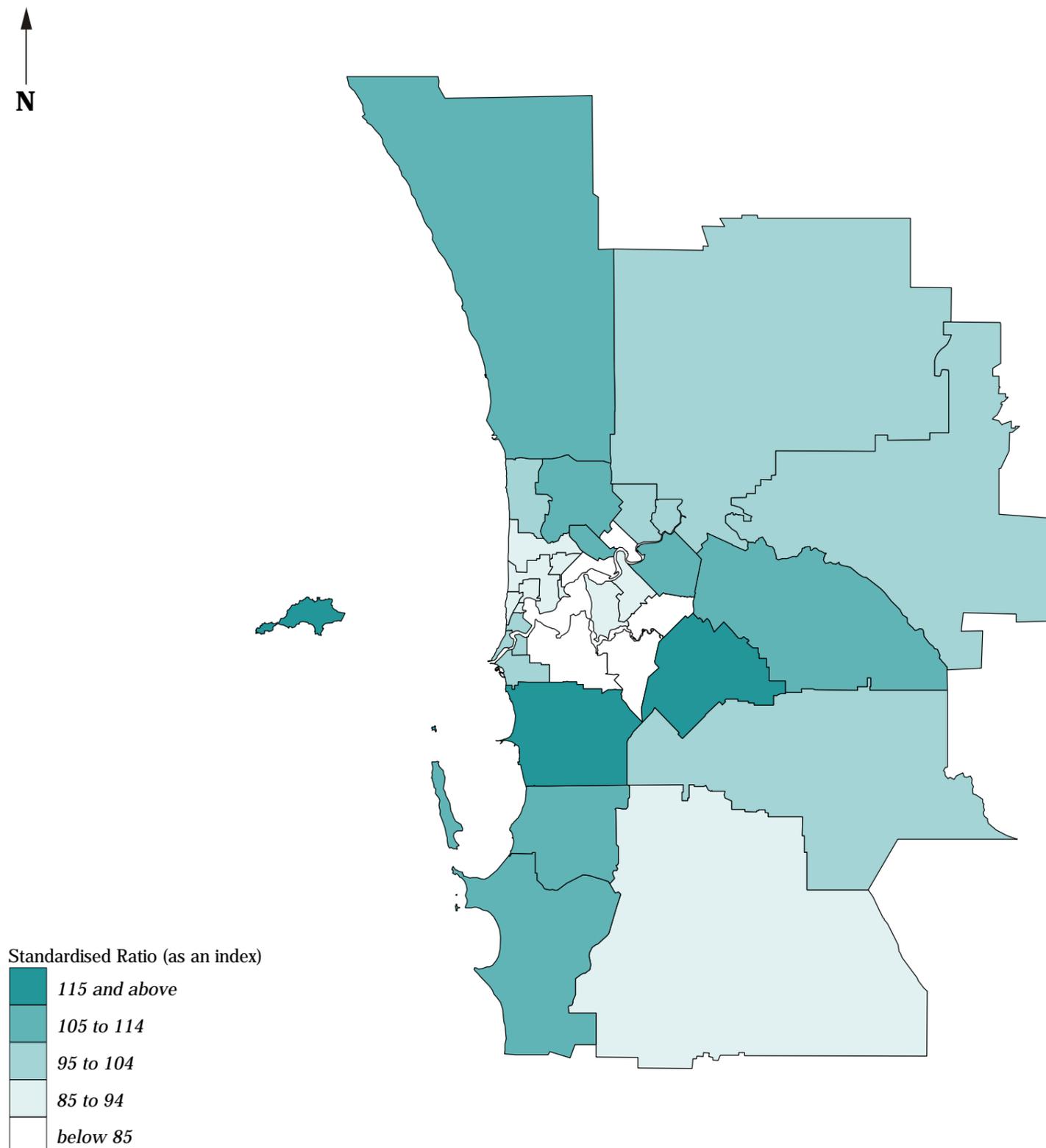
More than 10,000 admissions involving a surgical procedure were recorded for residents of Wanneroo (26,566 admissions), Stirling: Central (16,663), Gosnells (11,129) and Melville (10,765).

There were correlations of meaningful significance with the variables for unskilled and semi-skilled workers (0.56) and early school leavers (0.51), and inverse correlations with managers and administrators, and professionals (-0.51) and high income families (-0.45 respectively). These results, together with the inverse correlation with the IRSD (-0.45), support the existence of an association between high rates of admissions for a surgical procedure and socioeconomic disadvantage.

### Map 6.35

## Admissions for surgical procedures, Perth, 1995/96

Standardised Ratio: number of admissions in each Statistical Local Area compared with the number expected\*



\*Expected numbers were derived by indirect age-sex standardisation, based on WA totals

Source: See Data sources, Appendix 1.3

Details of map boundaries are in Appendix 1.2  
National Social Health Atlas Project, 1999

# Admissions for surgical procedures, 1995/96

## State/Territory comparison (Australia as the Standard)

There were 770,971 admissions of residents of the non-metropolitan areas to public acute and private hospitals (including day surgery facilities) at which at least one surgical procedure was performed. With the exception of Victoria and Western Australia, the standardised admission ratios (SARs) in the *Rest of State/Territory* areas are lower than those recorded for the capital cities. The Northern Territory, Tasmania and South Australia had largest differentials in ratios between the *Capital City* and *Rest of State/Territory* areas.

**Table 6.43: Admissions<sup>1</sup> for surgical procedures, State/Territory, 1995/96**  
**Standardised admission ratios**

	NSW	Vic	Qld	SA	WA	Tas	NT	ACT	Total
Capital city	99**	101**	101**	107**	95**	107**	108**	70**	100
Other major urban centres <sup>2</sup>	103**	90**	102**	..	..	..	..	..	102**
Rest of State/Territory	99**	104**	98**	104**	96**	95**	95**	- <sup>3</sup>	100*
Whole of State/Territory	100	102**	100	106**	96**	100	101	70**	100

<sup>1</sup>Includes admissions to public acute hospitals, private hospitals and day surgery facilities, including admissions of same day patients

<sup>2</sup>Includes Newcastle and Wollongong (NSW); Geelong (Vic); and Gold Coast-Tweed Heads and Townsville-Thuringowa (Qld)

<sup>3</sup>Data unreliable: included with ACT total

Source: See *Data sources*, Appendix 1.3

Statistical significance: \* significance at 5 per cent; \*\* significance at 1 per cent

## Rest of State (Western Australia as the Standard)

There were 60,947 admissions of residents of the non-metropolitan areas of Western Australia in 1995/96 for surgical procedures; this was at the level expected from the State rates (an SAR of 100). Females accounted for over half (56.5 per cent) of these admissions.

Standardised admission ratios for a surgical procedure were elevated by more than 50 per cent above the levels expected from the State rates in Wiluna (with an SAR of 187\*\* and 94 admissions) and Menzies (151\*\*; 46). Other SLAs with elevated ratios were Ravensthorpe (an SAR of 142\*\* and 262 admissions), Koorda (132\*\*; 94), Dundas (131\*\*; 264), Kalgoorlie/Boulder (129\*\*; 4,347), Mount Marshall (125\*; 114) and Albany Shire (121\*\*; 1,947).

Excluding SLAs with fewer than 20 admissions, the lowest ratios were in Exmouth (with an SAR of 58\*\*), Mullewa (60\*\*), Mount Magnet (61\*\*), Goomalling (63\*\*) and Three Springs (65\*\*).

Five of the seven towns mapped had more admissions of residents for a surgical procedure than expected from the State rates. The highest ratios were recorded in Kalgoorlie/Boulder (129\*\*) and Port Hedland (116\*\*). Mandurah (97\*) and Broome (95) both had slightly fewer admissions than expected.

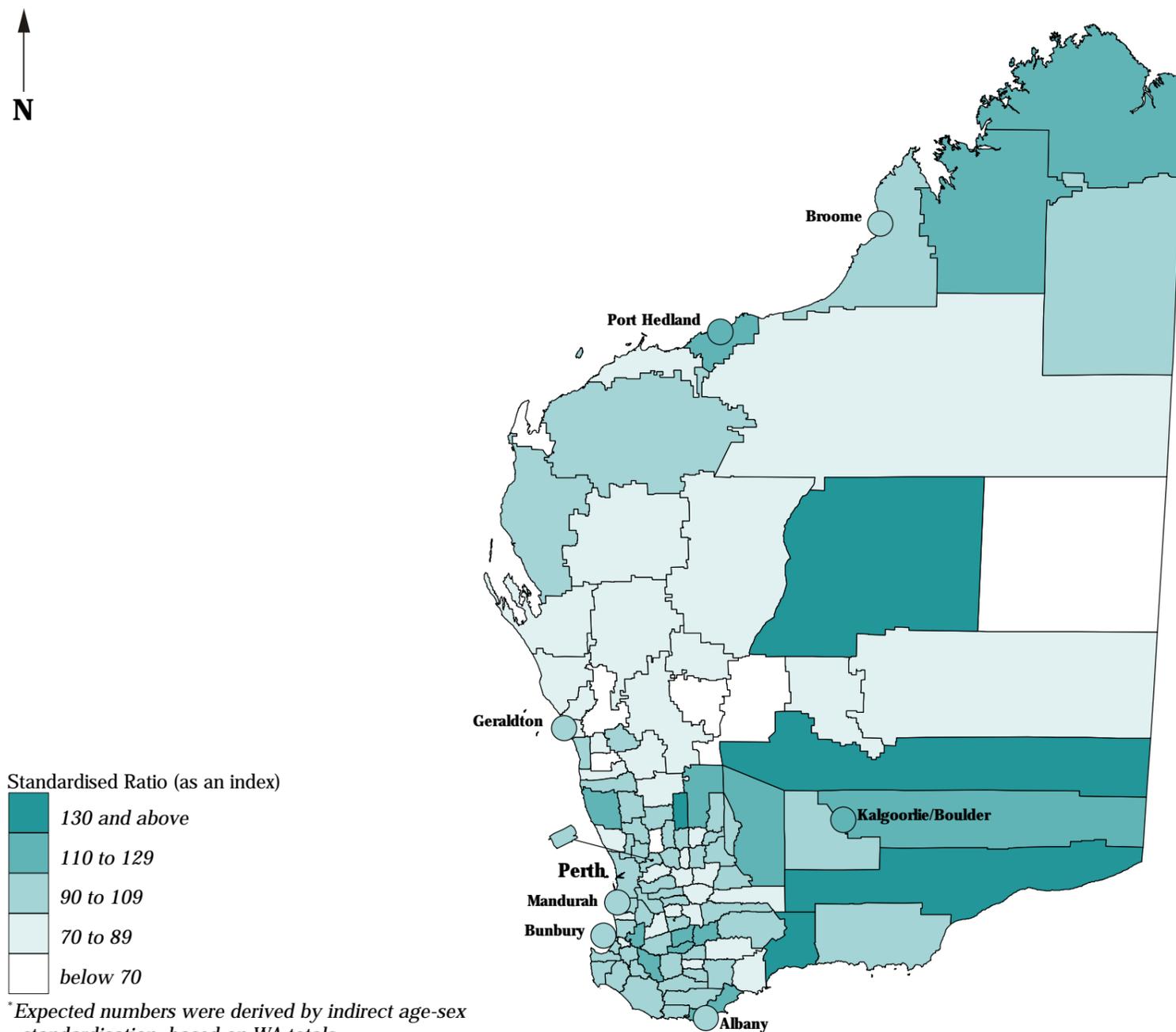
The largest numbers of admissions for a surgical procedure were recorded for residents of Mandurah (5,474 admissions), Kalgoorlie/Boulder (4,347), Bunbury (3,966), Geraldton (3,006) and Busselton (2,546).

There was no consistent evidence of an association at the SLA level between high rates of admissions of residents of the non-metropolitan areas of Western Australia for a surgical procedure and socioeconomic status.

### Map 6.36

## Admissions for surgical procedures, Western Australia, 1995/96

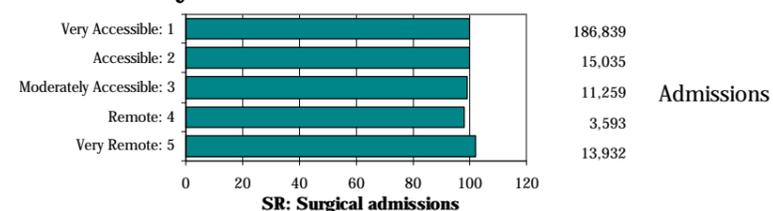
Standardised Ratio: number of admissions in each Statistical Local Area compared with the number expected\*



Source: See Data sources, Appendix 1.3

Details of map boundaries are in Appendix 1.2

### Accessibility/Remoteness Index of Australia



Standardised admission ratios for admissions involving a surgical procedure were close to the level expected from the State rates across all of the ARIA categories, with a marginally higher ratio in the Very Remote category (an SAR of 102) and a marginally lower ratio in the Remote category (an SAR of 98).

Source: Calculated on ARIA classification, DHAC National Social Health Atlas Project, 1999

## Same day admissions for surgical procedures, 1995/96

### Capital city comparison (Australia as the Standard)

There were 776,311 same day admissions of residents of the capital cities and 90,521 admissions of residents of the other major urban centres to public acute and private hospitals (including day surgery facilities) at which at least one surgical procedure was performed. These admissions represent 47.5 per cent of all admissions involving a surgical procedure.

The standardised admission ratios (SARs) ranged from 64\*\* in **Canberra** and 72\*\* in **Darwin** to 111\*\* in **Melbourne** and 104\*\* in **Sydney**. When compared with ratios for all admissions for surgical procedures (**Table 6.42**), standardised admission ratios (SARs) for same day admissions involving a surgical procedure (**Table 6.44**) are higher in **Sydney** and lower in **Hobart**, relative to the Australian rates. The lower rate in **Hobart** is likely to reflect the historically slower rate of take-up of same day procedures in Tasmania, a trend that is being rapidly reversed.

**Table 6.44: Same day admissions<sup>1</sup> for surgical procedures, capital cities, 1995/96**  
*Standardised admission ratios*

Sydney	Melbourne	Brisbane	Adelaide	Perth	Hobart	Darwin	Canberra <sup>2</sup>	All capitals
104**	111**	102**	101**	93**	87**	72**	64**	102**

<sup>1</sup>Includes admissions to public acute hospitals, private hospitals and day surgery facilities

<sup>2</sup>Includes Queanbeyan (C)

Source: See *Data sources*, Appendix 1.3

Statistical significance: \* significance at 5 per cent; \*\* significance at 1 per cent

Just under half (43.9 per cent) of all admissions of residents of Western Australia in 1995/96 involving a surgical procedure were same day admissions. Females accounted for over half (55.3 per cent) of same day admissions. Admission rates were higher for females than for males in the age groups from 10 to 14 years through to 50 to 59 years (**Figure 6.10**, page 184). For males, the largest differentials over the rates for females were in the 0 to 9 year age groups and from age 60 years.

### Perth (Western Australia as the Standard)

There were 76,881 same day admissions of residents of **Perth** for surgical procedures in 1995/96, 3 per cent more than were expected from the State rates (an SAR of 103\*\*). Females accounted for over half (55.4 per cent) of these same day admissions.

The distribution of the highest standardised admission ratios for same day surgical procedures was mainly concentrated in an area extending from Swan, south through Belmont to Gosnells, and then across to Cockburn on the coast and south to Rockingham (**Map 6.37**).

In Cockburn (with an SAR of 134\*\*), there were 34 per cent more admissions for same day surgical procedures than were expected from the State rates. Elevated SARs were also recorded in Gosnells and Kwinana (both with an SAR of 117\*\*), Rockingham and Stirling: Central (115\*\*) and Kalamunda and Wanneroo (both 110\*\*).

The only relatively low ratios were recorded for residents of Stirling: South-Eastern (an SAR of 42\*\*), the City of Perth (48\*\*) and Canning (73\*\*).

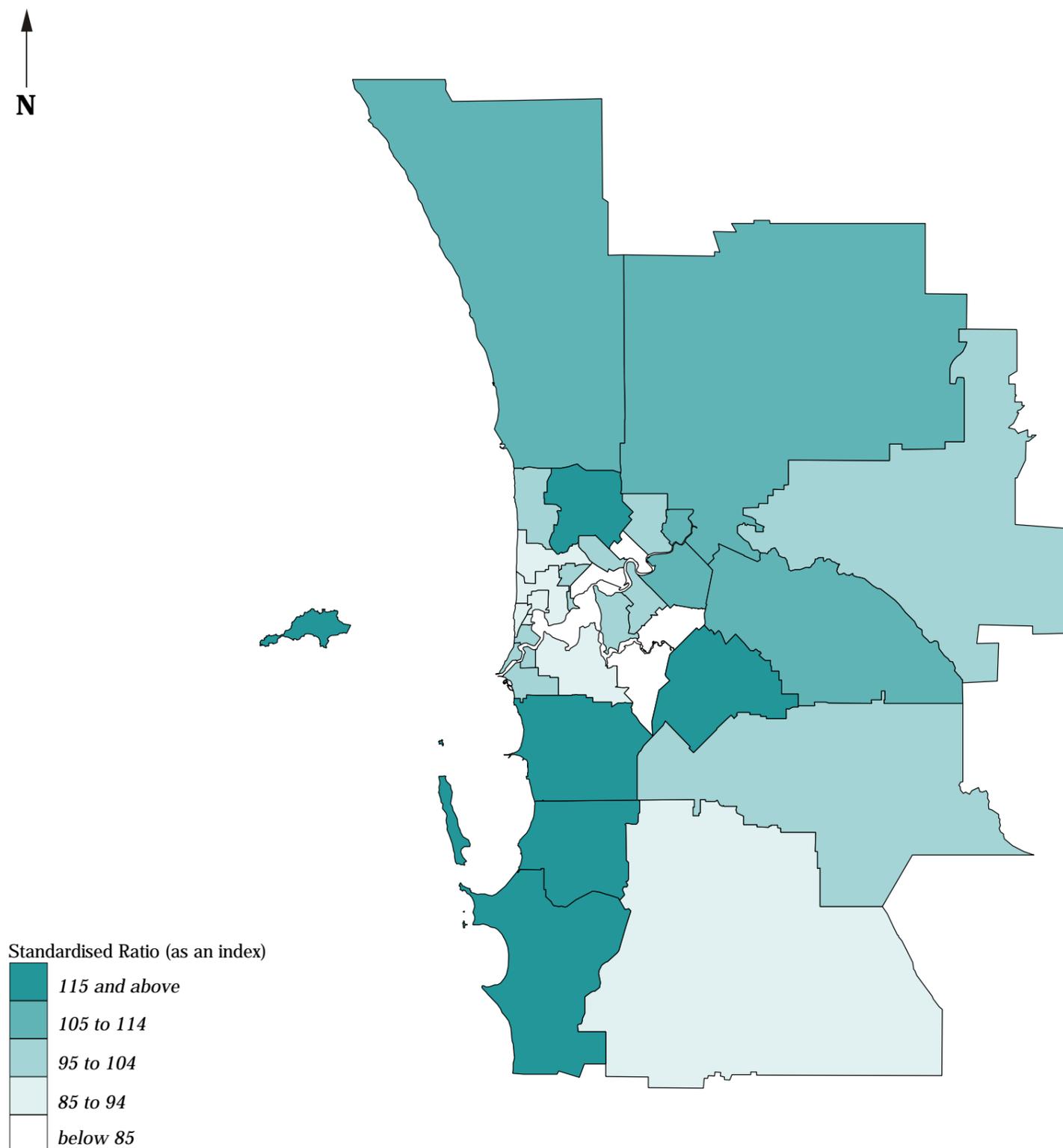
The largest number of same day admissions was recorded for people from the large northern SLA of Wanneroo, with 12,544 same day admissions. The next largest numbers were in Stirling: Central (7,470 admissions), Melville (5,021), Gosnells (4,860) and Cockburn (4,307).

There was a correlation of meaningful significance with the variable for unskilled and semi-skilled workers (0.52), and weaker correlations with early school leavers (0.46) and the Indigenous population (0.41). Inverse correlations were recorded with the variable for managers and administrators, and professionals (-0.48), female labour force participation (-0.47) and high income families (0.41). These results, together with the inverse correlation with the IRSD (-0.40), indicate the existence of an association at the SLA level between high rates of same day admissions for a surgical procedure and socioeconomic disadvantage.

### Map 6.37

## Same day admissions for surgical procedures, Perth, 1995/96

Standardised Ratio: number of admissions in each Statistical Local Area compared with the number expected\*



\*Expected numbers were derived by indirect age-sex standardisation, based on WA totals

Source: See Data sources, Appendix 1.3

Details of map boundaries are in Appendix 1.2  
National Social Health Atlas Project, 1999

## Same day admissions for surgical procedures, 1995/96

### State/Territory comparison (Australia as the Standard)

There were 334,448 same day admissions of residents of the non-metropolitan areas to public acute and private hospitals (including day surgery facilities) at which at least one surgical procedure was performed. These admissions represent 43.4 per cent of all admissions involving a surgical procedure.

Standardised admission ratios (SARs) in the *Rest of State/Territory* category in **Table 6.45** are lower than those in the capital cities for all States and the Northern Territory. The SAR for the non-metropolitan areas was highest in Victoria (105\*\*), and that in the Northern Territory (62\*\*) was the lowest.

**Table 6.45: Same day admissions<sup>1</sup> for surgical procedures, State/Territory, 1995/96**  
*Standardised admission ratios*

	NSW	Vic	Qld	SA	WA	Tas	NT	ACT	Total
Capital city	104**	111**	102**	101**	93**	87**	72**	64**	102**
Other major urban centres <sup>2</sup>	110**	79**	109**	..	..	..	..	..	107**
Rest of State/Territory	96**	105**	88**	90**	84**	81**	62**	- <sup>3</sup>	93**
Whole of State/Territory	102**	108**	97**	98**	90**	84**	67**	63**	100

<sup>1</sup>Includes admissions to public acute hospitals, private hospitals and day surgery facilities

<sup>2</sup>Includes Newcastle and Wollongong (NSW); Geelong (Vic); and Gold Coast-Tweed Heads and Townsville-Thuringowa (Qld)

<sup>3</sup>Data unreliable: included with ACT total

Source: See *Data sources*, Appendix 1.3

Statistical significance: \* significance at 5 per cent; \*\* significance at 1 per cent

### Rest of State (Western Australia as the Standard)

There were 24,824 same day admissions of residents of the non-metropolitan areas of Western Australia for a surgical procedure in 1995/96, eight per cent fewer than were expected from the State rates (an SAR of 92\*\*). Over half (55.0 per cent) were admissions of females.

There were only 14 non-metropolitan SLAs (12.4 per cent of all SLAs) with elevated ratios for a same day surgical procedure. Most of these were in the State's south-west region, or in areas relatively close to a regional population centre (**Map 6.38**).

The highest ratio was in Ravensthorpe, with 93 per cent more same day admissions for a surgical procedure than were expected from the State rates (an SAR of 193\*\* and 159 admissions). Relatively high ratios were also recorded in Albany Shire (an SAR of 138\*\*), Kalgoorlie/Boulder (134\*\*), Denmark (127\*\*), the town of Albany (126\*\*), Dundas (121\*\*) and Coolgardie (120\*\*).

Areas with ratios lower than expected from the State rates were widespread throughout Western Australia. Excluding SLAs with fewer than 20 admissions, the lowest ratio was in Halls Creek (28\*\*), with 72 per cent fewer admissions than expected. Very low ratios were also recorded for residents of Exmouth and Mount Magnet (both with an SAR of 36\*\*) and Mullewa (38\*\*).

In the towns, same day admissions for surgical procedures were elevated by more than 10 per cent in Kalgoorlie/Boulder (an SAR of 134\*\*), Albany (126\*\*), Geraldton (113\*\*) and Bunbury (110\*\*). The lowest admission ratios occurred in Broome (58\*\*) and Mandurah (91\*\*).

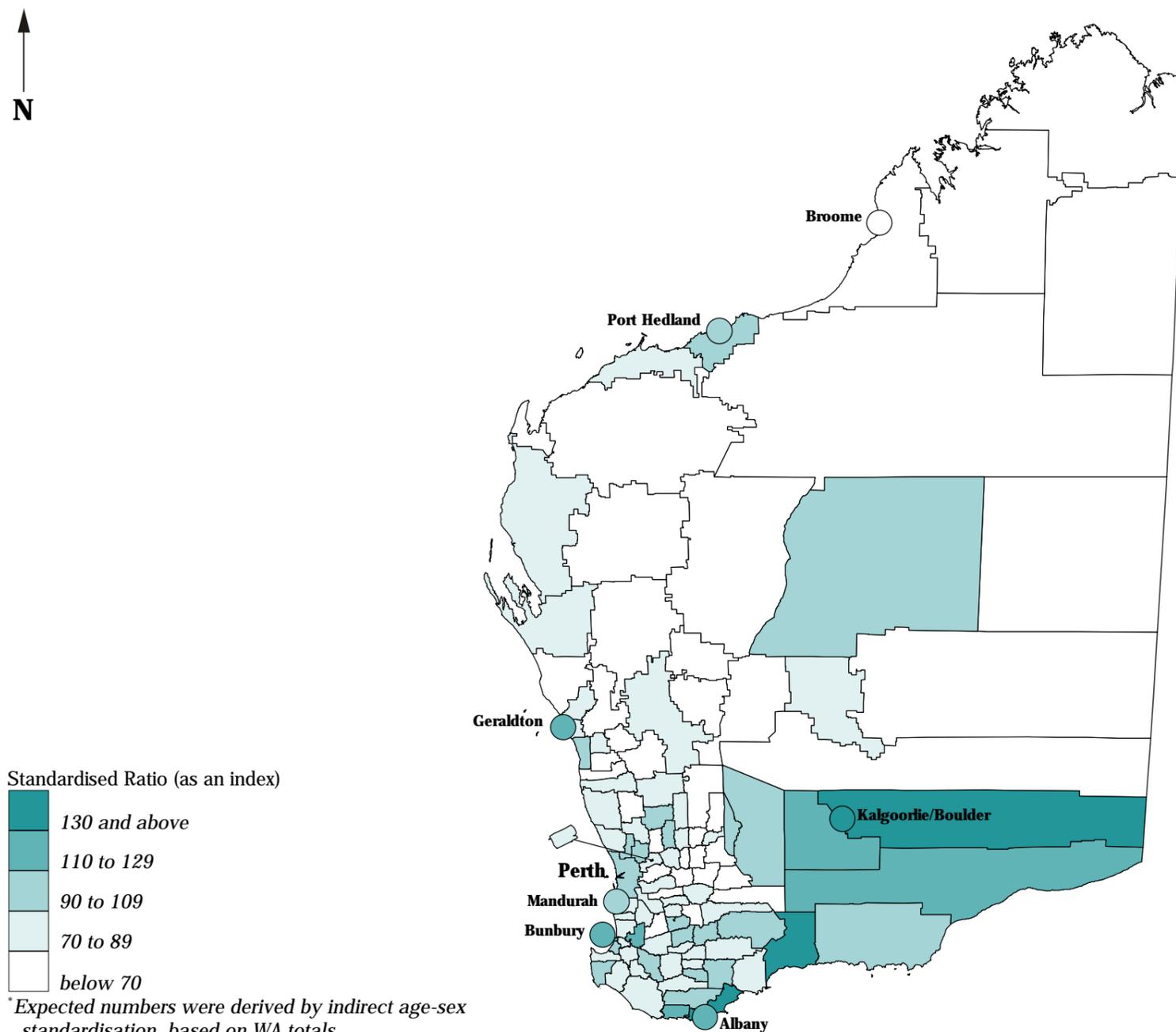
There were more than 1,000 admissions of residents of Mandurah (2,255 admissions), Kalgoorlie/Boulder (2,003), Bunbury (1,834), Geraldton (1,401), the town of Albany (1,255) and Albany Shire (1,002).

There was no consistent evidence of an association at the SLA level between high rates of same day admissions of residents of the non-metropolitan areas of Western Australia for a surgical procedure and socioeconomic status.

### Map 6.38

## Same day admissions for surgical procedures, Western Australia, 1995/96

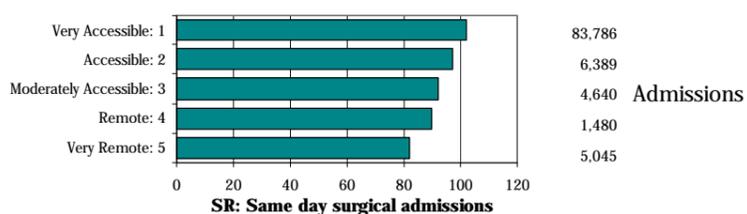
Standardised Ratio: number of admissions in each Statistical Local Area compared with the number expected\*



Source: See Data sources, Appendix 1.3

Details of map boundaries are in Appendix 1.2

### Accessibility/Remoteness Index of Australia



Standardised admission ratios for same day admissions involving a surgical procedure show a markedly different pattern to that evident for all surgical admissions, with lower ratios associated with increasing remoteness, reflecting the lack of these services outside of the most accessible areas. Ratios decline evenly across the ARIA categories, from a high of 101 in the Very Accessible areas to a low of 82 in the Very Remote areas.

Source: Calculated on ARIA classification, DHAC  
National Social Health Atlas Project, 1999

# Admissions for tonsillectomy and/or adenoidectomy, 1995/96

## Capital city comparison (Australia as the Standard)

There were 19,896 procedures for tonsillectomy and/or adenoidectomy (described below) performed as a principal procedure on residents of the capital cities (and an additional 2,305 on residents of other major urban centres). Standardised admission ratios (SARs) for these procedures varied widely between the capital cities (**Table 6.46**), from a low of 65\*\* in **Canberra** to a high of 136\*\* (more than double the ratio in **Canberra**) in **Adelaide**.

**Table 6.46: Admissions<sup>1</sup> with a principal procedure of tonsillectomy and/or adenoidectomy, capital cities, 1995/96**  
*Standardised admission ratios*

Sydney	Melbourne	Brisbane	Adelaide	Perth	Hobart	Darwin	Canberra <sup>2</sup>	All capitals
89**	109**	101	136**	95*	71**	71**	65**	100

<sup>1</sup>Includes admissions to public acute hospitals, private hospitals and day surgery facilities, including admissions of same day patients

<sup>2</sup>Includes Queanbeyan (C)

Source: See *Data sources*, Appendix 1.3

Statistical significance: \* significance at 5 per cent; \*\* significance at 1 per cent

Tonsillectomies involve the removal of a person's tonsils where, for example, there has been repeated infection of the tonsils over an extended period.

A majority of admissions for these procedures of residents of Western Australia were aged under 30 years. The largest number and rate of admissions for a tonsillectomy and/or adenoidectomy was for the 5 to 9 year age group, with 732.9 admissions per one hundred thousand females and 643.4 admissions per one hundred thousand males. Up until the age of 39 years, females had the highest admission rates for all except for the 0 to 4 year age group (with 440.9 admissions per 100,000 females compared with 593.0 admissions per 100,000 males) and with substantially higher rates than for males in the age groups from 10 to 24 years. Overall, 56.6 per cent of admissions were females.

Data for Australia published by the AIHW (1998) showed the tonsillectomy and/or adenoidectomy rate in Western Australia to be 2.7 per cent below that in the other States for which data were available (**Table 6.40**, page 259).

## Perth<sup>8</sup> (Western Australia as the Standard)

In 1995/96, there were 2,160 admissions for tonsillectomies and/or adenoidectomies in **Perth**, marginally more than expected from the State rates (an SAR of 101). Over half (56.2 per cent) of the admissions were for females.

There were two main areas with SLAs in **Perth** recording highly elevated ratios. One was located in the south-west and another was centred on the Wanneroo/Stirling: Central area. The lowest ratios were recorded in the older areas to the north of the Swan River, between the city centre and the coast.

Both Rockingham and Kwinana had 46 per cent more admissions than expected from the State rates (146\*\*). Elevated ratios were also recorded in Cockburn (an SAR of 130\*\*), South Perth (118), Wanneroo (118\*\*), Gosnells (116) and Stirling: Central (115). Only four other SLAs had elevated ratios.

The lowest ratios were in Peppermint Grove (with an SAR of 34), Stirling: South-Eastern (37\*\*), the City of Perth (47), Cottesloe (48), Mosman Park (52) and Subiaco (55).

There were more than 100 admissions for a tonsillectomy and/or adenoidectomy of residents of Wanneroo (460 admissions), Stirling: Central (182), Gosnells (163), Rockingham (154), Cockburn (139), Swan (129) and Melville (110).

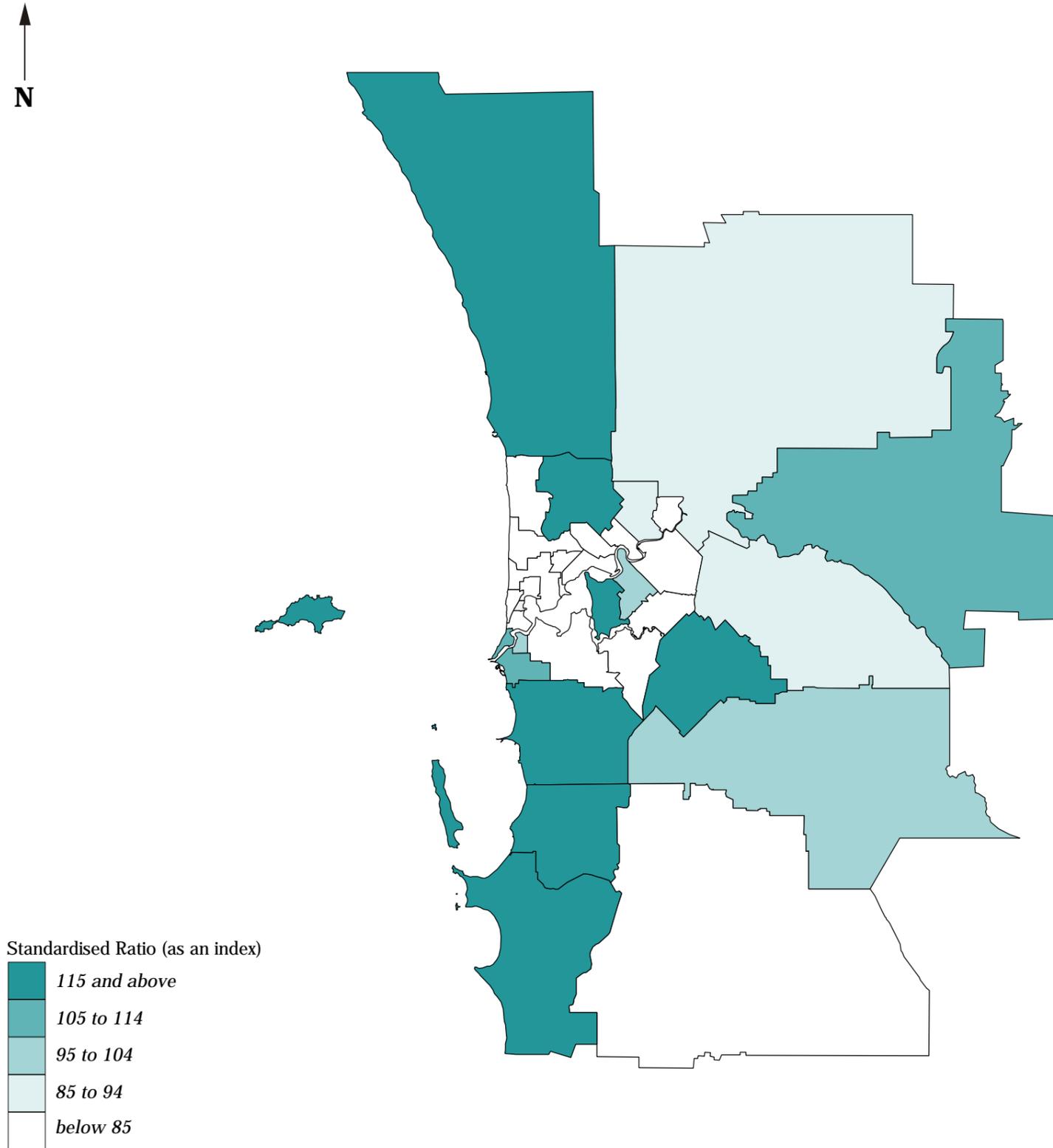
There were correlations of meaningful significance with the variables for early school leavers (0.58), children aged 0 to 4 years (0.57) and unskilled and semi-skilled workers (0.57). Inverse correlations of meaningful significance were recorded with the variables for female labour force participation (-0.63), managers and administrators, and professionals (-0.59) and high income families (-0.57). These results, together with the inverse correlation of meaningful significance with the IRSD (-0.53), indicate the existence of an association between high rates of admissions for tonsillectomy and/or adenoidectomy procedures and socioeconomic disadvantage.

<sup>8</sup>As there were relatively few areas with sufficient cases to analyse for this variable in the non-metropolitan areas of Western Australia, the data have not been mapped. A summary of the main features is on page 291.

### Map 6.39

## Admissions for a tonsillectomy and/or adenoidectomy, Perth, 1995/96

Standardised Ratio: number of admissions in each Statistical Local Area compared with the number expected\*



\*Expected numbers were derived by indirect age-sex standardisation, based on WA totals

Source: See Data sources, Appendix 1.3

Details of map boundaries are in Appendix 1.2  
National Social Health Atlas Project, 1999

# Admissions of children aged 0 to 9 years for a myringotomy, 1995/96

## Capital city comparison (Australia as the Standard)

There were 17,457 admissions for a myringotomy procedure (described below) performed as a principal procedure on children aged from 0 to 9 years and resident in the capital cities (and an additional 1,443 on young residents of the other major urban centres). Over half (60.9 per cent) of these admissions for residents of capital cities were boys. Standardised admission ratios (SARs) for this procedure varied markedly between the capital cities (Table 6.47), from a low of 59\*\* in **Canberra** to a highly elevated 205\*\* in **Adelaide** (more than 50 per cent above the next highest ratio).

**Table 6.47: Admissions<sup>1</sup> of children aged 0 to 9 years with a principal procedure of myringotomy, capital cities, 1995/96**  
**Standardised admission ratios**

Sydney	Melbourne	Brisbane	Adelaide	Perth	Hobart	Darwin	Canberra <sup>2</sup>	All capitals
78**	125**	103	205**	130**	119**	84	59**	112**

<sup>1</sup>Includes admissions to public acute hospitals, private hospitals and day surgery facilities, including admissions of same day patients

<sup>2</sup>Includes Queanbeyan (C)

Source: See *Data sources*, Appendix 1.3

Statistical significance: \* significance at 5 per cent; \*\* significance at 1 per cent

A myringotomy (incision into the eardrum, or tympanic membrane) is usually performed to relieve pressure and allow for drainage of fluid in the middle ear. Ventilation is maintained by putting a small tube (or grommet) into the incision.

As the majority (89.0 per cent) of admissions of Western Australian residents for this procedure were of children under 10 years of age, the SLA data have been standardised to the total population for those ages.

Children aged from 0 to 4 years accounted for just over half (58.9 per cent) of the admissions for this procedure, with most of the remainder (30.1 per cent) in the 5 to 9 year age group. Males accounted for over half (59.0 per cent) of admissions for all myringotomies and slightly more (62.1 per cent) in the 0 to 4 year age group.

Data for Australia published by the AIHW (1998) showed the tonsillectomy and /or adenoidectomy rate in Western Australia to be 9.0 per cent below that in the other States for which data were available (Table 6.40, page 259).

## Perth<sup>9</sup> (Western Australia as the Standard)

In 1995/96, there were 2,266 admissions of children in **Perth** aged from 0 to 4 years for a myringotomy, 13 per cent more admissions than were expected from the State rates (an SAR of 113\*\*). The majority (93.9 per cent) of these admissions were same day admissions. Males accounted for almost two thirds (61.0 per cent) of the admissions.

SLAs with high standardised admission ratios for this procedure were typically located on the urban fringe (Map 6.40). Excluding Peppermint Grove (with fewer than five admissions expected from the State rates), the most highly elevated ratios were recorded in Rockingham (with an SAR of 149\*\*) and Wanneroo (147\*\*), Armadale (138\*\*), Cockburn (137\*\*), Kwinana (136\*\*) and Stirling: Central (136\*\*). Ratios elevated by 10 per cent or more were

<sup>9</sup>As there were relatively few areas with sufficient cases to analyse for this variable in the non-metropolitan areas of Western Australia, the data have not been mapped. A summary of the main features is on page 292.

recorded for Fremantle (an SAR of 116), Mosman Park (114) and Swan (111).

The lowest ratios were in Stirling: South-Eastern (with an SAR of 22\*\*), Vincent (62), Canning (67\*\*) and Melville (72\*\*).

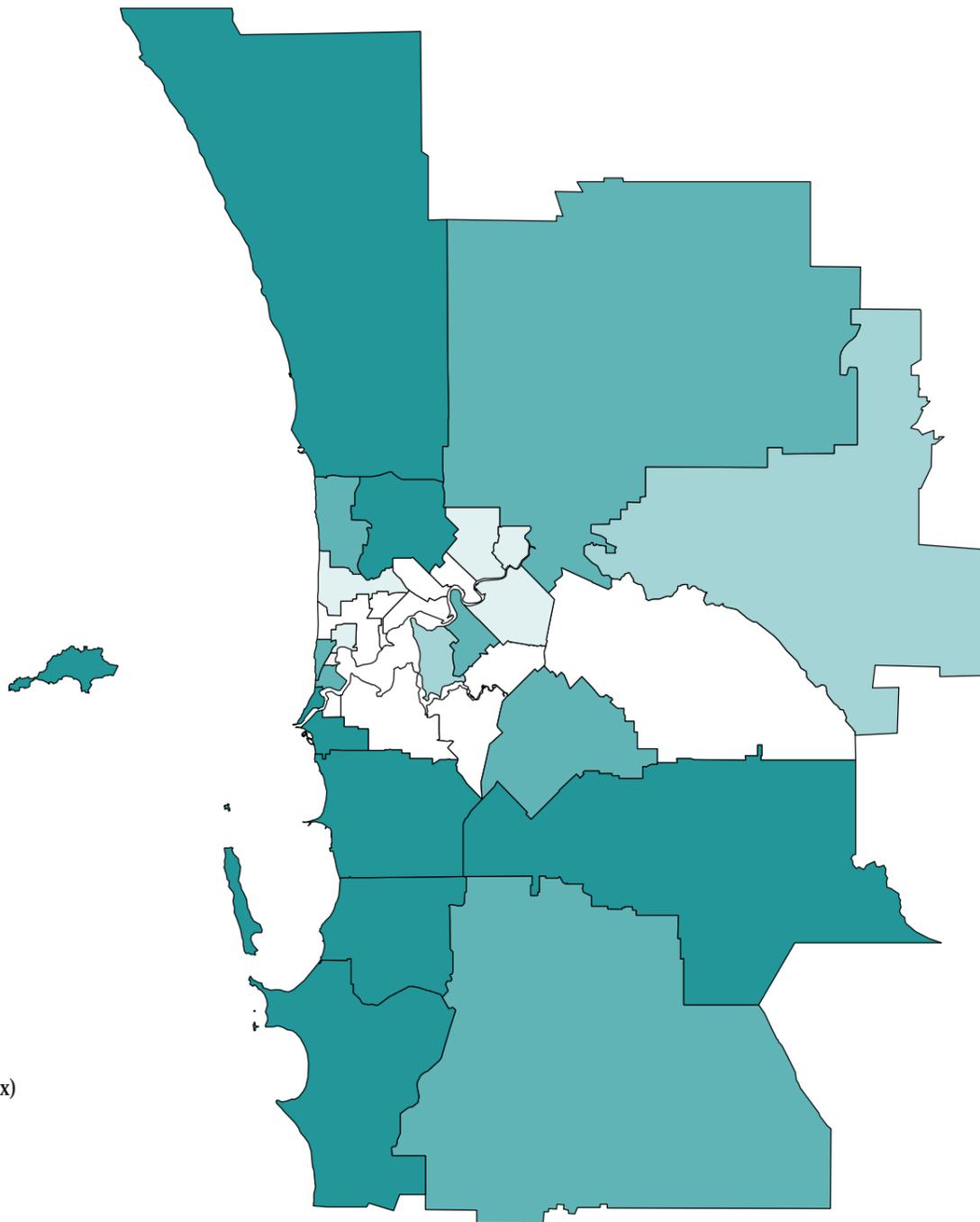
The largest numbers of admissions of children aged from 0 to 4 years for a myringotomy were from Wanneroo (535 admissions), Stirling: Central (196), Swan (172), Rockingham (167), Cockburn (155), Gosnells (148) and Armadale (136).

The strongest correlations were with the variables for unskilled and semi-skilled workers (0.49) and early school leavers (0.46). There was also an inverse correlation of meaningful significance with female labour force participation (-0.55), and of lesser significance with managers and administrators, and professionals (-0.46) and high income families (-0.43). These results, together with the inverse correlation with the IRSD (-0.42), indicate an association between high rates of admissions of children aged from 0 to 4 years for a myringotomy and socioeconomic disadvantage.

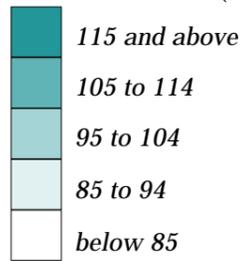
### Map 6.40

## Admissions of children aged 0 to 9 years for a myringotomy, Perth, 1995/96

Standardised Ratio: number of admissions in each Statistical Local Area compared with the number expected\*



Standardised Ratio (as an index)



\*Expected numbers were derived by indirect age-sex standardisation, based on WA totals

Source: See Data sources, Appendix 1.3

Details of map boundaries are in Appendix 1.2  
National Social Health Atlas Project, 1999

# Admissions of females aged 15 to 44 years for Caesarean section, 1995/96

## Capital city comparison (Australia as the Standard)

There were 29,965 Caesarean sections (described below) performed as a principal procedure on 15 to 44 year old female residents of the capital cities and an additional 3,070 on females resident in the other major urban centres. Most capital cities had near average standardised admission ratios (SARs) for this variable, with **Brisbane** (with the highest SAR of 118\*\*), **Darwin** (115\*) and **Adelaide** (107\*\*) recording more procedures than were expected from the Australian rates.

**Table 6.48: Admissions<sup>1</sup> of females aged 15 to 44 years with a principal procedure of Caesarean section, capital cities, 1995/96**  
*Standardised admission ratios*

Sydney	Melbourne	Brisbane	Adelaide	Perth	Hobart	Darwin	Canberra <sup>2</sup>	All capitals
92**	92**	118**	107**	92**	100	115*	90**	97**

<sup>1</sup>Includes admissions to public acute hospitals, private hospitals and day surgery facilities, including admissions of same day patients

<sup>2</sup>Includes Queanbeyan (C)

Source: See *Data sources*, Appendix 1.3

Statistical significance: \* significance at 5 per cent; \*\* significance at 1 per cent

Caesarean sections are performed to intervene in the birth process where the medical practitioner attending the birth perceives that the life of the mother or child is at risk without such an intervention. As Caesarean sections are generally performed on women aged from 15 to 44 years, this age range has been used in standardising the data.

Data for Australia published by the AIHW (1998) showed the Caesarean section rate in Western Australia to be 3.3 per cent below that in the other States for which data were available (**Table 6.40**, page 259).

## Perth<sup>10</sup> (Western Australia as the Standard)

In 1995/96, there were 3,069 admissions for Caesarean sections of female residents of **Perth** aged from 15 to 44 years, two per cent fewer than were expected from the State rates (an SAR of 98).

The distribution of SLAs with elevated standardised admission ratios forms a crescent shaped region, extending from Mundaring in the east Serpentine-Jarrahdale in the south and west to Kwinana and Rockingham (**Map 6.41**).

The most highly elevated standardised admission ratios for a Caesarean section were recorded for females aged from 15 to 44 years in Gosnells (with an SAR of 169\*\*), Armadale (166\*\*), Rockingham (145\*\*), Cockburn (140\*\*), Kwinana (128\*), Serpentine-Jarrahdale (127) and Belmont (119).

There were fewer admissions than expected from the State rates in more than two thirds (71.0 per cent) of the SLAs in **Perth**. Excluding SLAs with fewer than 20 admissions, the lowest ratios were recorded in South Perth and Nedlands (both with an SAR of 57\*\*), Subiaco (60\*\*), Bayswater (64\*\*) and Stirling: West (71\*\*).

The largest numbers of admissions for Caesarean sections were of female residents of Wanneroo (479 admissions), Gosnells (311), Stirling: Central (250), Cockburn and Rockingham (both 209) and Armadale (202).

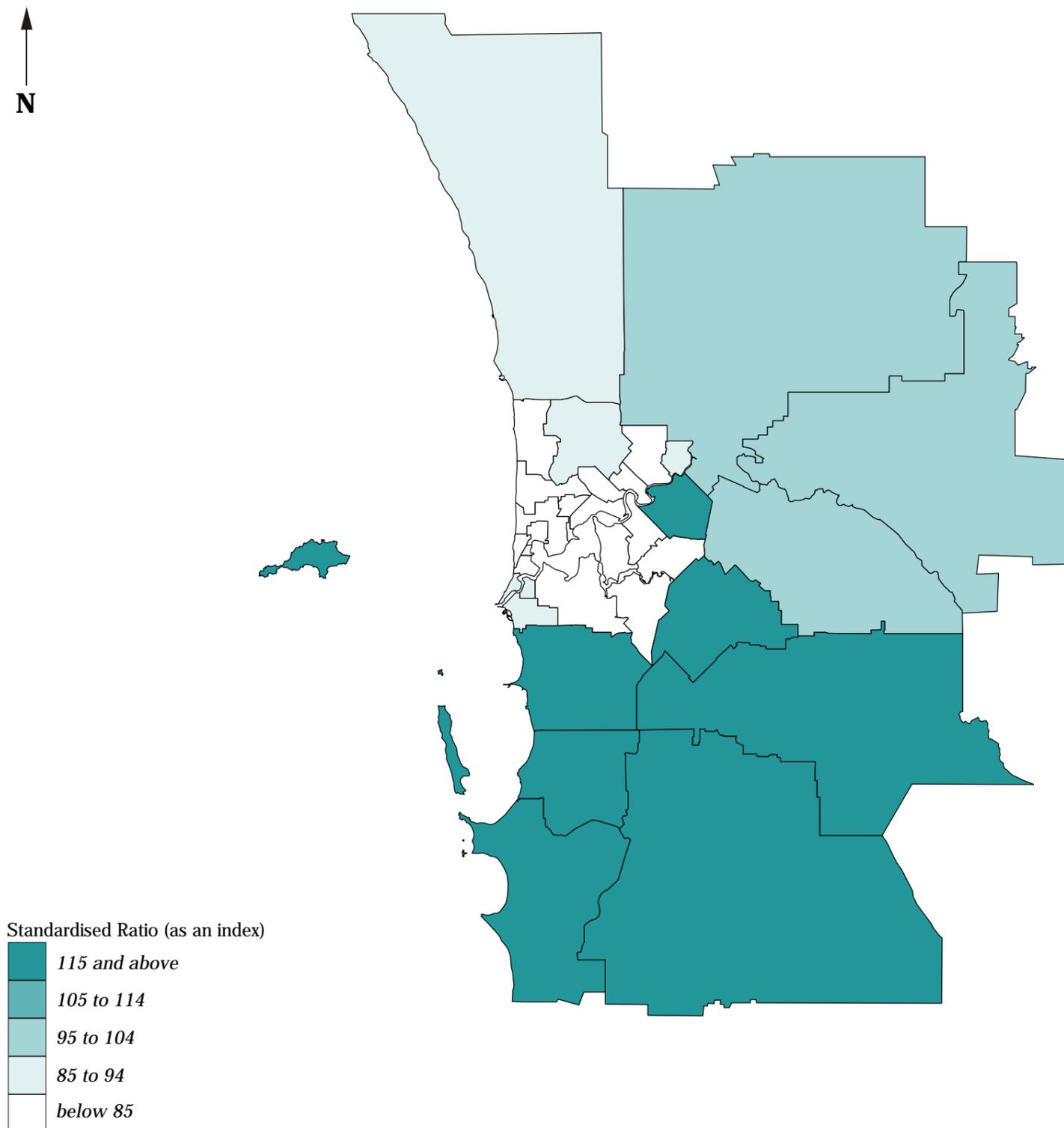
<sup>10</sup>As there were relatively few areas with sufficient cases to analyse for this variable in the non-metropolitan areas of Western Australia, the data have not been mapped. A summary of the main features is on page 293.

There were correlations of substantial significance at the SLA level with the variables for early school leavers (0.81), children aged from 0 to 4 years (0.80) and unskilled and semi-skilled workers (0.80). Inverse correlations of substantial significance were recorded with the variables for managers and administrators, and professionals (-0.76) and female labour force participation (-0.74), and of meaningful significance with high income families (-0.67). These results, together with the inverse correlation of meaningful significance with the IRSD (-0.63), indicate an association at the SLA level between high rates of admissions for a Caesarean section and socioeconomic disadvantage.

**Map 6.41**

**Admissions of females aged 15 to 44 years for a Caesarean section, Perth, 1995/96**

Standardised Ratio: number of admissions in each Statistical Local Area compared with the number expected\*



\*Expected numbers were derived by indirect age standardisation, based on WA totals

Source: See Data sources, Appendix 1.3

Details of map boundaries are in Appendix 1.2  
National Social Health Atlas Project, 1999

# Admissions of females aged 30 years and over for an hysterectomy, 1995/96

## Capital city comparison (Australia as the Standard)

There were 19,868 hysterectomies (described below) performed as a principal procedure on female residents aged 30 years and over of the capital cities and an additional 2,610 on females resident in the other major urban centres. Most capital cities had either low or near average standardised admission ratios (SARs) for this variable, with the most highly elevated ratio being recorded for females in **Darwin** (with an SAR of 135<sup>\*\*</sup>): other elevated ratios were in **Hobart** (with an SAR of 115<sup>\*\*</sup>) and **Brisbane** (106<sup>\*\*</sup>).

**Table 6.49: Admissions<sup>1</sup> of females aged 30 years and over with a principal procedure of hysterectomy, capital cities, 1995/96**  
*Standardised admission ratios*

Sydney	Melbourne	Brisbane	Adelaide	Perth	Hobart	Darwin	Canberra <sup>2</sup>	All capitals
86 <sup>**</sup>	91 <sup>**</sup>	106 <sup>**</sup>	102	100	115 <sup>**</sup>	135 <sup>**</sup>	87 <sup>**</sup>	94 <sup>**</sup>

<sup>1</sup>Includes admissions to public acute hospitals, private hospitals and day surgery facilities, including admissions of same day patients

<sup>2</sup>Includes Queanbeyan (C)

Source: See *Data sources*, Appendix 1.3

Statistical significance: \* significance at 5 per cent; \*\* significance at 1 per cent

Hysterectomies are performed for a number of reasons including the presence of fibroids, uterine cancer and excessive bleeding.

The number of women undergoing an hysterectomy increases with age, with the largest number and rate in the 40 to 44 and 45 to 49 year age groups (40 to 44 years: 607 admissions and a rate of 1120.7 per one hundred thousand females; 45 to 49 years: 697 admissions and a rate of 1385.7 per one hundred thousand females). As relatively few hysterectomies are performed on women younger than 30 years, the age range used in standardising this data is for women aged 30 years and over.

Data for Australia published by the AIHW (1998) showed the hysterectomy rate in Western Australia to be the same as that in the other States for which data were available (**Table 6.40**, page 259).

### Perth<sup>11</sup> (Western Australia as the Standard)

Female residents of **Perth**, aged 30 years and over, had 2,370 admissions for an hysterectomy, one per cent fewer admissions than were expected from the State rates (an SAR of 99).

Almost two thirds (61.3 per cent) of SLAs had notably fewer admissions for hysterectomies than expected from the State rates. The lowest standardised admission ratios were in SLAs in the older areas of **Perth**, between the city centre and the coast, as well as to the north of the Swan River. In contrast, higher ratios were recorded in SLAs on the urban fringe, particularly in the south-east and south-west of the metropolitan area (**Map 6.42**).

In Cockburn (with an SAR of 158<sup>\*\*</sup>) and adjacent Rockingham (152<sup>\*\*</sup>), SARs were elevated by more than 50 per cent above the level expected from the State rates. Other SLAs with relatively highly elevated ratios were Kwinana (with an SAR of 138<sup>\*</sup>), Armadale (135<sup>\*\*</sup>), Gosnells (129<sup>\*\*</sup>) and Serpentine-Jarrahdale (122).

Excluding SLAs with less than 20 admissions, the lowest ratios were in Vincent (with an SAR of 53<sup>\*\*</sup>), Cambridge (66<sup>\*</sup>), Shepperton (now Victoria Park) (68<sup>\*</sup>) and Nedlands (71).

In 1995/96, the largest numbers of admissions for an hysterectomy were recorded in Wanneroo (418 admissions), Gosnells (179), Stirling: Central (168), Cockburn (163), Rockingham (152) and Melville (151). Armadale, Swan, Canning and Kalamunda had more than 100 admissions each.

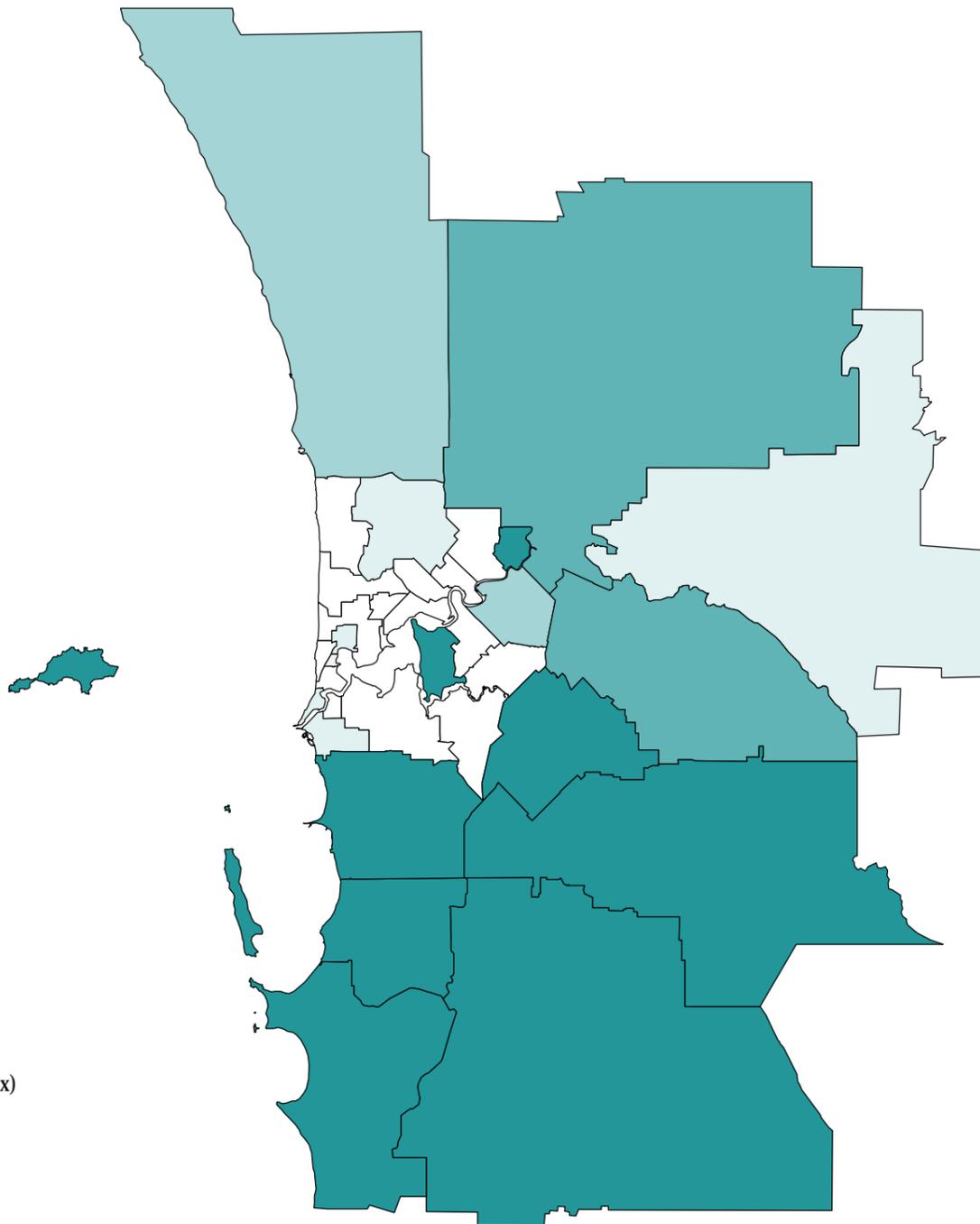
There were correlations of substantial significance with the variables for early school leavers (0.73) and unskilled and semi-skilled workers (0.73). An inverse correlation of substantial significance was recorded at the SLA level with the variable for female labour force participation (-0.71), and of meaningful significance with managers and administrators, and professionals (-0.70). These results, together with the inverse correlation of meaningful significance with the IRSD (-0.55), indicate the existence of an association at the SLA level in **Perth** between high rates of admission for hysterectomy procedures and socioeconomic disadvantage.

<sup>11</sup>As there were relatively few areas with sufficient cases to analyse for this variable in the non-metropolitan areas of Western Australia, the data have not been mapped. A summary of the main features is on page 294.

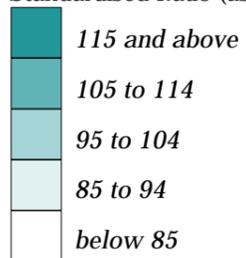
**Map 6.42**

**Admissions of females aged 30 years and over for an hysterectomy, Perth, 1995/96**

Standardised Ratio: number of admissions in each Statistical Local Area compared with the number expected\*



Standardised Ratio (as an index)



\*Expected numbers were derived by indirect age standardisation, based on WA totals

**Source:** See Data sources, Appendix 1.3

**Details of map boundaries are in Appendix 1.2**  
**National Social Health Atlas Project, 1999**

# Admissions for an hip replacement, 1995/96

## Capital city comparison (Australia as the Standard)

There were 8,246 hip replacements (described below) performed as a principal procedure on residents of the capital cities and an additional 1,004 on residents of the other major urban centres. Females accounted for 57.4 per cent of these admissions for residents of the capital cities, reflecting their longer life expectancy. Most capital cities had either low or near average standardised admission ratios (SARs) for this variable, with the highest ratio in **Hobart** (an SAR of 135\*\*) and a very low SAR of 51\*\* in **Darwin**.

**Table 6.50: Admissions<sup>1</sup> with a principal procedure of hip replacement, capital cities, 1995/96**  
*Standardised admission ratios*

Sydney	Melbourne	Brisbane	Adelaide	Perth	Hobart	Darwin	Canberra <sup>2</sup>	All capitals
91**	103	75**	99	90**	135**	51**	112	94**

<sup>1</sup>Includes admissions to public acute hospitals and private hospitals

<sup>2</sup>Includes Queanbeyan (C)

Source: See *Data sources*, Appendix 1.3

Statistical significance: \* significance at 5 per cent; \*\* significance at 1 per cent

Hip replacements are mainly performed on people at older ages, and mainly on females. The operation is undertaken to replace the hip joint where there has been deterioration, usually caused by arthritis. The higher rates for females are likely to reflect the higher incidence of loss of bone density (resulting in a higher rate of accidental falls) among females, as well as their longer life expectancy.

Females accounted for just over half (52.3 per cent) of the admissions for an hip replacement in Western Australia in 1995/96. Overall, the admission rate is marginally higher for females than males, however there is some variation between the age groups. Rates for 65 to 69 year olds are 253.0 admissions per 100,000 population for females and 318.4 for males; for 70 to 74 year olds, rates are 485.3 and 462.3 respectively; and for those aged 85 years and over, they are 352.3 and 355.5 respectively. For females, 67.3 per cent of admissions for hip replacements were for those aged 65 years and over, and for males, there were 63.4 per cent (76.8 per cent for males 60 years and over).

Data for Australia published by the AIHW (1998) showed the hip replacement rate in Western Australia to be 2.4 per cent above that in the other States for which data were available (**Table 6.40**, page 259).

## Perth<sup>12</sup> (Western Australia as the Standard)

In 1995/96, there were 831 admissions of residents of **Perth** for hip replacements, four per cent fewer than were expected from the State rates (an SAR of 96). Females accounted for over half (55.8 per cent) of these admissions.

SLAs with high standardised admission ratios were distributed widely throughout the metropolitan area (**Map 6.43**), although 13 SLAs had fewer than 20 admissions for this procedure.

Excluding SLAs with fewer than 20 admissions, the highest ratio was recorded in Cockburn, with nearly twice the number of admissions for an hip replacement than were expected from the State rates (an SAR of 197\*\* and 60 admissions). Relatively high

ratios were also recorded in Vincent (an SAR of 123), Swan (119) and Fremantle (110).

SLAs with the lowest ratios were Canning (with an SAR of 55\*\*), Bayswater (73), Rockingham (77) and Melville (82).

Wanneroo was the only **Perth** SLA with more than 100 admissions for an hip replacement (103 admissions). There were 95 admissions of residents of Stirling: Central, 63 from Melville and 60 from Cockburn.

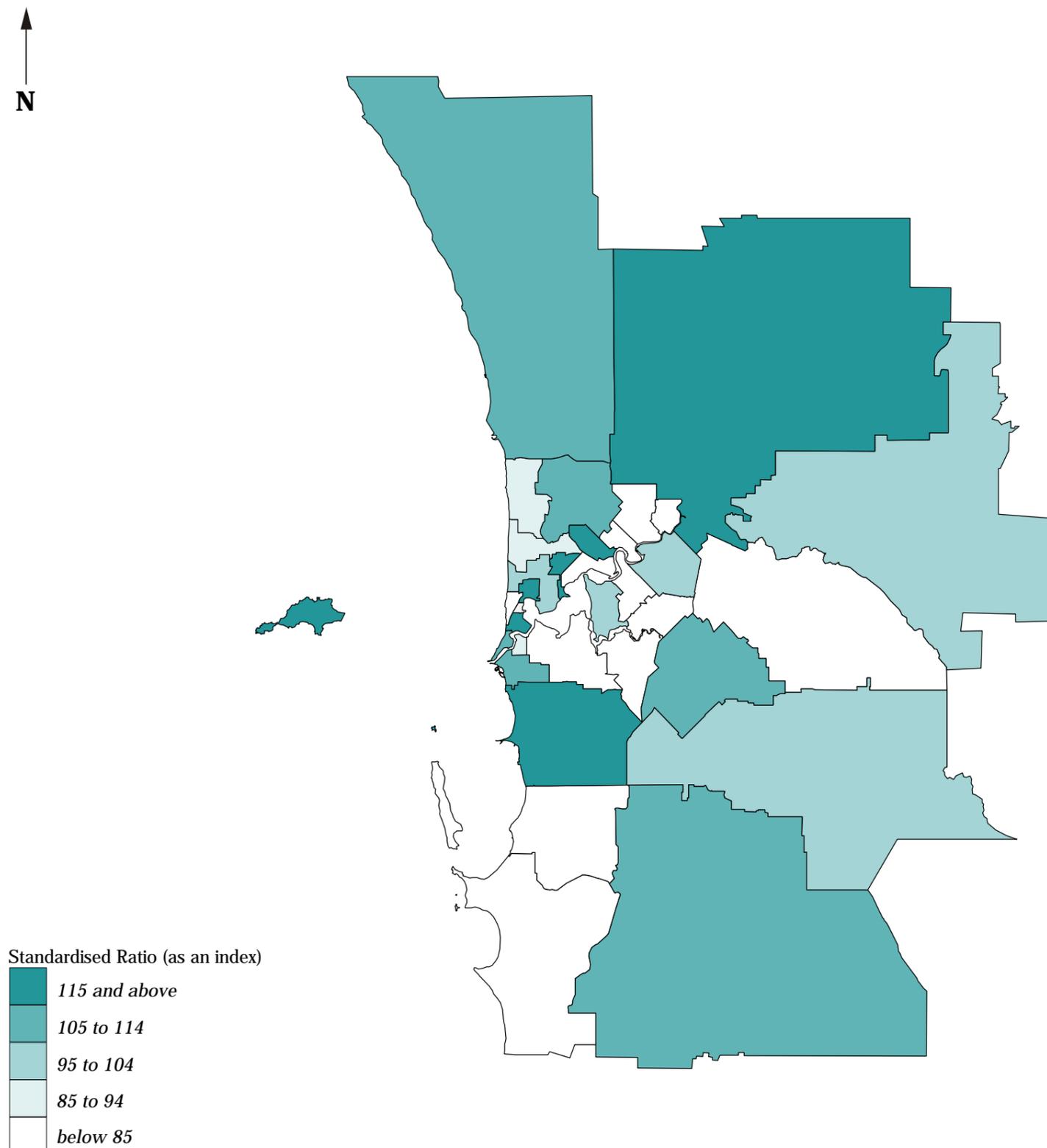
There was no consistent evidence in the correlation analysis of an association at the SLA level between high rates of admissions for an hip replacement and socioeconomic status.

<sup>12</sup>As there were relatively few areas with sufficient cases to analyse for this variable in the non-metropolitan areas of Western Australia, the data have not been mapped. A summary of the main features is on page 295.

### Map 6.43

## Admissions for an hip replacement, Perth, 1995/96

Standardised Ratio: number of admissions in each Statistical Local Area compared with the number expected\*



\*Expected numbers were derived by indirect age-sex standardisation, based on WA totals

Source: See Data sources, Appendix 1.3

Details of map boundaries are in Appendix 1.2  
National Social Health Atlas Project, 1999

# Admissions for lens insertion, 1995/96

## Capital city comparison (Australia as the Standard)

There were 55,446 admissions at which a lens insertion (described below) was undertaken on residents of the capital cities and an additional 8,263 on residents of the other major urban centres. Females accounted for 61.5 per cent of these admissions for residents of capital cities, reflecting their longer life expectancy. Most capital cities had either low or near average standardised admission ratios (SARs) for this variable, other than **Darwin** (with the highest ratio, an SAR of 130<sup>\*\*</sup>). The lowest SARs were in **Canberra**, with a very low SAR of 36<sup>\*\*</sup>, and Perth (84<sup>\*\*</sup>).

**Table 6.51: Admissions<sup>1</sup> for a lens insertion, capital cities, 1995/96**  
*Standardised admission ratios*

Sydney	Melbourne	Brisbane	Adelaide	Perth	Hobart	Darwin	Canberra <sup>2</sup>	All capitals
102 <sup>**</sup>	97 <sup>**</sup>	105 <sup>**</sup>	93 <sup>**</sup>	84 <sup>**</sup>	99	130 <sup>**</sup>	36 <sup>**</sup>	97 <sup>**</sup>

<sup>1</sup>Includes admissions to public acute hospitals, private hospitals and day surgery facilities, including admissions of same day patients

<sup>2</sup>Includes Queanbeyan (C)

Source: See *Data sources*, Appendix 1.3

Statistical significance: \* significance at 5 per cent; \*\* significance at 1 per cent

Cataracts are a common cause of impaired vision in people of any age. They may be congenital, or result from trauma, diseases like diabetes or changes associated with ageing. Cataract surgery is one of the most frequently performed surgical procedures in Australia since the introduction of intraocular lens implants. The implants are inserted at the time of surgery after the affected lens has been removed. Increasingly, cataract surgery is being performed as a same day procedure using local anaesthetic techniques, and the lens implant means that most patients enjoy significantly improved vision after surgery.

Data for Australia published by the AIHW (1998) showed the lens insertion rate in Western Australia to be 2.4 per cent below that in the other States for which data were available (**Table 6.40**, page 259).

## Perth (Western Australia as the Standard)

In 1995/96, there were 4,977 admissions of residents of **Perth** involving a lens insertion, with an SAR of 99. Females accounted for over half (59.4 per cent) of the admissions.

SLAs with elevated ratios tended to be concentrated in the older, higher socioeconomic areas of **Perth**, especially between the city centre and the coast to the north of the Swan River (**Map 6.44**).

Excluding SLAs with fewer than 20 admissions, the most highly elevated ratios were recorded in Vincent and Subiaco (both with an SAR of 138<sup>\*\*</sup>), Cockburn (129<sup>\*\*</sup>), Mosman Park (129), Gosnells (128<sup>\*\*</sup>) and Cottesloe (128). Elevated ratios were also recorded in a further eight SLAs.

Residents of Stirling: South-Eastern (with an SAR of 40<sup>\*\*</sup>), recorded 60 per cent fewer admissions for a lens insertion than expected from the State rates, while relatively low ratios were also recorded in the City of Perth (an SAR of 59<sup>\*\*</sup>), Shepperton (74<sup>\*\*</sup>) (now known as Victoria Park), East Fremantle (81), Kalamunda (84<sup>\*</sup>) and Canning (84<sup>\*</sup>).

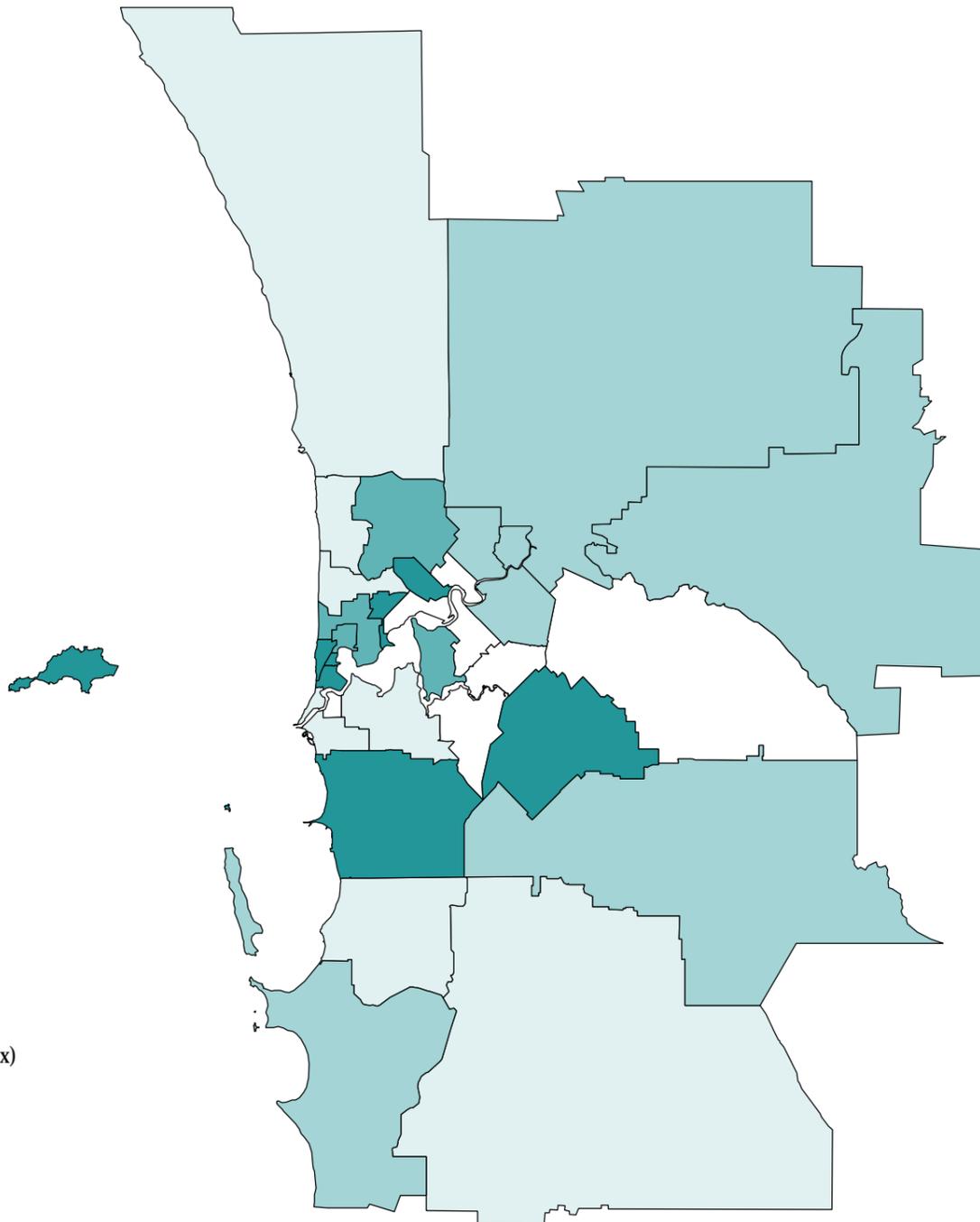
The largest numbers of admissions for lens insertion procedures were in Stirling: Central (567 admissions), Wanneroo (438), Melville (434), Stirling: West (269) and Gosnells (254).

The strongest correlations were with the variables for high income families (0.44) and managers and administrators, and professionals (0.33), while the strongest inverse correlations were with low income families (-0.46), unemployment (-0.41) and early school leavers (-0.37). These results, together with the weak correlation with the IRSD (0.37), suggest the existence of an association between high rates of admissions for lens insertion and high socioeconomic status.

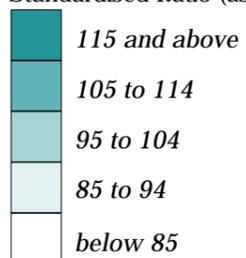
## Map 6.44

### Admissions for a lens insertion, Perth, 1995/96

Standardised Ratio: number of admissions in each Statistical Local Area compared with the number expected\*



Standardised Ratio (as an index)



\*Expected numbers were derived by indirect age-sex standardisation, based on WA totals

Source: See Data sources, Appendix 1.3

Details of map boundaries are in Appendix 1.2  
National Social Health Atlas Project, 1999

## Admissions for lens insertion, 1995/96

### State/Territory comparison (Australia as the Standard)

There were 28,332 admissions for which a lens insertion (described on the previous text page) was undertaken on residents of the non-metropolitan areas of Australia. Females accounted for 58.1 per cent of these admissions, reflecting their longer life expectancy. Standardised admission ratios (SARs) varied across the non-metropolitan areas of Australia, with the highest ratios in Queensland and New South Wales (SARs of 119\*\* and 112\*\* respectively) and low ratios in Victoria and Tasmania (78\*\* and 82\*\* respectively).

**Table 6.52: Admissions<sup>1</sup> for lens insertion, State/Territory, 1995/96**  
*Standardised admission ratios*

	NSW	Vic	Qld	SA	WA	Tas	NT	ACT	Total
Capital city	102**	97**	105**	93**	84**	99	130**	36**	97**
Other major urban centres <sup>2</sup>	103	73**	163**	..	..	..	..	..	120**
Rest of State/Territory	112**	78**	119**	93**	89**	82**	104	- <sup>3</sup>	101*
Whole of State/Territory	105**	91**	119**	93**	85**	89**	117**	35**	100

<sup>1</sup>Includes admissions to public acute hospitals, private hospitals and day surgery facilities, including admissions of same day patients

<sup>2</sup>Includes Newcastle and Wollongong (NSW); Geelong (Vic); and Gold Coast-Tweed Heads and Townsville-Thuringowa (Qld)

<sup>3</sup>Data unreliable: included with ACT total

Source: See *Data sources*, Appendix 1.3

Statistical significance: \* significance at 5 per cent; \*\* significance at 1 per cent

### Rest of State (Western Australia as the Standard)

There were 1,658 admissions involving a lens insertion of residents of the non-metropolitan areas of Western Australia, four per cent more than expected from the State rates (an SAR of 104). Females accounted for over half (56.0 per cent) of these admissions.

Fewer than five admissions were expected in just over half of the SLAs (**Map 6.45**). Of the remaining SLAs with 20 or more admissions, the highest standardised admission ratios were recorded in Derby-West Kimberley (with an SAR of 291\*\* and 31 admissions), Port Hedland (218\*\*; 22), Capel (163\*\*; 28), Busselton (146\*\*; 149), Collie (135\*; 47), Manjimup (128; 47) and Harvey (120; 65).

Low ratios were recorded in the town of Albany (56\*\*), Geraldton (85) and Esperance (86).

Of the towns mapped, Port Hedland (with an SAR of 218\*\* and 22 admissions) had the highest ratio, with more than twice the expected number of admissions for a lens insertion, considerably higher than the ratios in Broome (123; 15 admissions) and Bunbury (112; 144).

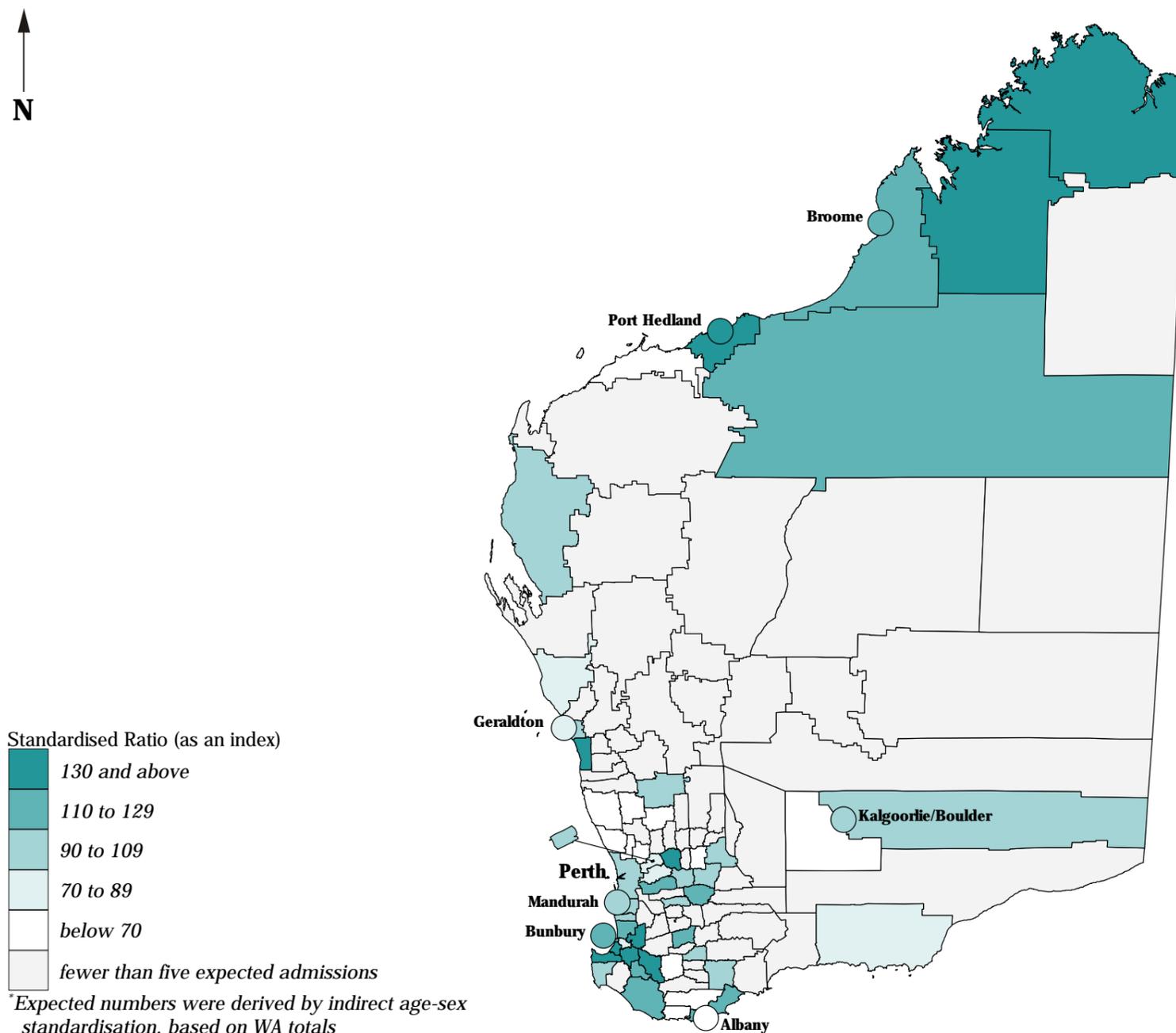
In 1995/96, the largest numbers of admissions for lens insertion were recorded for residents of Mandurah (231 admissions), Busselton (149) and Bunbury (144). No other SLA had more than 100 admissions.

The correlation analysis was not undertaken as there were too many SLAs with small numbers of cases.

## Map 6.45

### Admissions for a lens insertion, Western Australia, 1995/96

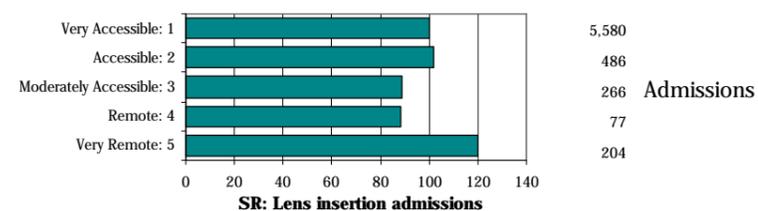
Standardised Ratio: number of admissions in each Statistical Local Area compared with the number expected\*



Source: See Data sources, Appendix 1.3

Details of map boundaries are in Appendix 1.2

### Accessibility/Remoteness Index of Australia



Standardised admission ratios for admissions for a lens insertion drop of with increasing remoteness, before increasing substantially in the Very Remote areas. Ratios of near the level expected from the State rates were recorded in the Very Accessible (with an SAR of 100) and Accessible (100) areas, with lower ratios of 89 and 88 in the Moderately Accessible and Remote areas, respectively. There was an elevated ratio, an SAR of 120, in Very Remote category.

Source: Calculated on ARIA classification, DHAC  
National Social Health Atlas Project, 1999

# Admissions for an endoscopy, 1995/96

## Capital city comparison (Australia as the Standard)

There were 249,411 endoscopies (described below) performed as a principal procedure on residents of the capital cities and an additional 26,647 on residents of the other major urban centres. Females accounted for 61.5 per cent of these admissions, reflecting their longer life expectancy. Standardised admission ratios (SARs) for this variable varied over a wide range, from a low of 58\*\* in **Canberra**, to highs of 115\*\* in **Brisbane**, 111\*\* in **Melbourne** and 111\*\* in **Hobart**. These large differences suggest markedly different clinical practice between the various States and Territories.

**Table 6.53: Admissions<sup>1</sup> with a principal procedure of endoscopy, capital cities, 1995/96**  
**Standardised admission ratios**

Sydney	Melbourne	Brisbane	Adelaide	Perth	Hobart	Darwin	Canberra <sup>2</sup>	All capitals
110**	111**	115**	81**	82**	111**	92**	58**	104**

<sup>1</sup>Includes admissions to public acute hospitals, private hospitals and day surgery facilities, including admissions of same day patients

<sup>2</sup>Includes Queanbeyan (C)

Source: See *Data sources*, Appendix 1.3

Statistical significance: \* significance at 5 per cent; \*\* significance at 1 per cent

Endoscopy procedures involve looking inside hollow organs or cavities in the body such as the intestinal tract, stomach, bladder, abdominal cavity and airways, using a rigid or flexible instrument, the endoscope. Endoscopies allow visual examination, photography, biopsy and some diagnostic and treatment procedures to be undertaken while a person is relaxed and conscious. These procedures are often now performed in accredited day endoscopy facilities, relieving pressure on hospital inpatient beds.

Data for Australia published by the AIHW (1998) shows the endoscopy rate in Western Australia to be 15.3 per cent below that in the other States for which data were available (**Table 6.40**, page 259).

## Perth (Western Australia as the Standard)

There were 21,526 admissions of residents of **Perth** for endoscopies in 1995/96, one per cent more than were expected from the State rates (an SAR of 101). Over half (53.9 per cent) of the admissions were for females. The majority (84.9 per cent) of all endoscopies were performed on a same day basis.

Almost one half of the SLAs in **Perth** had elevated standardised admission ratios and, with few exceptions, these SLAs were confined to a triangular area bounded by Wanneroo, Bayswater and Fremantle (**Map 6.46**). Only South Perth and Cockburn lay outside this region. Both Mosman Park (with an SAR of 145\*\* and 213 admissions) and Cockburn (140\*\*; 1,213) had at least 40 per cent more admissions than expected from the State rates. Relatively high ratios were also recorded in Wanneroo and adjacent Stirling: Central (both with an SAR of 119\*\*), Vincent (112') and Subiaco (111).

There were 54 per cent fewer admissions for an endoscopy in Stirling: South-Eastern than expected from the State rates in 1995/96 (an SAR of 46\*\*), with other low ratios in the City of Perth (58\*\*), Canning (69\*\*) and Rockingham (79\*\*).

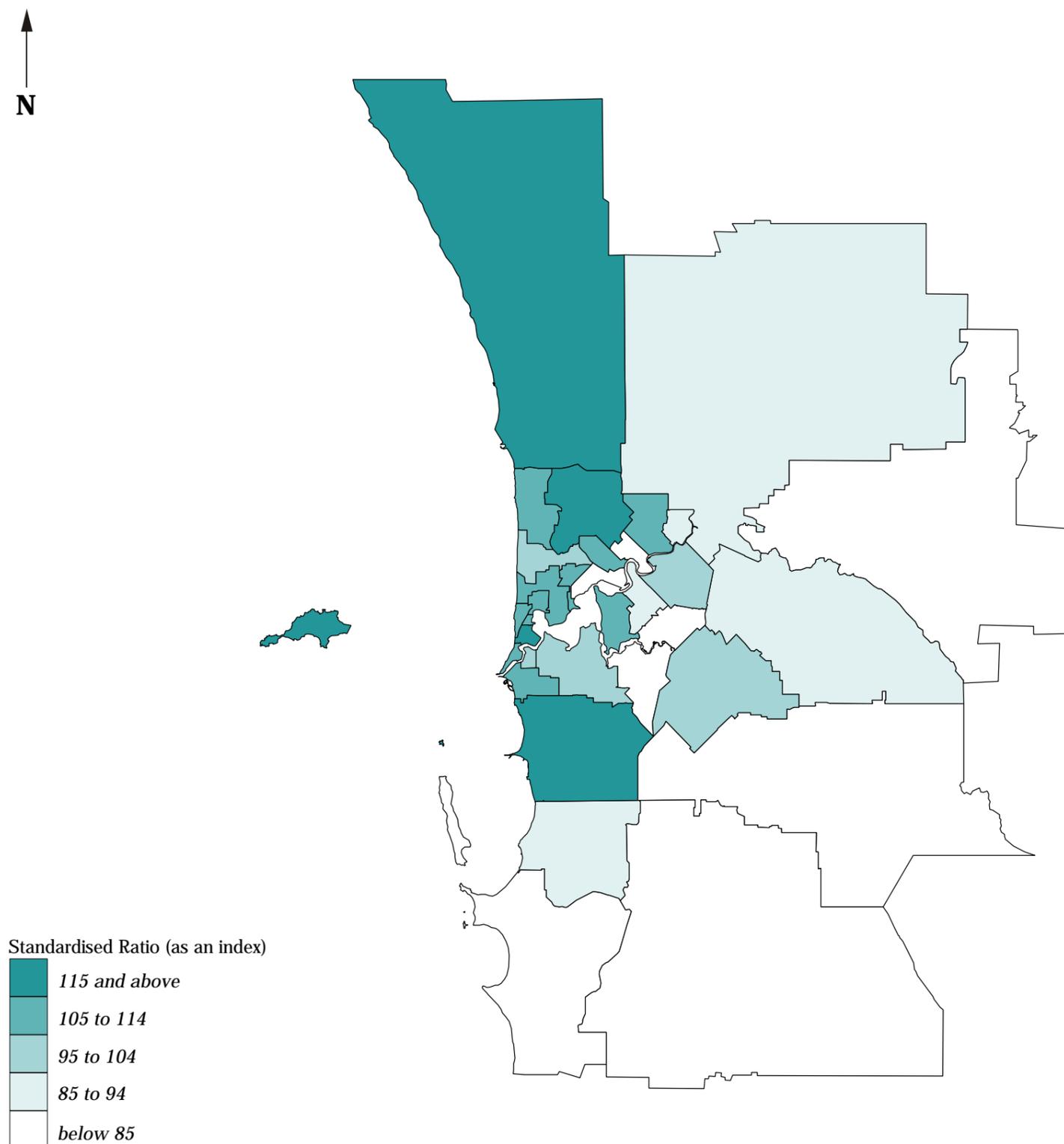
The largest numbers of admissions were of residents from Wanneroo (3,649 admissions), Stirling: Central (2,285), Melville (1,668), Cockburn (1,213) and Stirling: West and Gosnells (both 1,140).

There was no consistent evidence in the correlation analysis of an association at the SLA level between high rates of admission for an endoscopy and socioeconomic status.

## Map 6.46

### Admissions for an endoscopy, Perth, 1995/96

Standardised Ratio: number of admissions in each Statistical Local Area compared with the number expected\*



\*Expected numbers were derived by indirect age-sex standardisation, based on WA totals

Source: See Data sources, Appendix 1.3

Details of map boundaries are in Appendix 1.2  
National Social Health Atlas Project, 1999

## Admissions for an endoscopy, 1995/96

### State/Territory comparison (Australia as the Standard)

There were 106,877 endoscopies (described on the previous text page) performed as a principal procedure on residents of the non-metropolitan areas. Just over half (52.5 per cent) of these admissions were females, compared with 61.5 per cent in the capital cities.

With the exception of Tasmania and the Northern Territory, the standardised admission ratios (SARs) at the *Whole of State/Territory* and *Rest of State/Territory* levels largely followed the direction of the ratios for the capital cities, although they are somewhat closer to the Australian rates. In both Tasmania (an SAR of 77\*\*) and the Northern Territory (66\*\*), ratios were substantially below the level expected from the Australian rates. The only elevated SARs were in Victoria (104\*\*) and Queensland (101\*).

**Table 6.54: Admissions<sup>1</sup> with a principal procedure of endoscopy, State/Territory, 1995/96**  
*Standardised admission ratios*

	NSW	Vic	Qld	SA	WA	Tas	NT	ACT	Total
Capital city	110**	111**	115**	81**	82**	111**	92**	58**	104**
Other major urban centres <sup>2</sup>	97**	70**	104**	..	..	..	..	..	97**
Rest of State/Territory	92**	104**	101*	62**	80**	77**	66**	- <sup>3</sup>	93**
Whole of State/Territory	104**	108**	108**	76**	82**	108**	78**	58**	100

<sup>1</sup>Includes admissions to public acute hospitals, private hospitals and day surgery facilities, including admissions of same day patients

<sup>2</sup>Includes Newcastle and Wollongong (NSW); Geelong (Vic); and Gold Coast-Tweed Heads and Townsville-Thuringowa (Qld)

<sup>3</sup>Data unreliable: included with ACT total

Source: See *Data sources*, Appendix 1.3

Statistical significance: \* significance at 5 per cent; \*\* significance at 1 per cent

### Rest of State (Western Australia as the Standard)

There were 7,258 admissions of residents of the non-metropolitan areas of Western Australia for endoscopies in 1995/96, two per cent fewer than expected from the State rates (an SAR of 98). Females accounted for half (50.7 per cent) of the admissions. More than three quarters (80.5 per cent) were performed on a same day basis.

As can be seen from **Map 6.47**, a majority of SLAs (61.7 per cent) had fewer admissions for endoscopy procedures than were expected from the State rates.

Excluding SLAs in which there were fewer than 20 admissions, ratios were elevated by more than 70 per cent, in Albany Shire (with an SAR of 172\*\* and 355 admissions), Coolgardie (171\*\*; 113), Denmark (170\*\*; 122) and Irwin (170\*\*; 74). Other highly elevated ratios were recorded in Dundas (with an SAR of 165\*\*), Kalgoorlie/Boulder (155\*\*), the town of Albany (151\*\*), Geraldton (143\*\*), Collie (141\*\*) and Plantagenet (134\*\*).

The lowest ratios were recorded in Wyndham-East Kimberley and Waroona (both with an SAR of 38\*\*), Broome (40\*\*), Murray (41\*\*) and Mandurah (44\*\*).

Of the towns mapped, SARs for endoscopies were highly elevated in Kalgoorlie/Boulder (with an SAR of 155\*\*), Albany (151\*\*) and Geraldton (143\*\*). The lowest ratios were recorded for residents from Broome (an SAR of 40\*\*) and Mandurah (44\*\*).

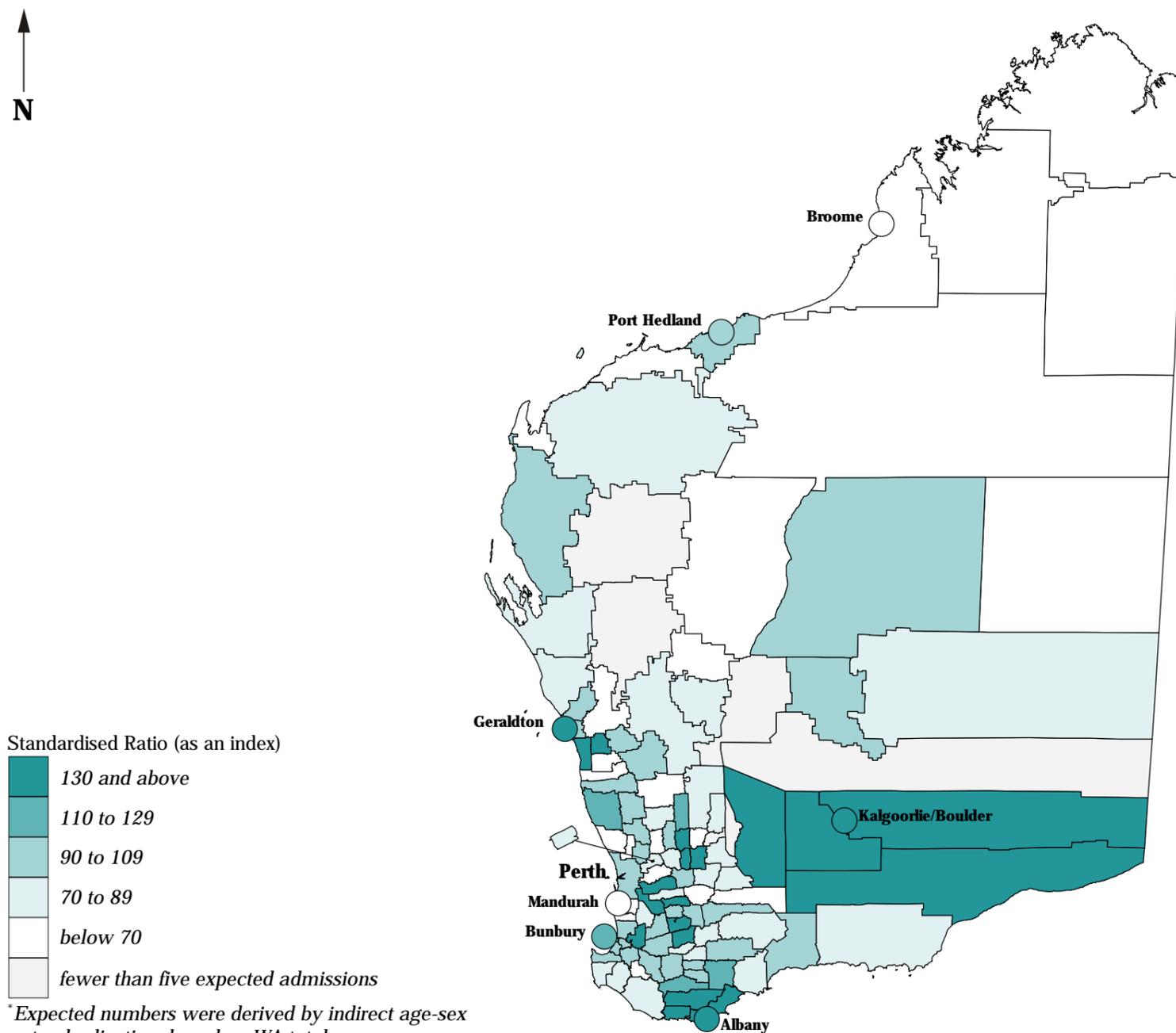
The largest numbers of admissions for endoscopies in non-metropolitan Western Australia were recorded in Kalgoorlie/Boulder (564 admissions), Bunbury (562), Geraldton (489), the town of Albany (450) and Albany Shire (355).

There were inverse correlations with the variables for the Indigenous population (-0.35) and dwellings with no motor vehicles (-0.30). These results, together with the weak correlation with the IRSD (0.33), indicate the existence of an association at the SLA level between high rates of admission for endoscopies and high socioeconomic status.

## Map 6.47

### Admissions for an endoscopy, Western Australia, 1995/96

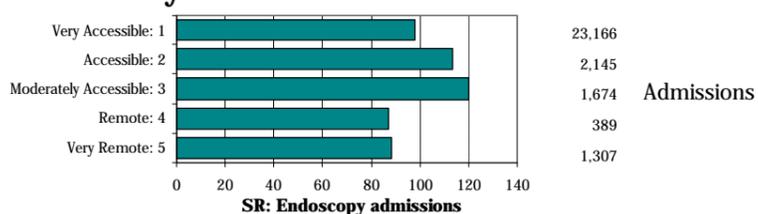
Standardised Ratio: number of admissions in each Statistical Local Area compared with the number expected\*



Source: See Data sources, Appendix 1.3

Details of map boundaries are in Appendix 1.2

### Accessibility/Remoteness Index of Australia



Standardised admission ratios for admissions involving an endoscopy increased across the ARIA categories from an SAR of 98 to SARs of 113 and 120 in the Accessible and Moderately Accessible areas, respectively. The Moderately Accessible and Remote areas had lower ratios of 89 and 88, respectively.

Source: Calculated on ARIA classification, DHAC National Social Health Atlas Project, 1999

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The information on these seven pages provides summary details for variables where it was considered that there were too few cases to map the data at the SLA level. Where SLA data is available it is in the tables in Volume 6.1.

## Admissions for lung cancer, 1995/96

### State/Territory comparison (Australia as the Standard)

Standardised admission ratios (SARs) for admissions for lung cancer (described on page 222) of residents of the non-metropolitan areas were relatively uniform across the States and Territories, with the exception of higher ratios in South Australia, Queensland, Tasmania and the Northern Territory (Table 6.55).

There was relatively little change in the ratios for the non-metropolitan areas between the periods shown in Table 6.23.

**Table 6.55: Admissions with a principal diagnosis of lung cancer, State/Territory**  
*Age-sex standardised admission ratios*

	NSW	Vic	Qld	SA	WA	Tas	NT	ACT	Total
<b>1995/96<sup>1</sup></b>									
Capital city	88**	99	121**	121**	89**	95	100	54**	98
Other major urban centres <sup>2</sup>	72**	116	92	..	..	..	..	..	83**
Rest of State/Territory	99	105	117**	135**	91	114*	116	.. <sup>3</sup>	108**
Whole of State/Territory	89**	102	114**	125**	90**	106	108	42**	100
<b>1989<sup>4</sup></b>									
Rest of State/Territory	94**	..	121**	126**	87*	..	119	..	106**

<sup>1</sup>Includes admissions to public acute hospitals and private hospitals, including admissions of same day patients

<sup>2</sup>Includes Newcastle and Wollongong (NSW); Geelong (Vic); and Gold Coast-Tweed Heads and Townsville-Thuringowa (Qld)

<sup>3</sup>Data unreliable: included with ACT total

<sup>4</sup>Excludes same day admissions: for New South Wales the period is 1989/90 and for Northern Territory it is 1987

Source: See Data sources, Appendix 1.3

Statistical significance: \* significance at 5 per cent; \*\* significance at 1 per cent

### Rest of State (Western Australia as the Standard)

There were 320 admissions for lung cancer of residents of the non-metropolitan areas of Western Australia, one per cent more than expected from the State rates (an SAR of 101). These admissions comprised 7.0 per cent of all cancer admissions, and almost two thirds (63.1 per cent) were of males.

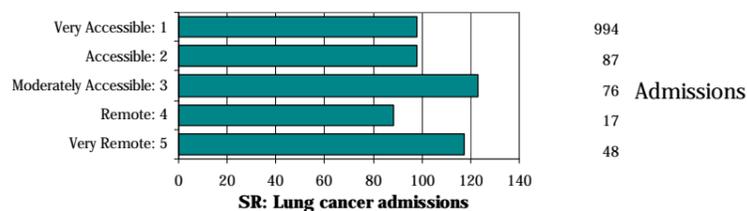
In only 14 SLAs were five or more admissions for lung cancer expected from the State rates, and within this group seven SLAs had fewer than ten admissions in 1995/96.

Of SLAs with five or more expected admissions, the highest ratio was in Murray (with an SAR of 204\*\* and 19 admissions). Ratios of 110 or higher were recorded for people from Collie (149; 10 admissions), Geraldton (117; 17 admissions), Esperance (114; 9 admissions) and Kalgoorlie/Boulder (110; 12 admissions).

Of the towns, ratios were elevated in Port Hedland (199; seven admissions), and ten per cent and 17 per cent above expected levels in Kalgoorlie/Boulder (110) and Geraldton (117). The lowest ratio was recorded in Bunbury (51\*; 11 admissions).

Only Mandurah, with 38 admissions, had more than 20 admissions for lung cancer in 1995/96, with 19 admissions from Murray, 17 from Geraldton and 15 from Busselton.

### Accessibility/Remoteness Index of Australia



Standardised admission ratios (SARs) for lung cancer present an unusual distribution when examined by the ARIA categories. The lowest ratio is in the Remote areas (an SAR of 88) and the highest in the Moderately Accessible and Very Remote areas, with SARs of 123 and 117, respectively. Residents of the Very Accessible and Moderately Accessible areas had marginally fewer admissions for lung cancer than expected from the State rates (both with an SAR of 98).

Source: Calculated on ARIA classification, DHAC  
National Social Health Atlas Project, 1999

## Admissions of females aged 40 years and over for breast cancer, 1995/96

### State/Territory comparison (Australia as the Standard)

Standardised admission ratios (SARs) for admissions for breast cancer of female residents of the non-metropolitan areas, who were aged 40 years and over, were most notably higher than expected in South Australia (122\*\*) and lower than expected in a number of jurisdictions, including Western Australia (72\*\*) and the Northern Territory (81). SARs in the other States were near average. In general, the differentials in the ratios between the two periods shown suggest lower rates of admission in the later period.

**Table 6.56: Admissions of females aged 40 years and over<sup>1</sup> with a principal diagnosis of breast cancer, State/Territory Age-sex standardised admission ratios**

	NSW	Vic	Qld	SA	WA	Tas	NT	ACT	Total
<b>1995/96<sup>2</sup></b>									
Capital city	97	125**	93*	94	81**	72**	129	90	102*
Other major urban centres <sup>3</sup>	89**	118	95	..	..	..	..	..	93*
Rest of State/Territory	101	101	94	122**	72**	88	81	.. <sup>4</sup>	97*
Whole of State/Territory	97*	118**	94**	101	79**	81**	106	89	100
<b>1989<sup>5</sup></b>									
Rest of State/Territory	115**	..	114**	100	80**	..	65	..	109**

<sup>1</sup>Data for '1989' is of females of all ages

<sup>2</sup>Includes admissions to public acute hospitals and private hospitals, including admissions of same day patients

<sup>3</sup>Includes Newcastle and Wollongong (NSW); Geelong (Vic); and Gold Coast-Tweed Heads and Townsville-Thuringowa (Qld)

<sup>4</sup>Data unreliable: included with ACT total

<sup>5</sup>Excludes same day admissions: for New South Wales the period is 1989/90 and for Northern Territory it is 1987

Source: See *Data sources*, Appendix 1.3

Statistical significance: \* significance at 5 per cent; \*\* significance at 1 per cent

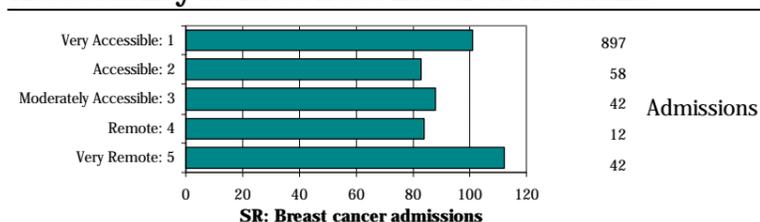
### Rest of State (Western Australia as the Standard)

As there were only 12 SLAs with five or more expected admissions in the non-metropolitan areas of Western Australia, the data has not been mapped. A summary of the main features follows.

There were 230 admissions for breast cancer of females aged 40 years and over and resident in the non-metropolitan areas of Western Australia, eight per cent fewer than expected from the State rates (an SAR of 92). The highest ratios occurred in Collie (an SAR of 184 and 10 admissions), Esperance (136 and nine admissions) and Bunbury (120 and 21 admissions) while the lowest ratios were in Manjimup (53 and 3 admissions), Murray (58 and 4 admissions) and Busselton (63 and eight admissions).

There were 21 admissions of residents of Bunbury and 20 from Mandurah. Admissions reached double figures in only three other SLAs, with 13 in Geraldton and 10 in each of Kalgoorlie/Boulder and Collie.

### Accessibility/Remoteness Index of Australia



Standardised admission ratios (SARs) for cancer of the female breast are highest in the most remote and most accessible areas. There is an elevated ratio of 112 in the Very Remote areas (12 per cent more admissions of females for breast cancer than were expected from the State rates) and an SAR of 101 in the Very Accessible areas. Lower SARs were recorded in the middle three ARIA categories, with the lowest in the Accessible (an SAR of 83) and Remote (84) areas.

Source: Calculated on ARIA classification, DHAC National Social Health Atlas Project, 1999

## Admissions for tonsillectomy and/or adenoidectomy, 1995/96

### State/Territory comparison (Australia as the Standard)

Standardised admission ratios (SARs) for admissions for the procedures of tonsillectomy and/or adenoidectomy (described on page 270) varied widely between the States and Territories, including across the non-metropolitan areas of Australia (Table 6.57). The range was from a low of 35\*\* for the non-metropolitan areas of Northern Territory to a high of 141\*\* in the non-metropolitan areas of South Australia. There were 10,042 of these procedures performed as a principal procedure on residents of the non-metropolitan areas.

**Table 6.57: Admissions<sup>1</sup> with a principal procedure of tonsillectomy and/or adenoidectomy, State/Territory, 1995/96**  
*Standardised admission ratios*

	NSW	Vic	Qld	SA	WA	Tas	NT	ACT	Total
Capital city	89**	109**	101	136**	95*	71**	71**	65**	100
Other major urban centres <sup>2</sup>	100	147**	106	..	..	..	..	..	106**
Rest of State/Territory	101	115**	84**	141**	92*	67**	35**	— <sup>3</sup>	99
Whole of State/Territory	94**	112**	94**	137**	94**	68**	50**	66**	100

<sup>1</sup>Includes admissions to public acute hospitals, private hospitals and day surgery facilities, including admissions of same day patients

<sup>2</sup>Includes Newcastle and Wollongong (NSW); Geelong (Vic); and Gold Coast-Tweed Heads and Townsville-Thuringowa (Qld)

<sup>3</sup>Data unreliable: included with ACT total

Source: See Data sources, Appendix 1.3

Statistical significance: \* significance at 5 per cent; \*\* significance at 1 per cent

### Rest of State (Western Australia as the Standard)

There were 863 admissions of residents of the non-metropolitan areas of Western Australia for a tonsillectomy and/or adenoidectomy procedure, two per cent fewer than expected from the State rates (an SAR of 98). Over half (57.7 per cent) were for females

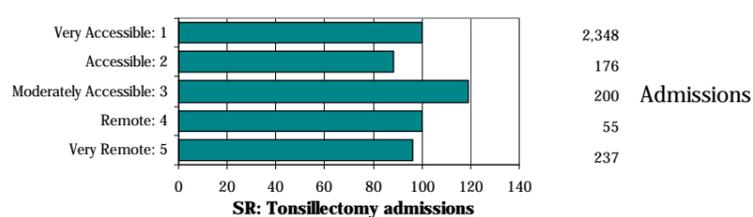
Although 38.9 per cent of SLAs had elevated ratios, only Kojonup (474\*\*) and Kalgoorlie/Boulder (190\*\*) had 20 or more admissions for a tonsillectomy and/or adenoidectomy procedure.

The lowest ratios were recorded in Harvey (an SAR of 76), Bunbury (77), Port Hedland (84) and Busselton (86).

Of the towns mapped, only Kalgoorlie/Boulder had an elevated SAR for tonsillectomy and/or adenoidectomy procedures. The lowest ratios were in Broome (an SAR of 47\*), Bunbury (77) and Port Hedland (84).

There were more than 100 admissions in Kalgoorlie/Boulder (110 admissions), with 56 admissions of residents from Mandurah and 38 from each of Bunbury and Geraldton, and 30 from Roebourne.

### Accessibility/Remoteness Index of Australia



Standardised admission ratios for admissions involving a tonsillectomy and/or adenoidectomy are close to the level expected from the State rates in the Very Accessible and two 'remote' ARIA categories. The main variations are the higher than expected ratio in the Moderately Accessible areas (19 per cent more admissions than expected from the State rates, an SAR of 119) and a lower than expected ratio in the Accessible areas (88).

Source: Calculated on ARIA classification, DHAC  
National Social Health Atlas Project, 1999

## Admissions of children aged 0 to 9 years for a myringotomy, 1995/96

### State/Territory comparison (Australia as the Standard)

There were 6,989 procedures for myringotomy (described on page 272) performed as a principal procedure on children aged from 0 to 9 years and resident in the non-metropolitan areas of Australia. As was the case for the capital cities, standardised admission ratios (SARs) for these procedures varied markedly across the non-metropolitan areas (Table 6.58), from lows of 44\*\* in the Northern Territory and 59\*\* in Queensland, to a highly elevated 163\*\* in South Australia.

**Table 6.58: Admissions<sup>1</sup> of children aged 0 to 9 years with a principal procedure of myringotomy, State/Territory, 1995/96**  
**Standardised admission ratios**

	NSW	Vic	Qld	SA	WA	Tas	NT	ACT	Total
Capital city	78**	125**	103	205**	130**	119**	84	59**	112**
Other major urban centres <sup>2</sup>	70**	133**	91*	..	..	..	..	..	85**
Rest of State/Territory	64**	116**	59**	163**	82**	68**	44**	- <sup>3</sup>	82**
Whole of State/Territory	73**	123**	82**	192**	114**	88*	60**	61**	100

<sup>1</sup>Includes admissions to public acute hospitals, private hospitals and day surgery facilities, including admissions of same day patients

<sup>2</sup>Includes Newcastle and Wollongong (NSW); Geelong (Vic); and Gold Coast-Tweed Heads and Townsville-Thuringowa (Qld)

<sup>3</sup>Data unreliable: included with ACT total

Source: See Data sources, Appendix 1.3

Statistical significance: \* significance at 5 per cent; \*\* significance at 1 per cent

### Rest of State (Western Australia as the Standard)

There were 657 admissions of children aged from 0 to 9 years in the non-metropolitan areas of Western Australia for a myringotomy, 29 per cent fewer than expected from the State rates (an SAR of 71\*\*). Close to two thirds (60.9 per cent) of these admissions were males. The majority (84.2 per cent) of these admissions were same day admissions.

Less than half of the SLAs (38.1 per cent) had at least five expected admissions. Only nine of these had elevated ratios, with Esperance (with an SAR of 114 and 27 admissions) and Mandurah (109; 68) the only SLAs with more than 20 admissions. The highest ratios were in York (with an SAR of 190\* and 10 admissions), Bridgetown-Greenbushes (163; 13 admissions) and Toodyay (162; 8 admissions).

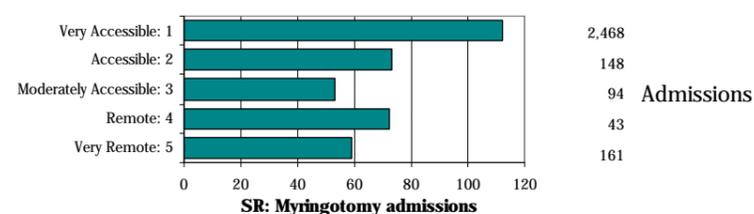
Of SLAs with more than 20 admissions, the lowest ratios were in Kalgoorlie/Boulder (an SAR of 58\*\*), Geraldton (89) and Bunbury (93).

Of the towns mapped, Mandurah (an SAR of 109) was the only town with more admissions than expected from the State rates. The lowest ratios were in Port Hedland (an SAR of 53\*), Albany (56\*) and Kalgoorlie/Boulder (58\*\*).

There were more than 20 admissions for a myringotomy procedure of children aged from 0 to 4 years from Mandurah (68 admissions), Bunbury (45), Geraldton (38), Kalgoorlie/Boulder (36) and Esperance (27).

The correlation analysis was not undertaken as there were too many SLAs with small numbers of cases.

### Accessibility/Remoteness Index of Australia



Standardised admission ratios (SARs) for admissions involving a myringotomy are highest in the Very Accessible areas and show a less predictable pattern across the other areas. The highest (and only elevated) ratio is in the Very Accessible areas (an SAR of 112), with the lowest ratios in the Moderately Accessible (53) and Very Remote (59) areas. Lower than expected ratios were also recorded in the Accessible (an SAR of 73) and Remote (72) areas.

Source: Calculated on ARIA classification, DHAC  
National Social Health Atlas Project, 1999

## Admissions of females aged 15 to 44 years for a Caesarean section, 1995/96

### State/Territory comparison (Australia as the Standard)

There were 13,966 Caesarean sections (described on page 274) performed as a principal procedure on female residents of the non-metropolitan areas of Australia. There were elevated standardised admission ratios (SARs) for this variable in most of the non-metropolitan areas other than in Western Australia (with an SAR of 99), with the most highly elevated ratios in the Northern Territory (142\*\*) and South Australia (123\*\*).

**Table 6.59: Admissions<sup>1</sup> of females aged 15 to 44 years with a principal procedure of Caesarean section, State/Territory, 1995/96**  
**Standardised admission ratios**

	NSW	Vic	Qld	SA	WA	Tas	NT	ACT	Total
Capital city	92**	92**	118**	107**	92**	100	115*	90**	97**
Other major urban centres <sup>2</sup>	95*	78**	106	..	..	..	..	..	97
Rest of State/Territory	105**	107**	109**	123**	99	104	142**	- <sup>3</sup>	108**
Whole of State/Territory	96**	95**	112**	111**	94**	102	130**	87**	100

<sup>1</sup>Includes admissions to public acute hospitals, private hospitals and day surgery facilities, including admissions of same day patients

<sup>2</sup>Includes Newcastle and Wollongong (NSW); Geelong (Vic); and Gold Coast-Tweed Heads and Townsville-Thuringowa (Qld)

<sup>3</sup>Data unreliable: included with ACT total

Source: See *Data sources, Appendix 1.3*

Statistical significance: \* significance at 5 per cent; \*\* significance at 1 per cent

### Rest of State (Western Australia as the Standard)

There were 1,211 admissions for a Caesarean section of female residents of the non-metropolitan areas of Western Australia aged from 15 to 44 years in 1995/96, six per cent more than were expected from the State rates (an SAR of 106\*).

Excluding SLAs with fewer than 20 admissions, the highest ratios were recorded in Katanning (an SAR of 183\*\* and 21 admissions), Busselton (151\*\*), Broome (143\*), Augusta-Margaret River (143), Mandurah (141\*\*) and Derby-West Kimberley (132).

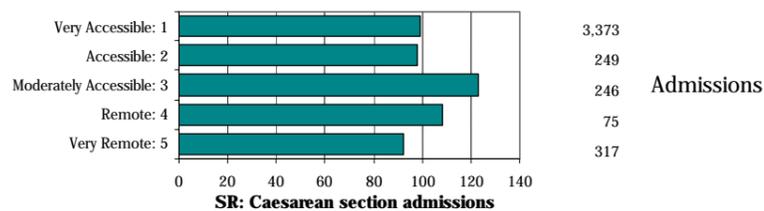
The lowest ratios were recorded for residents from Kalgoorlie/Boulder (an SAR of 72\*), Geraldton (74) and Roebourne (83).

Of the towns mapped, SARs for a Caesarean section were elevated by more than 40 per cent in Broome (an SAR of 143\*) and Mandurah (141\*\*). Bunbury (103) was the only other town with more admissions than expected. The lowest ratios were recorded in Kalgoorlie/Boulder (an SAR of 72\*) and Geraldton (74).

Only Mandurah (112 admissions) had more than 100 admissions, with 68 admissions of residents of Bunbury, 60 from Kalgoorlie/Boulder and 53 from Busselton. There were fewer than 40 admissions in the remaining SLAs.

The correlation analysis was not undertaken as there were too many SLAs with small numbers of cases.

### Accessibility/Remoteness Index of Australia



Standardised admission ratios for admissions of females aged from 15 to 44 years involving a Caesarean section were elevated by 23 per cent above the level expected from the State rates in the Moderately Accessible areas (an SAR of 123) and by eight per cent in the Remote areas (an SAR of 108). There were eight per cent fewer admissions from the Very Remote areas than expected (an SAR of 92) and close to the expected numbers in the Very Accessible (99) and Accessible (98) areas.

Source: Calculated on ARIA classification, DHAC  
National Social Health Atlas Project, 1999

## Admissions of females aged 30 years and over for an hysterectomy, 1995/96

### State/Territory comparison (Australia as the Standard)

There were 10,657 hysterectomies (described page 276) performed as a principal procedure on female residents of the non-metropolitan areas of Australia aged 30 years and over. Elevated standardised admission ratios (SARs) were recorded in the non-metropolitan areas of all States, with the most highly elevated ratios in South Australia (135\*\*) and Tasmania (120\*\*).

**Table 6.60: Admissions<sup>1</sup> of females aged 30 years and over with a principal procedure of hysterectomy, State/Territory, 1995/96**  
**Standardised admission ratios**

	NSW	Vic	Qld	SA	WA	Tas	NT	ACT	Total
Capital city	86**	91**	106**	102	100	115**	135**	87**	94**
Other major urban centres <sup>2</sup>	125**	103	98	..	..	..	..	..	115**
Rest of State/Territory	113**	108**	102	135**	106	120**	92	- <sup>3</sup>	110**
Whole of State/Territory	98*	95**	104**	110**	101	118**	113*	83**	100

<sup>1</sup>Includes admissions to public acute hospitals, private hospitals and day surgery facilities, including admissions of same day patients

<sup>2</sup>Includes Newcastle and Wollongong (NSW); Geelong (Vic); and Gold Coast-Tweed Heads and Townsville-Thuringowa (Qld)

<sup>3</sup>Data unreliable: included with ACT total

Source: See Data sources, Appendix 1.3

Statistical significance: \* significance at 5 per cent; \*\* significance at 1 per cent

### Rest of State (Western Australia as the Standard)

There were 822 admissions for hysterectomies in the non-metropolitan areas of Western Australia in 1995/96, four per cent more than expected from the State rates (an SAR of 104).

Only ten SLAs had 20 or more admissions. Excluding SLAs with fewer than 20 admissions, the highest ratios were recorded for residents from Mandurah (an SAR of 150\*\* and 107 admissions), Collie (137), Bunbury (132\*) and Busselton (130), all located in the State's south-west region.

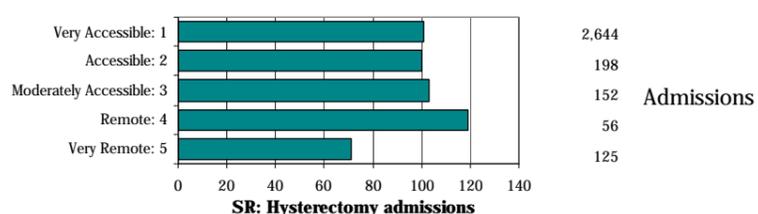
None of the SLAs with low ratios (ie. below 100) had 20 or more admissions. SLAs with low ratios and at least 10 admissions included Roebourne (an SAR of 42\*\* and 11 admissions), Geraldton (48\*\*; 17 admissions) and Port Hedland (54\*; 10 admissions).

Of the towns mapped, SARs for an hysterectomy procedure were elevated by more than 15 per cent in Mandurah (an SAR of 150\*\*), Bunbury (132\*) and Albany (115). The lowest ratios were in Broome (an SAR of 45\*) and Geraldton (48\*\*).

Mandurah had the largest number of admissions of females aged 30 years and over for an hysterectomy in the non-metropolitan areas of Western Australia (107 admissions), with 68 admissions of residents from Bunbury, 42 from Kalgoorlie/Boulder and 41 from Busselton.

The correlation analysis was not undertaken as there were too many SLAs with small numbers of cases.

### Accessibility/Remoteness Index of Australia



Standardised admission ratios for admissions of females aged 30 years and over involving an hysterectomy were close to the level expected from the State rates in the three 'accessible' ARIA categories. The major variations in the number of admissions for this procedure were of females from the Remote areas, who had 19 per cent more admissions than expected from the State rates (an SAR of 119) and those from the Very Remote areas, with 29 per cent fewer admissions than expected from the State rates (an SAR of 71).

Source: Calculated on ARIA classification, DHAC  
National Social Health Atlas Project, 1999

## Admissions for an hip replacement, 1995/96

### State/Territory Comparison (Australia as the Standard)

There were 4,955 hip replacements (described on page 278) performed as a principal procedure on residents of the non-metropolitan areas of Australia. Females accounted for 48.6 per cent of these admissions, lower than the 57.4 per cent in the capital cities. The higher proportion for males may in part reflect the occupations held by men in rural Australia and the need for such a procedure. Standardised admission ratios (SARs) varied across the non-metropolitan areas of Australia, with elevated ratios in all but Queensland and the Northern Territory. The highest ratio was in Victoria (an SAR of 129\*\*) and the lowest ratio (82\*\*) was in Queensland.

**Table 6.61: Admissions<sup>1</sup> with a principal procedure of hip replacement, State/Territory, 1995/96**  
**Standardised admission ratios**

	NSW	Vic	Qld	SA	WA	Tas	NT	ACT	Total
Capital city	91**	103	75**	99	90**	135**	51**	112	94**
Other major urban centres <sup>2</sup>	96	118	86**	..	..	..	..	..	95
Rest of State/Territory	122**	129**	82**	125**	107	120**	91	- <sup>3</sup>	113**
Whole of State/Territory	100	111**	80**	106*	94*	127**	71*	103	100

<sup>1</sup>Includes admissions to public acute hospitals, private (acute and psychiatric) hospitals

<sup>2</sup>Includes Newcastle and Wollongong (NSW); Geelong (Vic); and Gold Coast-Tweed Heads and Townsville-Thuringowa (Qld)

<sup>3</sup>Data unreliable: included with ACT total

Source: See *Data sources, Appendix 1.3*

Statistical significance: \* significance at 5 per cent; \*\* significance at 1 per cent

### Rest of State (Western Australia as the Standard)

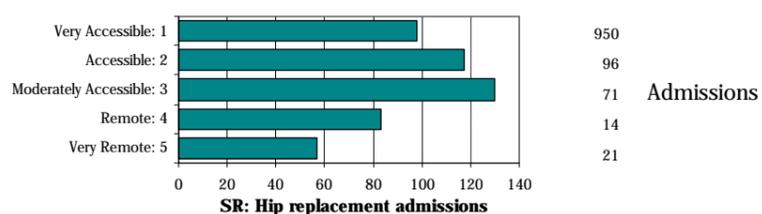
There were 327 admissions of residents of the non-metropolitan areas of Western Australia, 14 per cent more than expected from the State rates (an SAR of 114<sup>1</sup>).

There were more than twice the expected number of admissions in Albany Shire (217\*\*; 17 admissions), with relatively high ratios in Collie (145; 9 admissions), Augusta-Margaret River (142; 8 admissions), Mandurah (130; 49 admissions) and the town of Albany (127; 19 admissions). Only six other SLAs had elevated ratios.

The lowest ratios (in SLAs where five or more admissions were expected) were in Esperance (41; 3 admissions), Geraldton (66; 9 admissions) and Harvey (86; 9 admissions).

The correlation analysis was not undertaken as there were too many SLAs with small numbers of cases.

### Accessibility/Remoteness Index of Australia



Standardised admission ratios for admissions for an hip replacement increase from an SAR of 98 in the Very Accessible areas (accounting for 82.5 per cent of the admissions) to a high of 130 in the Moderately Accessible ARIA category (30 per cent more admissions than expected from the State rates), before dropping sharply to a ratio of 83 in the Remote areas and dropping again to a ratio of 57 in the Very Remote areas.

Source: Calculated on ARIA classification, DHAC  
National Social Health Atlas Project, 1999

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# General medical practitioner services

## Introduction

General medical practitioners (GPs) comprise the largest group of health professionals providing primary health care services. They are frequently the first point of contact with the health care system, for the 80 per cent of the population who visit them each year. As such, they are an essential part of the health care system.

## Background

In 1996/97, the Health Insurance Commission (which operates the national health insurance plan, Medicare) processed accounts for 36.9 million unreferral attendances (called services in this atlas)<sup>13</sup> by GPs in New South Wales, an average of 5.9 services for each person enrolled with Medicare. Total Medicare payments to GPs for these services were \$843 million (Health Insurance Commission 1997).

Consultations with GPs cover a wide range of injuries and illness conditions, in addition to consultations for preventive measures. The most frequently reported reasons for consulting a doctor, as reported in the 1995 National Health Survey, were diseases of the respiratory, musculoskeletal and circulatory systems.

## Data limitations

### Coverage

The following analysis uses Medicare statistics for the year 1996. Details of the number of GP services in each postcode were provided by the Medicare Statistics Section, Department of Health and Aged Care, based on Medicare data from the Health Insurance Commission. This dataset includes services provided at a surgery/clinic, at the patient's home or in an institution (hostel, nursing home, etc). It excludes GP type services not covered by Medicare, which are mainly:

- inpatient services to 'hospital' patients in public acute hospitals (ie. patients receiving treatment under Medicare);
- attendances at accident and emergency/ casualty departments of public acute hospitals for GP type services;
- GP services at some community health services which do not bill their clients;
- services operated by the Aboriginal Medical Service and some State funded Aboriginal health services; and
- medical services provided by private companies (eg. mining companies), the defence forces and the Royal Flying Doctor Service (**Table 6.62** includes details of the operations of this service, some of which are GP type services).

<sup>13</sup>At each consultation, a GP may provide one or more service. One of these services will be the consultation itself: additional services, such as a minor surgical procedure or immunisation, may also be provided, and are recorded separately in Medicare statistics. It is estimated that there are, on average, 1.1 services per consultation.

National data are not available for the number of attendances at accident and emergency departments of public hospitals that are for primary health care services: that is, services that could have been provided by a GP. A study in South Australia in 1993/94 found that up to one third of such attendances were of this kind. This represents the equivalent of approximately 1.3 per cent of GP attendances recorded in the Medicare statistics collection for that year. These attendances are again likely to be predominantly of people of lower socioeconomic status.

Similarly, the exclusion of data for attendances at some community health centres is also unlikely to change the spatial patterns of distribution evident in the maps. Not only do these centres account for a relatively small number of attendances, their clients are also predominantly of lower socioeconomic status.

The impact on the data of services provided by Aboriginal Medical Services is of particular relevance in rural and remote areas. Details of the number of services provided through Aboriginal Medical Services by GPs, Aboriginal workers, etc. are not currently available. The Office of Aboriginal and Torres Strait Islander Health is currently undertaking a collection of this information which may, in time, fill an important gap in the available data.

### Missing data

In the dataset provided for the atlas, there were 103,695 records (0.1 per cent of all records for Australia) for which the postcode was not able to be allocated to an SLA using the postcode to SLA converter from the ABS (see Chapter 2 for details of this conversion process). The postcode associated with these records was either not valid (four fifths) or was not on the postcode to SLA conversion list (one fifth). This latter group includes postcodes for businesses and post office boxes, as well as valid residential postcodes that do not appear in the ABS conversion table (eg. where there are two postcodes in a Collection District (CD), the whole CD is allocated to just one postcode and this is shown in the conversion table; the other postcode does not appear).

### Other gaps and deficiencies

The data presented here are only of services provided by general practitioners and not by specialist medical practitioners. The spatial patterns of distribution of services of specialist medical practitioners would be of value in informing strategic policy and planning activities. They cannot, however, be mapped as details of the large number of such services provided through public hospitals outpatient departments (and the lesser number through public hospital accident and emergency departments) are not available by SLA. Details of such services provided outside of public hospitals by specialist medical practitioners (and billed through Medicare) are available, but to map just this set of the whole would provide a biased view of the distribution at the small area level.

**Table 6.62: Location of Royal Flying Doctor Service bases and number of services, 1997**

Operational organisation	Remote consultations		Patients attended				Patient transport		Clinics	Patient contacts	Doctors	Nurses
	Radio	Telephone	Field clinics	Other clinics	Inpatient services	Immuni-sations	Evacuation	Hospital transfers				
<b>Queensland</b>												
Mt Isa	6	3,624	4,522	-	-	-	240	473	335	9,200	-	-
Charleville	37	1,893	4,373	-	-	-	185	168	259	6,915	-	-
Cairns	10	6,370	10,609	-	-	-	396	757	602	18,744	-	-
Rockhampton	-	-	-	-	-	-	14	939	-	953	-	-
Brisbane	-	-	-	-	-	-	5	843	-	948	-	-
Townsville	-	-	-	-	-	-	14	357	-	371	-	-
<b>Total</b>	<b>53</b>	<b>11,887</b>	<b>19,504</b>	-	-	-	<b>854</b>	<b>3,537</b>	<b>1,196</b>	<b>37,031</b>	<b>11</b>	<b>24</b>
<b>New South Wales</b>												
Broken Hill	5	6,741	14,624	-	-	506	339	484	917	23,616	-	-
Moomba	-	-	-	5,782	-	-	-	-	-	5,782	-	-
Sydney	-	-	17,962	-	-	-	-	-	-	17,962	-	-
Tasmania	-	-	-	-	-	-	-	162	-	162	-	-
<b>Total</b>	<b>5</b>	<b>6,741</b>	<b>32,586</b>	<b>5,782</b>	-	<b>506</b>	<b>339</b>	<b>646</b>	<b>917</b>	<b>47,522</b>	<b>5</b>	<b>10</b>
<b>Central Section</b>												
Alice Springs	60	870	3,552	-	-	-	1,459	237	158	6,336	-	-
Yulara	-	-	-	9,242	-	93	-	-	364	9,699	-	-
Port Augusta	12	8,020	3,682	119	3,683	555	947	574	278	17,870	-	-
Adelaide	-	-	-	-	-	-	306	2,712	-	3,018	-	-
<b>Total</b>	<b>72</b>	<b>8,890</b>	<b>7,234</b>	<b>9,361</b>	<b>3,683</b>	<b>648</b>	<b>2,712</b>	<b>3,523</b>	<b>800</b>	<b>36,923</b>	<b>6</b>	<b>25</b>
<b>Western Operations</b>												
Derby	-	-	7,346	-	-	-	338	662	477	8,823	-	-
Jandakot	98	2,031	3,886	49	58	-	63	1,335	270	7,790	-	-
Kalgoorlie	15	4,267	3,075	80	973	-	281	842	299	9,832	-	-
Meekatharra	2	2,591	735	7,658	1,135	-	82	729	57	12,989	-	-
Port Hedland	146	2,941	1,987	880	1,144	-	184	577	155	8,014	-	-
<b>Total</b>	<b>261</b>	<b>11,830</b>	<b>17,029</b>	<b>8,667</b>	<b>3,310</b>	-	<b>948</b>	<b>4,145</b>	<b>1,258</b>	<b>47,448</b>	<b>10</b>	<b>25</b>
<b>Tasmania Section</b>												
Launceston	-	-	-	118	-	-	180	262	-	560	-	-
<b>All Sections</b>	<b>391</b>	<b>39,348</b>	<b>76,353</b>	<b>23,928</b>	<b>6,993</b>	<b>1,154</b>	<b>5,033</b>	<b>12,113</b>	<b>4,171</b>	<b>169,484</b>	<b>32<sup>2</sup></b>	<b>84<sup>2</sup></b>

Source: Annual Report 1996, Royal Flying Doctor Service of Australia

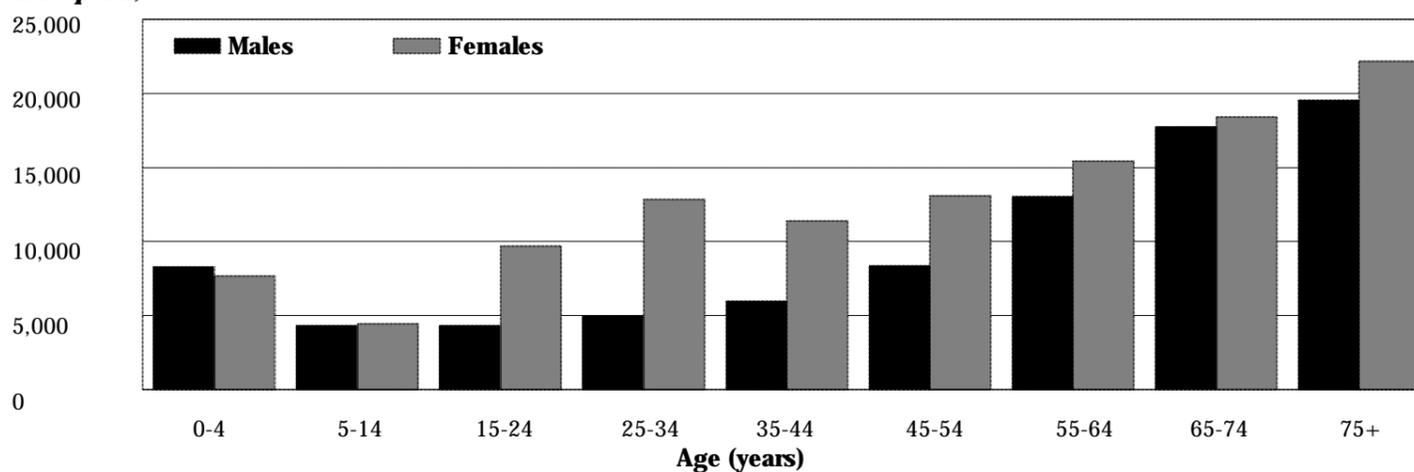
**GP services by age and sex of patient**

Females used GP services more than males, accounting for 59.0 per cent of services in Western Australia in 1996. Females accounted for more services per patient at each age group from the 15 to 24 year age group right through to 75 years and over,

with males accounting for more services only in the 0 to 4 year age group (Figure 6.11). Females and males had similar rates in the 5 to 14 year age group.

**Figure 6.11: General medical practitioner services, by age and sex, Western Australia, 1996-97**

Rate per 1,000



Source: Statistical Tables, 1996-97, Health Insurance Commission

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## General medical practitioner services to males, 1996

### Capital city comparison (Australia as the Standard)

Standardised ratios (SRs) for general medical practitioner (GP) services to males varied between the capital cities (broadly in proportion to their population) from the highest ratio in the largest capital city of **Sydney** (125\*\*), to the lowest in **Darwin** (80\*\*). The differentials between the highest and lowest ratios is substantial, at just over fifty per cent.

Between 1989 and 1996 the *All capitals* SR increased (relative to the Australian rate) from 108\*\* to 113\*\*, indicating a higher rate of use of GP services by male residents of the capital cities relative to those in the non-metropolitan areas of Australia. At the capital city level, the largest movements were increases in **Melbourne** (where the ratio moved from well below the *All capitals* figure in 1989 to equal it in 1995/96) and **Perth** (where the ratio remained well below the *All capitals* average) to a decrease in **Hobart**.

**Table 6.63: General medical practitioner services to males, capital cities**  
*Standardised ratios*

	Sydney	Melbourne	Brisbane	Adelaide	Perth	Hobart	Darwin	Canberra <sup>1</sup>	All capitals
<b>1996</b>	125**	113**	106**	107**	101**	90**	80**	87**	113**
<b>1989</b>	124**	99**	111**	106**	91**	101**	84**	86**	108**

<sup>1</sup>Includes Queanbeyan (C)

Source: See *Data sources*, Appendix 1.3

Statistical significance: \* significance at 5 per cent; \*\* significance at 1 per cent

### Perth (Western Australia as the Standard)

Male residents of **Perth** received 2,934,505 services from GPs in 1996. This was 13 per cent more than expected in relation to the State rates, an SR of 113\*\*. The age distribution of these patients is shown in **Figure 6.11** on page 298.

The use of GP services by males was particularly high in **Perth's** older suburbs to the north and east of the city centre, the newer suburbs on the northern fringe and in the Kwinana area (**Map 6.48**). Slightly lower usage levels for GP services prevailed in the south-east sector of the metropolitan area, while the lower levels were recorded in the higher socioeconomic status areas to the west of the city, and adjacent to the coast.

The highest levels of use of GP services by males were recorded in Wanneroo: South-East (an SR of 139\*\*) and Stirling: Central (131\*\*). Other ratios elevated by at least 20 per cent were recorded in Bassendean (an SR of 127\*\*), Wanneroo: Central Coast (124\*\*), Wanneroo: South-West (123\*\*), Bayswater (123\*\*), Wanneroo: North-West, Kwinana and Belmont (all 122\*\*).

Eleven other SLAs had ratios elevated by at least 10 per cent, the highest being in Vincent (an SR of 121\*\*), Gosnells (118\*\*) and Stirling: South-Eastern (118\*\*). Overall, there were elevated ratios for GP services to males in almost three quarters (71.4 per cent) of the SLAs in **Perth**.

Generally, areas with the lowest rates of GP use by males were in the older western suburbs. The lowest standardised ratios were recorded for residents from Nedlands (with an SR of 70\*\*), Cottesloe (79\*\*), Serpentine-Jarrahdale and Claremont (both 81\*\*), Perth (82\*\*) and Peppermint Grove (88\*\*).

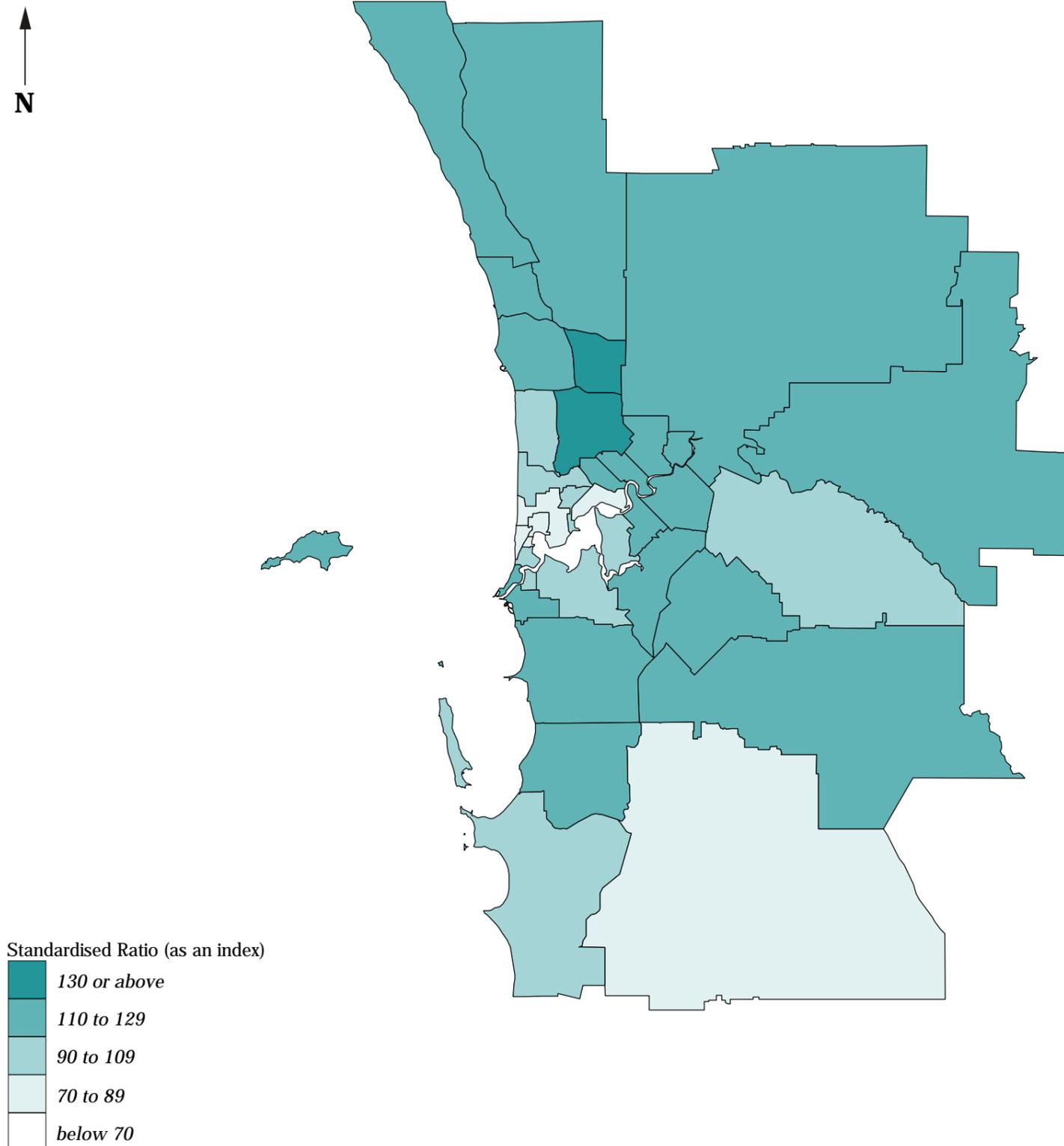
There were more than 150,000 GP services recorded for males in six SLAs in 1996, with the largest numbers occurring in Stirling: Central (256,081 GP services), Wanneroo: South-West (255,816), Melville (191,323) and Gosnells (178,792).

There was a correlation of substantial significance with the variable for low income families (0.71) and of meaningful significance with early school leavers (0.66), unemployment (0.66), unskilled and semi-skilled workers (0.65), the Indigenous population (0.60) and migrants from predominately non-English speaking countries resident for five years or more (0.60). Inverse correlations of meaningful significance were recorded with the variables for high income families and managers and administrators, and professionals (both -0.75). These results, together with the inverse correlation of substantial significance with the IRSD (-0.76), indicate an association at the SLA level between high rates of use of GP services by males and socioeconomic disadvantage.

### Map 6.48

## General medical practitioner services to males, Perth, 1996

Standardised Ratio: number of services in each Statistical Local Area compared with the number expected\*



\*Expected numbers were derived by indirect age standardisation, based on WA totals

Source: See Data sources, Appendix 1.3

Details of map boundaries are in Appendix 1.2  
National Social Health Atlas Project, 1999

# General medical practitioner services to males, 1996

## State/Territory comparison (Australia as the Standard)

Standardised ratios (SRs) for GP services to males were lower in the non-metropolitan areas than in the capital cities, some substantially so. SRs ranged from a high of 83\*\* in Tasmania (the State with the smallest differential between the capital city and *Rest of State* rate) to a very low 31\*\* in the rural and remote areas of the Northern Territory. Readers should be aware of the notes on page 297, under *Data limitations*, as to the gaps in the data which are particularly likely to be contributing to the low rates in the Northern Territory and, to a lesser extent, Western Australia. The information in Chapter 7 as to the numbers and distribution of GPs in these areas is also of relevance.

With the exception of Victoria, SRs declined (relative to the Australian rate) in the non-metropolitan areas of all the States and the Northern Territory. The largest declines were in the Northern Territory, New South Wales and Tasmania,

**Table 6.64: General medical practitioner services to males, State/Territory**  
**Standardised admission ratios**

	NSW	Vic	Qld	SA	WA	Tas	NT	ACT	Total
<b>1996</b>									
Capital city	125**	113**	106**	107**	101**	90**	80**	87**	113**
Other major urban centres <sup>1</sup>	99**	90**	97**	..	..	..	..	..	97**
Rest of State/Territory	74**	76**	79**	79**	61**	83**	31**	- <sup>2</sup>	74**
Whole of State/Territory	108**	103**	93**	99**	90**	86**	53**	88**	100
<b>1989</b>									
Rest of State/Territory	87**	76**	85**	80**	63**	95**	44**	- <sup>2</sup>	81**

<sup>1</sup>Includes Newcastle and Wollongong (NSW); Geelong (Vic); and Gold Coast-Tweed Heads and Townsville-Thuringowa (Qld)

<sup>2</sup>Data unreliable: included with ACT total

Source: See *Data sources*, Appendix 1.3

Statistical significance: \* significance at 5 per cent; \*\* significance at 1 per cent

## Rest of State (Western Australia as the Standard)

Male residents living in the non-metropolitan areas of Western Australia used 733,612 GP services in 1996. This was significantly fewer services than expected from the State rates, an SR of 68\*\*; these low rates of use are in line with the lower levels of access to GPs in non-metropolitan areas (see Chapter 7 for details of the distribution of GPs).

The use of GP services by males in the non-metropolitan areas of Western Australia was relatively low in SLAs throughout the State, particularly in areas beyond the eastern margins of the wheat belt (**Map 6.49**). The highest rates of use of GP services were in SLAs located in the south-west of the State.

There were eight SLAs with elevated ratios for use of GP services by males, with the highest ratios in Kojonup (an SR of 120\*\*), Harvey (116\*\*), York (108\*\*) and Chittering (105\*\*).

All the other SLAs had standardised ratios below the level expected from the State rates. Within this group, the highest ratios were in Beverley, Katanning and Morawa (each with an SR of 99), Perenjori (96) and Mandurah (94\*\*).

Standardised ratios 50 per cent lower than expected from the State rates were recorded in one fifth of non-metropolitan SLAs, with the lowest ratios recorded for residents from Derby-West Kimberley and Sandstone (both with an SR of 5\*\*), Meekatharra (7\*\*), Exmouth and Menzies (both 9\*\*), Shark Bay (14\*\*), and Halls Creek and Laverton (both 15\*\*).

More than 30,000 GP services were used by males in six non-metropolitan SLAs in Western Australia; they were Mandurah (81,165 GP services), Kalgoorlie/Boulder (45,511), Harvey (36,163), Busselton (31,853), Bunbury (31,263) and Geraldton (30,623).

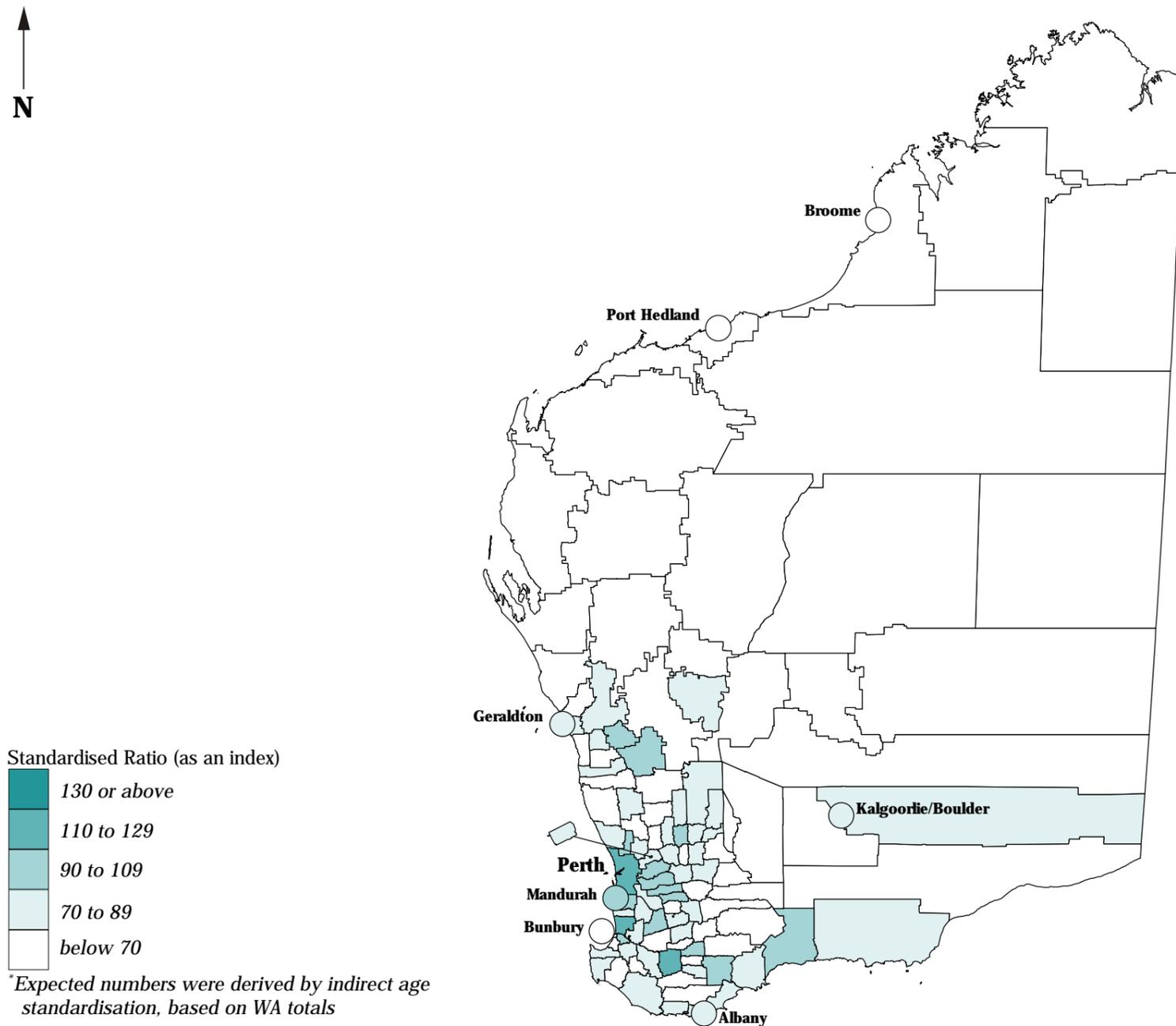
Of the towns mapped, all had lower than expected use of GP services by males. The highest standardised ratios were in Mandurah (94\*\*) and Albany (76\*\*), with the lowest ratios in Broome (38\*\*), Port Hedland (44\*\*) and Bunbury (55\*\*).

There was a weak correlation with the variable for managers and administrators, and professionals (0.30); and an inverse correlation of meaningful significance with the Indigenous population (-0.51) and of lesser significance with dwellings without a motor vehicle (-0.45) and single parent families (-0.38). These results, together with the correlation with the IRSD (0.45), suggest the existence of an association at the SLA level between high rates of use of GP services by males and high socioeconomic status. This is in contrast with the situation in **Perth**.

## Map 6.49

### General medical practitioner services to males, Western Australia, 1996

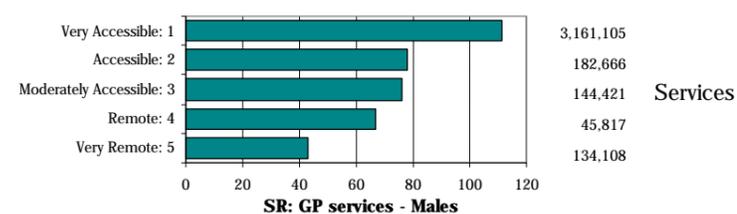
Standardised Ratio: number of services in each Statistical Local Area compared with the number expected\*



Source: See Data sources, Appendix 1.3

Details of map boundaries are in Appendix 1.2

### Accessibility/Remoteness Index of Australia



Males in areas included in the Accessible category had the highest rate of use of general medical practitioner (GP) services, using 11 per cent more GP services than expected from the State rates (an SR of 111). Ratios in the other categories dropped away to SARs of 78, 76 and 67 in the middle categories, before declining to a very low SR of 43 in the Very Remote category (53 per cent fewer GP services to males than were expected from the State rates). Details of the distribution of GPs (Chapter 7) are of relevance in interpreting these data.

Source: Calculated on ARIA classification, DHAC

National Social Health Atlas Project, 1999

# General medical practitioner services to females, 1996

## Capital city comparison (Australia as the Standard)

As was the case for GP services to males, the level of GP services received by females resident in the capital cities closely mirrored population size. There was, however, a lower differential (of 44.4 per cent) between the highest ratio, of 117\*\* in **Sydney**, and the lowest, of 81\*\* in **Darwin**, than was evident for males (56.2 per cent).

Between 1989 and 1996 SRs declined (relative to the Australian rates) in five of the capital cities, with the largest declines being in **Darwin** and **Hobart**.

**Table 6.65: General medical practitioner services to females, capital cities**  
*Standardised admission ratios*

	Sydney	Melbourne	Brisbane	Adelaide	Perth	Hobart	Darwin	Canberra <sup>1</sup>	All capitals
<b>1996</b>	<b>117**</b>	<b>110**</b>	<b>107**</b>	<b>105**</b>	<b>102**</b>	<b>96**</b>	<b>81**</b>	<b>88**</b>	<b>110**</b>
<b>1989</b>	<b>120**</b>	<b>99**</b>	<b>110**</b>	<b>103**</b>	<b>92**</b>	<b>102**</b>	<b>88**</b>	<b>89**</b>	<b>107**</b>

<sup>1</sup>Includes Queanbeyan (C)

Source: See *Data sources*, Appendix 1.3

Statistical significance: \* significance at 5 per cent; \*\* significance at 1 per cent

As noted in the introductory text, females use more general medical practitioner (GP) services than males, 6.2 services per female and 4.3 services per male. The highest rates of use by women, and the greatest difference between their rates of use and those of men, were by women in the 20 to 50 year age groups. The age distribution of women receiving these services is shown in **Figure 6.11** on page 298.

Correlations of meaningful significance were recorded with the variables for the Indigenous population (0.69), low income families (0.65), unemployment (0.60) and children aged 0 to 4 years (0.60). These results, together with the inverse correlation of substantial significance with the IRSD (-0.78), indicate the existence of an association at the SLA level between high rates of use of GP services by females and socioeconomic disadvantage.

## Perth (Western Australia as the Standard)

Female residents of **Perth** used 4,264,974 services from GPs in 1996, nine per cent more than expected from the State rates (an SR of 109\*\*). Females used 45.3 per cent more GP services than males.

Areas with high rates of GP use of services by females were concentrated in **Perth's** northern, inner eastern and southern areas (see **Map 6.50**). Slightly fewer than half (48.4 per cent) of the SLAs had standardised ratios within ten per cent of the level expected from the State rates. The very lowest levels of use of GP services were in a number of high socioeconomic SLAs located between the city centre and the coast.

The highest standardised ratios for GP services by females were recorded in Wanneroo: South-East (with an SR of 132\*\*), Wanneroo: North-West (123\*\*), Stirling: Central (121\*\*), Wanneroo: South-West (121\*\*), Bassendean (120\*\*) and Bayswater (120\*\*). Other elevated SRs were in Armadale and Cockburn (both with an SR of 110\*\*) and Mundaring (108\*\*).

The lowest ratios were recorded for residents in Nedlands (with an SR of 76\*\*), Claremont and the City of Perth (both 77\*\*), Serpentine-Jarrahdale (80\*\*) and Cottesloe (82\*\*).

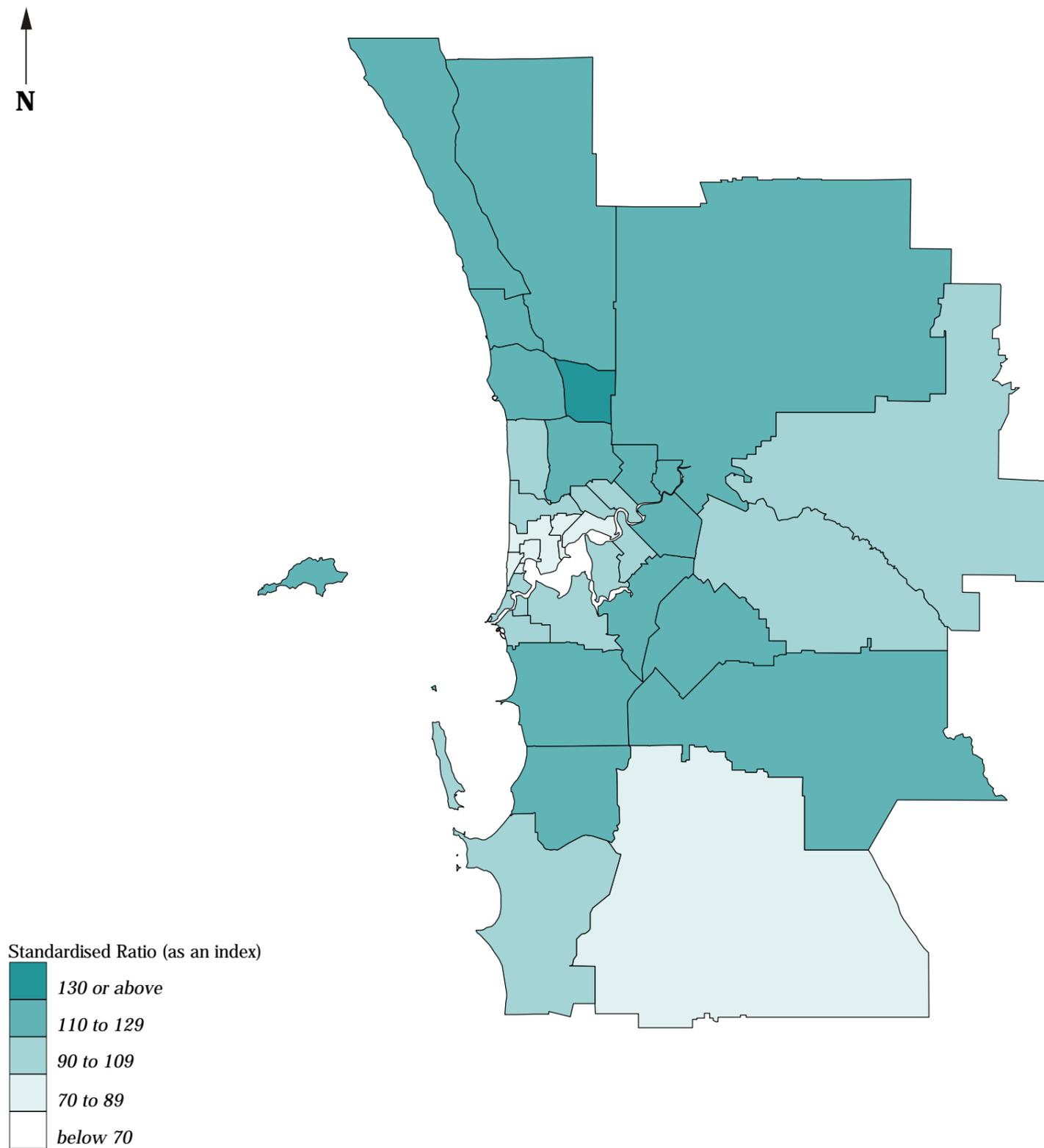
The largest numbers of GP services provided to females were recorded in Stirling: Central (371,029 GP services), Wanneroo: South-West (368,152), Melville (289,236), Gosnells (251,685), Canning (236,476) and Swan (231,050).

There were correlations of substantial significance with the variables for unskilled and semi-skilled workers (0.73) and early school leavers (0.73), and inverse correlations of substantial significance with managers and administrators, and professionals (-0.83) and high income families (-0.78).

## Map 6.50

### General medical practitioner services to females, Perth, 1996

Standardised Ratio: number of services in each Statistical Local Area compared with the number expected\*



\*Expected numbers were derived by indirect age standardisation, based on WA totals

Source: See Data sources, Appendix 1.3

Details of map boundaries are in Appendix 1.2  
National Social Health Atlas Project, 1999

# General medical practitioner services to females, 1996

## State/Territory comparison (Australia as the Standard)

As for males, standardised ratios (SRs) for GP services for females were lower in the *Rest of State/Territory* areas than in the capital cities for all the States and the Northern Territory. SRs were, however, generally higher than those for males. Again, SRs ranged from the highest in Tasmania (89\*\*) to the lowest in the Northern Territory (33\*\*). The data limitations for these rural and remote areas should be borne in mind when using this data (see page 297). The information in Chapter 7 as to the numbers and distribution of GPs in these areas is also of relevance.

There was less movement in the SRs between 1989 and 1996 than was evident for GP services to males. The largest declines in GP service use were in the ratios for Queensland and the Northern Territory.

**Table 6.66: General medical practitioner services to females, State/Territory**  
*Standardised admission ratios*

	NSW	Vic	Qld	SA	WA	Tas	NT	ACT	Total
<b>1996</b>									
Capital city	117**	110**	107**	105**	102**	96**	81**	88**	110**
Other major urban centres <sup>1</sup>	98**	92**	97**	..	..	..	..	..	97**
Rest of State/Territory	78**	81**	82**	82**	70**	89**	33**	- <sup>2</sup>	79**
Whole of State/Territory	105**	102**	95**	99**	94**	93**	55**	89**	100
<b>1989</b>									
Rest of State/Territory	88**	79**	100	81**	70**	95**	46**	- <sup>2</sup>	87**

<sup>1</sup>Includes Newcastle and Wollongong (NSW); Geelong (Vic); and Gold Coast-Tweed Heads and Townsville-Thuringowa (Qld)

<sup>2</sup>Data unreliable: included with ACT total

Source: See *Data sources*, Appendix 1.3

Statistical significance: \* significance at 5 per cent; \*\* significance at 1 per cent

## Rest of State (Western Australia as the Standard)

As for male residents living in the non-metropolitan areas of Western Australia, females also used significantly fewer GP services than were expected in 1996. There were 1,022,922 GP services, 26 per cent fewer than expected from the State rates, an SR of 74\*\*; these low rates of use are in line with the lower levels of access to GPs in non-metropolitan areas (see Chapter 7 for details of the distribution of GPs).

Although the use of GP services by females was higher than expected in 13 SLAs scattered throughout an area extending from Morawa to Gnowangerup, generally their use of GP services was relatively low in SLAs throughout the State. The lowest rates of use were recorded in the most remote areas, with usage levels tending to increase with reducing distance from **Perth (Map 6.51)**.

There were 13 SLAs in the non-metropolitan areas of Western Australia with elevated standardised ratios for GP service use by females. Of these, the highest ratios were in Kojonup (with an SR of 136\*\*) and Morawa (133\*\*), with 36 per cent and 33 per cent, respectively, more GP services than expected from the State rates. Other elevated ratios were recorded in Harvey (with an SR of 120\*\*), Wandering (118\*\*), Gnowangerup and Narrogin (both 117\*\*) and Chittering (116\*\*).

In almost one third (32.7 per cent) of SLAs, females used at least 30 per cent fewer GP services than expected from the State rates. Within this group of SLAs, the lowest ratios were recorded in Derby-West Kimberley (an SR of 6\*\* and 1,187 services), Sandstone (8\*\*; 39), Exmouth (12\*\*; 1,389), Meekatharra (13\*\*; 673), Menzies (14\*\*; 130), Shark Bay (16\*\*; 984), Ngaanyatjarraku (16\*\*; 660) and Wyndham-East Kimberley (19\*\*; 4,510).

In Mandurah, there were 114,075 GP services provided to females in 1996, the only non-metropolitan SLA with more than 100,000 GP services. Other SLAs with relatively large numbers of GP services were Kalgoorlie/Boulder (62,871 services), Harvey (51,533), Bunbury (49,814), Busselton (47,306) and Geraldton (43,698).

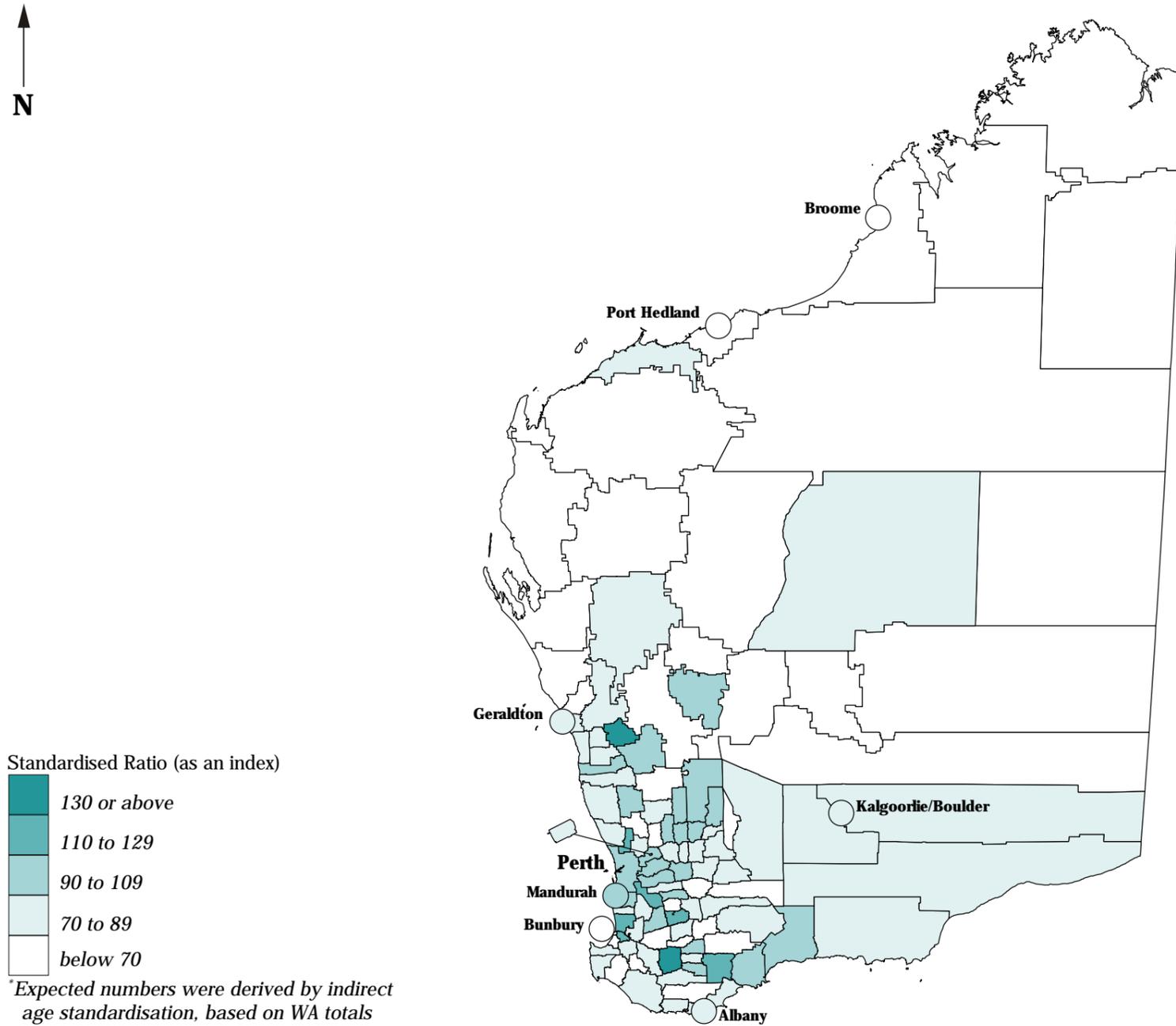
The use of GP services by females was lower than expected in each of the towns mapped, with the highest ratios in Mandurah (an SR of 93\*\*) and Kalgoorlie/Boulder (79\*\*). The lowest ratios were recorded in Broome (an SR of 40\*\*) and Port Hedland (53\*\*).

There were weak correlations with the variables for the Indigenous population (-0.49), single parent families (-0.45) and dwellings without a motor vehicle (-0.45); and with managers and administrators, and professionals (0.33). These results, together with the correlation of meaningful significance with the IRSD (0.50), suggest the existence of an association at the SLA level between high rates of use of GP services by females and high socioeconomic status. As was the case for males, this is in contrast with the situation in **Perth**.

## Map 6.51

### General medical practitioner services to females, Western Australia, 1996

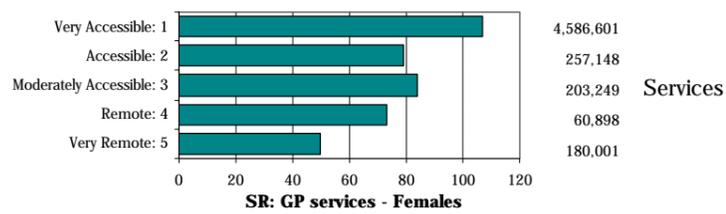
Standardised Ratio: number of services in each Statistical Local Area compared with the number expected\*



Source: See Data sources, Appendix 1.3

Details of map boundaries are in Appendix 1.2

### Accessibility/Remoteness Index of Australia



As for males, females in areas included in the Accessible category had the highest rate of use of general medical practitioner (GP) services, using 7 per cent more GP services than expected from the State rates (an SR of 107). Ratios in the three middle categories were 79, 84 and 73, respectively, with a lower ratio of 50 in the Very Remote category. Details of the distribution of GPs (Chapter 7) are of relevance in interpreting these data.

Source: Calculated on ARIA classification, DHAC  
National Social Health Atlas Project, 1999

# Immunisation status of children at 12 months of age, 1998

## Capital city comparison

Immunisation data are collected by the Health Insurance Commission which maintains the Australian Childhood Immunisation Register (ACIR). The ACIR, a project funded by the Commonwealth Government through the Commonwealth Department of Health and Aged Care, provides comprehensive information on the immunisation status of children under seven years of age in Australia. These data are used to provide a measure of coverage at a National, State/Territory and local level and to provide an effective management tool for monitoring immunisation coverage and service delivery. The register was commenced in 1996 and by mid 1998 had sufficient coverage of the immunisation status of children at twelve months of age to be used for this analysis. Hull et al. (1999) reported that 80.1 per cent of vaccinations recorded in the ACIR for New South Wales were provided by GPs, 8.4 per cent by municipal councils and 11.5 per cent by other providers (eg. Government operated community health centres, Aboriginal health services and Royal Flying Doctor services).

The data shown here are the proportion of children born between 1 October 1996 and 30 September 1997 who were registered with Medicare and who were shown on the ACIR at 31 December 1998 as being fully immunised. Children who were fully immunised at 12 months of age were those who had been immunised for three doses of DTP (diphtheria, tetanus and pertussis), three doses of OPV (oral polio vaccine) and three doses of Hib (*Haemophilus influenzae* type b). The calculations shown in the tables and maps were made by the National Centre for Immunisation Research and Surveillance (NCIRS).

Immunisation rates for the capital cities were all close to the *All capitals* average of 82.5 per cent, ranging from 79.7 per cent in **Sydney** to 86.9 per cent in **Canberra**.

**Table 6.67: Proportion of children who were fully immunised at 12 months of age, capital cities, 1998**

Per cent								
Sydney	Melbourne	Brisbane	Adelaide	Perth	Hobart	Darwin	Canberra <sup>1</sup>	All capitals
79.7	84.0	85.4	84.5	81.2	84.0	80.0	86.9	82.5

<sup>1</sup>Includes Queanbeyan (C)

Source: See *Data sources*, Appendix 1.3

## Perth

In 1998, 81.2 per cent of **Perth's** children aged 12 months were fully immunised, a total of 17,299 children.

Immunisation rates were between 85.0 per cent and 90.0 per cent in four SLAs (**Map 6.52**). Two of these were situated on the edge of the Perth Statistical Division, while the other two were located ten kilometres north-west of the city centre. SLAs with immunisation rates of between 80 per cent and 85.0 per cent were widespread throughout the metropolitan area.

The highest rates of immunisation were in Kalamunda and Serpentine-Jarrahdale, where 88.3 and 87.3 per cent of children aged 12 months were fully immunised. Relatively high rates of immunisation were also recorded in Bayswater (85.8 per cent), Bassendean (85.0 per cent), Vincent (84.9 per cent), Cambridge (84.8 per cent), Mundaring (84.6 per cent), Stirling: Coastal and Swan (both 84.5 per cent.)

There were 13 SLAs in which fewer than 80 per cent of 12 month old children were fully immunised. Within this group, the lowest rates were in the City of Perth (67.8 per cent), Belmont (68.6 per cent), South Perth (71.8 per cent) and Armadale (74.4 per cent).

The largest numbers of children fully immunised at 12 months of age were in the SLAs of Stirling: Central (1,317 children), Swan (1,257), Wanneroo: South-West (1,230), Gosnells (1,214) and Rockingham (1,033). No other SLAs had more than 1,000 fully immunised children.

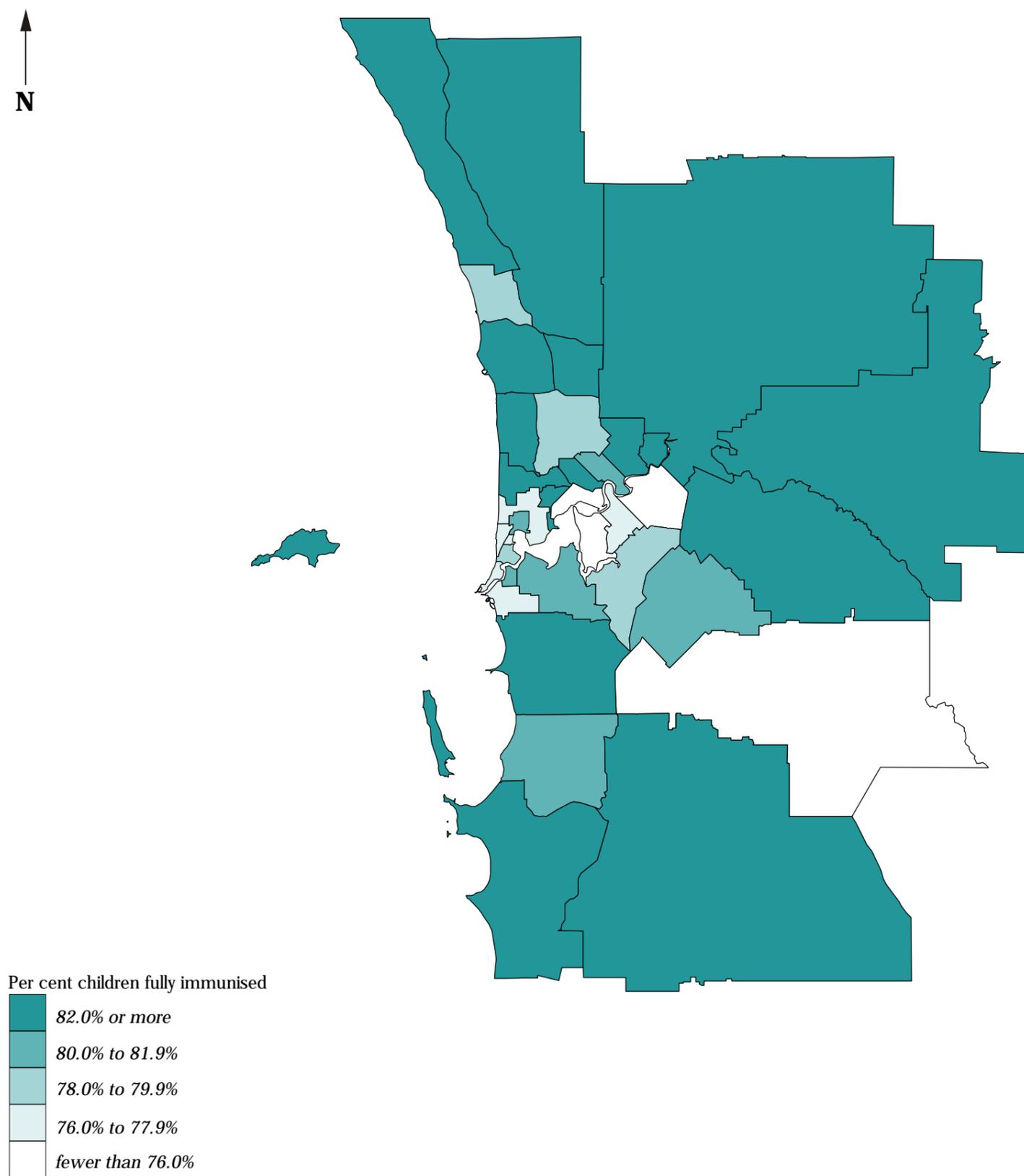
As expected, the correlation analysis showed there to be an association at the SLA level between high rates of immunisation and high proportions of young children (0.30).

There was, however, no consistent evidence in the correlation analysis of an association at the SLA level in **Perth** between immunisation rates and socioeconomic status

### Map 6.52

## Immunisation status of children at 12 months of age, Perth, 1998

as a percentage of all children at 12 months of age in each Statistical Local Area



Source: See Data sources, Appendix 1.3

Details of map boundaries are in Appendix 1.2  
National Social Health Atlas Project, 1999

# Immunisation status of children at 12 months of age, 1998

## State/Territory comparison

Details of the information described below are on the previous text page. Immunisation rates were higher in the *Rest of State/Territory* areas than in the capital cities in a number of States, with the highest rates in Queensland and Victoria. As can be seen from the graph of the ARIA index (opposite page), these higher rates do not apply uniformly across the *Rest of State/Territory* areas. With the exception of the Northern Territory, immunisation rates for the non-metropolitan areas of Australia were all close to the *Rest of State/Territory* average of 83.6 per cent. The low rate reported for the Northern Territory reflects a number of factors, including difficulties in transmitting accurate data on levels of immunisation in the Territory: it is unclear whether the real rate is lower than in other parts of Australia.

**Table 6.68: Proportion of children who were fully immunised at 12 months of age, capital cities, 1998**

	<i>Per cent</i>								
	NSW	Vic	Qld	SA	WA	Tas	NT	ACT	Total <sup>1</sup>
Capital city	79.7	84.0	85.4	84.5	81.2	84.0	80.0	86.9 <sup>1</sup>	82.5
Other major urban centres <sup>2</sup>	86.0	86.9	84.2	..	..	..	..	..	85.4
Rest of State/Territory	81.8	86.0	86.1	83.6	80.6	84.5	62.8	— <sup>3</sup>	83.6
Whole of State/Territory	81.0	84.6	85.5	84.2	81.0	84.3	70.6	86.8	83.0

<sup>1</sup>Includes Queanbeyan (C)

<sup>2</sup>Includes Newcastle and Wollongong (NSW); Geelong (Vic); and Gold Coast-Tweed Heads and Townsville-Thuringowa (Qld)

<sup>3</sup>Data included with ACT total

Source: See *Data sources, Appendix 1.3*

## Rest of State

In 1998, 7,536 children in the non-metropolitan areas of Western Australia were fully immunised at the age of 12 months, 80.6 per cent of the population of that age.

As can be seen from **Map 6.53**, the highest rates of immunisation were in SLAs located in a broad coastal strip. Low rates were generally confined to the more remote inner regions of the State.

Immunisation rates of 100 per cent were recorded in the SLAs of Kent (11 children), Nungarin (four children) and Woodanilling (three children). In 12 other SLAs the immunisation rate was above 90 per cent, with the highest rates in Mount Marshall and Victoria Plains (both 96.0 per cent), Corrigin (94.1 per cent), Kojonup (92.7 per cent), Kulin (92.5 per cent) and Dalwallinu (91.7 per cent).

The immunisation rate was below 80 per cent in almost half (46.5 per cent) of the non-metropolitan SLAs. In this group, the highest rates were recorded for children in Dardanup (78.6 per cent), Esperance (78.3 per cent), Harvey (78.1 per cent) and Broome (77.7 per cent). Excluding SLAs with fewer than ten fully immunised children, the lowest immunisation rates were in Meekatharra (43.8 per cent), Dundas (45.9 per cent), Mount Magnet (54.5 per cent) and Morawa (56.3 per cent).

Of the towns mapped, there were more than 80 per cent of children fully immunised at 12 months of age in Albany (86.4 per cent), Port Hedland (84.8 per cent), Geraldton (84.3 per cent) and Mandurah (83.2 per cent). The lowest levels of immunisation were recorded in Bunbury (76.5 per cent) and Broome (77.7 per cent).

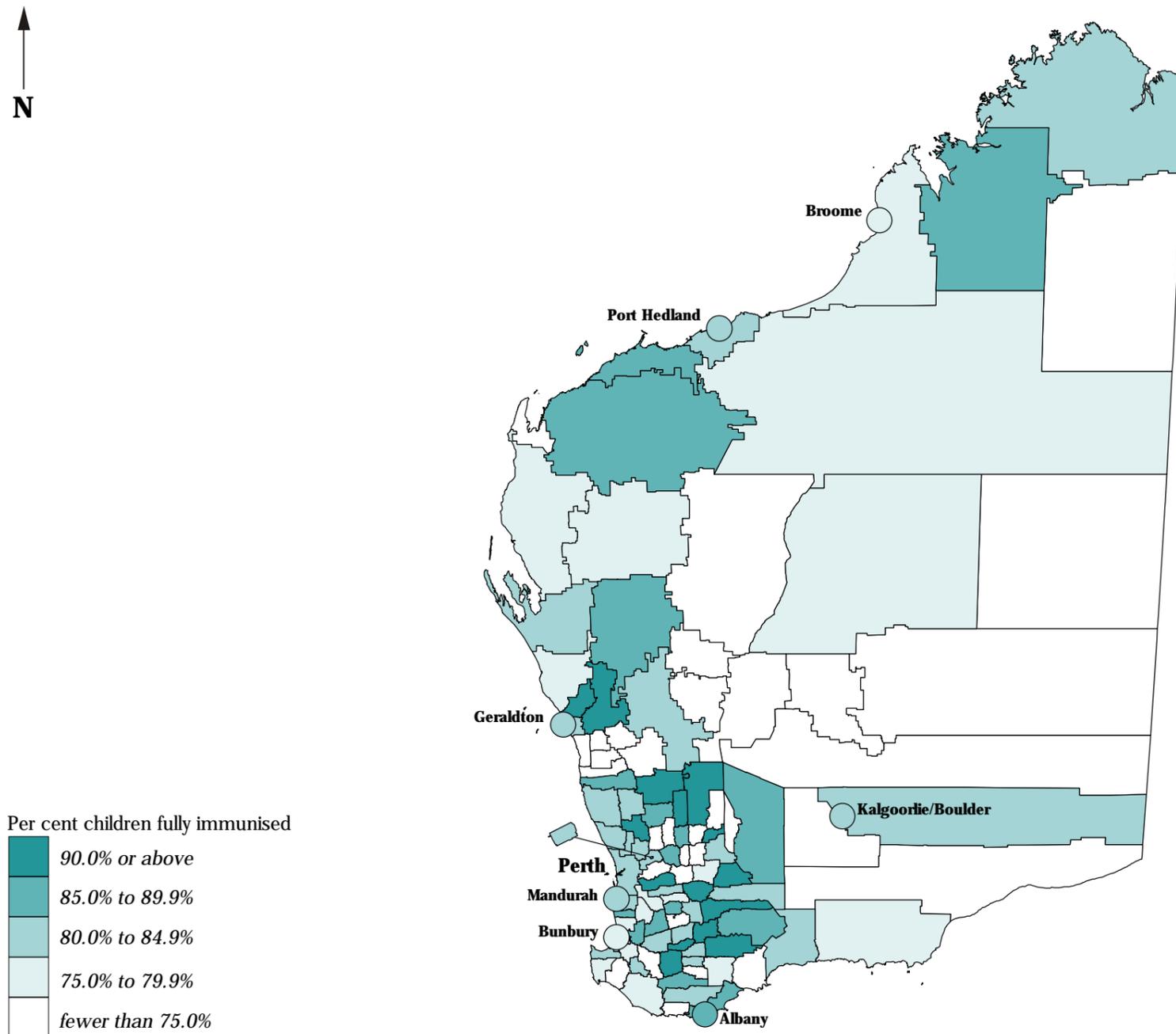
The largest numbers of fully immunised children in the non-metropolitan areas of Western Australia were in Kalgoorlie/Boulder (599 children), Mandurah (525), Geraldton (383) and Harvey (324). Numbers in Bunbury, Busselton, Roebourne, Port Hedland, Albany and Esperance were between 200 and 300.

The correlation analysis showed there to be a generally weak association at the SLA level with the indicators of socioeconomic status. The strongest correlation was with the variable for managers and administrators, and professionals (0.26), while the strongest inverse correlation was with the Indigenous population (-0.21). These results, together with the weak correlation with the IRSD (0.32), suggest the existence of a weak association at the SLA level in non-metropolitan Western Australia between high rates of immunisation and high socioeconomic status. There was also a weak correlation with the variable for children aged from 0 to 4 years (0.34).

### Map 6.53

## Immunisation status of children at 12 months of age, Western Australia, 1998

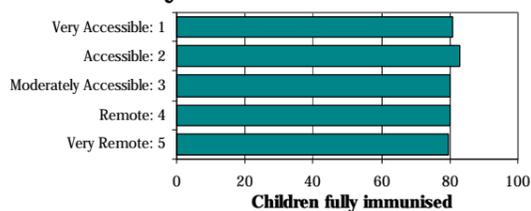
as a percentage of all children at 12 months of age in each Statistical Local Area



Source: See Data sources, Appendix 1.3

Details of map boundaries are in Appendix 1.2

### Accessibility/Remoteness Index of Australia



Children fully immunised

There is little variation in recorded immunisation rates across the ARIA categories, with between 79.7 per cent (in the Very Remote areas) and 83.0 per cent (in the Accessible areas) of 12 month old children being fully immunised.

Source: Calculated on ARIA classification, DHAC National Social Health Atlas Project, 1999

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