

# **A Comparative Overview of Aboriginal Health in Western Australia**

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Department of Health  
Western Australia

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## Executive summary

While comparative health statistics of the Aboriginal and non-Aboriginal populations are useful, the wide disparity in social, demographic, economic and cultural characteristics of these groups can make interpretation of these statistics difficult. Intra-sub-population analysis can be beneficial in highlighting more subtle variations in health measures. This can lead to identification of areas where significant improvements in health are being made or those places where more direction or appropriate resources are required. This report attempts to provide information that allows both intra- and inter-subpopulation comparison for a number of health measures.

The five conditions reported on in this study account for 75% of all Aboriginal deaths in Western Australia. Analysis of other conditions is difficult due to the very low numbers of deaths, even when 10 years of data are aggregated.

The largest cause of Aboriginal mortality and third-highest reason for hospitalisation was due to circulatory disease. While at State level, there has been a significant fall in age-standardised mortality rates (ASMR's) for Aboriginal females, there was no significant variation across the State. Statewide, Aboriginals dying of cardiovascular disease died approximately six years younger than non-Aboriginals dying of cardiovascular disease. The highest rates of hospitalisation occurred in the Midwest and Great Southern Health Regions.

Injury and poisoning was the second most common cause of death and the second most common reason for hospitalisation. Three-quarters of deaths occurred in males. Although rates of mortality and hospitalisation were more than three times higher than for non-Aboriginals, the potential years of life lost per death were similar. Areas of the State with the highest injury and poisoning rates for mortality and hospitalisation for Aboriginal people were the Kimberley, Pilbara, Midwest and Goldfields.

Respiratory disease is a major cause of Aboriginal death and the most common cause of hospitalisation for Aboriginal people. The gap in potential years of life lost between Aboriginal and non-Aboriginal people is largest (13.4 years) for this condition, suggesting this is the area most affected, hospitalisation for respiratory disease is generally higher in all northern and eastern regions of the State.

Although a significant cause of death for Aboriginal people, cancer is one condition that showed the least variation with non-Aboriginal people. There has been no change in cancer mortality rates during the past 10 years and little to no variation between metropolitan and country areas. Higher rates of hospitalisation due to cancer were seen in the Pilbara and Great Southern Regions.

Although diabetes only affects a small number of Aboriginal people, diabetes-related mortality and morbidity rates are more than ten times those of the non-Aboriginal population. In recent years, some reduction in mortality rates has occurred but this was not statistically significant. Rates of hospitalisation have increased, perhaps reflecting better awareness and access to treatment. Aboriginal people in country areas appear to be at highest risk although elevated rates of hospitalisation occur in the Midwest, Pilbara, Goldfields and Great Southern Regions.

Results of this study show significant variation in Aboriginal health throughout WA. These findings should provide useful information to guide targeted Aboriginal health programs and encourage discussion about local priority needs for the enhancement of Aboriginal health.

# 1 Introduction

Despite ongoing attempts in WA to address the imbalance, the level of Aboriginal health continues to lag behind that of the non-Aboriginal population.<sup>1,2</sup> Behavioural-based risk factors contributing to the poor state of Aboriginal health such as smoking, alcohol and substance abuse, poor nutrition, obesity and exposure to violence have been well-documented.<sup>3-6</sup> Further, environmental conditions such as inadequate supply of water, sanitation and housing have also been recognised as significant contributors.<sup>7</sup> In recent times, there has been increasing impetus to improve the health status of indigenous people, however, due to a complex combination of social and economic disadvantage, Aboriginal health remains poor.<sup>8,9</sup>

Life expectancy at birth for indigenous Western Australians over the 1997–99 period was estimated to be 59.6 years among males and 66.4 years among females. This was 16.8 years less than that for WA males and 15.7 years less than that for WA females.<sup>1</sup> Aboriginal people also represent a disproportionately high percentage of the mortality and morbidity cases in the State. Although Aboriginal people accounted for only 2.7% of the State population, they represented 3.2% of the State deaths and 5.8% of the State hospitalisation admissions.

The status of Aboriginal health, however, cannot be comprehensively assessed solely through comparison with non-Aboriginal people. In order to identify change within Aboriginal communities, the Aboriginal population must be examined separately from the non-Aboriginal population. That is, comparing Aboriginal communities with other Aboriginal communities presents a more relevant picture than simply identifying the already well-documented disparity between Aboriginal and non-Aboriginal populations. As WA is geographically large and immensely diverse, detailed examination of rural, remote and urban areas is vital for meaningful assessment.

This report updates and expands on an earlier report.<sup>10</sup> Like the previous report, this report examines variations in Aboriginal health status within WA. While this has been the primary emphasis, data has also been included for the non-Aboriginal population. This allows for more comprehensive analysis in relation to the causation of varying health status, particularly in rural and remote areas.

Specifically, the report targeted five main health conditions across the State, down to the Health Service level. The purpose of this report was to support health care providers in delivering appropriate services to Aboriginal communities and to help in the identification of areas that were able to demonstrate gains in health status as well as areas of special need.

## 2 Data sources and methodology

Hospitalisation and mortality data were extracted from the Hospital Morbidity Data System (HMDS) and mortality database maintained by the Department of Health (DoH). Hospital morbidity data from 1994–2000 inclusive was extracted based on the principal diagnosis. Mortality data for the required period (1990–1999) was extracted on the basis of cause and year of death. In both cases only people whose usual place of residence was in WA were included in the analysis.

Population figures by gender and five-year age-groups were obtained from estimates made by the DoH. Aboriginal population estimates for Health Service were determined using a method similar to that previously described<sup>10</sup> but based on the 1996 Census counts. The non-Aboriginal estimates were derived by subtracting age and gender-specific Aboriginal estimates from the estimated resident populations published by the Australian Bureau of Statistics.<sup>11</sup>

### 2.1 Selection of records for inclusion in study

Deaths registered after 1 January 1999 were coded using the tenth revision of the International Classification of Diseases (ICD-10) while data for earlier years were coded to ICD-9. Similarly, the system used to code hospital morbidity records also changed from ICD-9CM to ICD-10AM in the middle of 1999. Consequently routines that extracted records for both coding systems had to be used as shown in the table below.

**Table 1: Conditions and their selection codes**

Condition	ICD-9 codes	ICD-10 codes
Circulatory disease	390.0-459.9	I00.0-I99.9
Cancer	140.0-239.9	C00.0-D48.9
Respiratory disease	460.0-519.9	J00.0-J99.9
Injury and poisoning	800.0-999.9	S00.0-T98.9
Diabetes	250.0-250.9	E10.0-E14.9

### 2.3 Statistical methods

The statistics reported in this document were calculated using the Rates Calculator<sup>a</sup>. Age-standardised rates (ASR) were calculated using the direct method<sup>12</sup> with the Australian 1991 population as the standard. Due to low numbers in the Aboriginal data, rates were estimated after smoothing using a moving average technique. Time trend analysis of these rates utilised Poisson regression of age-specific rates with the year effect averaged over all age-groups. The likelihood-ratio chi-square test and average year-to-year rate ratios were used to calculate the nature and significance of any trend in the rates over the study time period. Standardised rate ratios were estimated using the indirect method as described elsewhere.<sup>13</sup> Age-specific and age-standardised rates are expressed as per person-year.

Rate ratios for each Health Authority were estimated using the State data for Aboriginal and non-Aboriginal people as indicated. Rate ratios at the Health Service level were based on data for the Health Authority that the Health Service belonged in and calculated once again using Aboriginal and non-Aboriginal data. Confidence intervals (95%) were used to determine statistically significant variations.

<sup>a</sup> The *Rates Calculator* was developed by Dr J Codde, Director, Epidemiology & Analytical Services, Department of Health.



Thus it is possible for a Health Authority to show no statistical variation from the State rate but for one or more Health Services within the Authority to be significantly higher or lower than the rate of the Authority. This approach allows identification of the areas of poor health outcome within a Health Authority. It does mean, however, that comparison of health outcomes between Health Services must use the age-standardised rate and not the standardised rate ratio.

Person years of life lost (PYLL) were used as an alternative measure of mortality to reflect the impact of deaths that occur at younger ages. The potential years of life lost up to the age of 69 years was estimated using the method described in Hakulinen and Teppo.<sup>14</sup>

## 2.4 Explanation of table layout

In all tables:

- The Health Authorities were standardised to the respective Aboriginal or non-Aboriginal population of the State.
- The Health Services were standardised to the respective Aboriginal or non-Aboriginal population of the parent Health Authority.
- RR refers to the rate ratio between Aboriginal and non-Aboriginal age-standardised rate.
- The symbol ‘-’ indicates that the number of cases was too low to draw meaningful conclusions.
- ‘SIGN’ refers to the statistical significance of the corresponding SMR, SRR or RR (NS = not significant, L = significantly lower, H = significantly higher).

For the mortality tables:

- ‘ASR’ refers to the age-standardised rate per 100,000 of population.
- ‘SMR’ refers to the standardised mortality rate ratios.
- ‘PYLL’ refers to person-years life lost per death calculated on a life span of 69 years.

For the morbidity tables:

- ‘ASR’ refers to the age-standardised rate per 1,000 of population.
- ‘SRR’ refers to the standardised hospitalisation rate ratios.

## 2.5 Explanation of maps

- Maps show statistically significant results contained in the associated table.
- The shading highlights the disparity between Aboriginal and non-Aboriginal rates (that is, significantly higher or lower).
- The striped areas indicate how the Aboriginal population of a Health Service compares to the Aboriginal population of the parent Health Authority (that is, significantly higher or lower).

## **2.6 Overview of results**

In WA, the Aboriginal population is younger than the WA population as a whole (median age 20.5 years versus 34.2 years respectively in 2000), and more likely to live in the country than the metropolitan region (64% versus 24%).

As a group, Aboriginal people are socio-economically disadvantaged compared to the non-Aboriginal population. This places them at greater risk of ill-health and reduced wellbeing. While variation in socio-economic status can be quantified through Census statistics, most surveys of population health and wellbeing fail to capture a representative cross-section of the Aboriginal community. Consequently the most reliable measures of health status come from mortality and hospitalisation statistics.

### ***Mortality***

In the State, the largest rates of Aboriginal deaths were seen in circulatory disease, cancer, respiratory disease, endocrine disorders (in particular, diabetes) and injury and poisoning. As mortality rates are a reliable indicator of health status, these were the conditions chosen for study. Overall, these five conditions account for 75% of Aboriginal deaths with circulatory disease being the single largest cause (30%), followed by injury & poisoning (15%), cancer (11%), respiratory disease (10%) and diabetes (8%). The causes of death which showed the greatest disparity between Aboriginal and non-Aboriginal rates were endocrine disorders, genitourinary diseases, skin diseases, mental disorders and infectious and parasitic diseases. Overall, Aboriginal males died at 2.5 times the rate of non-Aboriginal males while Aboriginal females died at 2.7 times the rate of non-Aboriginal females.

### ***Hospitalisation***

The highest rates of Aboriginal hospitalisations were seen in respiratory disease, injury and poisoning, complications due to pregnancy, circulatory disease and mental disorders. The conditions that demonstrated the greatest disparity between Aboriginal and non-Aboriginal people for hospital admissions were endocrine disorders, respiratory disease, skin diseases, infectious and parasitic diseases and injury and poisoning. Overall, Aboriginal males were hospitalised at 2.5 times the rate of non-Aboriginal males while Aboriginal females were hospitalised at 2.9 times the rate of non-Aboriginal females.

More detailed analysis of the most common causes of Aboriginal death and hospitalisation are shown in the following pages.

### **3 Circulatory disease**

Circulatory disease encompasses all abnormal conditions of the circulatory system that includes the heart and blood vessels. The two major circulatory-related causes of death and disability are ischaemic heart disease (IHD) and cerebrovascular accidents (or strokes).

Ischaemic heart disease results from the interruption of blood supply to the heart, usually from clogging of coronary blood vessels through atherosclerosis. Atherosclerosis of arteries of the neck and the base of the brain also accounts for the majority of strokes. The effects of atherosclerosis are not restricted to the heart or brain—abdominal aneurism and peripheral vascular disease also result from this process. Other cardiovascular diseases may arise as a result of hypertension, which leads to heart failure, or infectious diseases that cause damage to the heart and lead to rheumatic heart disease or cardiomyopathy.<sup>15</sup>

#### **3.1 Risk factors**

The determinants of the incidence and resultant mortality for circulatory disease can be categorised into four broad groups. Social and environmental factors are thought to contribute to a disproportionate distribution of disease in the general population. Genetic predisposition and demographic factors such as age and sex are important risk factors for circulatory disease. Physiological risk factors for circulatory disease such as obesity, high blood pressure, elevated cholesterol and diabetes mellitus<sup>15</sup> are associated with modifiable lifestyle choices such as smoking, diet and inactivity.

Since the 1950s and 1960s, the contributions of smoking, blood pressure and blood cholesterol (diet-mediated) in the causation of IHD have been increasingly identified. Later studies have also identified physical inactivity, diabetes and social status as further risk factors.<sup>15</sup> Health promotion strategies targeting lifestyle choices, therefore, can significantly reduce the incidence and severity of IHD.

#### **3.2 Impact on Aboriginal people**

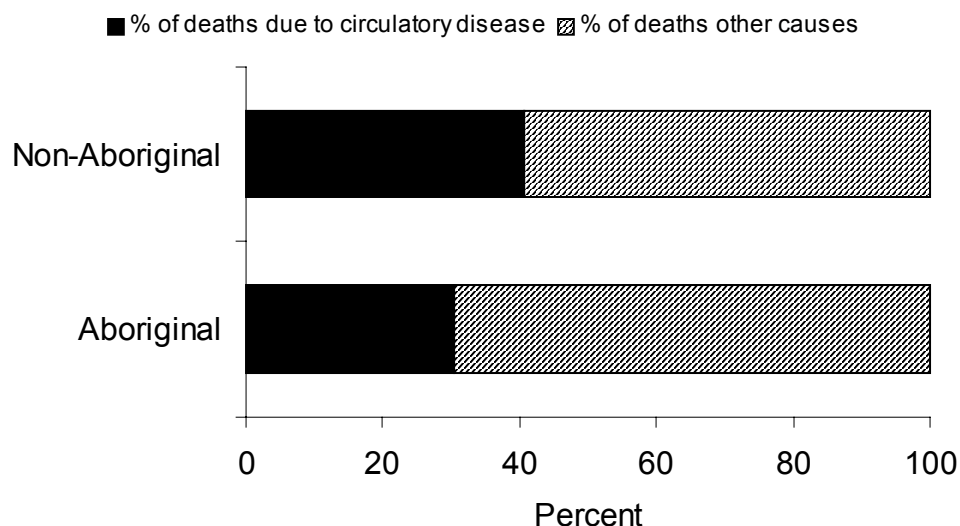
Circulatory disease is the leading cause of death among Aboriginal and Torres Strait Islanders.<sup>16</sup> Of the major lifestyle-related risk factors, smoking is about twice as common among Aboriginal and Torres Strait Islanders compared with non-Aboriginal people.<sup>17</sup> Poor nutrition is a factor for Aboriginal people because of the limited availability and expense of nutritious foods in remote areas where Aboriginal people are more likely to live. The economic disadvantage means that it is more difficult for Aboriginal people to make healthy food choices.<sup>18</sup> The following overview examines circulatory disease mortality and hospitalisation among Aboriginal people in WA.

### 3.3 State overview

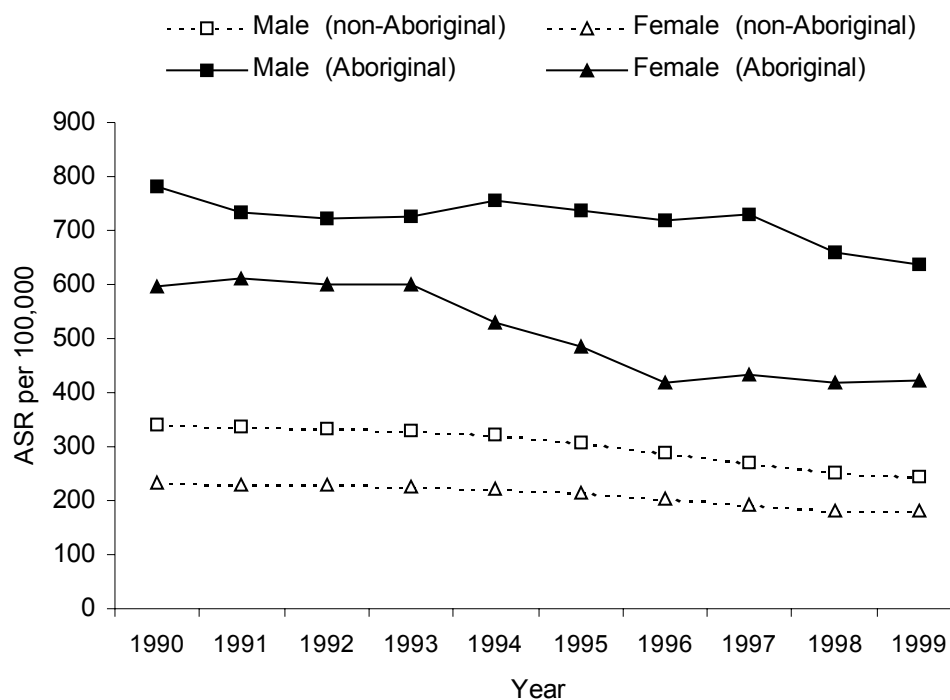
#### ***Mortality***

- Circulatory diseases accounted for 30.3% of all Aboriginal deaths between 1990 and 1999, representing an annual average of 100 deaths (non-Aboriginals: 40.6%; 3960 deaths) (Figure 1).
- Of these deaths, the percentage of males was 55.9% and 50.3% for Aboriginals and non-Aboriginals respectively.
- Despite the proportion of deaths attributed to circulatory disease being lower in Aboriginal people, the rate of death was significantly higher in both Aboriginal males (2.4 times) and females (2.5 times).
- Trend analysis showed that for the Aboriginal population, the male rates did not alter significantly while the female rates experienced a statistically significant average annual decrease of 6.0%. Among the non-Aboriginal population, both males and females experienced a statistically significant average annual decrease of 4.2% and 3.1% respectively (Figure 2).
- Using aggregated data the rate of circulatory disease-related deaths increased with age for both the Aboriginal and non-Aboriginal population and Aboriginal people experienced a much greater increase in rates and at an earlier age (Figure 3).

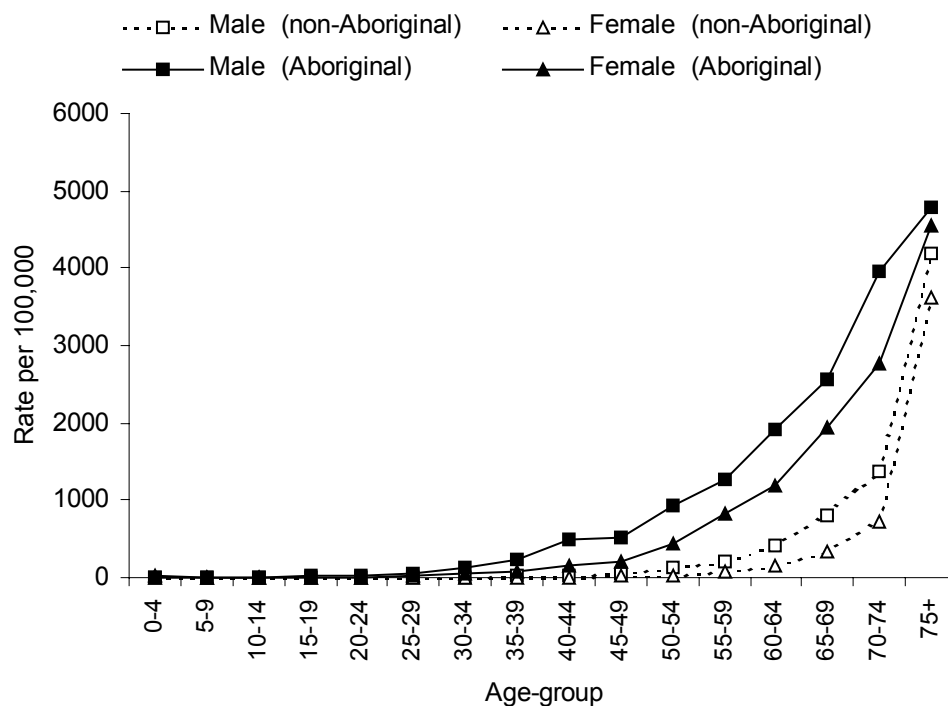
**Figure 1: Percentage of all deaths for residents of the State (1990–1999)**



**Figure 2: Age-standardised mortality rates – circulatory disease**



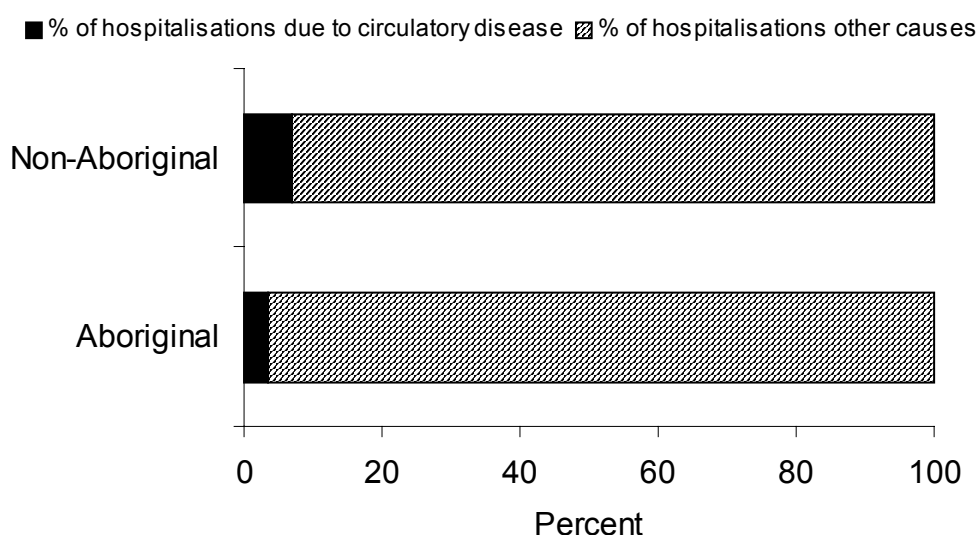
**Figure 3: Age-specific mortality rates – circulatory disease (1990–1999)**



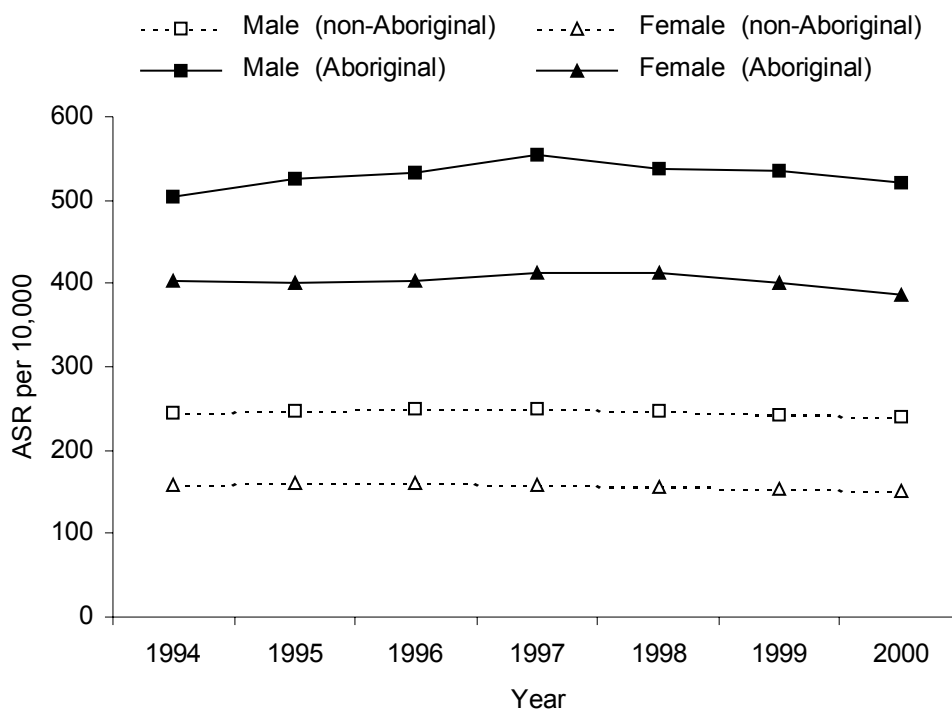
## Morbidity

- For the period 1994–2000, circulatory diseases accounted for 3.5% and 6.9% of all hospitalisations in Aboriginals and non-Aboriginals respectively. This represented an average of 1,003 Aboriginal and 31,993 non-Aboriginal discharges per year (Figure 4).
- Of these hospitalisations, the percentage of males was 53.5% and 57.2% for Aboriginal and non-Aboriginal respectively.
- The Aboriginal rate of hospitalisation due to circulatory disease was considerably higher than the non-Aboriginal rate. Compared to the non-Aboriginal population, the rate of hospitalisation was significantly higher in Aboriginal males (2.2 times), females (2.6 times) and total persons (2.3 times).
- Trend analysis revealed that among the Aboriginal population, there were no statistically significant alterations in rates across the seven-year study period. For the non-Aboriginal population, both males and females experienced a statistically significant annual average decrease of (0.7% and 1% respectively; see Figure 5).
- Among both Aboriginal and non-Aboriginal people, the rate of hospitalisation due to circulatory disease increased with age, however, Aboriginal people experienced a much greater increase at an earlier age.

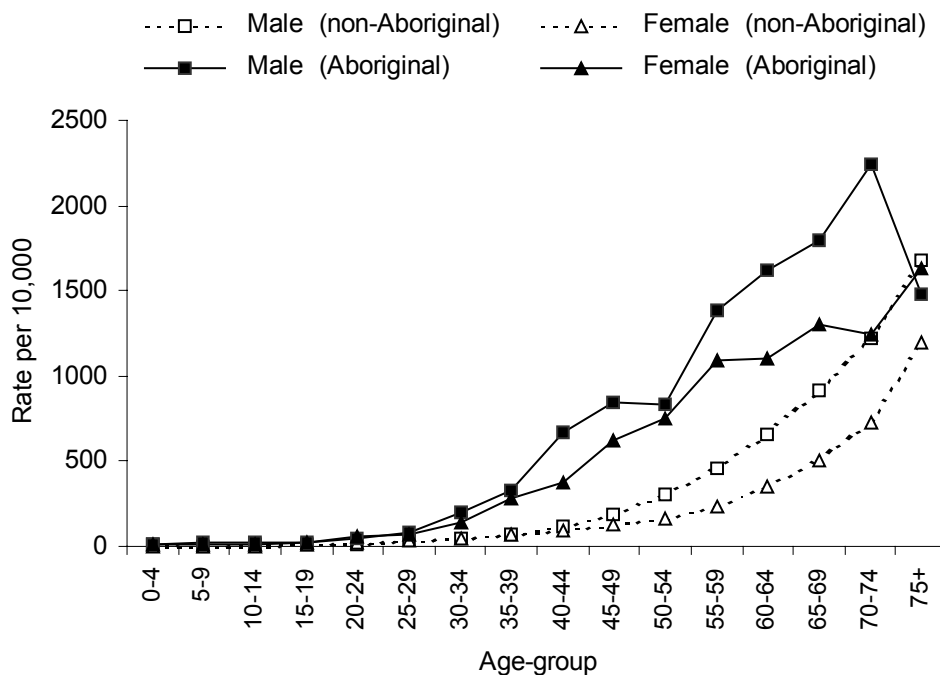
**Figure 4: Percentage of all hospitalisations for residents of the State (1994–2000)**



**Figure 5: Age-standardised hospitalisation rates – circulatory disease**



**Figure 6: Age-specific hospitalisation rates – circulatory disease (1994–2000)**

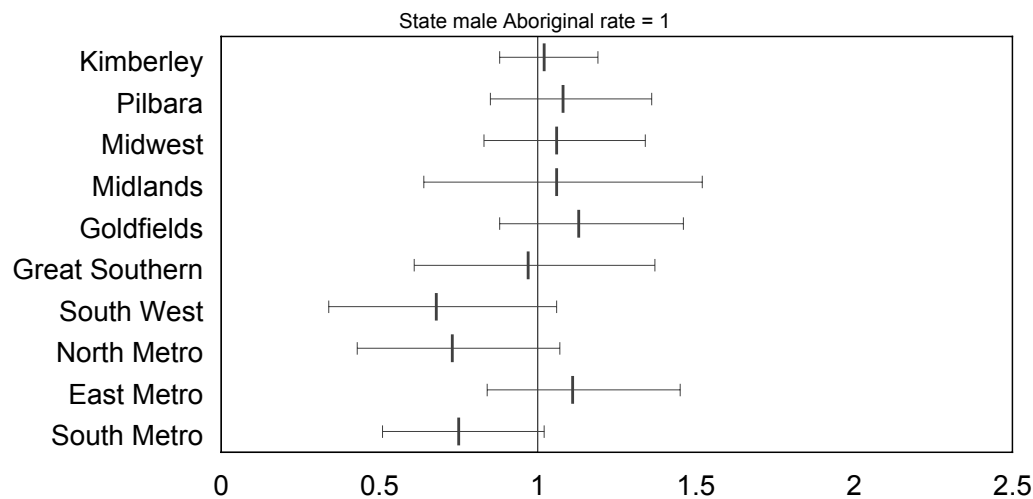


### 3.4 Circulatory disease in the Health Authorities

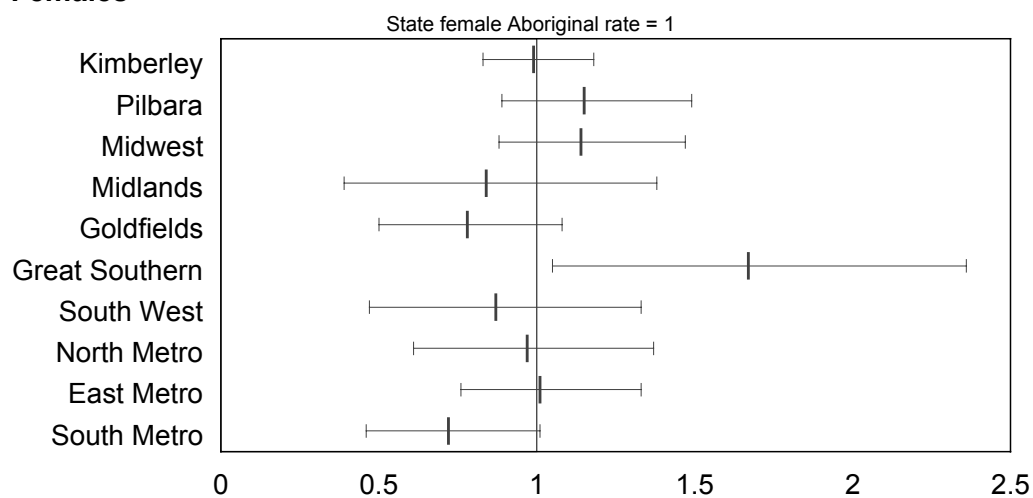
#### *Mortality*

**Figure 7: Aboriginal standardised mortality rate ratios by Health Authority of residence – circulatory disease (1990–1999)**

#### **Males**



#### **Females**



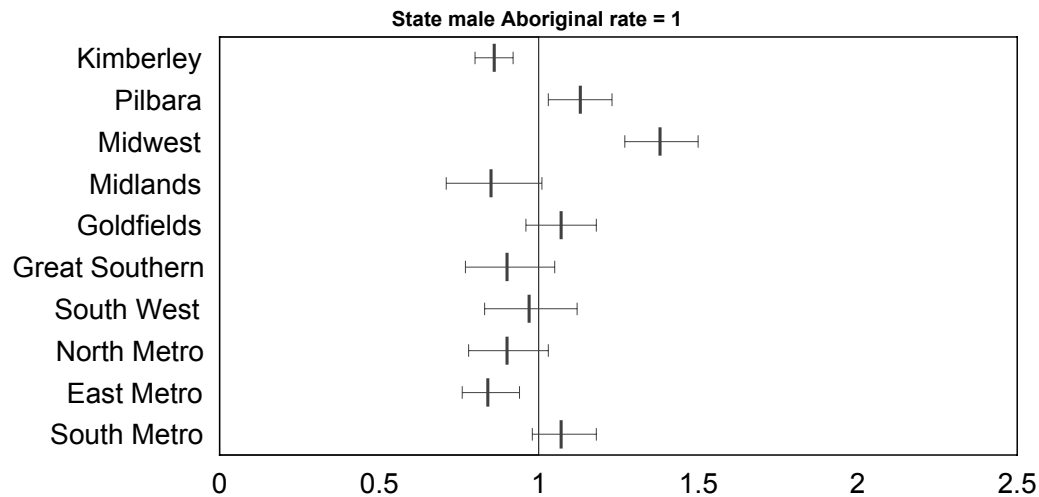
- For Aboriginal males there were no areas that showed statistically significant variation from that expected based on the Aboriginal State rate.
- Among the Aboriginal females, those residing in the Great Southern Health Authority showed a significantly higher rate of circulatory disease deaths compared to the State over the 10-year period.



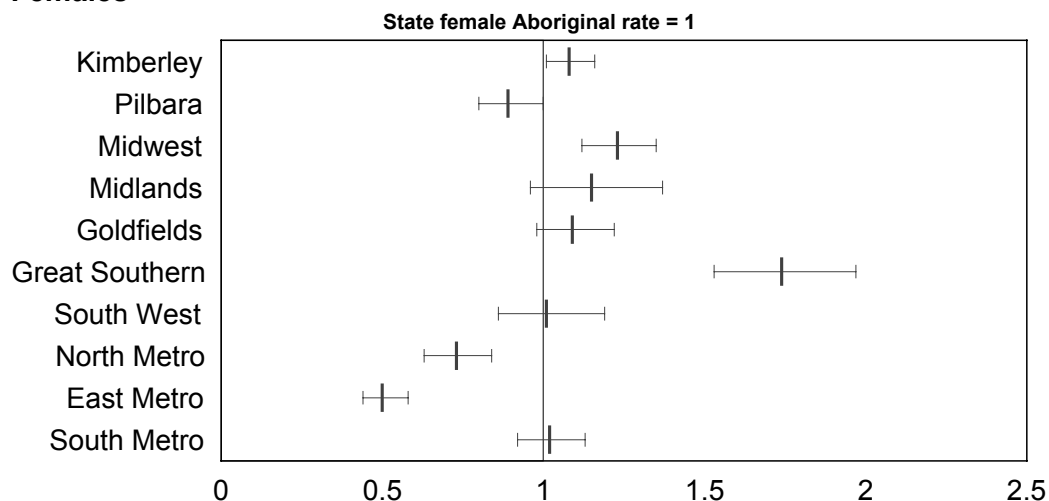
## Morbidity

**Figure 8: Aboriginal standardised hospital rate ratios by Health Authority of residence – circulatory disease (1994–2000)**

### Males



### Females



- Among the Aboriginal males, those residing in the Pilbara and Midwest Health Authorities experienced significantly higher rates of hospitalisation due to circulatory disease than the State, whereas those in the Kimberley and East Metropolitan areas experienced significantly lower rates.
- For Aboriginal females, those residing in the Kimberley, Midwest and Great Southern Health Authorities experienced significantly higher rates of hospitalisation due to circulatory disease while those in the North and East Metropolitan Health Authorities experienced significantly lower rates compared to the State.

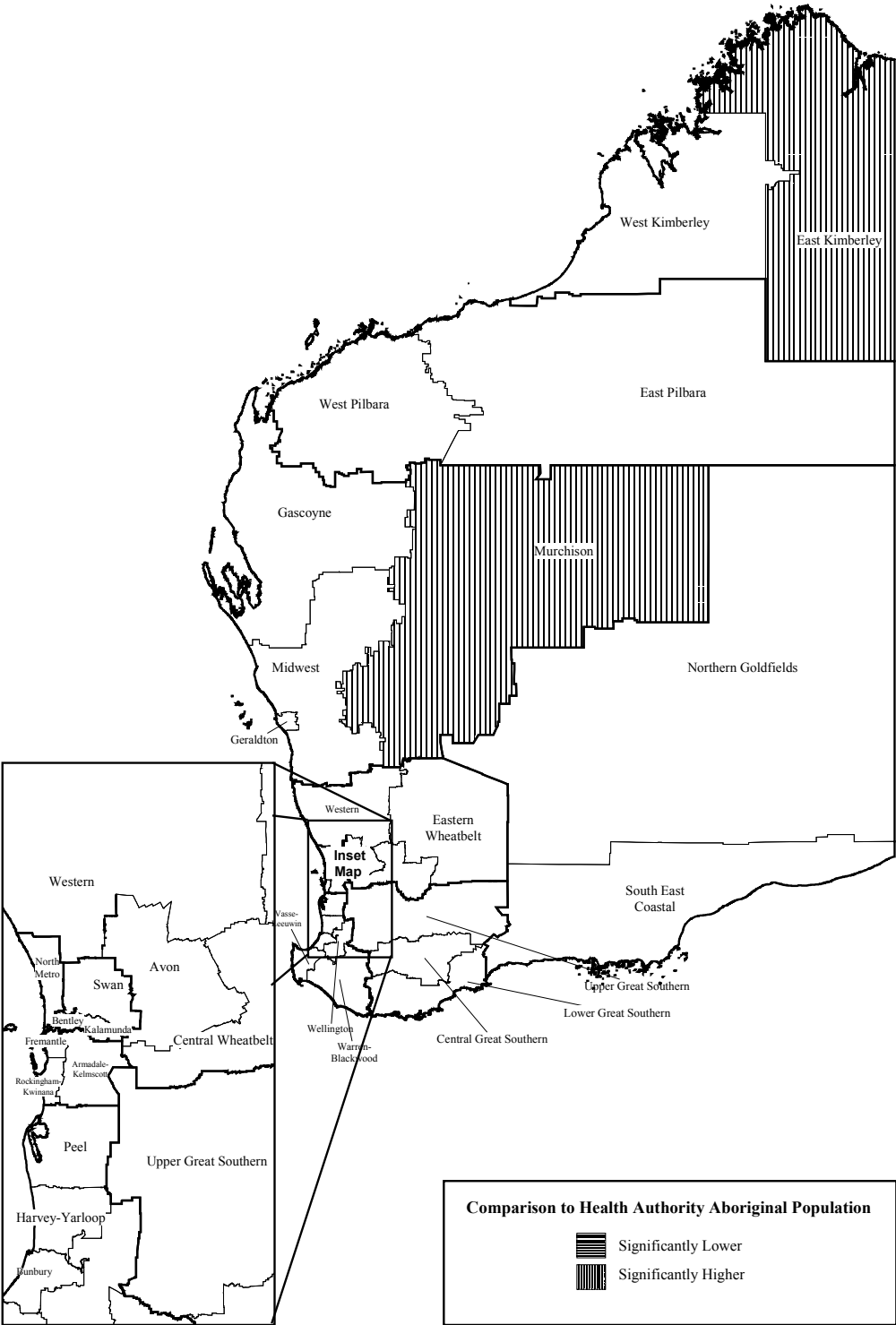
### 3.5 Circulatory disease in the Health Services

#### Mortality

**Table 2: Mortality-related statistics for circulatory disease by Health Service of residence (1990–1999)**

	Aboriginal					Non-Aboriginal					A/Non-A	
	SMR	SIGN	ASR	PYLL	N	SMR	SIGN	ASR	PYLL	N	RR	SIGN
<b>Kimberley</b>	<b>1.0</b>	<b>NS</b>	<b>576.1</b>	<b>16.3</b>	<b>302</b>	<b>0.7</b>	<b>L</b>	<b>151.2</b>	<b>14.6</b>	<b>74</b>	<b>3.8</b>	<b>H</b>
East Kimberley	1.2	H	777.9	15.9	120	1.2	NS	190.1	14.8	34	4.1	H
West Kimberley	0.9	NS	510.3	16.6	182	0.9	NS	150.3	14.4	40	3.4	H
<b>Pilbara</b>	<b>1.1</b>	<b>NS</b>	<b>618.4</b>	<b>14.1</b>	<b>136</b>	<b>0.8</b>	<b>L</b>	<b>145.3</b>	<b>14.7</b>	<b>114</b>	<b>4.3</b>	<b>H</b>
East Pilbara	1.1	NS	647.5	14.4	102	1.1	NS	164.6	14.1	68	3.9	H
West Pilbara	0.9	NS	538.6	13.2	34	0.9	NS	122.9	15.5	46	4.4	H
<b>Midwest</b>	<b>1.1</b>	<b>NS</b>	<b>620.4</b>	<b>14.6</b>	<b>130</b>	<b>1.0</b>	<b>NS</b>	<b>250.8</b>	<b>9.8</b>	<b>995</b>	<b>2.5</b>	<b>H</b>
Gascoyne	1.0	NS	633.8	14.1	41	0.9	NS	220.4	9.2	126	2.9	H
Geraldton	0.9	NS	547.1	14.9	34	1.1	H	277.8	9.5	623	2.0	H
Midwest	0.7	NS	493.3	13.4	18	0.9	L	215.9	10.6	217	2.3	NS
Murchison	1.5	H	955.6	15.1	37	0.7	NS	160.9	10.2	29	5.9	H
<b>Midlands</b>	<b>1.0</b>	<b>NS</b>	<b>623.2</b>	<b>12.6</b>	<b>36</b>	<b>0.9</b>	<b>L</b>	<b>223.5</b>	<b>10.0</b>	<b>1066</b>	<b>2.8</b>	<b>H</b>
Avon	1.6	NS	1066.0	14.0	14	1.2	H	237.1	9.6	367	4.5	H
Central Wheatbelt	0.7	NS	415.4	8.0	6	1.0	NS	224.3	12.3	185	1.9	NS
Western	1.2	NS	894.6	14.1	11	1.0	NS	207.4	9.8	282	4.3	H
Eastern Wheatbelt	0.2	NS	525.6	10.2	5	1.2	H	245.5	9.5	232	2.1	NS
<b>Goldfields</b>	<b>1.0</b>	<b>NS</b>	<b>606.5</b>	<b>14.4</b>	<b>92</b>	<b>1.2</b>	<b>H</b>	<b>295.6</b>	<b>11.2</b>	<b>818</b>	<b>2.1</b>	<b>H</b>
Northern Goldfields	1.0	NS	614.8	14.2	81	1.1	H	334.9	11.9	554	1.8	H
South East Coastal	1.0	NS	653.8	16.3	11	0.9	NS	269.2	9.0	294	2.4	NS
<b>Great Southern</b>	<b>1.2</b>	<b>NS</b>	<b>997.3</b>	<b>11.1</b>	<b>54</b>	<b>1.2</b>	<b>H</b>	<b>290.8</b>	<b>9.1</b>	<b>2005</b>	<b>3.4</b>	<b>H</b>
Lower Grt Southern	1.5	NS	1019.1	11.7	23	1.0	NS	284.3	8.7	1234	3.6	H
Central Grt Southern	1.1	NS	1017.8	13.1	15	1.0	NS	293.2	9.2	267	3.5	H
Upper Grt Southern	0.7	NS	686.9	7.5	16	1.0	NS	272.3	10.1	504	2.5	H
<b>South West</b>	<b>0.8</b>	<b>NS</b>	<b>459.5</b>	<b>17.9</b>	<b>32</b>	<b>1.0</b>	<b>NS</b>	<b>241.1</b>	<b>8.9</b>	<b>4093</b>	<b>1.9</b>	<b>H</b>
Peel	0.9	NS	304.3	24.7	7	1.0	NS	235.8	8.1	1435	1.3	NS
Vasse–Leeuwin	0.9	-	250.6	29.8	4	1.0	NS	231.2	9.0	718	1.1	-
Bunbury	0.8	NS	550.1	17.0	7	1.1	H	265.1	9.7	1037	2.1	NS
Warren–Blackwood	1.6	-	726.0	9.5	4	1.1	NS	258.2	9.1	388	2.8	-
Wellington	1.5	NS	641.5	14.9	8	1.1	H	272.1	10.6	333	2.4	NS
Harvey–Yarloop	0.8	-	485.5	2.4	2	0.7	L	162.1	8.0	182	3.0	-
<b>North Metro</b>	<b>0.8</b>	<b>NS</b>	<b>618.7</b>	<b>17.4</b>	<b>48</b>	<b>0.9</b>	<b>L</b>	<b>211.8</b>	<b>9.7</b>	<b>9280</b>	<b>2.9</b>	<b>H</b>
<b>East Metro</b>	<b>1.0</b>	<b>NS</b>	<b>632.6</b>	<b>17.1</b>	<b>109</b>	<b>1.2</b>	<b>H</b>	<b>304.2</b>	<b>9.1</b>	<b>12736</b>	<b>2.1</b>	<b>H</b>
Bentley	1.3	NS	940.0	12.4	41	1.0	NS	308.0	8.5	5160	3.1	S
Inner City	0.8	NS	862.7	16.4	9	1.3	H	796.0	7.7	3281	1.1	NS
Swan	0.9	NS	476.9	20.1	57	0.9	L	204.9	9.6	3513	2.3	H
Kalamunda	0.6	-	70.0	20.8	2	0.7	L	209.7	11.0	782	0.3	-
<b>South Metro</b>	<b>0.7</b>	<b>L</b>	<b>437.2</b>	<b>18.1</b>	<b>64</b>	<b>0.9</b>	<b>L</b>	<b>221.7</b>	<b>9.7</b>	<b>8410</b>	<b>2.0</b>	<b>H</b>
Fremantle	0.9	NS	290.9	19.4	19	1.0	NS	227.9	9.2	4330	1.3	NS
Armadaile–Kelmscott	1.0	NS	526.3	16.9	30	1.0	NS	212.5	10.8	2601	2.5	H
Rockingham–Kwinana	1.2	NS	571.6	17.9	15	1.0	NS	218.0	9.1	1479	2.6	H
<b>State</b>	<b>1.0</b>	<b>NS</b>	<b>580.0</b>	<b>15.6</b>	<b>1003</b>	<b>1.0</b>	<b>NS</b>	<b>247.6</b>	<b>9.6</b>	<b>39591</b>	<b>2.3</b>	<b>H</b>

**Map 1:            Aboriginal deaths due to circulatory disease, 1990–1999**

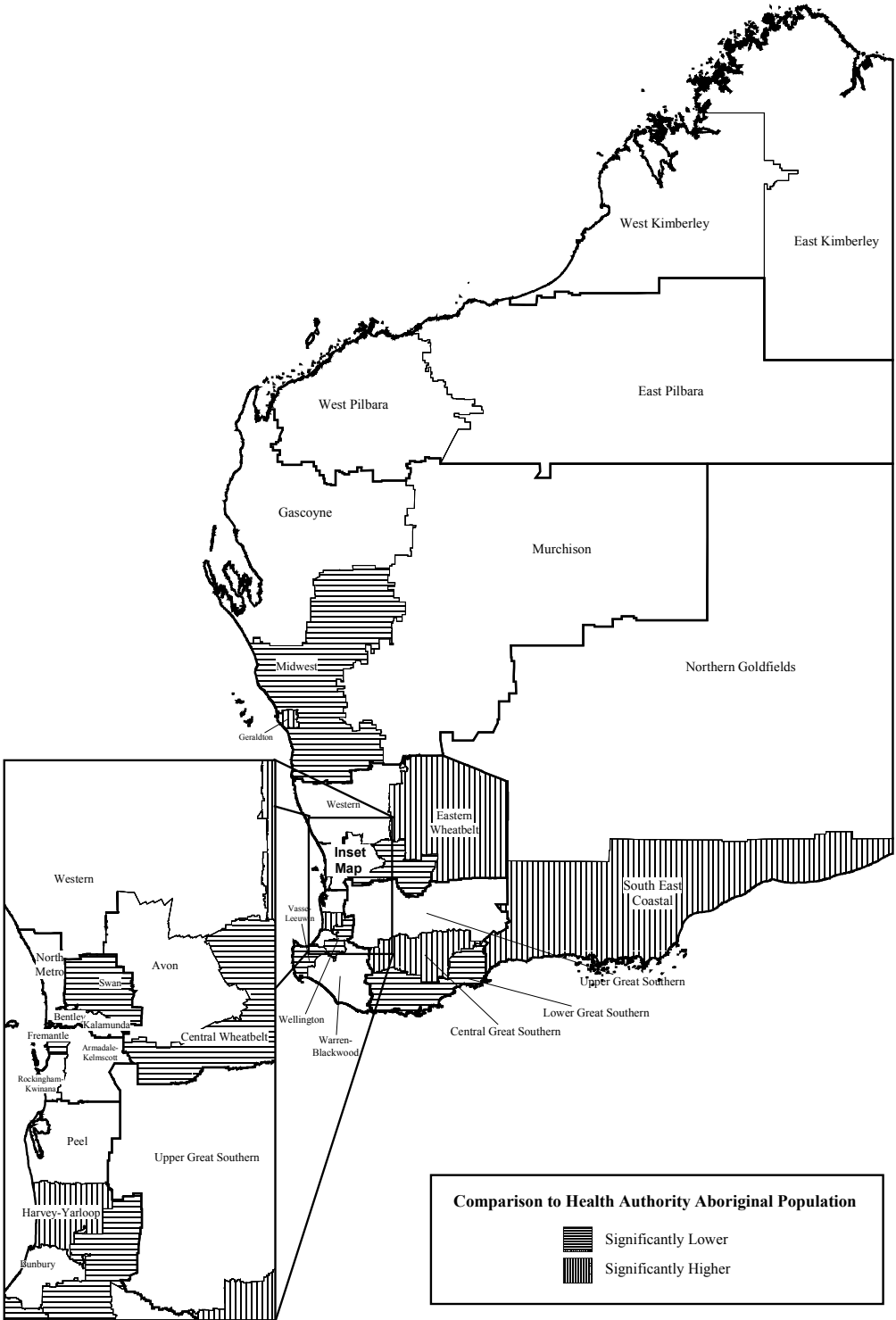


## Morbidity

**Table 3: Hospital-related statistics for circulatory disease by Health Service of residence (1994–2000)**

	Aboriginal				Non-Aboriginal				A/Non-A	
	SRR	SIGN	ASR	N	SRR	SIGN	ASR	N	RR	SIGN
<b>Kimberley</b>	<b>1.0</b>	<b>NS</b>	<b>36.9</b>	<b>1720</b>	<b>0.8</b>	<b>L</b>	<b>12.9</b>	<b>922</b>	<b>2.9</b>	<b>H</b>
East Kimberley	1.0	NS	44.2	592	0.6	L	7.4	218	6.0	H
West Kimberley	1.0	NS	36.3	1128	1.2	H	16.7	704	2.2	H
<b>Pilbara</b>	<b>1.0</b>	<b>NS</b>	<b>39.7</b>	<b>788</b>	<b>1.0</b>	<b>NS</b>	<b>15.4</b>	<b>1961</b>	<b>2.6</b>	<b>H</b>
East Pilbara	1.1	NS	43.1	557	1.1	H	16.1	1041	2.7	H
West Pilbara	0.9	NS	34.9	231	0.9	L	14.6	920	2.4	H
<b>Midwest</b>	<b>1.3</b>	<b>H</b>	<b>54.4</b>	<b>1055</b>	<b>1.1</b>	<b>H</b>	<b>20.3</b>	<b>7095</b>	<b>2.7</b>	<b>H</b>
Gascoyne	1.0	NS	50.7	306	1.0	NS	19.2	1031	2.6	H
Geraldton	1.1	H	65.0	382	1.1	H	22.0	4151	3.0	H
Midwest	0.8	L	49.3	158	0.9	L	18.9	1692	2.6	H
Murchison	1.1	NS	53.5	209	0.6	L	10.7	221	5.0	H
<b>Midlands</b>	<b>1.0</b>	<b>NS</b>	<b>47.9</b>	<b>260</b>	<b>1.0</b>	<b>H</b>	<b>19.2</b>	<b>7313</b>	<b>2.5</b>	<b>H</b>
Avon	1.1	NS	43.6	84	0.9	L	18.0	2164	2.4	H
Central Wheatbelt	0.5	L	27.5	28	1.1	H	20.8	1182	1.3	NS
Western	0.9	NS	33.4	69	0.9	L	17.9	2144	1.9	H
Eastern Wheatbelt	1.5	H	89.5	79	1.2	H	23.8	1823	3.8	H
<b>Goldfields</b>	<b>1.1</b>	<b>H</b>	<b>45.6</b>	<b>719</b>	<b>1.2</b>	<b>H</b>	<b>21.0</b>	<b>5207</b>	<b>2.2</b>	<b>H</b>
Northern Goldfields	1.0	NS	43.6	601	1.0	NS	21.0	3224	2.1	H
South East Coastal	1.4	H	59.0	118	1.0	NS	21.1	1983	2.8	H
<b>Great Southern</b>	<b>1.3</b>	<b>H</b>	<b>139.3</b>	<b>426</b>	<b>1.1</b>	<b>H</b>	<b>20.8</b>	<b>10644</b>	<b>6.7</b>	<b>H</b>
Lower Great Southern	0.7	L	63.2	108	1.0	NS	20.0	6325	3.2	H
Central Great Southern	1.3	H	104.5	150	1.1	H	22.7	1555	4.6	H
Upper Great Southern	1.0	NS	75.6	168	1.0	NS	20.3	2764	3.7	H
<b>South West</b>	<b>1.0</b>	<b>NS</b>	<b>51.5</b>	<b>320</b>	<b>1.1</b>	<b>H</b>	<b>20.2</b>	<b>26176</b>	<b>2.5</b>	<b>H</b>
Peel	1.1	NS	96.7	83	0.9	L	18.3	8866	5.3	H
Vasse–Leeuwin	0.7	L	26.4	30	0.9	L	17.7	3929	1.5	NS
Bunbury	0.9	NS	68.9	94	1.3	H	26.2	7534	2.6	H
Warren–Blackwood	1.5	NS	18.8	21	1.1	H	21.3	2490	0.9	NS
Wellington	0.7	L	38.0	38	1.1	H	22.8	2026	1.7	H
Harvey–Yarloop	1.7	H	64.3	54	0.7	L	13.2	1331	4.9	H
<b>North Metro</b>	<b>0.8</b>	<b>L</b>	<b>32.3</b>	<b>397</b>	<b>0.9</b>	<b>L</b>	<b>16.8</b>	<b>54361</b>	<b>1.9</b>	<b>H</b>
<b>East Metro</b>	<b>0.7</b>	<b>L</b>	<b>41.7</b>	<b>767</b>	<b>0.6</b>	<b>L</b>	<b>18.1</b>	<b>33508</b>	<b>2.3</b>	<b>H</b>
Bentley	1.1	NS	46.2	241	1.0	NS	18.3	18685	2.5	H
Inner City	2.0	H	103.1	126	1.3	H	24.5	11047	4.2	H
Swan	0.8	L	34.0	361	0.9	L	15.7	17258	2.2	H
Kalamunda	1.1	NS	55.2	39	0.9	L	16.7	5203	3.3	H
<b>South Metro</b>	<b>1.0</b>	<b>NS</b>	<b>40.3</b>	<b>566</b>	<b>1.4</b>	<b>H</b>	<b>19</b>	<b>76765</b>	<b>2.1</b>	<b>H</b>
Fremantle	0.8	L	28.4	143	1.0	NS	18.7	26334	1.5	H
Armadale–Kelmscott	1.1	NS	49.0	290	0.9	L	17.9	19516	2.7	H
Rockingham–Kwinana	1.1	NS	34.6	133	1.1	H	21.7	12230	1.6	H
<b>State</b>	<b>1.0</b>	<b>NS</b>	<b>41.3</b>	<b>7018</b>	<b>1.0</b>	<b>NS</b>	<b>18.5</b>	<b>223952</b>	<b>2.2</b>	<b>H</b>

**Map 2:     Aboriginal hospitalisations due to circulatory disease, 1994–2000**



### **3.6 Summary**

#### ***Mortality***

Circulatory disease is responsible for more than 30% of all Aboriginal deaths in WA. Compared to non-Aboriginals, the rate of circulatory disease death is 2.3 times higher in the Aboriginal population, resulting in approximately 100 deaths per year.

Comparison of Aboriginal death rates across WA revealed no significant variation with the exception of those Aboriginal people in the South Metropolitan Health Authority where the rate of death was lower. Some of this lack of variation is due to the small number of deaths as the actual mortality rates do vary. For example, the age-standardised mortality rate in Great Southern Health Authority is twice that of Aboriginal people in the South West. Despite the higher rate of death in the Great Southern, the average number of years of life lost (PYLL) was only 11.1 years compared to 17.9 years in the South West. This indicates that while Aboriginal mortality rates are higher in the Great Southern, the Aboriginal people there are living longer than Aboriginal people in the South West.

Surprisingly, among the Aboriginal population, the years of life lost per death increased for city dwellers. While the rates in the city were not particularly high in comparison to the country (with the exception of Bentley and the Inner City), those who did die of circulatory disease, died younger than their country counterparts.

Among the non-Aboriginal population, the situation was reversed. While the rates of circulatory-related deaths were relatively constant between city and country areas, those living in the country lost more years off their lives, per death, than their city counterparts. The disparity in rates between Aboriginal and non-Aboriginal people was greater in the country areas.

The Pilbara was the Health Authority with the greatest disparity between Aboriginal and non-Aboriginal people. However, within the Pilbara Aboriginal population, there was little variation between the East and West Pilbara.

The Murchison Aboriginal population experienced significantly high rates of circulatory disease-related deaths in comparison to the other areas of the Midwest. It was also the Health Service with the greatest disparity between Aboriginal and non-Aboriginal people with a rate ratio of 5.9.

#### ***Morbidity***

Hospitalisation due to circulatory diseases accounts for only 3.5% of all Aboriginal admissions and is about half that observed for the non-Aboriginal population. Despite this, the rate of hospitalisation is more than twice as high for Aboriginals than non-Aboriginals. In addition, the age of onset of circulatory diseases appears to be younger in the Aboriginal population with the admission rate of persons aged 45 years being twice that of non-Aboriginal people.

Unlike the mortality data, Aboriginal rates of hospitalisation for circulatory disease did vary significantly across the State. The Great Southern, Midwest and Goldfields Aboriginal population were higher than the State rate while lower rates were calculated from residents of North and East Metropolitan Authorities.

## 4 Cancer

Cancer arises from the proliferation and spread of abnormal cells in the body producing a tumour that invades and destroys the tissue in which it originates. Metastases, or secondary cancers distant to the primary cancer, are caused by the spread of cancer cells from the original site via the bloodstream, lymphatic channels or across body cavities. The term 'cancer' refers to all neoplasms.

Cancer was the second leading cause of death in WA from 1990–1999. The burden of cancer on the community in terms of the mortality and associated psychological, social and economic consequence is great. The aim, therefore, of cancer prevention and control strategies, is the avoidance of premature deaths and consequent years of life lost attributable to cancer. The National Health Priority Initiative identified cancer as warranting particular attention. Specifically, lung cancer, skin cancer, colorectal cancer, prostate cancer in males and cancers of the cervix and breast in females.<sup>19</sup>

### 4.1 Risk factors

Studies researching the environmental and genetic influences on various cancers showed that different cancers have different sets of risk factors. While for some cancers the aetiology remains unknown, many forms of cancer may share the same risk factors.<sup>20</sup> Some of the major determinants of cancer are reported as smoking, dietary influences, alcohol, radiation exposure and infectious agents. Gender and ethnicity have also been identified as factors that might influence responses to environmental agents. Estimates show that reducing exposure through behaviour change could prevent a third of cancer cases.<sup>19</sup>

Cancer survival varies from individual to individual and is influenced by several factors. The type and growth rate of the cancer, the stage of the cancer at diagnosis, the availability of appropriate treatment and the person's general health all affect the ultimate outcome.<sup>18</sup>

### 4.2 Impact on Aboriginal people

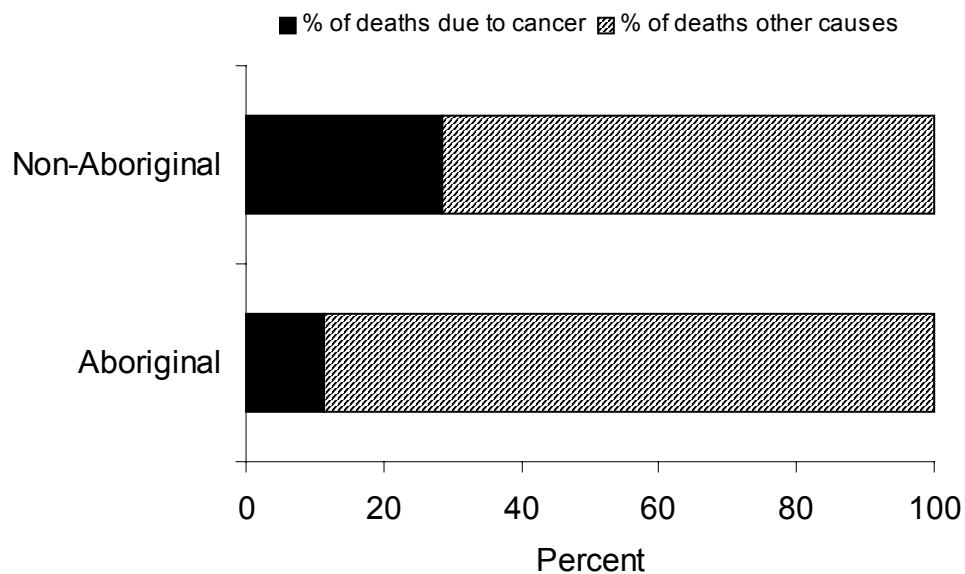
For most cancers there is little difference in incidence rates between Aboriginal and non-Aboriginal people with the exception of cervical cancer. However, Aboriginal and Torres Strait Islanders who suffer cancer are more likely to die from it than are non-Aboriginal people.<sup>21</sup> The following overview examines the WA deaths and hospitalisations due to cancer in the Aboriginal population compared to the non-Aboriginal population.

### 4.3 State overview

#### ***Mortality***

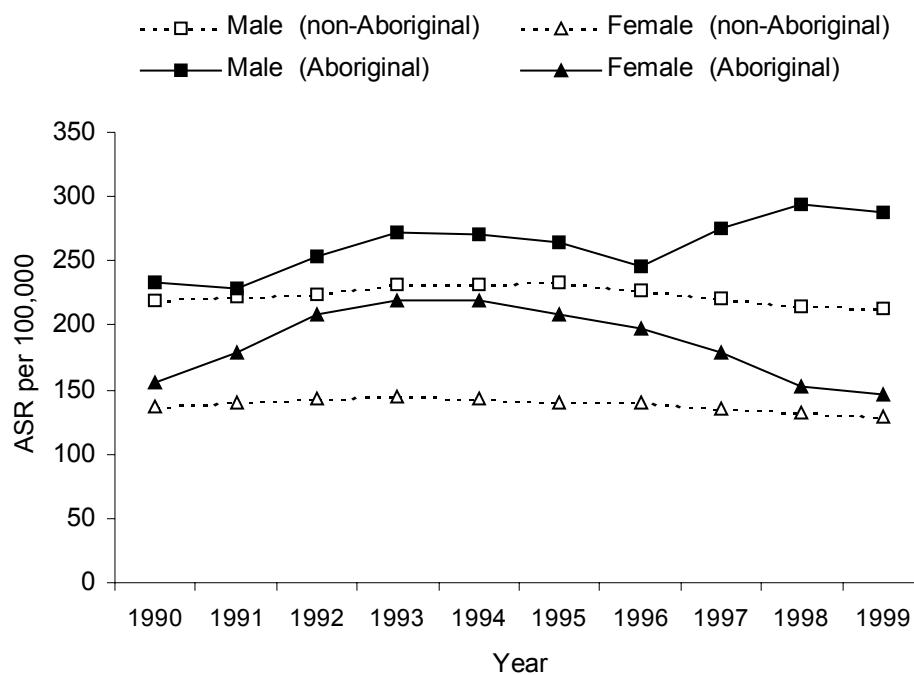
- Cancers accounted for 11.4% of all Aboriginal deaths between 1990 and 1999, representing an annual average of 37 deaths (non-Aboriginals: 28.5%; 2,783 deaths) (Figure 9).
- Of these deaths, the percentage of males was 53.7% and 56.6% for Aboriginals and non-Aboriginals respectively.
- Compared to the non-Aboriginal population, the rate of death was significantly higher in Aboriginal females (1.4 times) but not Aboriginal males (1.2 times).
- Trend analysis revealed that there was no significant change in cancer-related mortality rates for males or females of either the Aboriginal or non-Aboriginal populations (Figure 10).
- Age-specific rates of cancer mortality were slightly higher in the Aboriginal population than in the non-Aboriginal population (Figure 11).

**Figure 9: Percentage of all deaths for residents of the State (1990–1999)**

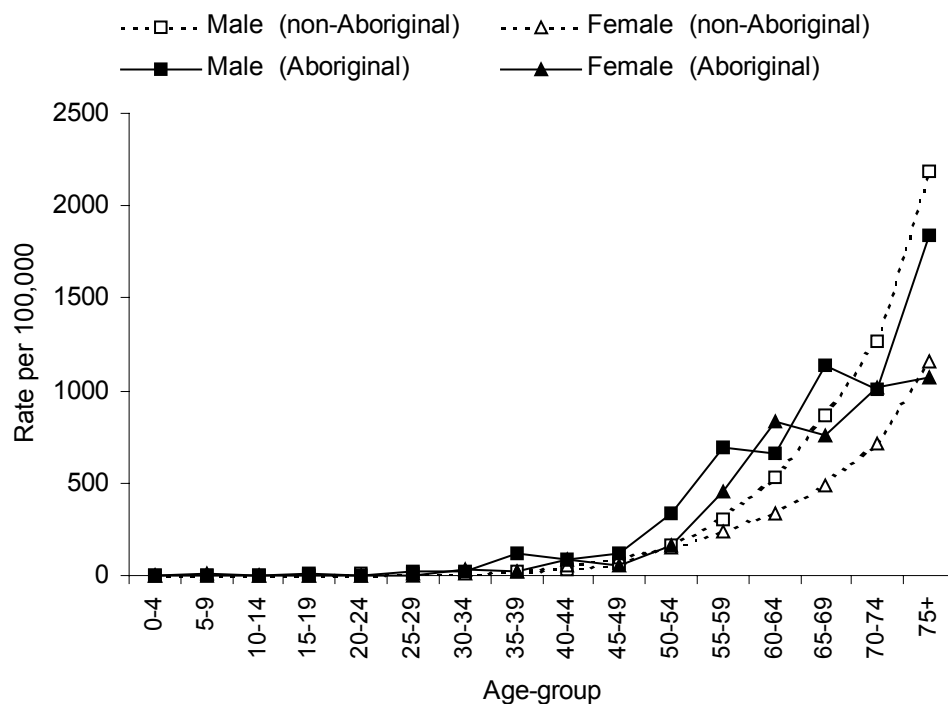




**Figure 10: Age-standardised mortality rates – cancer**



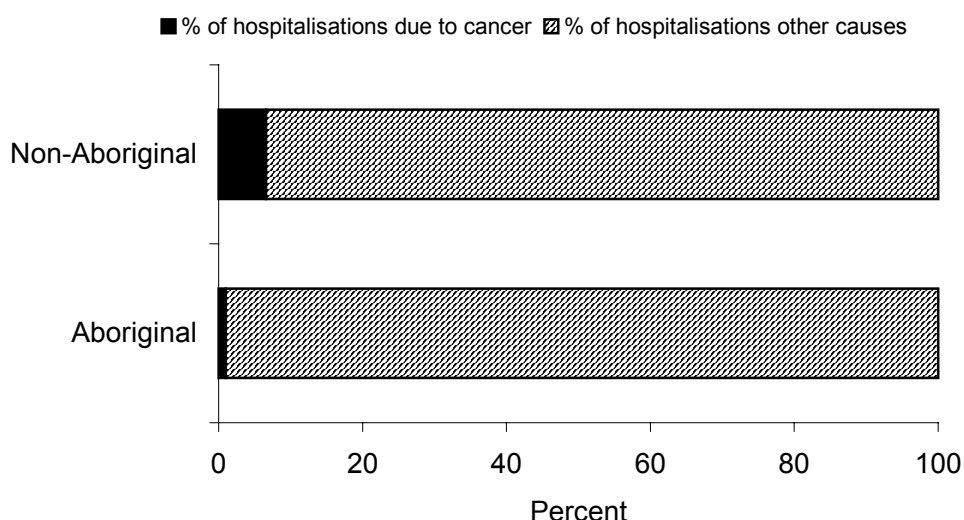
**Figure 11: Age-specific mortality rates – cancer (1990–1999)**



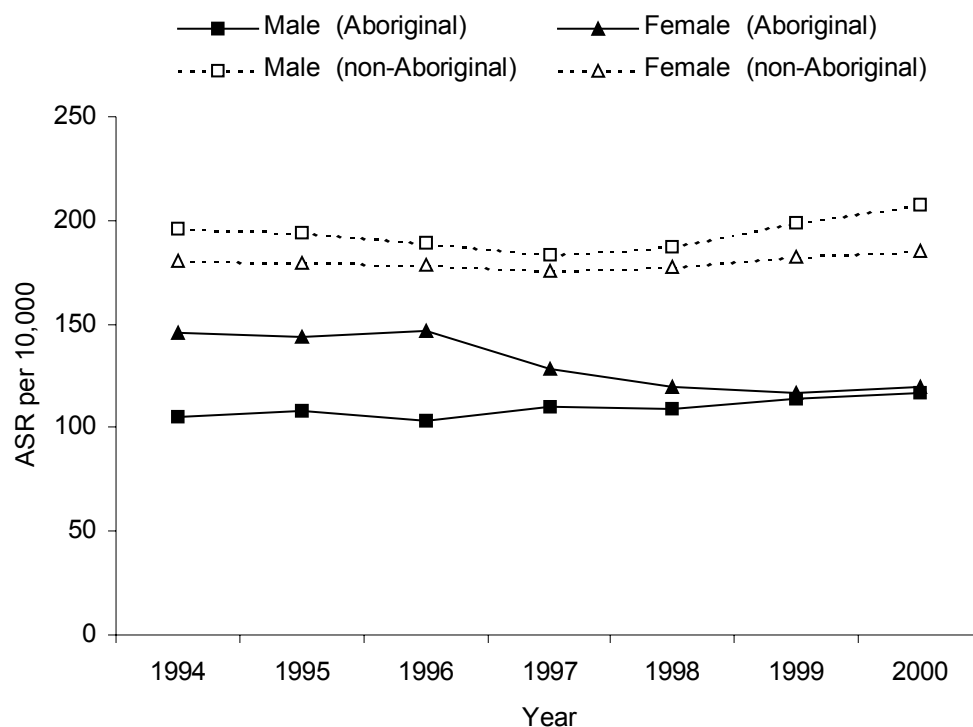
## Morbidity

- For the period 1994–2000, cancer admissions accounted for 1.0% and 6.6% of all Aboriginal and non-Aboriginal hospital admissions respectively. This represents an average of 296 Aboriginal and 30,919 non-Aboriginal persons per year between 1994 and 2000 inclusive (Figure 12).
- Of these hospitalisations, the percentage of males was 38.9% and 48.8% for Aboriginals and non-Aboriginals respectively.
- Aboriginal people accounted for 2.7% of the total State population but 1.0% of all cancer hospitalisations.
- Compared to the non-Aboriginal population, the rate of hospitalisation was lower in Aboriginal people (0.6 times) but this was not statistically significant.
- Trend analysis showed that the rate of hospitalisation for cancer in Aboriginal males increased significantly by 4% annually but that for Aboriginal females there was a significant decrease of 3.8%. For non-Aboriginals, the rate of hospitalisation for cancer increased significantly for both males and females by 1.1% and 0.7% respectively (Figure 13).
- Prior to the age of 65 years, the age-specific hospital admission rates were similar or slightly higher for Aboriginal people compared to non-Aboriginals. After that age the rate for Aboriginal people was somewhat lower (Figure 14).

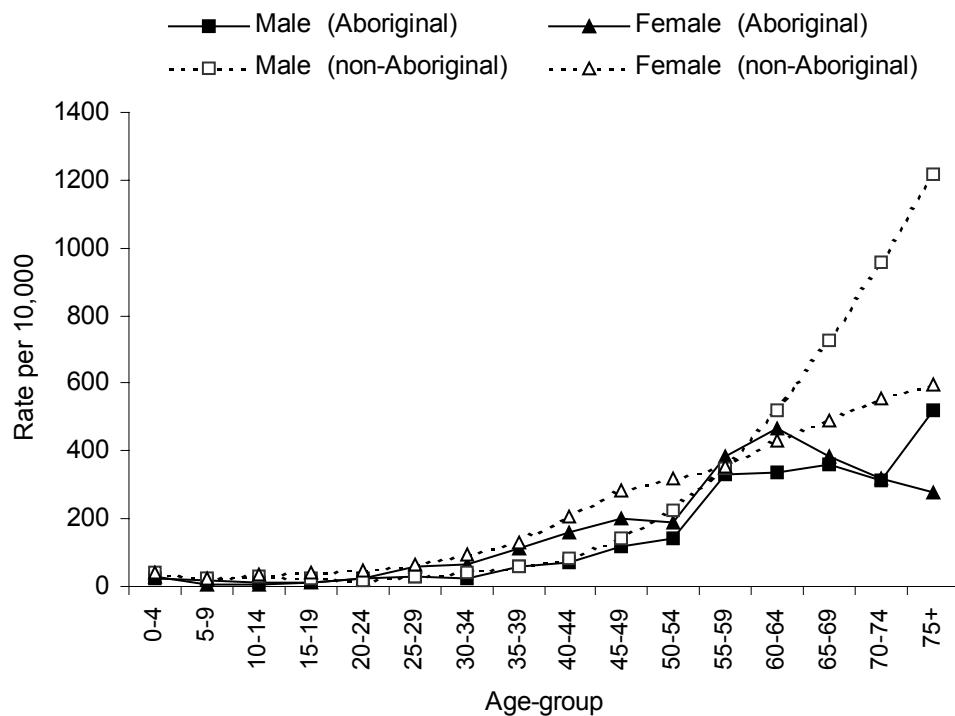
**Figure 12: Percentage of all hospitalisations for residents of the State (1994–2000)**



**Figure 13: Age-standardised hospitalisation rates – cancer**



**Figure 14: Age-specific hospitalisation rates – cancer (1994–2000)**

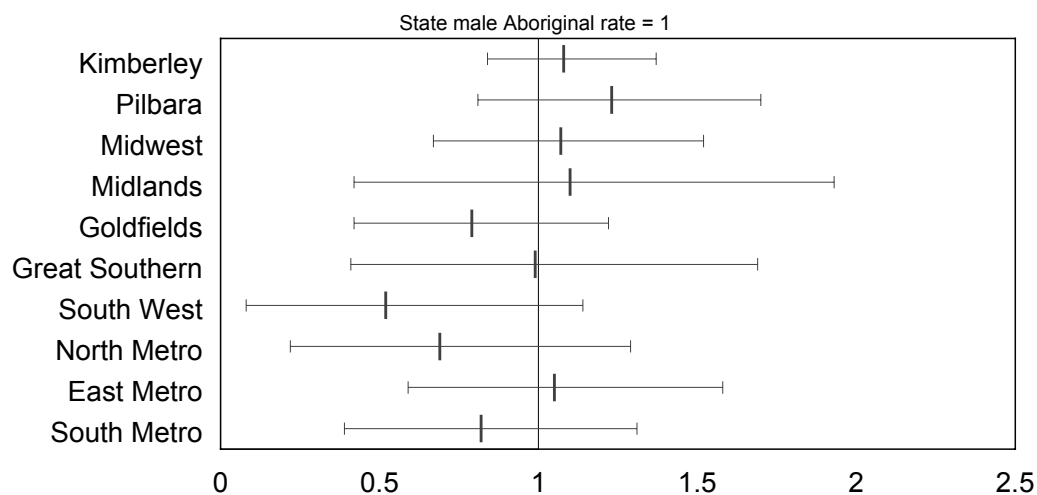


## 4.4 Cancer in the Health Authorities

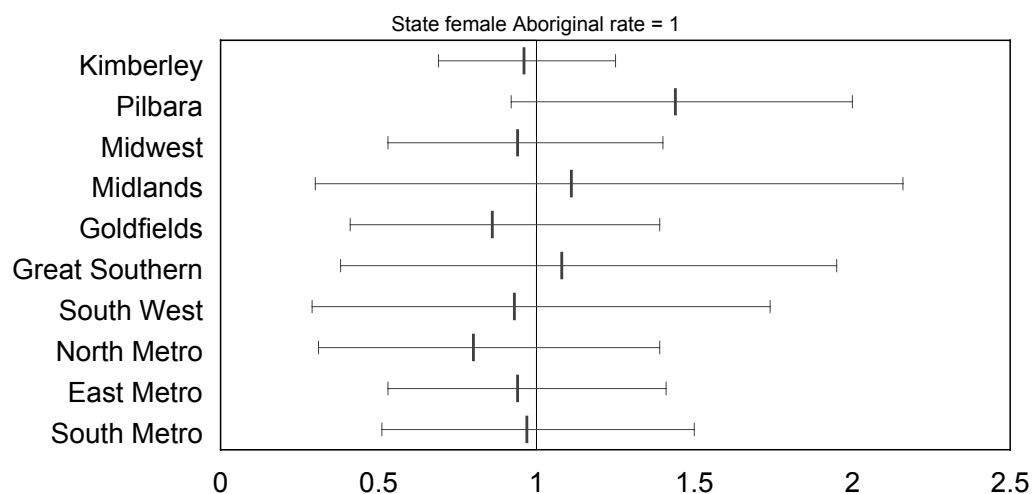
### Mortality

**Figure 15: Aboriginal-standardised mortality rate ratios by Health Authority of residence – cancer (1990–1999)**

#### Males



#### Females

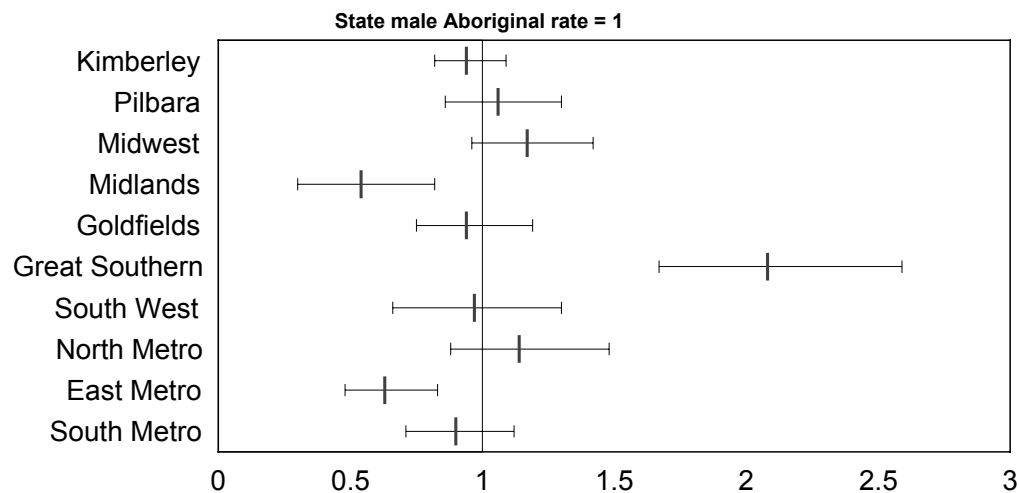


- For both Aboriginal males and females, no area showed a statistically significant variation from the State rate. The wide confidence intervals are due to the small number of deaths despite aggregation of 10 years of data.

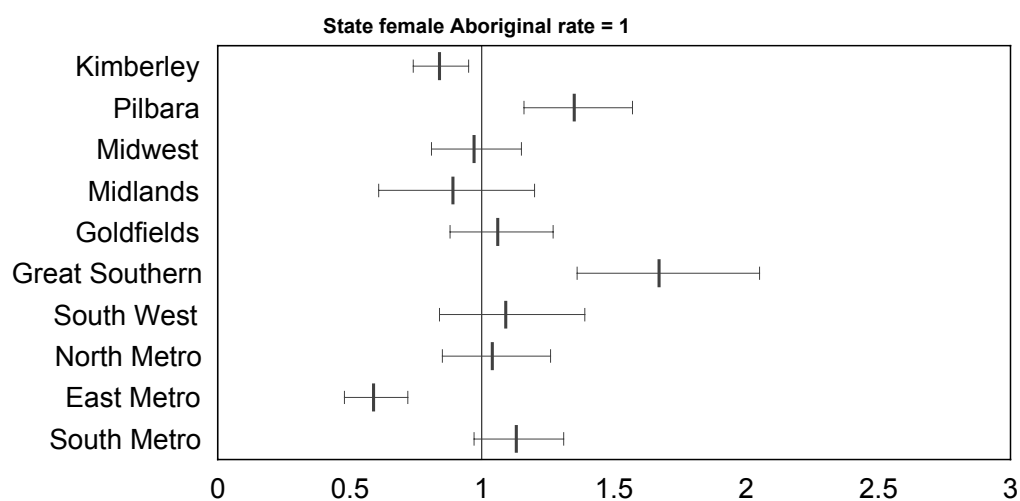
## Morbidity

**Figure 16: Aboriginal-standardised hospitalisation rates ratios by Health Authority of residence – cancer (1994–2000)**

### Males



### Females



- Compared to the State rate, Aboriginal males who lived in the Great Southern Health Authority experienced significantly higher rates of hospitalisation due to cancer whereas those in the Midlands and East Metropolitan areas experienced significantly lower rates.
- Among the female Aboriginal population, those residing in the Pilbara and Great Southern Health Authorities experienced significantly higher rates of hospitalisation due to cancer while those in the Kimberley and North Metropolitan areas experienced significantly lower rates compared to the State.

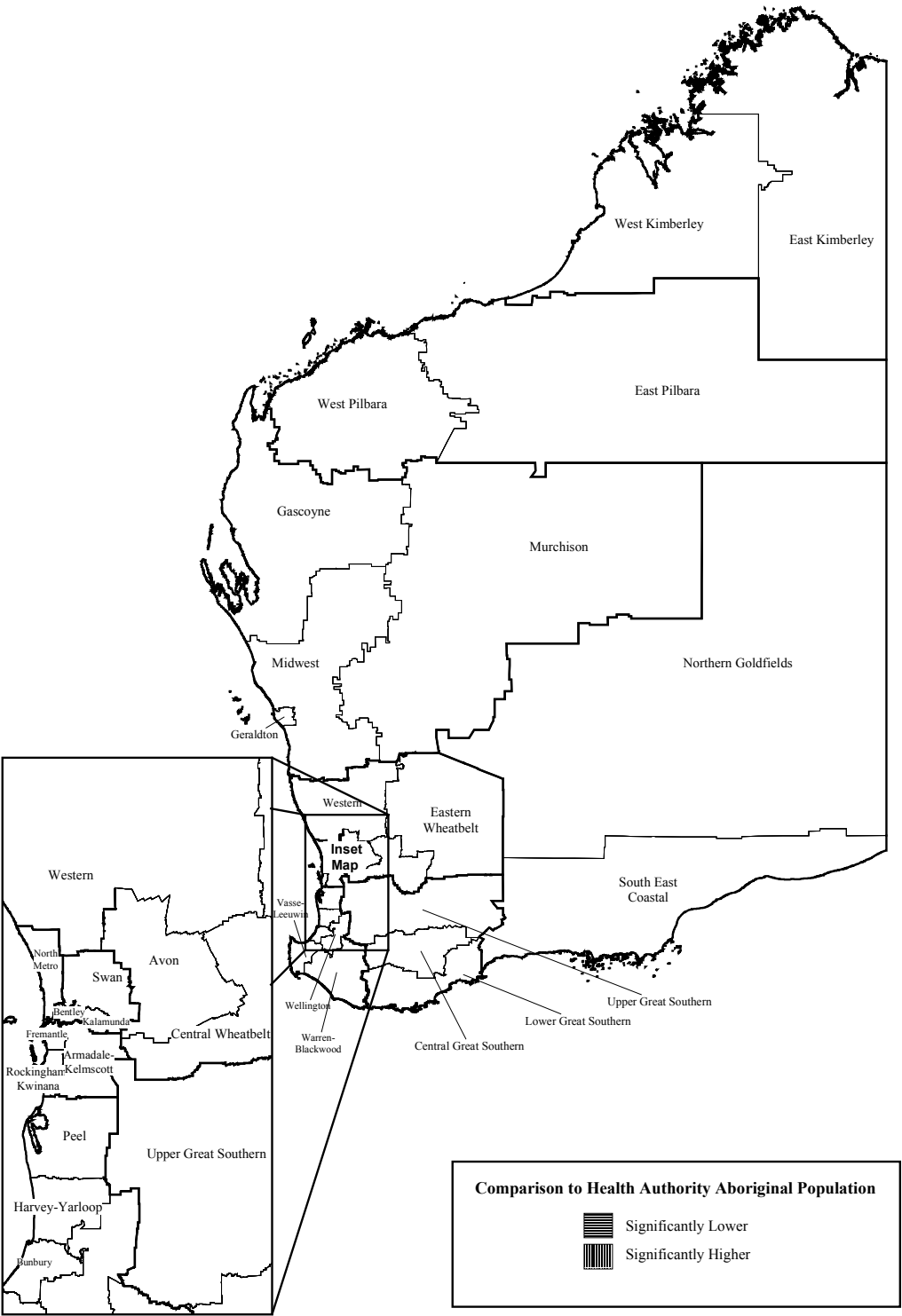
## 4.5 Cancer in the Health Services

### Mortality

**Table 4: Mortality-related statistics for cancer by Health Service of residence (1990–1999)**

	Aboriginal					Non-Aboriginal					A/Non-A	
	SMR	SIGN	ASR	PYLL	N	SMR	SIGN	ASR	PYLL	N	RR	SIGN
<b>Kimberley</b>	<b>1.0</b>	<b>NS</b>	<b>220.4</b>	<b>13.6</b>	<b>115</b>	<b>0.8</b>	<b>NS</b>	<b>137.9</b>	<b>14.3</b>	<b>83</b>	<b>1.6</b>	<b>H</b>
East Kimberley	0.9	NS	202.6	15.3	31	0.6	L	80.5	15.0	17	2.5	NS
West Kimberley	1.1	NS	238.6	12.9	84	1.2	NS	206.2	14.1	66	1.2	NS
<b>Pilbara</b>	<b>1.3</b>	<b>H</b>	<b>268.2</b>	<b>11.5</b>	<b>60</b>	<b>0.8</b>	<b>L</b>	<b>140.3</b>	<b>17.2</b>	<b>147</b>	<b>1.9</b>	<b>H</b>
East Pilbara	1.0	NS	266.7	11.2	42	1.1	NS	162.4	15.7	83	1.6	NS
West Pilbara	1.1	NS	266.5	12.0	18	0.9	NS	109.7	19.0	64	2.4	NS
<b>Midwest</b>	<b>1.0</b>	<b>NS</b>	<b>203.3</b>	<b>16.3</b>	<b>45</b>	<b>1.0</b>	<b>NS</b>	<b>179.4</b>	<b>11.2</b>	<b>778</b>	<b>1.1</b>	<b>NS</b>
Gascoyne	1.3	NS	243.0	17.1	18	1.0	NS	176.1	11.2	117	1.4	NS
Geraldton	0.7	NS	155.5	17.6	9	1.1	NS	195.1	11.3	467	0.8	NS
Midwest	1.4	NS	247.5	16.8	12	0.9	NS	159.7	11.0	177	1.5	NS
Murchison	0.7	NS	152.4	11.8	6	0.5	L	104.2	10.2	17	1.5	NS
<b>Midlands</b>	<b>1.1</b>	<b>NS</b>	<b>252.1</b>	<b>16.2</b>	<b>15</b>	<b>1.0</b>	<b>NS</b>	<b>165.2</b>	<b>10.7</b>	<b>825</b>	<b>1.5</b>	<b>NS</b>
Avon	0.8	-	72.4	27.6	3	1.2	H	176.1	9.3	283	0.4	-
Central Wheatbelt	1.1	-	271.0	12.1	4	1.1	NS	170.0	12.6	135	1.6	-
Western	1.5	NS	556.7	8.9	7	1.0	NS	154.4	11.6	230	3.6	NS
Eastern Wheatbelt	0.3	-	88.7	0.0	1	1.2	H	176.6	10.5	177	0.5	-
<b>Goldfields</b>	<b>0.8</b>	<b>NS</b>	<b>191.3</b>	<b>10.2</b>	<b>29</b>	<b>1.0</b>	<b>NS</b>	<b>175.7</b>	<b>12.9</b>	<b>536</b>	<b>1.1</b>	<b>NS</b>
Northern Goldfields	1.0	NS	198.4	8.1	25	1.1	NS	193.9	14.1	339	1.0	NS
South East Coastal	1.1	-	108.6	26.5	4	1.0	NS	167.8	10.9	197	0.6	-
<b>Great Southern</b>	<b>1.1</b>	<b>NS</b>	<b>229.8</b>	<b>12.9</b>	<b>18</b>	<b>1.0</b>	<b>NS</b>	<b>170.2</b>	<b>12.0</b>	<b>1162</b>	<b>1.4</b>	<b>NS</b>
Lower Great Southern	0.9	NS	96.2	12.7	5	1.0	NS	168.5	12.3	723	0.6	NS
Central Great Southern	1.4	NS	219.2	15.4	7	1.0	NS	164.0	10.6	150	1.3	NS
Upper Great Southern	0.8	NS	286.4	6.3	6	0.9	NS	158.2	11.9	289	1.8	NS
<b>South West</b>	<b>0.7</b>	<b>NS</b>	<b>161.9</b>	<b>12.3</b>	<b>11</b>	<b>1.0</b>	<b>NS</b>	<b>173.3</b>	<b>11.0</b>	<b>2948</b>	<b>0.9</b>	<b>NS</b>
Peel	2.9	NS	625.3	16.6	6	1.1	NS	184.1	9.8	1143	3.4	NS
Vasse–Leeuwin	-	-	-	-	0	1.0	NS	163.6	10.7	485	-	-
Bunbury	1.1	-	166.4	10.2	3	1.1	NS	187.0	11.8	718	0.9	-
Warren–Blackwood	-	-	-	-	0	1.0	NS	174.6	12.4	270	-	-
Wellington	0.8	-	120.5	2.2	2	1.0	NS	173.7	13.4	214	0.7	-
Harvey–Yarloop	-	-	-	-	0	0.6	L	97.3	12.3	118	-	-
<b>North Metro</b>	<b>0.7</b>	<b>NS</b>	<b>160.0</b>	<b>9.4</b>	<b>16</b>	<b>0.9</b>	<b>L</b>	<b>159.6</b>	<b>12.2</b>	<b>6883</b>	<b>1.0</b>	<b>NS</b>
<b>East Metro</b>	<b>1.0</b>	<b>NS</b>	<b>214.0</b>	<b>14.2</b>	<b>38</b>	<b>1.1</b>	<b>H</b>	<b>196.4</b>	<b>11.7</b>	<b>7768</b>	<b>1.1</b>	<b>NS</b>
Bentley	0.9	NS	201.1	16.9	10	1.0	NS	205.9	10.8	3033	1.0	NS
Inner City	1.1	NS	747.2	10.6	5	1.1	H	441.9	10.2	1477	1.7	NS
Swan	1.0	NS	182.8	13.3	22	0.9	L	150.0	12.3	2587	1.2	NS
Kalamunda	1.0	-	70.0	20.8	1	0.8	L	165.5	14.3	671	0.4	-
<b>South Metro</b>	<b>0.9</b>	<b>NS</b>	<b>211.6</b>	<b>13.4</b>	<b>29</b>	<b>1.0</b>	<b>NS</b>	<b>170.4</b>	<b>12.1</b>	<b>6702</b>	<b>1.2</b>	<b>NS</b>
Fremantle	1.2	NS	250.8	11.5	11	1.0	NS	168.5	12.0	3175	1.5	NS
Armadale–Kelmscott	0.8	NS	146.9	16.2	11	1.0	NS	162.9	12.9	2182	0.9	NS
Rockingham–Kwinana	1.2	NS	125.9	11.2	7	1.1	H	189.8	11.0	1345	0.7	NS
<b>State</b>	<b>1.0</b>	<b>NS</b>	<b>213.2</b>	<b>13.2</b>	<b>376</b>	<b>1.0</b>	<b>NS</b>	<b>173.9</b>	<b>11.9</b>	<b>27832</b>	<b>1.2</b>	<b>H</b>

**Map 3:            Aboriginal deaths due to cancer, 1990–1999**

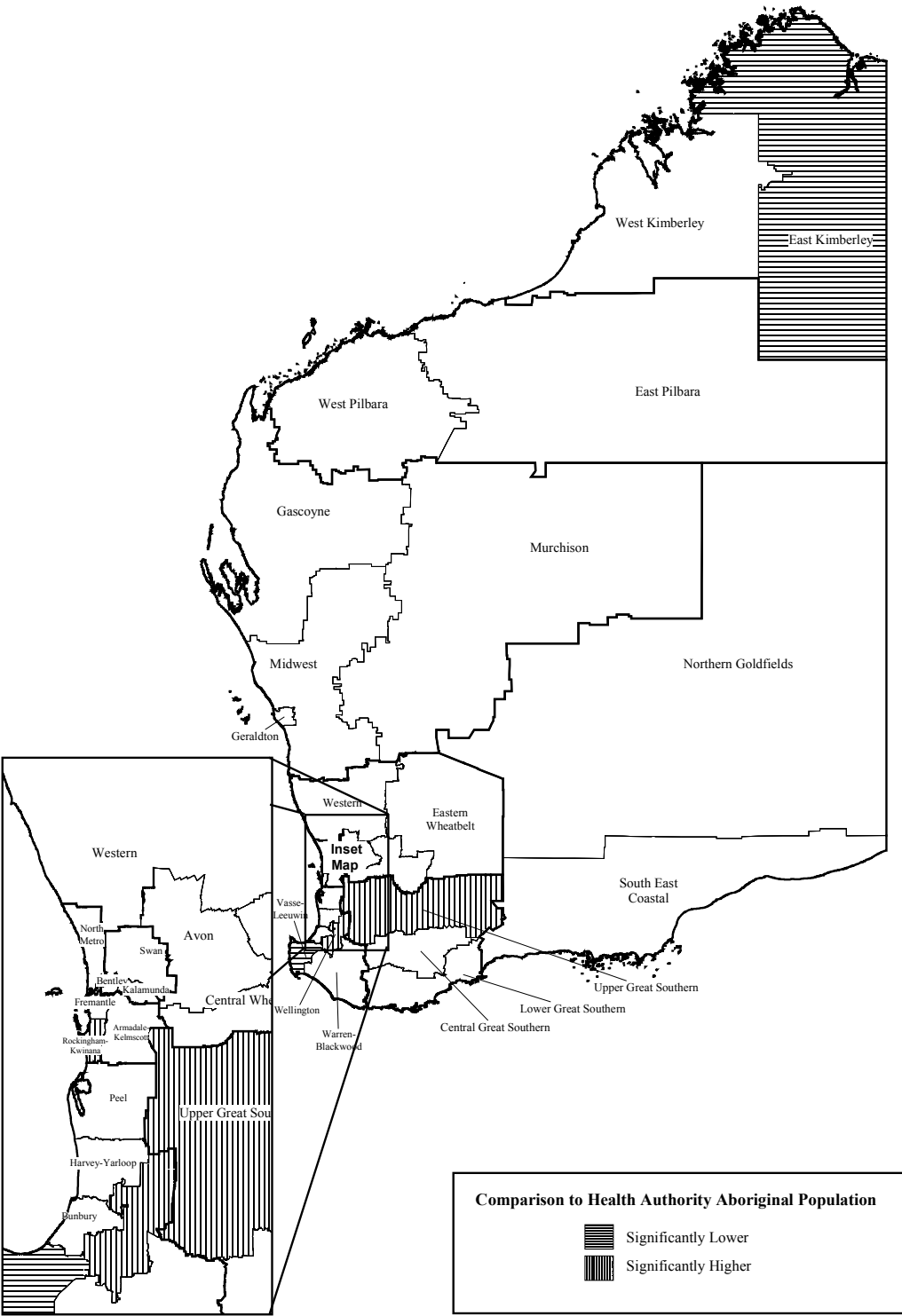


**Table 5: Hospital-related statistics for cancer by Health Service of residence (1994–2000)**

	Aboriginal				Non-Aboriginal				A/Non-A	
	SRR	SIGN	ASR	N	SRR	SIGN	ASR	N	RR	SIGN
<b>Kimberley</b>	<b>0.9</b>	<b>L</b>	<b>9.3</b>	<b>454</b>	<b>0.7</b>	<b>L</b>	<b>11.6</b>	<b>912</b>	<b>0.8</b>	<b>L</b>
East Kimberley	0.8	L	8.2	130	0.5	L	4.8	150	1.7	H
West Kimberley	1.1	NS	10.6	324	1.3	H	15.7	762	0.7	L
<b>Pilbara</b>	<b>1.2</b>	<b>H</b>	<b>14.0</b>	<b>275</b>	<b>0.8</b>	<b>L</b>	<b>12.7</b>	<b>2028</b>	<b>1.1</b>	<b>NS</b>
East Pilbara	1.0	NS	12.9	181	1.1	NS	13.3	1045	1.0	NS
West Pilbara	1.1	NS	17.8	94	0.9	NS	12.1	983	1.5	H
<b>Midwest</b>	<b>1.0</b>	<b>NS</b>	<b>11.8</b>	<b>243</b>	<b>1.0</b>	<b>NS</b>	<b>17.7</b>	<b>6343</b>	<b>0.7</b>	<b>L</b>
Gascoyne	1.0	NS	11.1	73	0.9	NS	16.1	910	0.7	L
Geraldton	1.0	NS	11.7	78	1.1	H	19.5	3737	0.6	L
Midwest	1.2	NS	17.9	55	0.9	L	16.0	1495	1.1	NS
Murchison	0.8	NS	10.7	37	0.6	L	11.5	201	0.9	NS
<b>Midlands</b>	<b>0.7</b>	<b>L</b>	<b>10.5</b>	<b>56</b>	<b>0.9</b>	<b>L</b>	<b>15.2</b>	<b>5875</b>	<b>0.7</b>	<b>L</b>
Avon	1.1	NS	7.7	19	1.1	H	16.5	1988	0.5	L
Central Wheatbelt	0.8	NS	10.4	11	1.1	NS	16.7	888	0.6	NS
Western	1.5	NS	14.5	22	1.0	NS	15.4	1865	0.9	NS
Eastern Wheatbelt	0.4	-	3.1	4	0.9	L	14.3	1134	0.2	-
<b>Goldfields</b>	<b>1.0</b>	<b>NS</b>	<b>11.7</b>	<b>199</b>	<b>0.9</b>	<b>L</b>	<b>16.4</b>	<b>4311</b>	<b>0.7</b>	<b>L</b>
Northern Goldfields	1.0	NS	11.7	173	1.0	L	15.6	2584	0.8	L
South East Coastal	1.1	NS	12.5	26	1.1	H	17.7	1727	0.7	NS
<b>Great Southern</b>	<b>1.8</b>	<b>H</b>	<b>23.0</b>	<b>183</b>	<b>1.0</b>	<b>L</b>	<b>17.1</b>	<b>8638</b>	<b>1.3</b>	<b>H</b>
Lower Great Southern	0.9	NS	9.6	58	1.1	H	18.2	5651	0.5	L
Central Great Southern	0.8	NS	14.5	42	0.8	L	14.0	974	1.0	NS
Upper Great Southern	1.3	H	20.2	83	0.9	L	14.9	2013	1.4	H
<b>South West</b>	<b>1.0</b>	<b>NS</b>	<b>13.9</b>	<b>102</b>	<b>1.0</b>	<b>NS</b>	<b>17.6</b>	<b>22478</b>	<b>0.8</b>	<b>L</b>
Peel	1.0	NS	13.6	25	1.1	H	18.8	8647	0.7	NS
Vasse–Leeuwin	0.4	L	7.9	5	0.9	L	15.3	3299	0.5	L
Bunbury	0.9	NS	13.4	31	1.3	H	22.3	6405	0.6	L
Warren–Blackwood	0.8	-	1.2	4	0.9	L	15.0	1793	0.1	-
Wellington	1.8	H	30.3	27	1.0	NS	16.5	1508	1.8	H
Harvey–Yarloop	0.9	NS	15.0	10	0.4	L	7.9	826	1.9	NS
<b>North Metro</b>	<b>1.1</b>	<b>NS</b>	<b>11.0</b>	<b>166</b>	<b>1.0</b>	<b>H</b>	<b>18.0</b>	<b>58521</b>	<b>0.6</b>	<b>L</b>
<b>East Metro</b>	<b>0.6</b>	<b>L</b>	<b>9.2</b>	<b>221</b>	<b>0.7</b>	<b>L</b>	<b>18.5</b>	<b>34920</b>	<b>0.5</b>	<b>L</b>
Bentley	1.1	NS	9.5	76	1.0	NS	18.2	17305	0.5	L
Inner City	1.2	NS	14.4	23	1.3	H	24.5	10204	0.6	L
Swan	0.9	NS	7.8	106	0.9	L	16.3	18481	0.5	L
Kalamunda	1.3	NS	21.8	16	1.0	NS	23.4	72408	0.9	NS
<b>South Metro</b>	<b>1.1</b>	<b>NS</b>	<b>7.4</b>	<b>177</b>	<b>1.3</b>	<b>H</b>	<b>17.7</b>	<b>6235</b>	<b>0.4</b>	<b>L</b>
Fremantle	1.0	NS	7.4	48	1.0	NS	17.9	24982	0.4	L
Armadale–Kelmscott	0.8	NS	6.6	75	1.0	L	16.7	19375	0.4	L
Rockingham–Kwinana	1.4	H	14.2	54	1.1	H	18.9	10746	0.8	NS
<b>State</b>	<b>1.0</b>	<b>NS</b>	<b>10.6</b>	<b>2076</b>	<b>1.0</b>	<b>NS</b>	<b>17.7</b>	<b>150261</b>	<b>0.6</b>	<b>L</b>



**Map 4:            Aboriginal hospitalisations due to cancer, 1994–2000**



## **4.6 Summary**

### ***Mortality***

Cancer is only responsible for 11.4% of all Aboriginal deaths in WA. Compared to non-Aboriginals, the mortality rate due to cancer is 1.2 times that of the non-Aboriginal population, resulting in approximately 37 deaths per year.

Results confirm that there is little difference in the rates of cancer-related deaths between Aboriginal and non-Aboriginal people. Indeed, the Kimberley and the Pilbara were the only areas to experience significant variation between the populations although this was in part due to lower rates of non-Aboriginal cancer deaths rather than high cancer mortality in the Aboriginal population.

The rate of death due to cancer varied only slightly from country to city areas among the Aboriginal population with those residing in the country experiencing slightly higher rates than their city counterparts. The degree to which Aboriginal people had their lives cut short due to cancer, per death, also altered little between city and country.

Among the Aboriginal population, the rate of death due to cancer was sizeable in the Western Health Service. However, this rate was not significant due to the low number of deaths. This was also true for the Peel and Inner City Health Services.

### ***Morbidity***

Overall, Aboriginal people experienced significantly lower rates of hospitalisation due to cancer than non-Aboriginal people in WA. Cancer-related hospital admissions only accounted for 1% of all Aboriginal admissions and were somewhat lower than the 6.6% observed in the non-Aboriginal population.

Compared to the State Aboriginal population, the Kimberley, Midlands and East Metropolitan Health Authorities had significantly lower rates of cancer-related hospitalisations while the Pilbara and Great Southern showed significantly higher rates.

## **5 Respiratory disease**

Respiratory disease is a broad category of illness that encompasses all conditions of the respiratory system. These groups include acute respiratory infections, pneumonia and influenza, chronic obstructive pulmonary diseases (COPD), lung disease from external agents, and other respiratory conditions.

COPD is a combination of several different but related diseases, which are progressive and irreversible, and are primarily characterised by difficulty in breathing.<sup>21</sup> Chronic bronchitis and emphysema are examples of COPD. It is a major cause of disability, occurring more commonly in older people.

Asthma warrants particular attention as it is an important public health problem and is listed as a National Health Priority. Asthma is a disease that, in the presence of allergens, makes the airways readily prone to excessive narrowing, leading to shortness of breath, wheezing and coughing.<sup>22</sup> Asthma prevalence has increased in children in many populations, including Australia in the past 20–30 years.<sup>23</sup> Although asthma deaths have decreased since 1986 in people aged five to 34 years, for school children, asthma death rates in Australia were the highest in 1986.<sup>23</sup>

### **5.1 Risk factors**

Several risk factors have been identified for COPD. They include cigarette smoking, exposure to pollution (in the workplace or elsewhere) and infection.<sup>22</sup> For asthma, known irritants include allergens, exercise, viral infections, exposure to tobacco smoke, food chemicals, cold air and weather changes.<sup>21</sup>

### **5.2 Impact on Aboriginal people**

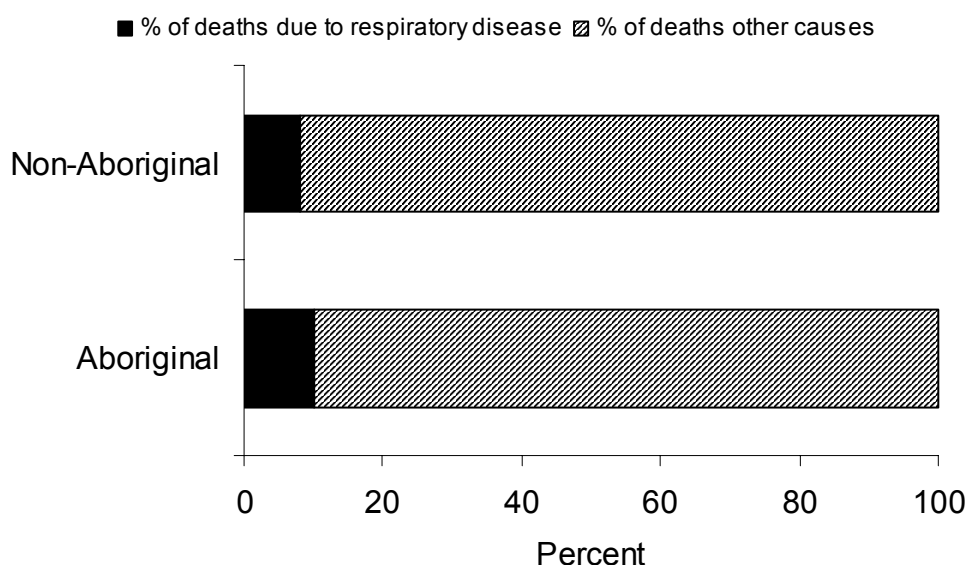
Respiratory diseases are among the most common causes of Aboriginal hospitalisations and include a high rate of infectious diseases such as pneumonia and chronic diseases such as COPD and asthma. High rates of infectious disease among Aboriginal people are influenced by inadequate housing, overcrowding, poor access to health care, inadequate nutrition and impaired immune function. The following overview examines the WA deaths and hospitalisations due to respiratory disease among Aboriginal people.

### 5.3 State overview

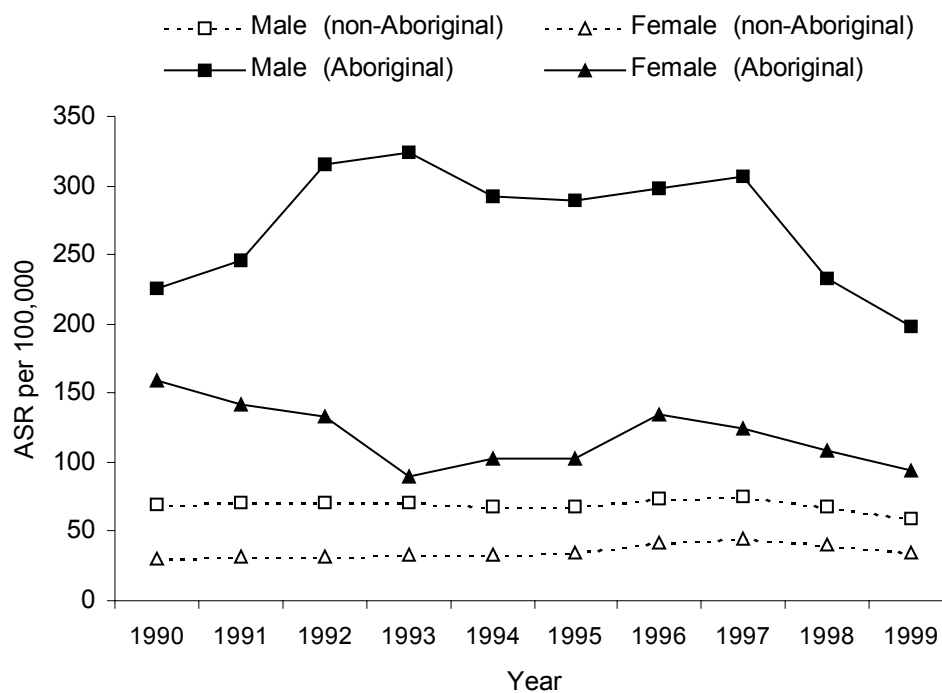
#### **Mortality**

- Respiratory diseases accounted for 10.1% of all Aboriginal deaths between 1990 and 1999, representing an annual average of 33 deaths (non-Aboriginals: 8.0%; 782 deaths) (Figure 17).
- Of these deaths, the percentage of males was 62.9% and 58.0% for Aboriginals and non-Aboriginals respectively.
- Aboriginal people accounted for 2.7% of the total State population but for 4.1% of all respiratory disease deaths.
- Compared to the non-Aboriginal population, the mortality rate attributable to respiratory disease was significantly higher in both Aboriginal males (3.9 times) and females (3.3 times).
- Despite a reduction in recent years, trend analysis showed no change in the respiratory disease death rate over the 10-year period of 1990–1999 in the Aboriginal population. For non-Aboriginals however, both males and females showed a significant average annual decrease in the mortality rate of 1.4% and 3.1% respectively (Figure 18).
- While age increased the incidence of respiratory disease-related deaths for both the Aboriginal and non-Aboriginal population, Aboriginal people experienced a greater increase in rates and at an earlier age. For Aboriginals older than 45 years, the rate was 3.5 times and 2.9 times greater than the non-Aboriginal male and female population respectively (Figure 19).

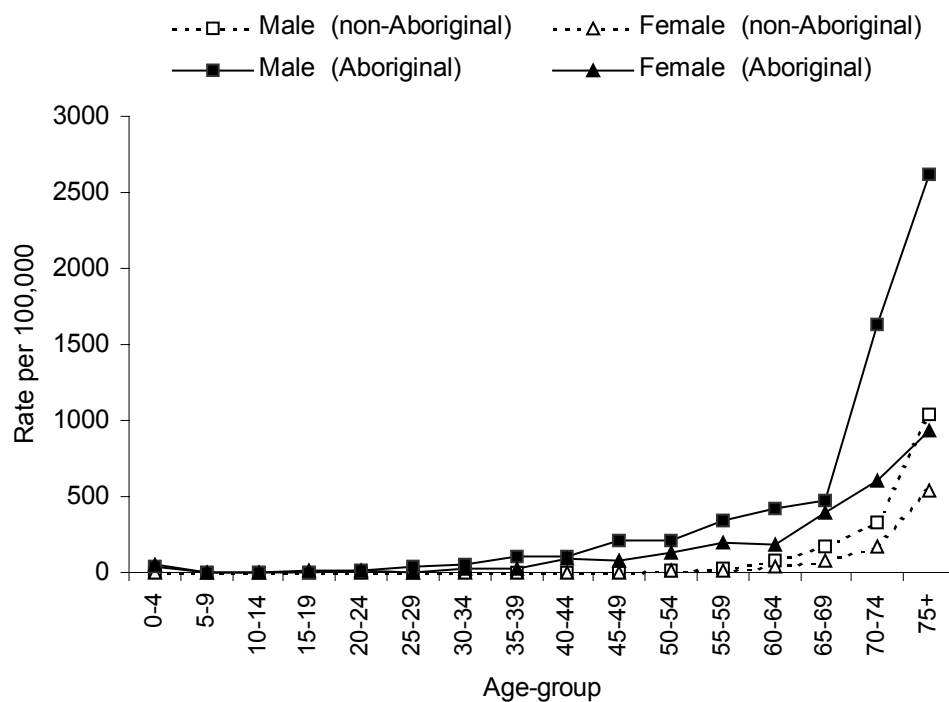
**Figure 17: Percentage of all deaths for residents of the State (1990–1999)**



**Figure 18: Age-standardised mortality rates – respiratory disease**



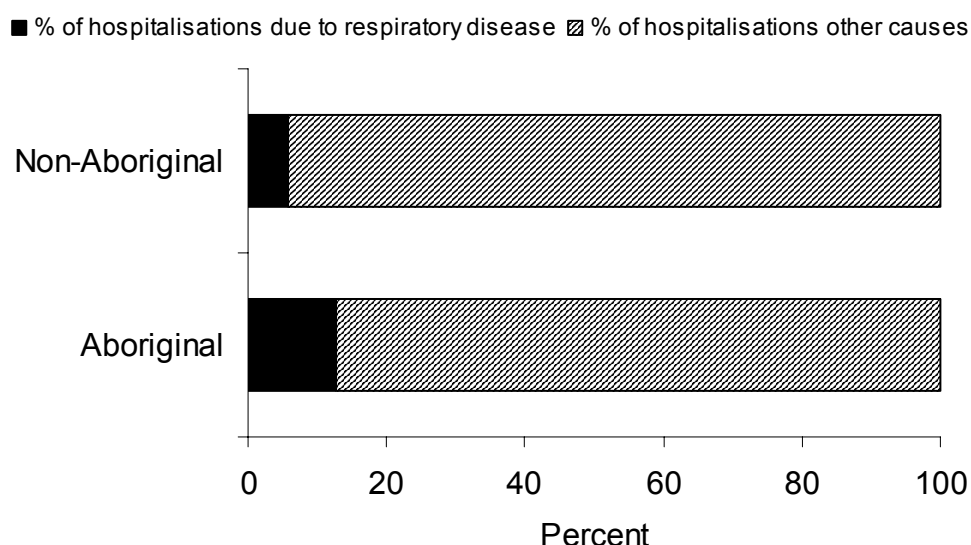
**Figure 19: Age-specific mortality rates – respiratory disease (1990–1999)**



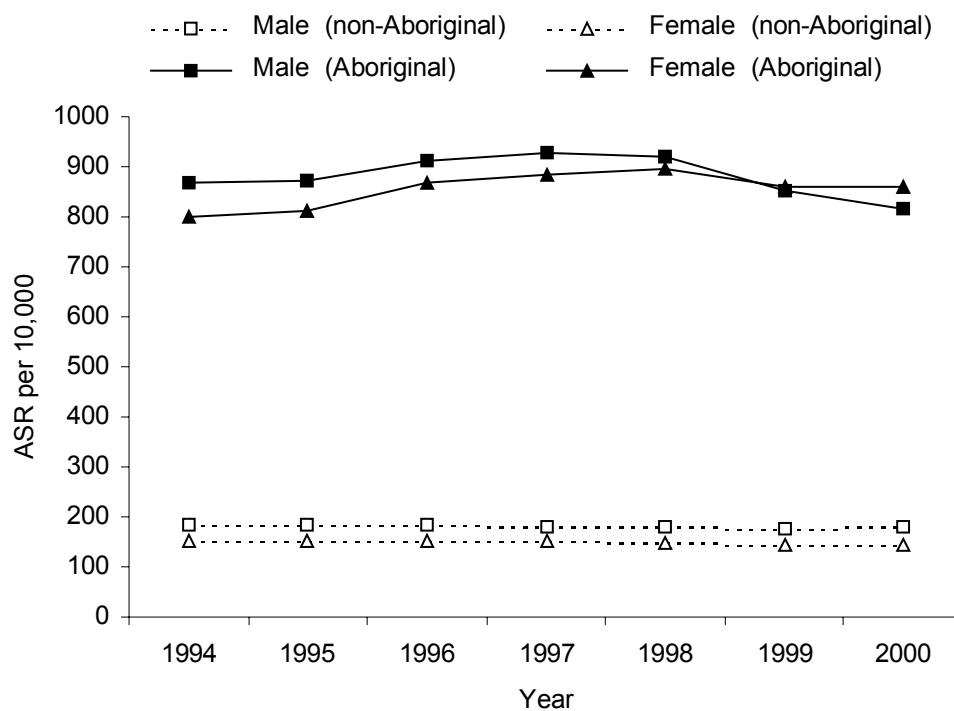
## Morbidity

- For the period 1994–2000, respiratory diseases accounted for 12.6% and 5.8% of all hospitalisations in Aboriginal and non-Aboriginal people respectively. This represents an average of 3,611 Aboriginal and 26,931 non-Aboriginal admissions per year (Figure 20).
- Of these hospitalisations, the percentage of males was 50.6% and 53.3% for Aboriginals and non-Aboriginals respectively.
- Aboriginal people accounted for 2.7% of the total State population but 11.8% of all respiratory diseases hospitalisations.
- The Aboriginal rate of hospitalisation for respiratory diseases was considerably higher than the non-Aboriginal rate. Compared to the non-Aboriginal population, the rate of hospitalisation was 5.0 times higher in Aboriginal males and 5.7 times higher in Aboriginal females.
- Trend analysis of annual hospital admission rates showed that for the Aboriginal population, males had a significant average decrease of 1.5% while females had a significant average increase of 0.9%. For the non-Aboriginal population, both males and females showed a significant average decrease of 0.9% and 1.2% respectively (Figure 21).
- Examination of age-specific hospital admission rates showed a high rate in the 0–4 year-old age-group although this was much higher in Aboriginal children. Admission rates remain low between the ages of five and 29 after which they commence to increase with age. For Aboriginals older than 45 years, the admission rate was 6–8 times greater than the non-Aboriginal population (Figure 22).

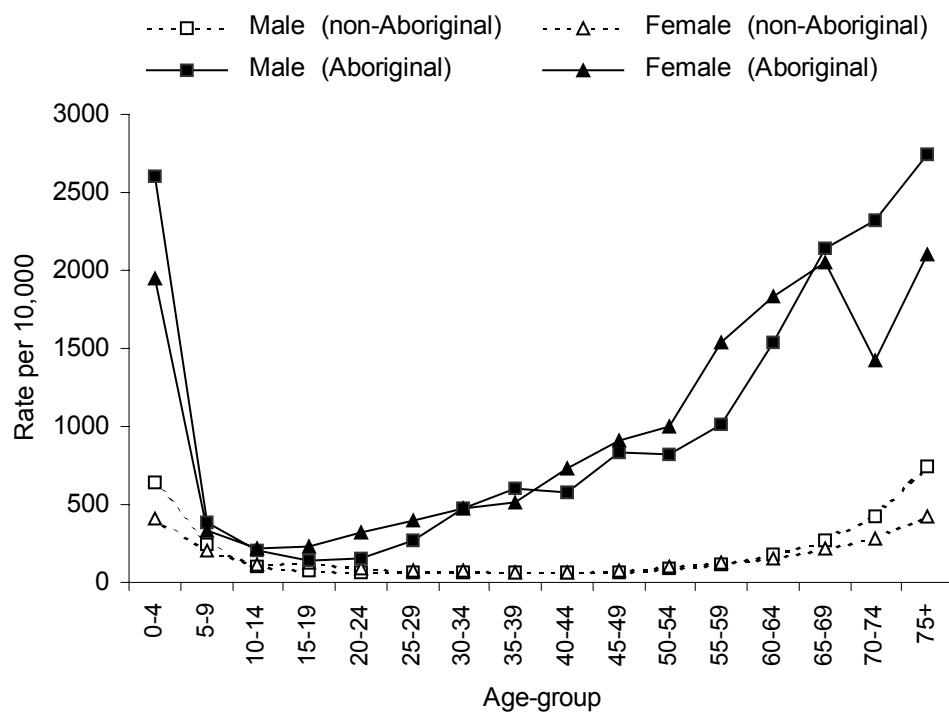
**Figure 20: Percentage of all hospitalisations for residents of the State (1994–2000)**



**Figure 21: Age-standardised hospitalisation rates – respiratory diseases**



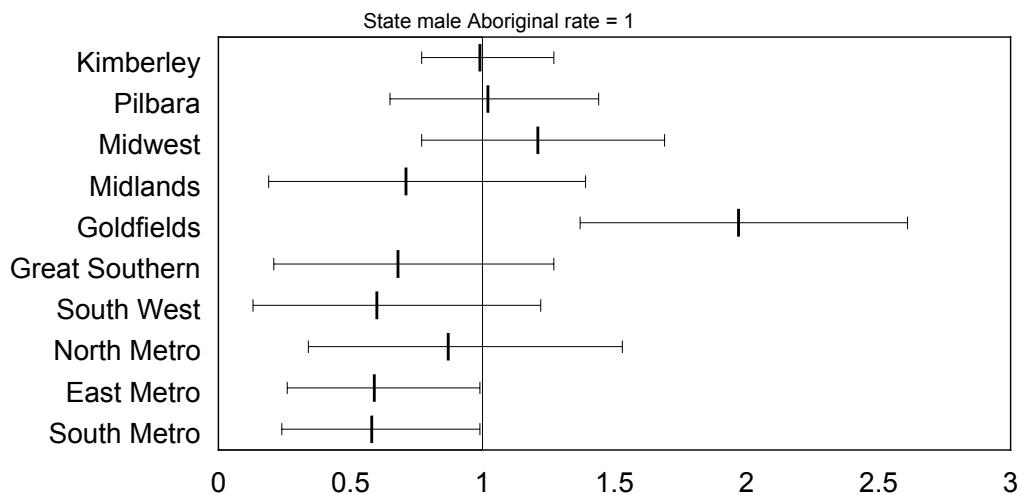
**Figure 22: Age-specific hospitalisation rates – respiratory disease (1994–2000)**



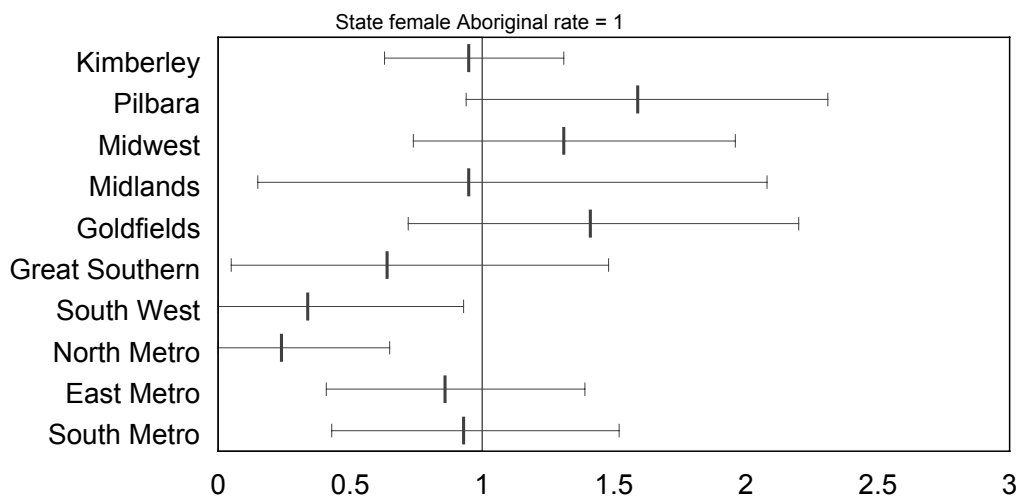
## 5.4 Respiratory disease in the Health Authorities

### Mortality

**Figure 23: Aboriginal standardised mortality rate ratios by Health Authority of residence – respiratory diseases (1990–1999)**  
**Males**



### Females

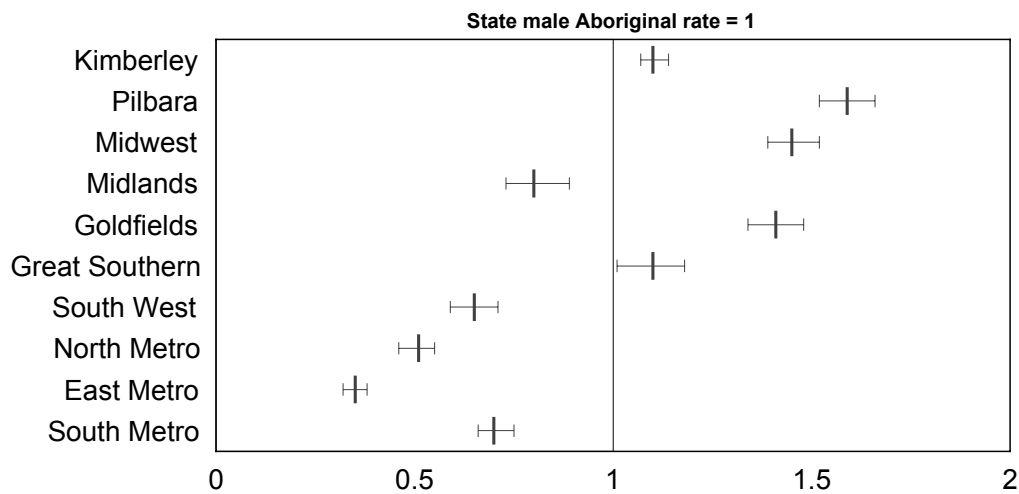


- Aboriginal males living in the Goldfields Health Authority experienced significantly higher rates of death due to respiratory disease compared to the State male Aboriginal rate.
- Aboriginal females residing in the South West and North Metropolitan areas experienced significantly lower rates of death from respiratory disease compared to the State female Aboriginal rate.

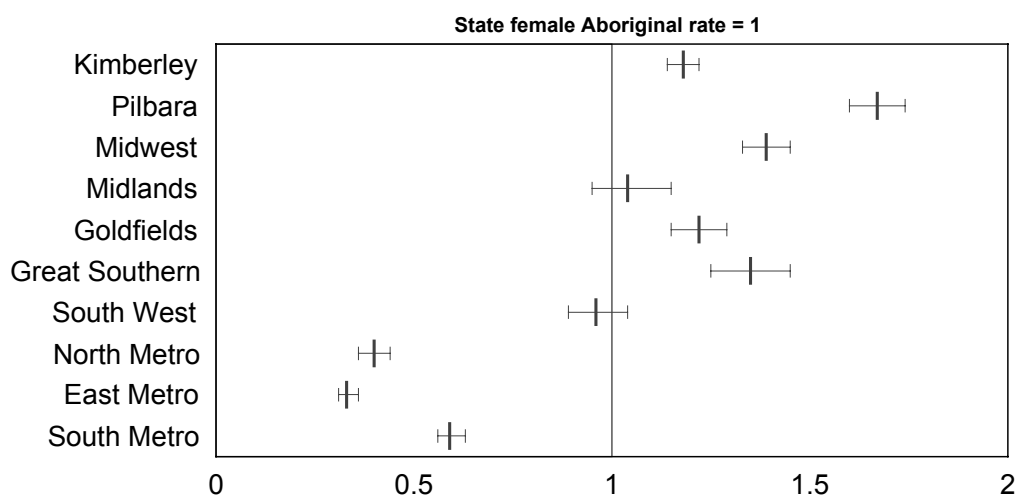


**Figure 24: Aboriginal standardised hospital rates ratios by Health Authority of residence – respiratory diseases (1994–2000)**

### Males



### Females



- Aboriginal males living in the Kimberley, Pilbara, Midwest, Goldfields and Great Southern Health Authorities experienced significantly higher rates of hospitalisation due to respiratory disease than the State male Aboriginal rate, whereas those residing in the Midlands, South West, North, East and South Metropolitan areas experienced significantly lower rates.
- Among the female Aboriginal population, those residing in the Kimberley, Pilbara, Midwest, Goldfields and Great Southern Health Authorities experienced significantly higher rates of hospitalisation due to respiratory disease while those in the North, East and South Metropolitan Health Authorities experienced significantly lower rates compared to the State female Aboriginal rate.

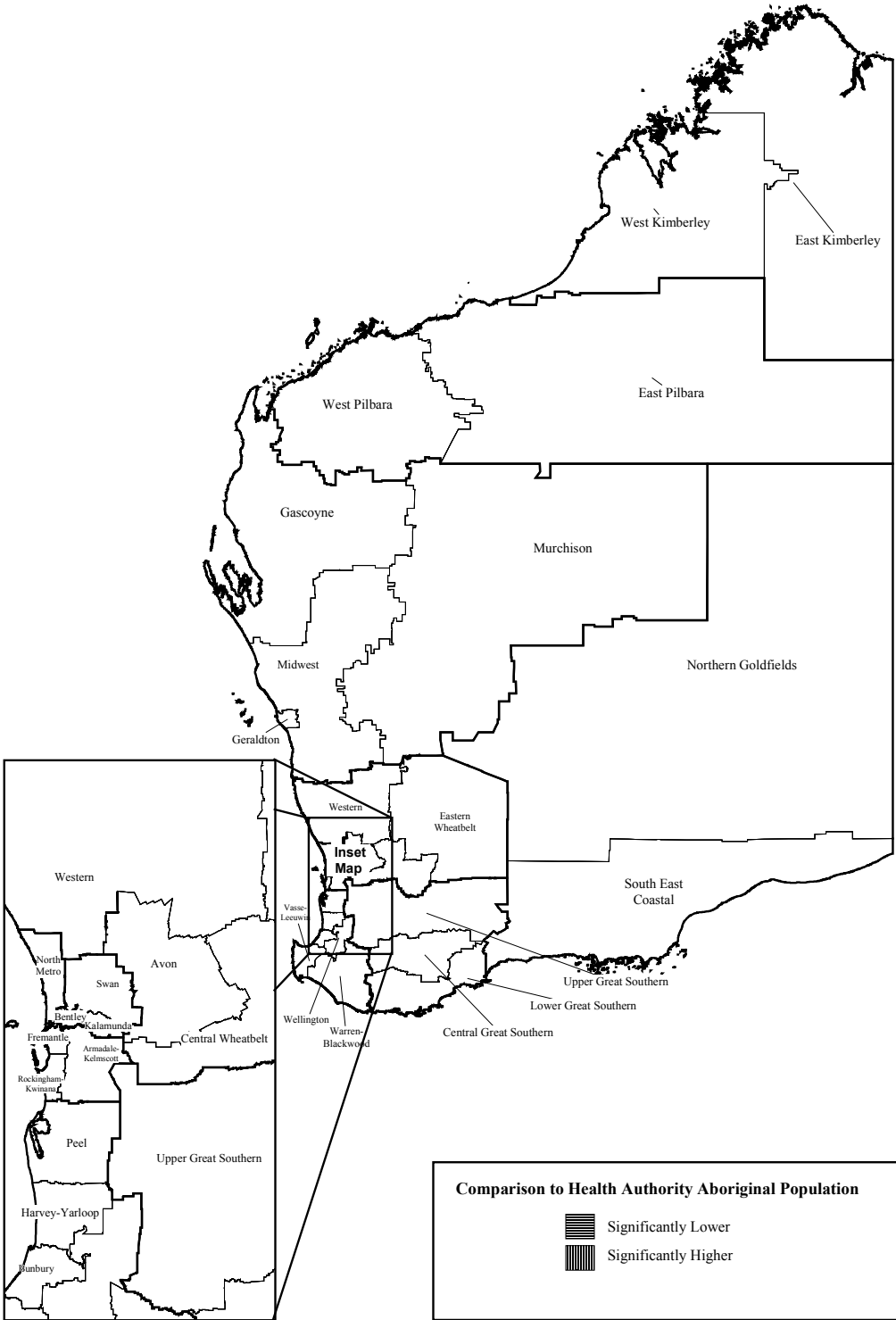
## 5.5 Respiratory disease in the Health Services

### Mortality

**Table 6: Mortality-related statistics for respiratory disease by Health Service of residence (1990–1999)**

	Aboriginal					Non-Aboriginal					Ab/Non-A	
	SMR	SIGN	ASR	PYLL	N	SMR	SIGN	ASR	PYLL	N	RR	SIGN
<b>Kimberley</b>	<b>1.0</b>	<b>NS</b>	<b>169.1</b>	<b>20.4</b>	<b>96</b>	<b>1.7</b>	<b>H</b>	<b>75.0</b>	<b>12.7</b>	<b>34</b>	<b>2.3</b>	<b>H</b>
East Kimberley	1.2	NS	272.6	16.1	37	0.6	NS	44.5	14.2	8	6.1	H
West Kimberley	0.9	NS	145.6	22.6	59	1.3	NS	125.9	11.8	26	1.2	NS
<b>Pilbara</b>	<b>1.3</b>	<b>NS</b>	<b>220.2</b>	<b>23.5</b>	<b>50</b>	<b>1.0</b>	<b>NS</b>	<b>43.1</b>	<b>23.5</b>	<b>28</b>	<b>5.1</b>	<b>H</b>
East Pilbara	1.0	NS	218.5	23.8	37	1.2	NS	50.4	24.5	18	4.3	H
West Pilbara	1.0	NS	262.5	27.5	13	0.8	NS	33.2	21.9	10	7.9	H
<b>Midwest</b>	<b>1.2</b>	<b>NS</b>	<b>241.5</b>	<b>18.5</b>	<b>48</b>	<b>1.3</b>	<b>H</b>	<b>62.4</b>	<b>12.5</b>	<b>251</b>	<b>3.9</b>	<b>H</b>
Gascoyne	1.1	NS	246.9	16.2	18	0.8	NS	47.5	12.8	27	5.2	H
Geraldton	0.8	NS	224.7	22.9	11	1.1	NS	71.1	10.8	162	3.2	H
Midwest	0.9	NS	260.5	10.4	8	0.8	NS	50.5	15.3	51	5.2	H
Murchison	1.2	NS	273.3	25.0	11	1.1	NS	70.8	15.7	11	3.9	NS
<b>Midlands</b>	<b>0.8</b>	<b>NS</b>	<b>195.7</b>	<b>20.5</b>	<b>10</b>	<b>1.0</b>	<b>NS</b>	<b>47.7</b>	<b>10.1</b>	<b>226</b>	<b>4.1</b>	<b>H</b>
Avon	2.2	-	703.5	14.8	4	1.3	H	55.4	7.7	86	12.7	-
Central Wheatbelt	0.9	-	145.4	14.1	2	1.3	NS	53.0	14.8	44	2.7	-
Western	1.1	-	308.4	31.7	3	1.0	NS	42.4	7.7	57	7.3	-
Eastern Wheatbelt	0.5	-	88.7	0.0	1	1.0	NS	41.7	15.3	39	2.1	-
<b>Goldfields</b>	<b>1.8</b>	<b>H</b>	<b>296.4</b>	<b>23.2</b>	<b>56</b>	<b>1.4</b>	<b>H</b>	<b>70.8</b>	<b>13.8</b>	<b>205</b>	<b>4.2</b>	<b>H</b>
Northern Goldfields	1.1	NS	311.0	24.6	54	1.1	NS	81.8	11.2	131	3.8	H
South East Coastal	0.3	-	328.3	0.0	2	1.0	NS	67.2	21.5	74	4.9	-
<b>Great Southern</b>	<b>0.7</b>	<b>NS</b>	<b>153.8</b>	<b>11.0</b>	<b>10</b>	<b>1.0</b>	<b>NS</b>	<b>46.8</b>	<b>9.9</b>	<b>316</b>	<b>3.3</b>	<b>NS</b>
Lower Grt Southern	0.6	-	131.5	2.3	2	0.9	NS	40.2	7.6	175	3.3	-
Central Grt Southern	1.6	-	343.9	10.4	4	1.3	NS	61.7	10.4	56	5.6	-
Upper Grt Southern	0.9	-	138.9	14.7	4	1.0	NS	46.1	10.8	85	3.0	-
<b>South West</b>	<b>0.5</b>	<b>L</b>	<b>70.8</b>	<b>24.5</b>	<b>7</b>	<b>1.0</b>	<b>NS</b>	<b>51.4</b>	<b>10.5</b>	<b>873</b>	<b>1.4</b>	<b>NS</b>
Peel	0.7	-	5.3	61.2	1	0.9	NS	46.3	8.2	287	0.1	-
Vasse–Leeuwin	1.0	-	110.3	20.6	1	0.9	NS	47.2	10.3	147	2.3	-
Bunbury	-	-	-	-	0	1.3	H	64.5	9.6	250	-	-
Warren–Blackwood	3.3	-	41.7	22.8	1	1.1	NS	58.2	15.5	87	0.7	-
Wellington	3.2	-	256.4	11.7	4	1.2	NS	59.3	15.0	72	4.3	-
Harvey–Yarloop	-	-	-	-	0	0.5	L	26.2	17.3	30	-	-
<b>North Metro</b>	<b>0.6</b>	<b>L</b>	<b>91.6</b>	<b>23.3</b>	<b>11</b>	<b>0.8</b>	<b>L</b>	<b>38.0</b>	<b>9.3</b>	<b>1653</b>	<b>2.4</b>	<b>NS</b>
<b>East Metro</b>	<b>0.7</b>	<b>L</b>	<b>109.2</b>	<b>32.5</b>	<b>24</b>	<b>1.3</b>	<b>H</b>	<b>62.1</b>	<b>9.3</b>	<b>2582</b>	<b>1.8</b>	<b>NS</b>
Bentley	1.4	NS	108.2	42.4	10	1.0	NS	63.2	7.3	1053	1.7	NS
Inner City	1.9	NS	463.6	19.7	5	1.3	H	164.0	8.6	654	2.8	H
Swan	0.7	NS	83.0	21.1	9	0.8	L	40.2	11.6	687	2.1	NS
Kalamunda	-	-	-	-	0	0.8	L	51.2	7.7	188	-	-
<b>South Metro</b>	<b>0.7</b>	<b>NS</b>	<b>107.0</b>	<b>28.9</b>	<b>22</b>	<b>0.9</b>	<b>L</b>	<b>43.9</b>	<b>9.2</b>	<b>1658</b>	<b>2.4</b>	<b>NS</b>
Fremantle	1.5	NS	146.6	28.2	10	1.0	NS	44.7	7.2	848	3.3	NS
Armadale–Kelmscott	0.8	NS	114.3	27.3	8	0.9	NS	40.3	10.6	492	2.8	NS
Rockingham–Kwinana	0.8	-	48.6	22.8	4	1.1	NS	47.2	10.9	318	1.0	-
<b>State</b>	<b>1.0</b>	<b>NS</b>	<b>175.8</b>	<b>23.4</b>	<b>334</b>	<b>1.0</b>	<b>NS</b>	<b>49.2</b>	<b>10.0</b>	<b>7826</b>	<b>3.6</b>	<b>H</b>

**Map 5:            Aboriginal deaths due to respiratory disease, 1990–1999**

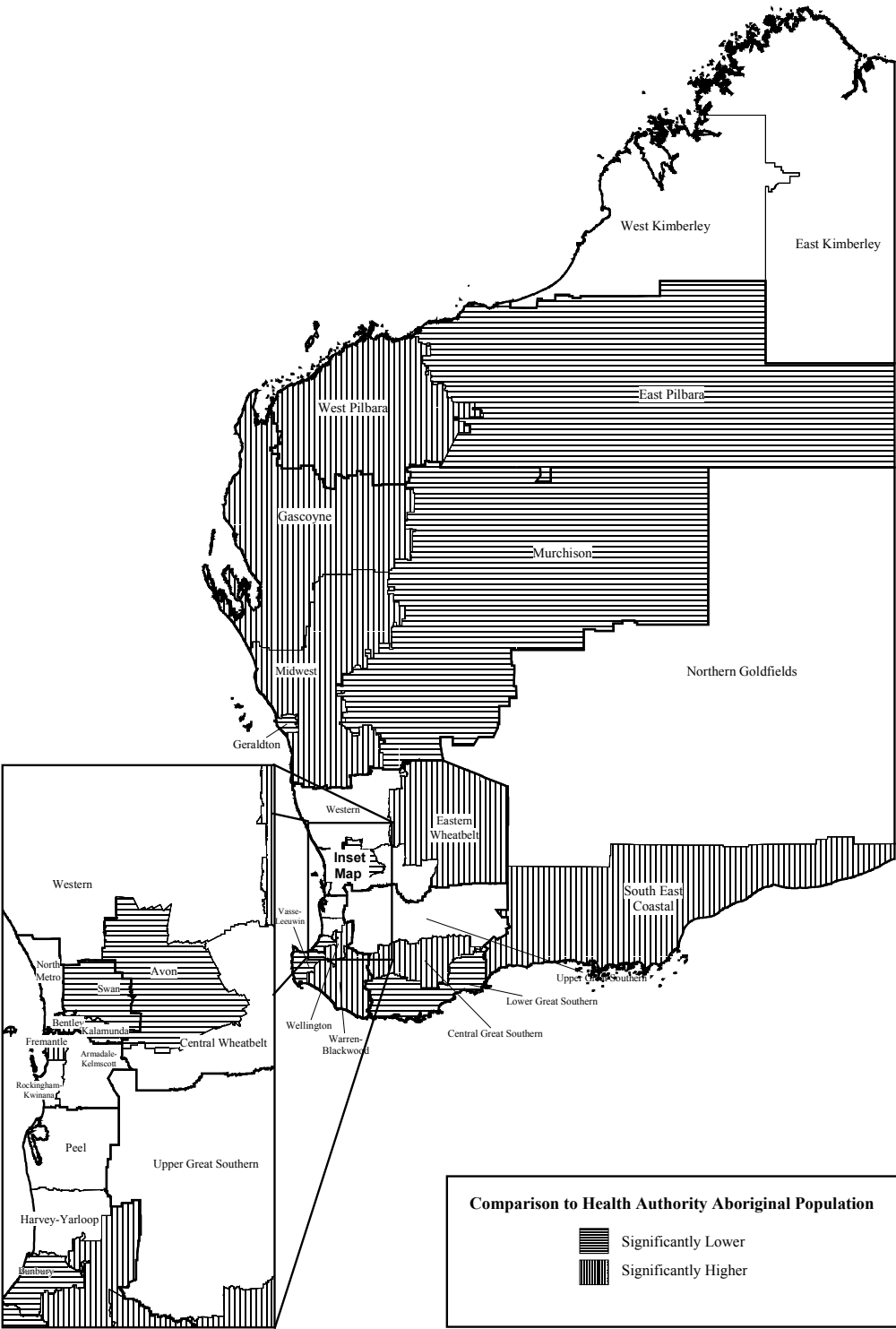


## Morbidity

**Table 7: Hospital-related statistics for respiratory disease by Health Service of residence (1994–2000)**

	Aboriginal				Non-Aboriginal				A/Non-A	
	SRR	SIGN	ASR	N	SRR	SIGN	ASR	N	RR	SIGN
<b>Kimberley</b>	<b>1.1</b>	<b>H</b>	<b>92.4</b>	<b>6803</b>	<b>1.3</b>	<b>H</b>	<b>21.0</b>	<b>1799</b>	<b>4.4</b>	<b>H</b>
East Kimberley	1.0	NS	101.8	2608	0.8	L	15.8	552	6.4	H
West Kimberley	1.0	NS	91.6	4195	1.1	H	24.8	1247	3.7	H
<b>Pilbara</b>	<b>1.6</b>	<b>H</b>	<b>133.9</b>	<b>4240</b>	<b>1.3</b>	<b>H</b>	<b>20.3</b>	<b>4365</b>	<b>6.6</b>	<b>H</b>
East Pilbara	0.8	L	108.4	2207	1.0	NS	20.3	2005	5.3	H
West Pilbara	1.4	H	206.3	2033	1.0	NS	20.5	2360	10.1	H
<b>Midwest</b>	<b>1.4</b>	<b>H</b>	<b>110.2</b>	<b>3884</b>	<b>1.5</b>	<b>H</b>	<b>23.4</b>	<b>8712</b>	<b>4.7</b>	<b>H</b>
Gascoyne	1.2	H	128.6	1295	0.9	L	20.6	1182	6.2	H
Geraldton	0.9	L	96.5	1261	1.1	H	26.4	5390	3.7	H
Midwest	1.1	H	122.8	781	0.9	L	20.5	1843	6.0	H
Murchison	0.8	L	95.7	547	0.6	L	14.7	297	6.5	H
<b>Midlands</b>	<b>0.9</b>	<b>L</b>	<b>78.0</b>	<b>818</b>	<b>1.4</b>	<b>H</b>	<b>21.8</b>	<b>8200</b>	<b>3.6</b>	<b>H</b>
Avon	0.8	L	55.6	230	0.8	L	18.2	1995	3.1	H
Central Wheatbelt	1.0	NS	78.0	137	1.0	NS	22.6	1133	3.5	H
Western	0.9	NS	66.9	224	0.8	L	18.7	2238	3.6	H
Eastern Wheatbelt	1.5	H	134.0	227	1.5	H	34.1	2834	3.9	H
<b>Goldfields</b>	<b>1.3</b>	<b>H</b>	<b>108.8</b>	<b>2969</b>	<b>1.4</b>	<b>H</b>	<b>22.4</b>	<b>7325</b>	<b>4.9</b>	<b>H</b>
Northern Goldfields	1.0	NS	108.8	2545	0.9	L	20.2	4284	5.4	H
South East Coastal	1.1	H	110.2	424	1.3	H	29.2	3041	3.8	H
<b>Great Southern</b>	<b>1.2</b>	<b>H</b>	<b>122.4</b>	<b>1379</b>	<b>1.3</b>	<b>H</b>	<b>20.7</b>	<b>10019</b>	<b>5.9</b>	<b>H</b>
Lower Great Southern	0.7	L	77.3	368	0.9	L	17.6	4962	4.4	H
Central Great Southern	1.5	H	140.7	584	1.3	H	26.3	1946	5.3	H
Upper Great Southern	0.9	NS	91.4	427	1.1	H	22.5	3111	4.1	H
<b>South West</b>	<b>0.8</b>	<b>L</b>	<b>92.5</b>	<b>1124</b>	<b>1.2</b>	<b>H</b>	<b>18.9</b>	<b>22851</b>	<b>4.9</b>	<b>H</b>
Peel	0.9	NS	166.8	283	0.9	L	16.5	6626	10.1	H
Vasse–Leeuwin	0.6	L	31.4	73	0.8	L	15.4	3132	2.0	H
Bunbury	0.9	L	40.6	333	1.3	H	24.3	6841	1.7	H
Warren–Blackwood	1.9	H	131.5	125	1.3	H	24.5	2914	5.4	H
Wellington	1.7	H	174.6	219	1.2	H	22.5	2053	7.8	H
Harvey–Yarloop	0.9	NS	48.0	91	0.6	L	12.2	1285	3.9	H
<b>North Metro</b>	<b>0.5</b>	<b>L</b>	<b>32.4</b>	<b>904</b>	<b>0.8</b>	<b>L</b>	<b>13.2</b>	<b>40632</b>	<b>2.5</b>	<b>H</b>
<b>East Metro</b>	<b>0.3</b>	<b>L</b>	<b>44.2</b>	<b>1706</b>	<b>0.6</b>	<b>L</b>	<b>14.6</b>	<b>26567</b>	<b>3.0</b>	<b>H</b>
Bentley	1.3	H	55.3	684	1.0	NS	14.9	12247	3.7	H
Inner City	1.4	H	75.7	190	1.3	H	19.5	7021	3.9	H
Swan	0.8	L	35.7	756	0.9	L	13.4	15408	2.7	H
Kalamunda	0.7	L	46.0	76	0.9	L	13.1	4138	3.5	H
<b>South Metro</b>	<b>0.7</b>	<b>L</b>	<b>34.9</b>	<b>1443</b>	<b>1.2</b>	<b>H</b>	<b>14.9</b>	<b>58050</b>	<b>2.3</b>	<b>H</b>
Fremantle	1.2	H	38.4	478	1.0	L	14.2	17918	2.7	H
Armadale–Kelmscott	0.9	NS	31.1	678	0.9	L	13.8	16562	2.3	H
Rockingham–Kwinana	0.9	NS	37.2	287	1.3	H	19.0	11323	2.0	H
<b>State</b>	<b>1.0</b>	<b>NS</b>	<b>82.7</b>	<b>25270</b>	<b>1.0</b>	<b>NS</b>	<b>15.8</b>	<b>188520</b>	<b>5.2</b>	<b>H</b>

**Map 6:            Aboriginal hospitalisations due to respiratory disease, 1994–2000**



## 5.6 Summary

### ***Mortality***

Respiratory diseases account for more than 10% of all Aboriginal deaths in WA. This contrasts with only 8% in the non-Aboriginal population. Overall, the rate of death due to this condition is 3.6 times higher in Aboriginals resulting in an average of 33 deaths per year.

Among the Aboriginal population, those residing in the city appeared to experience lower rates of respiratory-related deaths than those residing in the country although they tended to die at a slightly younger age. Due to the low number of deaths, interpretation of these results should be made with caution.

Male Aboriginals living in the Goldfields Health Authority had significantly higher mortality rates due to respiratory disease compared to the State Aboriginal rate. The Aboriginal residents of the South West Health Authority experienced significantly lower rates of respiratory-related deaths. Within the Health Services, however, the numbers of cases were too low to draw any significance. The North and East Metropolitan areas also experienced significantly low rates of Aboriginal respiratory related-deaths.

### ***Morbidity***

Hospitalisation due to respiratory diseases accounted for approximately 13% of all Aboriginal admissions with an annual average of 3,610 discharges. Aboriginal rates of respiratory hospitalisations were significantly higher than the non-Aboriginal rates across the State (5.2 times). Rates were generally considerably higher in the country areas than in the city for both populations but particularly for Aboriginal people. The disparity between Aboriginal and non-Aboriginal people was also greater in the country areas.

Among the Aboriginal population of the State, those residing in the Kimberley, Pilbara, Midwest, Goldfields and Great Southern Health Authorities had significantly higher rates of respiratory-related hospitalisations compared to the State. Those residing in the Midlands, South West, North, East and South Metropolitan areas experienced significantly lower rates compared to the State.

## 6 Injury and poisoning

Injury is a major contributor to premature mortality, morbidity and permanent disability in WA. Substantial differences exist in injury rates between segments of the WA population. Exposure to hazards as a result of differences in gender, age, place of residence, occupation, behaviour and race are an important factors in explaining injury differentials.

### 6.1 Risk factors

In terms of gender as a risk factor for injury, males are more likely to be involved in at-risk behaviour than females. More males than females tend to consume alcohol at harmful levels, use illicit drugs, be employed in hazardous occupations and engage in risky behaviour, in sport or while driving.<sup>24</sup>

Injury causation varies with age. Typically, drowning is more frequent among preschool children, transport injury in early childhood and suicide in adolescence. Occupational injury is understandably seen through much of adult life and falls occur primarily in the elderly.

A greater risk of death from road accidents exists for residents of rural and remote areas compared with residents of metropolitan areas. Remote area residents are exposed to hazards associated with long distance, high-speed motor travel and travel on unsurfaced roads. Remoteness may also result in worse outcomes following injury due to slower retrieval and later initiation of treatment than a comparable injury in an urban setting. In remote areas of WA, the chances of dying from an injury prior to reaching hospital have been estimated to be twice those in the metropolitan area.<sup>25</sup>

### 6.2 Impact on Aboriginal people

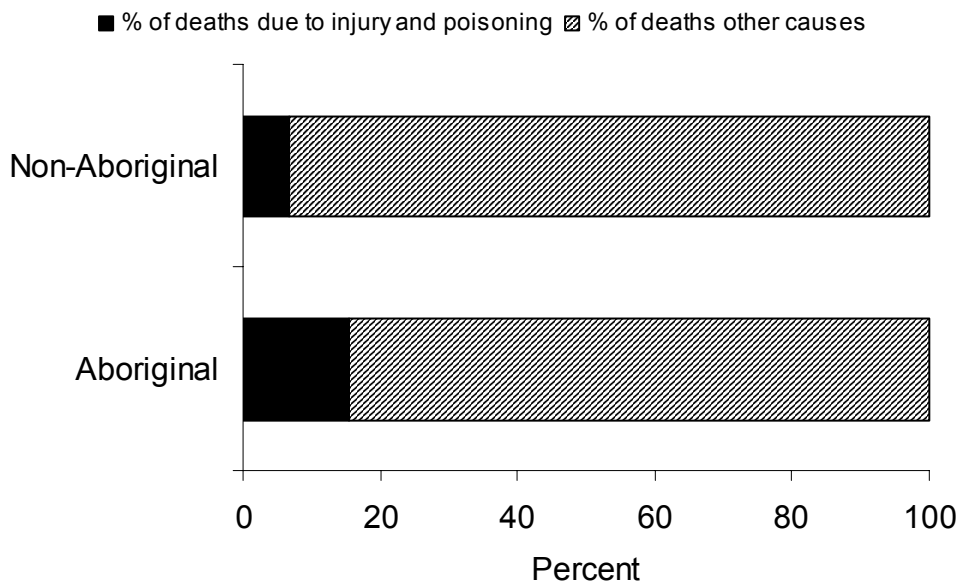
Injury and poisoning is one of the leading causes of death among Aboriginal people in WA. Aboriginal people have significantly higher injury rates compared to non-Aboriginal people with a mortality rate 3.2 times higher. Aboriginal people have significantly higher rates of interpersonal violence, transport, drowning and poisoning fatalities.<sup>26</sup> Interpersonal violence, in particular, resulted in 13–16 times the non-Aboriginal mortality rates (females and males, respectively). Aboriginal females have a higher proportion of non-sexual violent crimes perpetrated against them when compared with non-Aboriginal females.<sup>26</sup> The following overview examines the WA deaths and hospitalisations due to injury among Aboriginal people.

### 6.3 State overview

#### **Mortality**

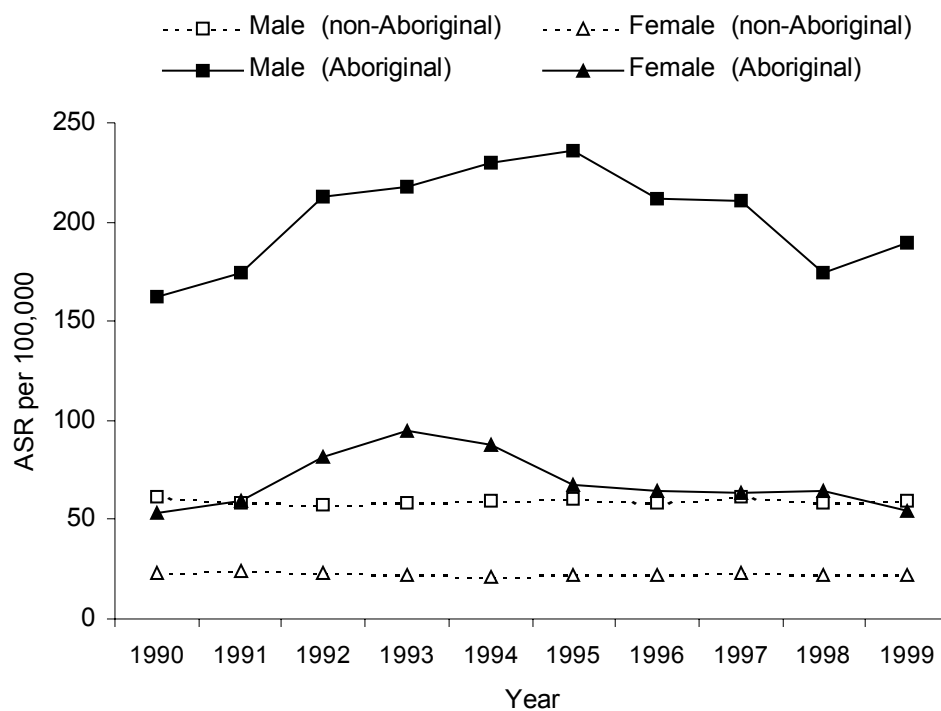
- Injury and poisoning caused 15.4% of all Aboriginal deaths which translated to an average of 50 Aboriginal deaths per year between 1990 and 1999 inclusive (non-Aboriginals 6.7%; 653 deaths) (Figure 25).
- Of these deaths, the percentage of males was 72.9% and 71.2% for Aboriginals and non-Aboriginals respectively.
- Aboriginal people accounted for 2.7% of the total State population but for 7.2% of all injury and poisoning-related deaths.
- Compared to the non-Aboriginal population, the rate of death was significantly higher for both Aboriginal males (3.5 times) and females (3.1 times).
- Despite a slight improvement in annual mortality rates due to injury and poisoning, trend analysis failed to show any statistical change for Aboriginal and non-Aboriginal people over the 10-year period (Figure 26).
- Examination of the aggregated age-specific mortality rates showed that Aboriginal rates were usually higher than their respective non-Aboriginal rates for all ages. Male rates were higher than the female rates for both Aboriginal and non-Aboriginal people for all ages. For Aboriginals older than 45 years, the male rate was 3.5 times greater than the non-Aboriginal population while the female rate was 1.9 times greater (Figure 27).

**Figure 25: Percentage of all deaths for residents of the State (1990–1999)**

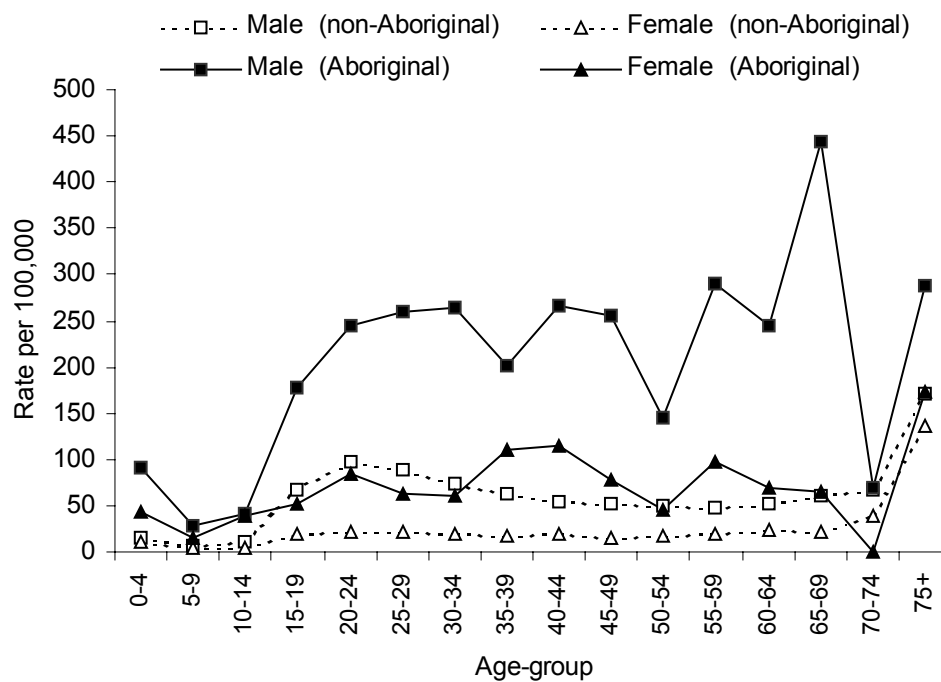




**Figure 26: Age-standardised mortality rates – injury and poisoning**



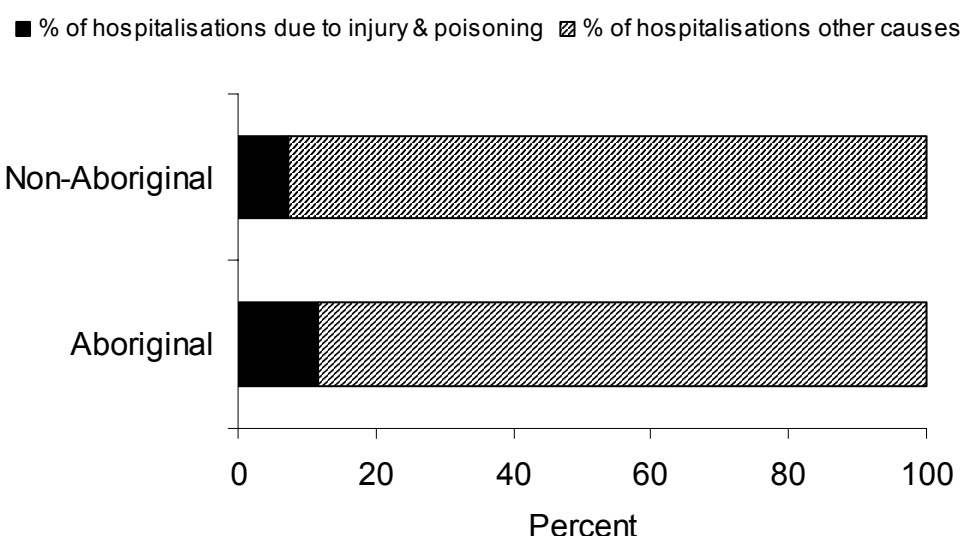
**Figure 27: Age-specific mortality rates – injury and poisoning (1990–1999)**



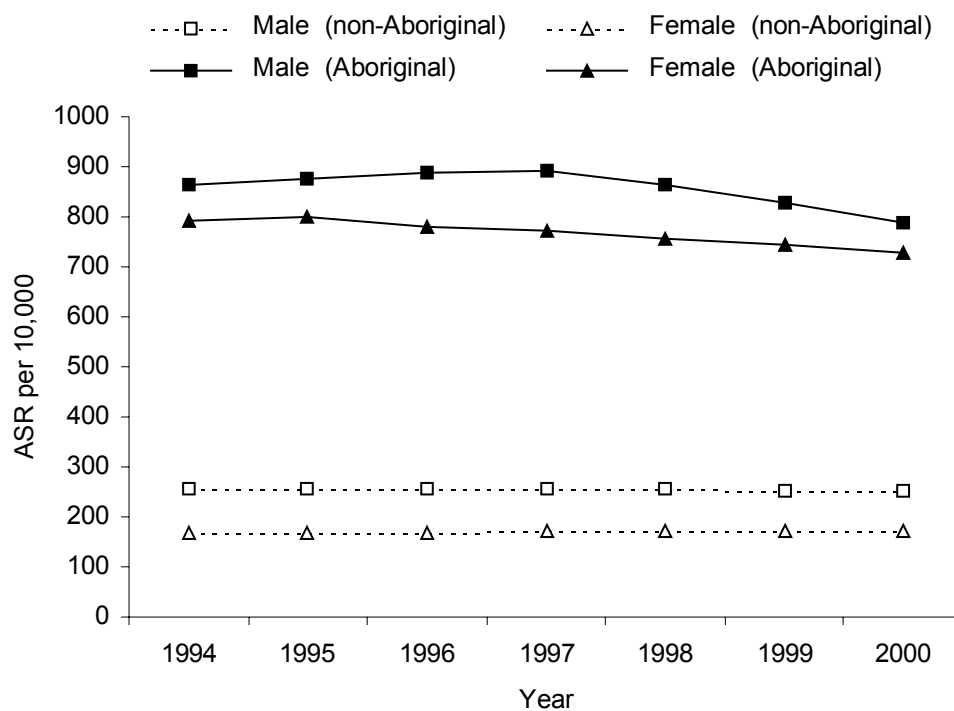
## Morbidity

- For the period 1994–2000, injury and poisoning conditions accounted for 11.5% and 7.2% of all hospitalisations in Aboriginal and non-Aboriginal people respectively. This represented an average number of admissions of 3,289 Aboriginals and 33,456 non-Aboriginals per year (Figure 28).
- Of these hospitalisations, the percentage of males was 51.3% and 59.6% for Aboriginals and non-Aboriginals respectively.
- Aboriginal people accounted for 2.7% of the total State population but for 9.0% of all injury and poisoning conditions hospitalisations.
- Compared to the non-Aboriginal population, the male and female rates of hospitalisation were 3.2 times and 4.6 times higher in Aboriginals.
- Trend analysis of annual mortality rates showed a significant decrease for both Aboriginal males (1.5%) and females (2.2%) over the six-year study period. For non-Aboriginals, a significant decrease was also seen for males (0.5%) but not for females (Figure 29).
- Analysis of the age-specific rates showed that Aboriginals were hospitalised at considerably higher rates than non-Aboriginals. While children aged 0–4 years had high rates of hospitalisation, these decreased with age until 15–19 years when the rates increased rapidly. For Aboriginal males older than 45 years, the rate was 2.9 times greater than the non-Aboriginal population. However, for Aboriginal males aged from 15–44 years, the rate was four times greater than non-Aboriginals. Very similar rates were observed in females (Figure 30).

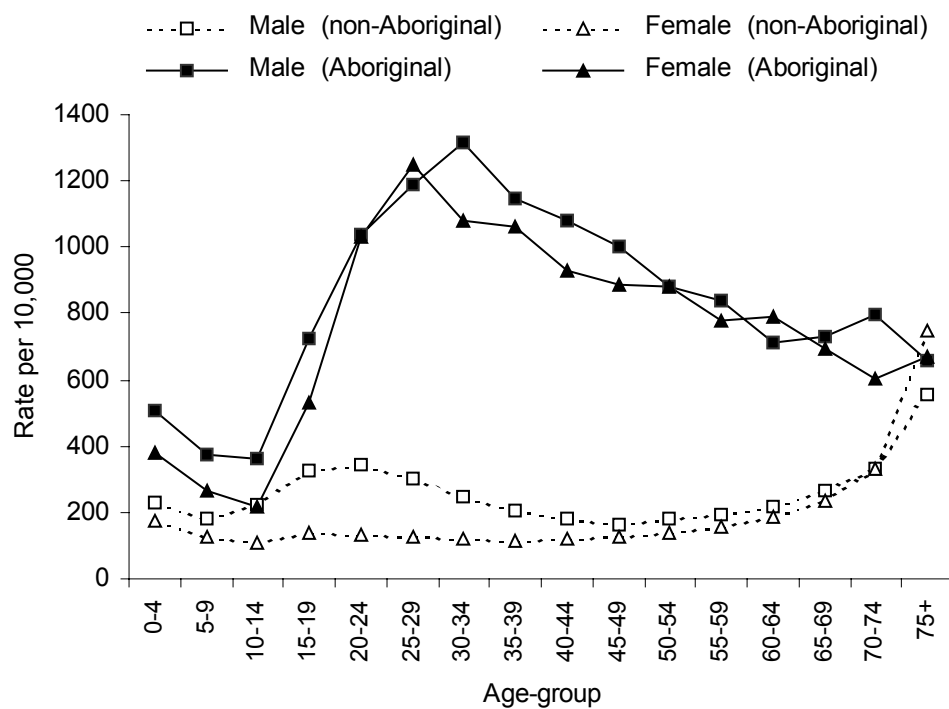
**Figure 28: Percentage of all hospitalisations for residents of the State (1994–2000)**



**Figure 29: Age-standardised hospitalisation rate – injury and poisoning**



**Figure 30: Age-specific hospitalisation rate – injury and poisoning (1994–2000)**

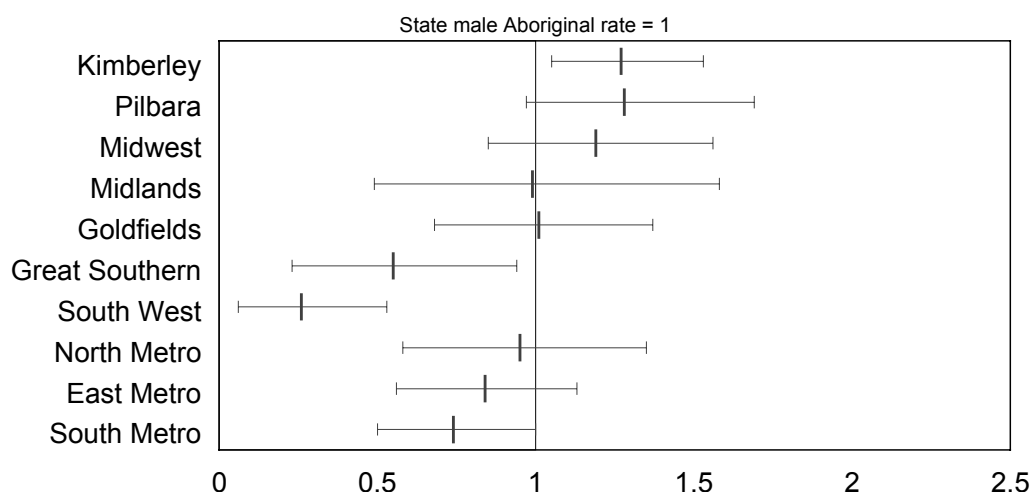


## 6.4 Injury and poisoning in the Health Authorities

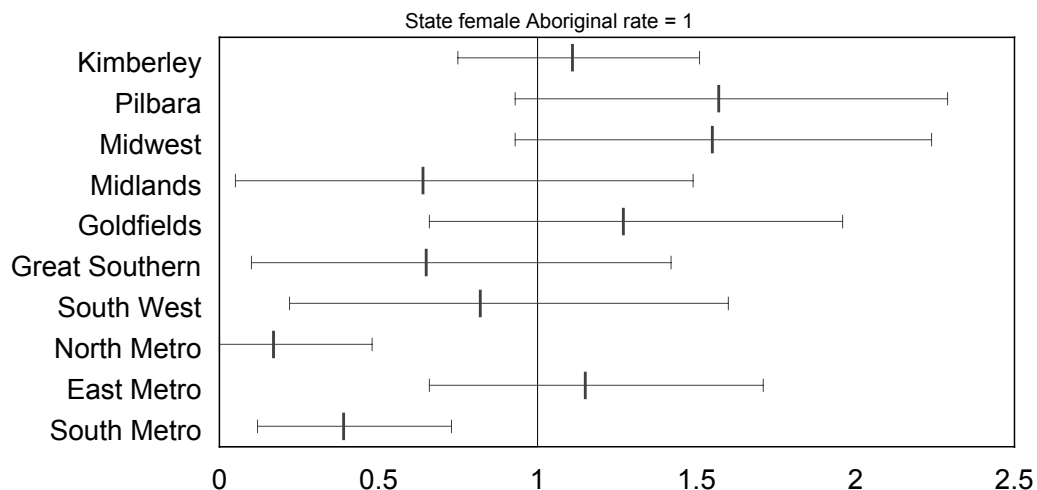
### Mortality

**Figure 31: Aboriginal standardised mortality rate ratios by Health Authority of residence – injury and poisoning (1990–1999)**

#### Males



#### Females

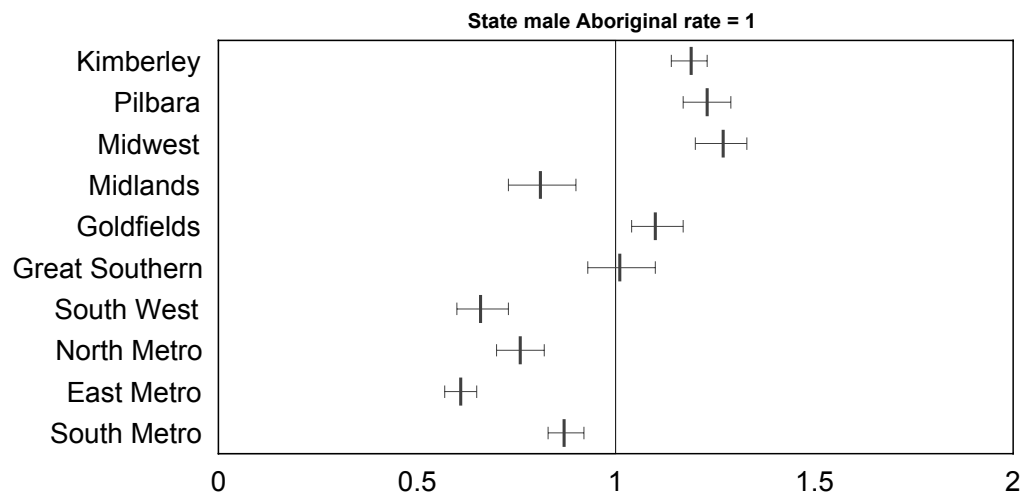


- Aboriginal males in the Great Southern and South West Health Authorities showed significantly lower rates of deaths due to injury and poisoning while those residing in the Kimberley showed a significantly higher rate compared to the State.
- Aboriginal females in the North and South Metropolitan Health Authorities showed significantly lower death rates in comparison to the State over the 10-year period. Female Aboriginal death rates in the Pilbara and Midwest Authorities were high but this was not statistically significant.

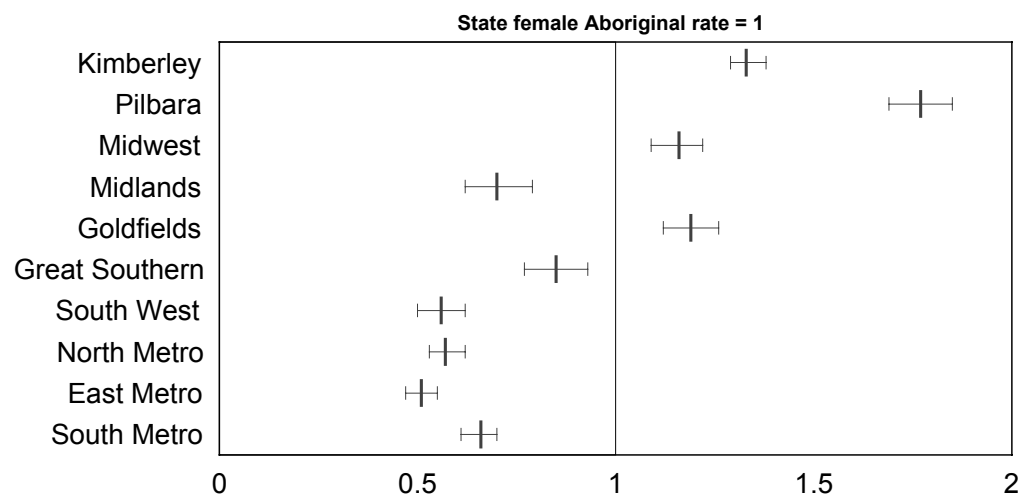
## Morbidity

**Figure 32: Aboriginal standardised hospital rate ratios by Health Authority of residence – injury and poisoning (1994–2000)**

### Males



### Females



- Aboriginal males in the Kimberley, Pilbara, Midwest and Goldfields Health Authorities experienced significantly higher rates of hospitalisation due to injury and poisoning than the State, whereas those in the Midlands, South West, North, East and South Metropolitan areas experienced significantly lower rates.
- The female Aboriginal population in the Kimberley, Pilbara, Midwest and Goldfields Health Authorities experienced significantly higher rates of hospitalisation due to injury and poisoning while those in the Midlands, Great Southern, South West, North, East and South Metropolitan Health Authorities experienced significantly lower rates compared to the State.

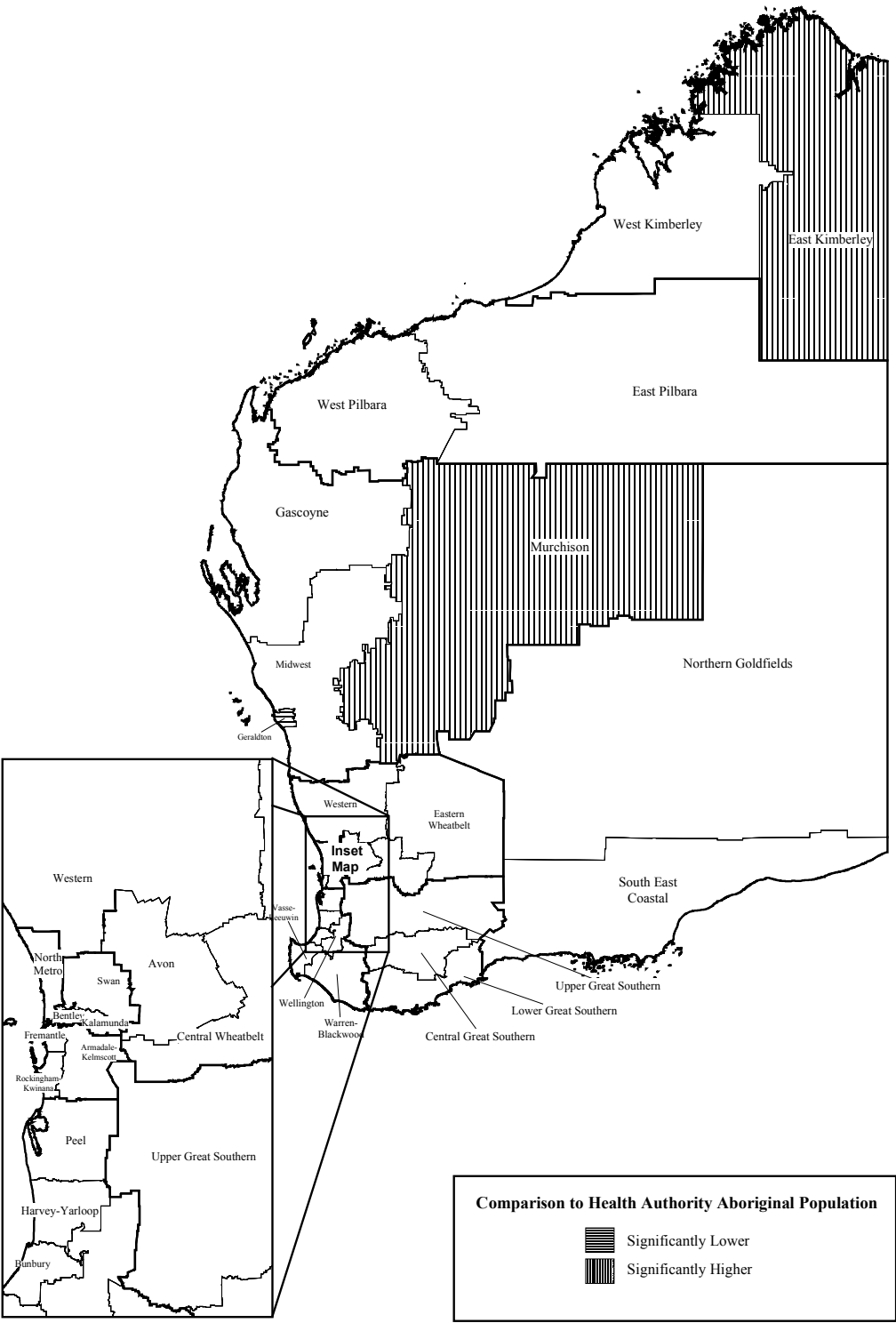
## 6.5 Injury and poisoning in the Health Services

### Mortality

**Table 8: Mortality-related statistics for injury and poisoning by Health Service of residence (1990–1999)**

	Aboriginal					Non-Aboriginal					A/Non-A	
	SMR	SIGN	ASR	PYLL	N	SMR	SIGN	ASR	PYLL	N	RR	SIGN
<b>Kimberley</b>	<b>1.2</b>	<b>H</b>	<b>145.0</b>	<b>36.9</b>	<b>147</b>	<b>1.4</b>	<b>H</b>	<b>56.3</b>	<b>31.5</b>	<b>70</b>	<b>2.6</b>	<b>H</b>
East Kimberley	1.3	H	170.6	36.6	69	1.0	NS	47.0	33.0	24	3.6	H
West Kimberley	0.8	NS	130.3	32.9	78	1.0	NS	65.1	30.7	46	2.0	H
<b>Pilbara</b>	<b>1.4</b>	<b>H</b>	<b>191.0</b>	<b>31.8</b>	<b>75</b>	<b>1.0</b>	<b>NS</b>	<b>38.8</b>	<b>38.3</b>	<b>127</b>	<b>4.9</b>	<b>H</b>
East Pilbara	1.1	NS	208.0	30.7	55	1.2	NS	46.7	38.0	73	4.5	H
West Pilbara	0.8	NS	195.6	27.4	20	0.8	NS	31.4	38.7	54	6.2	H
<b>Midwest</b>	<b>1.3</b>	<b>H</b>	<b>165.8</b>	<b>34.8</b>	<b>69</b>	<b>1.1</b>	<b>H</b>	<b>43.9</b>	<b>33.2</b>	<b>232</b>	<b>3.8</b>	<b>H</b>
Gascoyne	1.1	NS	188.6	25.6	21	1.3	NS	53.5	29.8	46	3.5	H
Geraldton	0.5	L	68.8	39.0	13	1.0	NS	43.2	34.5	120	1.6	NS
Midwest	1.0	NS	208.4	35.5	13	0.9	NS	41.7	32.3	50	5.0	H
Murchison	1.8	H	293.6	35.0	22	0.9	NS	39.1	35.9	16	7.5	H
<b>Midlands</b>	<b>0.9</b>	<b>NS</b>	<b>110.0</b>	<b>39.5</b>	<b>17</b>	<b>1.4</b>	<b>H</b>	<b>56.1</b>	<b>35.7</b>	<b>273</b>	<b>2.0</b>	<b>NS</b>
Avon	1.1	NS	166.8	29.2	7	1.3	NS	68.8	37.8	97	2.4	NS
Central Wheatbelt	0.8	-	90.8	31.5	2	1.1	NS	58.2	35.5	38	1.6	-
Western	0.8	-	70.7	39.9	4	1.1	NS	56.0	34.4	85	1.3	-
Eastern Wheatbelt	1.2	-	84.6	50.7	4	0.9	NS	46.6	34.2	53	1.8	-
<b>Goldfields</b>	<b>1.1</b>	<b>NS</b>	<b>142.7</b>	<b>33.0</b>	<b>52</b>	<b>1.5</b>	<b>H</b>	<b>58.0</b>	<b>34.1</b>	<b>284</b>	<b>2.5</b>	<b>H</b>
Northern Goldfields	1.0	NS	149.8	31.0	47	1.0	NS	59.7	34.5	210	2.5	H
South East Coastal	0.8	NS	109.8	33.9	5	1.0	NS	55.1	32.8	74	2.0	NS
<b>Great Southern</b>	<b>0.6</b>	<b>L</b>	<b>101.0</b>	<b>37.4</b>	<b>14</b>	<b>1.3</b>	<b>H</b>	<b>52.9</b>	<b>36.7</b>	<b>328</b>	<b>1.9</b>	<b>NS</b>
Lower Great Southern	0.4	-	27.2	29.1	2	1.0	NS	49.7	35.0	181	0.5	-
Central Great Southern	1.0	-	62.1	34.1	4	0.9	NS	44.2	38.6	44	1.4	-
Upper Great Southern	1.6	NS	173.5	38.2	8	1.1	NS	56.8	38.5	103	3.1	NS
<b>South West</b>	<b>0.4</b>	<b>L</b>	<b>90.2</b>	<b>30.1</b>	<b>11</b>	<b>1.2</b>	<b>H</b>	<b>47.7</b>	<b>34.7</b>	<b>719</b>	<b>1.9</b>	<b>NS</b>
Peel	1.4	-	188.9	20.8	4	1.1	NS	51.0	33.6	233	3.7	-
Vasse–Leeuwin	2.0	-	110.6	25.9	2	1.1	NS	53.5	35.6	130	2.1	-
Bunbury	0.6	-	35.8	24.1	2	0.8	L	39.1	34.4	151	0.9	-
Warren–Blackwood	-	-	-	-	0	1.3	H	61.5	34.8	96	-	-
Wellington	0.6	-	49.6	45.1	2	1.3	H	63.4	37.1	80	0.8	-
Harvey–Yarloop	0.8	-	36.3	21.1	1	0.5	L	21.5	33.4	29	1.7	-
<b>North Metro</b>	<b>0.7</b>	<b>L</b>	<b>74.9</b>	<b>37.6</b>	<b>27</b>	<b>0.8</b>	<b>L</b>	<b>32.3</b>	<b>33.3</b>	<b>1425</b>	<b>2.3</b>	<b>H</b>
<b>East Metro</b>	<b>0.9</b>	<b>NS</b>	<b>121.6</b>	<b>38.5</b>	<b>55</b>	<b>1.1</b>	<b>H</b>	<b>41.8</b>	<b>33.0</b>	<b>1637</b>	<b>2.9</b>	<b>H</b>
Bentley	1.3	NS	188.3	37.2	22	1.1	NS	44.6	33.0	587	4.2	H
Inner City	1.3	NS	466.6	29.4	7	1.2	H	108.3	29.0	322	4.3	H
Swan	0.8	NS	68.0	37.8	23	0.9	L	30.5	33.3	565	2.2	H
Kalamunda	0.8	-	99.9	30.7	3	0.9	NS	36.8	35.3	163	2.7	-
<b>South Metro</b>	<b>0.6</b>	<b>L</b>	<b>57.1</b>	<b>44.5</b>	<b>42</b>	<b>0.9</b>	<b>L</b>	<b>34.7</b>	<b>33.9</b>	<b>1443</b>	<b>1.6</b>	<b>H</b>
Fremantle	0.8	NS	44.9	39.8	9	1.0	NS	34.8	32.9	635	1.3	NS
Armadale–Kelmscott	1.4	NS	80.0	42.0	29	0.9	NS	31.6	34.9	516	2.5	H
Rockingham–Kwinana	0.4	-	20.9	48.6	4	1.2	H	41.3	34.1	292	0.5	-
<b>State</b>	<b>1.0</b>	<b>NS</b>	<b>125.8</b>	<b>34.4</b>	<b>509</b>	<b>1.0</b>	<b>NS</b>	<b>39.4</b>	<b>34.0</b>	<b>6538</b>	<b>3.2</b>	<b>H</b>

**Map 7:            Aboriginal deaths due to injury and poisoning, 1990–1999**



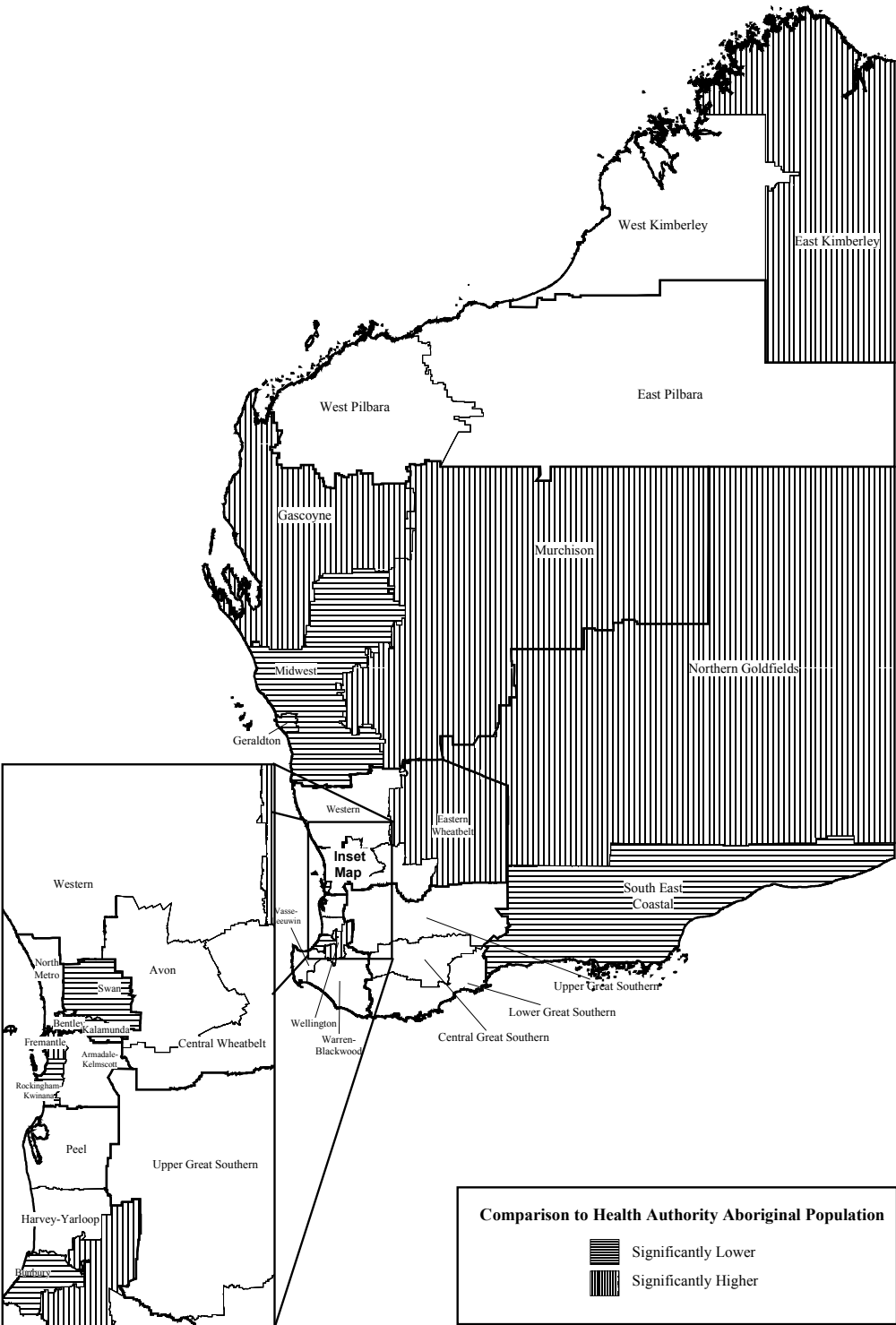
## Morbidity

**Table 9: Hospital-related statistics for injury and poisoning by Health Service of residence (1994–2000)**

	Aboriginal				Non-Aboriginal				A/Non-A	
	SRR	SIGN	ASR	N	SRR	SIGN	ASR	N	RR	SIGN
<b>Kimberley</b>	<b>1.3</b>	<b>H</b>	<b>86.7</b>	<b>6577</b>	<b>1.5</b>	<b>H</b>	<b>26.9</b>	<b>2812</b>	<b>3.2</b>	<b>H</b>
East Kimberley	1.1	H	96.8	2592	0.9	L	22.5	895	4.3	H
West Kimberley	1.0	NS	81.9	3985	1.1	H	30.0	1917	2.7	H
<b>Pilbara</b>	<b>1.5</b>	<b>H</b>	<b>104.9</b>	<b>3561</b>	<b>1.3</b>	<b>H</b>	<b>23.0</b>	<b>5591</b>	<b>4.6</b>	<b>H</b>
East Pilbara	1.0	NS	99.4	2190	1.0	NS	22.7	2588	4.4	H
West Pilbara	1.1	NS	118.4	1371	1.0	NS	23.3	3003	5.1	H
<b>Midwest</b>	<b>1.2</b>	<b>H</b>	<b>85.1</b>	<b>2926</b>	<b>1.3</b>	<b>H</b>	<b>25.6</b>	<b>9511</b>	<b>3.3</b>	<b>H</b>
Gascoyne	1.3	H	106.2	1037	1.0	NS	24.4	1446	4.4	H
Geraldton	0.8	L	70.6	868	1.0	NS	26.1	5219	2.7	H
Midwest	0.8	L	71.3	430	1.1	NS	27.6	2353	2.6	H
Murchison	1.1	H	98.3	591	0.8	L	19.9	493	4.9	H
<b>Midlands</b>	<b>0.8</b>	<b>L</b>	<b>52.3</b>	<b>625</b>	<b>1.3</b>	<b>H</b>	<b>25.0</b>	<b>8928</b>	<b>2.1</b>	<b>H</b>
Avon	0.9	NS	47.5	197	0.9	L	21.7	2331	2.2	H
Central Wheatbelt	0.9	NS	53.3	85	1.1	H	29.3	1346	1.8	H
Western	1.0	NS	53.5	190	0.9	L	23.3	2640	2.3	H
Eastern Wheatbelt	1.3	H	68.7	153	1.3	H	32.9	2611	2.1	H
<b>Goldfields</b>	<b>1.1</b>	<b>H</b>	<b>81.4</b>	<b>2440</b>	<b>1.4</b>	<b>H</b>	<b>26.3</b>	<b>9287</b>	<b>3.1</b>	<b>H</b>
Northern Goldfields	1.1	H	87.0	2259	1.0	NS	26.3	6510	3.3	H
South East Coastal	0.6	L	43.5	181	1.1	H	27.7	2777	1.6	H
<b>Great Southern</b>	<b>0.9</b>	<b>NS</b>	<b>64.0</b>	<b>1014</b>	<b>1.3</b>	<b>H</b>	<b>25.7</b>	<b>11829</b>	<b>2.5</b>	<b>H</b>
Lower Great Southern	0.9	NS	56.8	337	0.9	L	23.4	6299	2.4	H
Central Great Southern	1.0	NS	62.9	300	1.2	H	28.8	2019	2.2	H
Upper Great Southern	1.1	NS	64.6	377	1.1	H	26.8	3511	2.4	H
<b>South West</b>	<b>0.6</b>	<b>L</b>	<b>45.5</b>	<b>758</b>	<b>1.1</b>	<b>H</b>	<b>21.8</b>	<b>25224</b>	<b>2.1</b>	<b>H</b>
Peel	1.0	NS	45.7	200	0.9	L	19.8	7451	2.3	H
Vasse–Leeuwin	0.8	NS	35.1	53	1.0	L	21.0	3977	1.7	H
Bunbury	0.8	L	28.7	211	1.2	H	25.1	7099	1.1	NS
Warren–Blackwood	0.8	NS	31.2	44	1.3	H	28.8	3298	1.1	NS
Wellington	2.0	H	102.4	178	1.2	H	25.8	2271	4.0	H
Harvey–Yarloop	1.0	NS	40.2	72	0.5	L	10.9	1128	3.7	H
<b>North Metro</b>	<b>0.7</b>	<b>L</b>	<b>44.2</b>	<b>1233</b>	<b>0.9</b>	<b>L</b>	<b>17.0</b>	<b>54248</b>	<b>2.6</b>	<b>H</b>
<b>East Metro</b>	<b>0.6</b>	<b>L</b>	<b>60.0</b>	<b>2354</b>	<b>0.7</b>	<b>L</b>	<b>19.0</b>	<b>35224</b>	<b>3.2</b>	<b>H</b>
Bentley	1.1	H	62.0	817	1.0	NS	19.3	16720	3.2	H
Inner City	1.8	H	163.0	380	1.4	H	27.5	10618	5.9	H
Swan	0.9	L	48.6	1054	0.9	L	16.5	19040	2.9	H
Kalamunda	0.6	L	56.8	103	0.9	L	17.1	5566	3.3	H
<b>South Metro</b>	<b>0.8</b>	<b>L</b>	<b>33.8</b>	<b>1522</b>	<b>1.2</b>	<b>H</b>	<b>17.7</b>	<b>71540</b>	<b>1.9</b>	<b>H</b>
Fremantle	1.2	H	39.3	506	1.0	NS	17.4	22853	2.3	H
Armadale–Kelmescott	1.0	NS	33.9	790	1.0	L	17.2	21034	2.0	H
Rockingham–Kwinana	0.7	L	30.6	226	1.1	H	19.3	10933	1.6	H
<b>State</b>	<b>1.0</b>	<b>NS</b>	<b>69.6</b>	<b>23010</b>	<b>1.0</b>	<b>NS</b>	<b>19.4</b>	<b>234194</b>	<b>3.6</b>	<b>H</b>



**Map 8:            Aboriginal hospitalisations due to injury and poisoning, 1994–2000**



## 6.6 Summary

### ***Mortality***

Injury and poisoning causes more than 15% of Aboriginal deaths in WA. Mortality rates are 3.2 times that of the non-Aboriginal population and significantly higher for both males and females. On average, 50 Aboriginal deaths occur each year with almost three-quarters involving males.

For both Aboriginal and non-Aboriginal people, the rates tended to be higher in the country than in the city. Despite this, the number of potential years of life lost was similar between the country and metropolitan areas, and between Aboriginal and non-Aboriginal people.

Aboriginal people living in the Kimberley, Pilbara or Midwest Health Authorities had higher rates of death due to injury and poisoning than expected based on the State rate. Conversely, those living in the Great Southern, South West, North and South Metro Health Authorities had lower mortality rates than expected.

While the Pilbara population had significantly higher rates than the State, there was little variation between the East and West Pilbara Health Services for the Aboriginal population. The Pilbara was also the area of greatest disparity between Aboriginal and non-Aboriginal people with a rate ratio of 4.9.

While the South Metropolitan Aboriginal population experienced significantly lower rates than the State, the person-years of life lost per death was quite high. That is, although there were comparatively fewer deaths in this area, those who died did so at a younger age.

### ***Morbidity***

Hospitalisation due to injury and poisoning account for approximately 12% of Aboriginal admissions. Unlike mortality rates, which are higher for Aboriginal males, hospitalisation rates are higher for Aboriginal females. Overall, rates of hospitalisation in Aboriginal people are 3.6 times that of non-Aboriginals.

Admission rates were higher in the country than in the city for both populations, but to a greater extent for Aboriginal people.

Within the Aboriginal population of the State, those residing in the Kimberley, Pilbara, Midwest and Goldfields Authorities experienced significantly higher rates of injury and poisoning-related hospitalisations compared to the State. Those residing in the Midlands, South West, North, East and South Metropolitan areas experienced significantly lower rates compared to the State.

## 7 Diabetes

Diabetes is a complex disorder characterised by an inability to metabolise carbohydrate, fat and protein, primarily due to a relative or complete lack of insulin.<sup>27</sup> There are various forms of diabetes. The two major categories are Type I (insulin dependent diabetes mellitus) and Type II (non-insulin dependent diabetes mellitus). Diabetes has major implications for quality of life with long-term effects that include an increased risk of heart attack, stroke, impotence, blindness, kidney problems, lower limb amputation and reduced life expectancy.<sup>22</sup>

It should be noted that diabetes often contributes to other chronic conditions (in particular, ischaemic heart disease and renal disease). People who died from or were hospitalised from other chronic diseases (which may have been caused by or precipitated by diabetes) are not included in this data. Only those with the primary diagnosis of 'diabetes' or the cause of death as 'diabetes' have been included.

### 7.1 Risk factors

There is evidence to suggest that there is a genetic predisposition for Type I diabetes.<sup>28</sup> Among environmental factors associated with the onset of Type I diabetes, a previous viral infection has been demonstrated to have the strongest aetiological association.<sup>29</sup>

The cause of Type II diabetes also has a genetic basis but the specific genes involved are unknown. Onset of diabetes may be triggered by obesity in individuals who are genetically predisposed to diabetes.<sup>29</sup> The risk of onset of Type II diabetes is related to both the duration and degree of obesity. Other risk factors influencing onset are sedentary lifestyle, dietary factors, stress, urbanisation and socio-economic factors.<sup>30</sup>

Complications from diabetes can severely impede quality of life and lead to premature death. Risk factors associated with the developing of complications include uncontrolled glucose levels, the duration of the disease, age, genetic predisposition, obesity, high blood pressure, high cholesterol and cigarette smoking. Through modification of lifestyle, risk levels can be reduced which, in turn, can delay the onset or slow the progression of the complications associated with diabetes.<sup>21</sup>

### 7.2 Impact on Aboriginal people

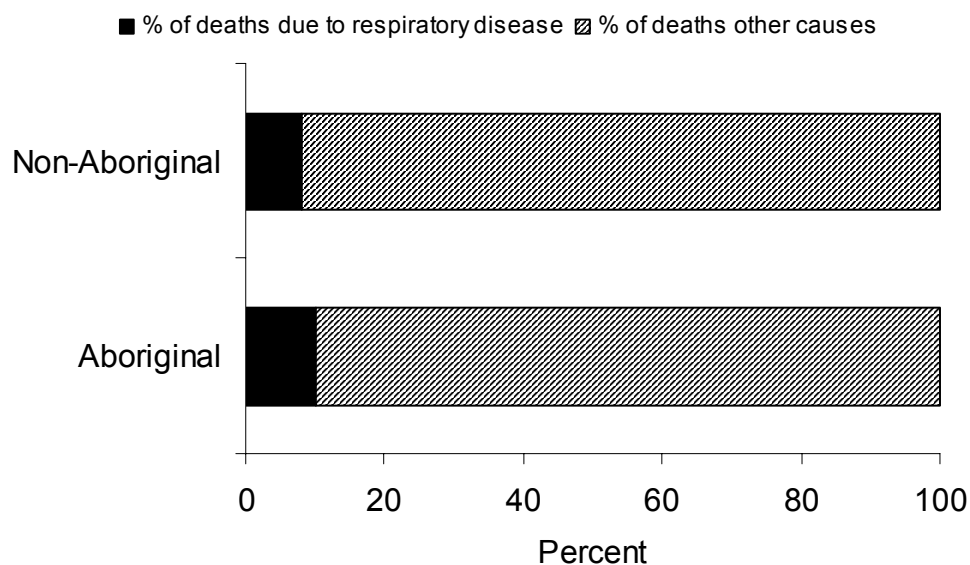
Aboriginal and Torres Strait Islanders have one of the highest rates of diabetes in the world. The underlying metabolic characteristic predisposing people to increased risk of diabetes (as well as obesity and coronary heart disease) is insulin resistance. The traditional hunter-gatherer lifestyle of Aboriginal people was characterised by high physical activity and low-energy density diet. This probably promoted the maintenance of a very lean body weight and minimised insulin resistance. However, the change to energy-dense diets and reduced physical activity which now characterise the lifestyles of most Aboriginal people may, when combined with a predisposition for insulin resistance, result in higher rates of diabetes. The following overview examines diabetes mortality and hospitalisation among Aboriginal and Torres Strait Islanders in WA.

### 7.3 State overview

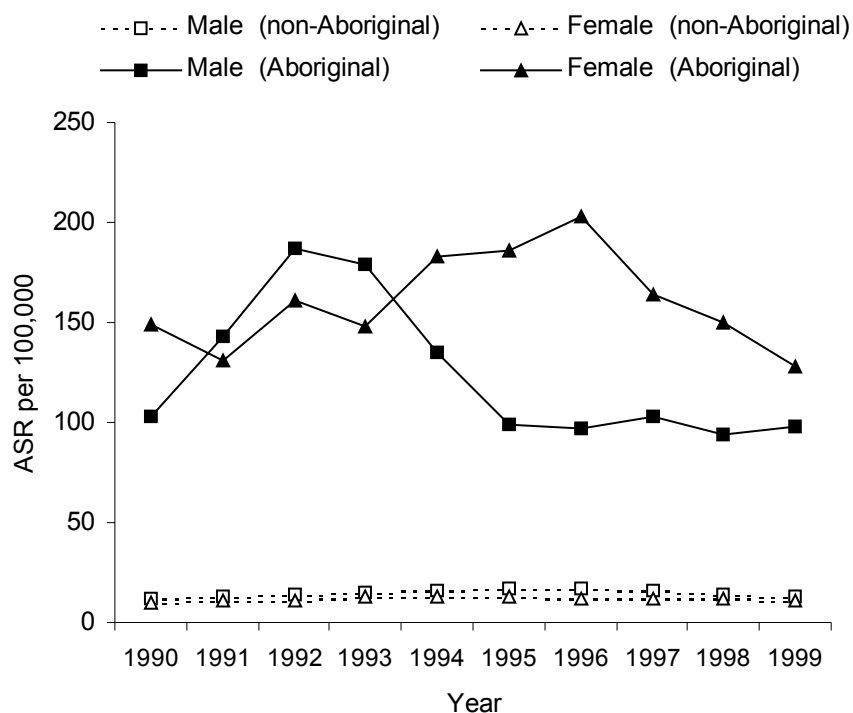
#### **Mortality**

- Death due to diabetes accounts for more than 7% of the Aboriginal total. An average of 24 deaths per year occurred during the 1990–1999 period (non-Aboriginals: 2.1%; 202 deaths) (Figure 33).
- The percentages of males were 39.6% and 48.8% for Aboriginal people and non-Aboriginal people respectively.
- Aboriginal people accounted for 2.7% of the total State population but 10.6% of all diabetes deaths.
- Compared to the non-Aboriginal population, the rate of death was significantly higher for both the Aboriginal male (8.2 times) and female (14.2 times) population.
- Trend analysis revealed no significant change in diabetes-related mortality rates over the period 1990–99 even though there appeared to be some reduction in rates for Aboriginal females during the past three years (Figure 34).
- Age-specific analysis showed a marked increase in mortality due to diabetes with increasing age in the Aboriginal population. This was much more marked than that seen in non-Aboriginals. For Aboriginals over the age of 45 years, the diabetes mortality rate was 7.9 times and 13.3 times higher than non-Aboriginal males and females respectively (Figure 35).

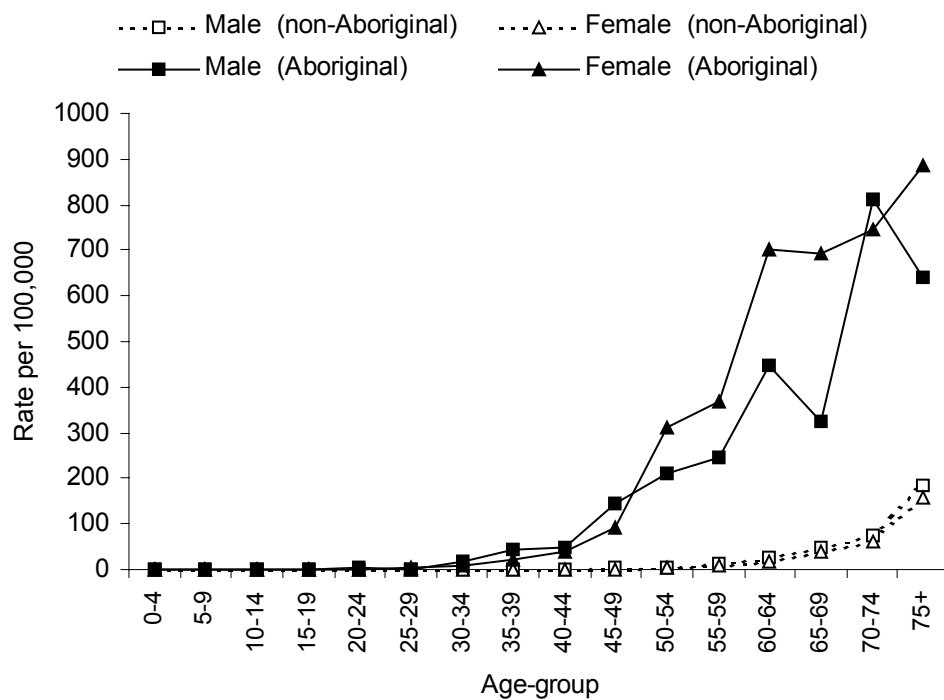
**Figure 33: Percentage of all deaths for residents of the State (1990–1999)**



**Figure 34: Age-standardised mortality rates – diabetes**



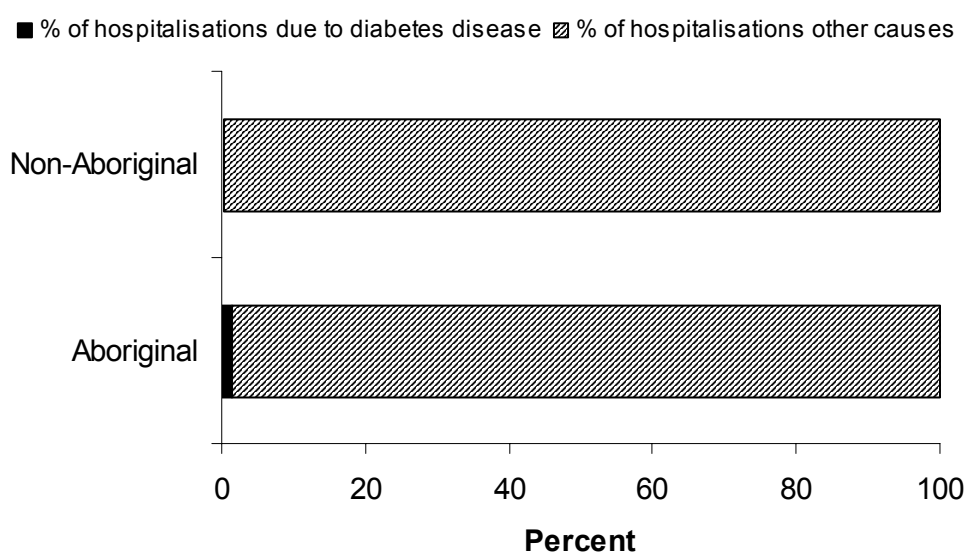
**Figure 35: Age-specific mortality rates – diabetes (1990–1999)**



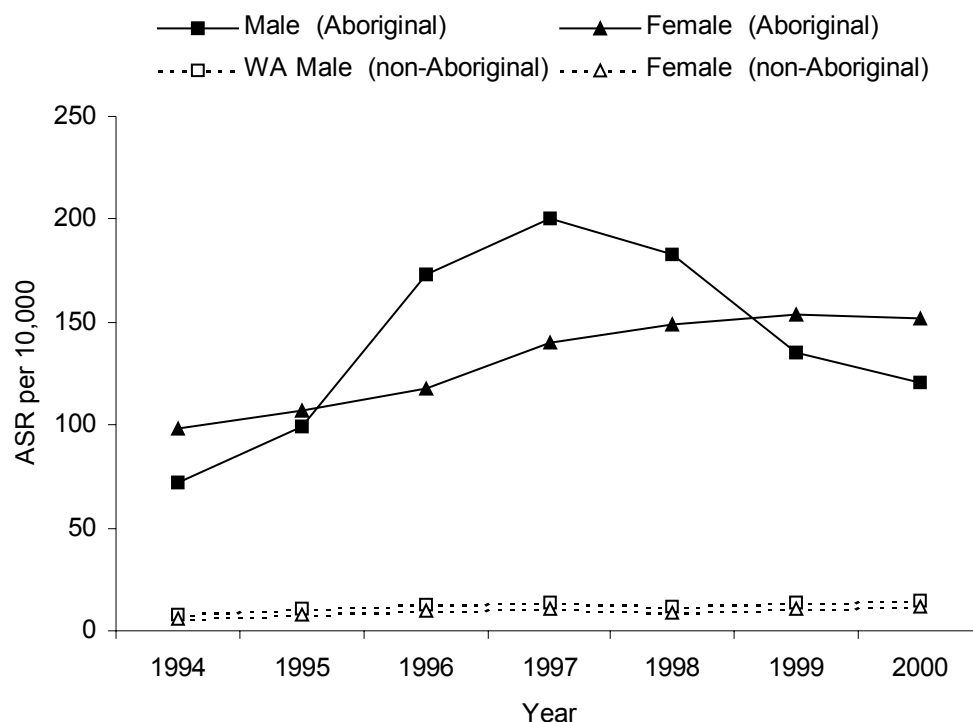
## Morbidity

- Over the period 1994–2000, diabetes-related admissions accounted for 1.3% and 0.4% of all hospitalisations for Aboriginal and non-Aboriginal people respectively. This represented an average of 378 Aboriginal and 1,865 non-Aboriginal discharges a year (Figure 36).
- Of these hospitalisations, the percentage of males was 49.1% and 53.2% for Aboriginals and non-Aboriginals respectively.
- Aboriginal people accounted for 2.7% of the total State population but 16.9% of all diabetes hospitalisations.
- Compared to the non-Aboriginal population, the rate of hospitalisation was significantly higher in Aboriginal males (11.4 times) and females (14.1 times).
- Trend analysis revealed a statistically significant average annual increase in the rates of hospitalisation for Aboriginal males (6.6%) and females (8.9%). Similar findings were observed for the non-Aboriginal population (males 10.2%, females 10.5%) (Figure 37).
- As with age-specific mortality rates, admission rates into hospital for diabetes also increased with age. However, the rate in the Aboriginal population was markedly higher. For Aboriginals aged 45 years and over, the age-specific hospitalisation rate was 7.9 times and 13.3 times higher for males and females respectively compared to their non-Aboriginal counterparts (Figure 38).

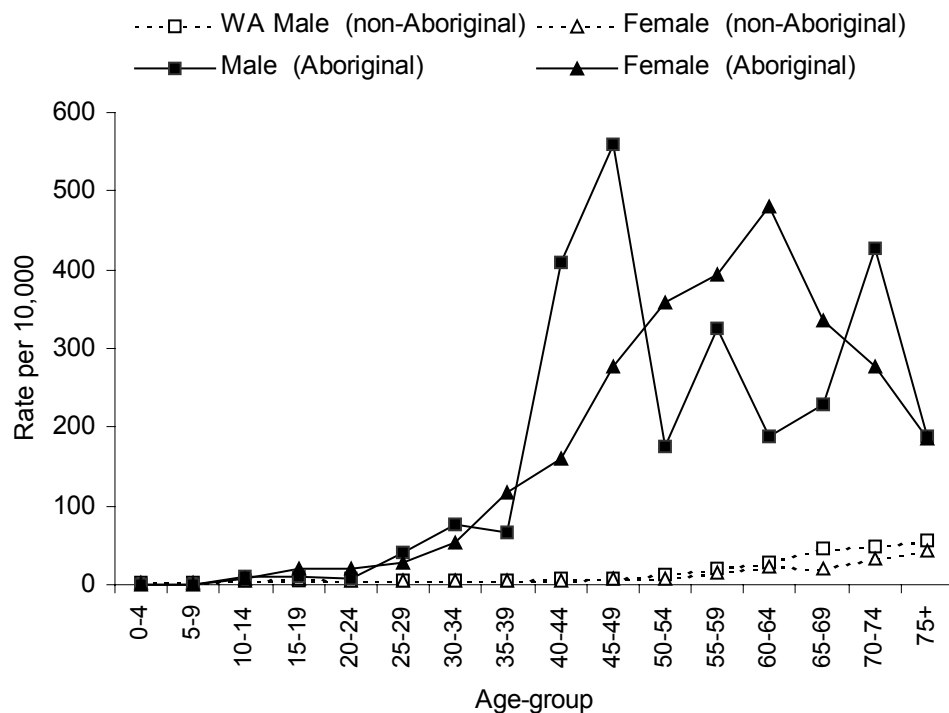
**Figure 36: Percentage of all hospitalisations for residents of the State (1994–2000)**



**Figure 37: Age-standardised hospitalisation rates – diabetes**



**Figure 38: Age-specific hospitalisation rates – diabetes (1994–2000)**

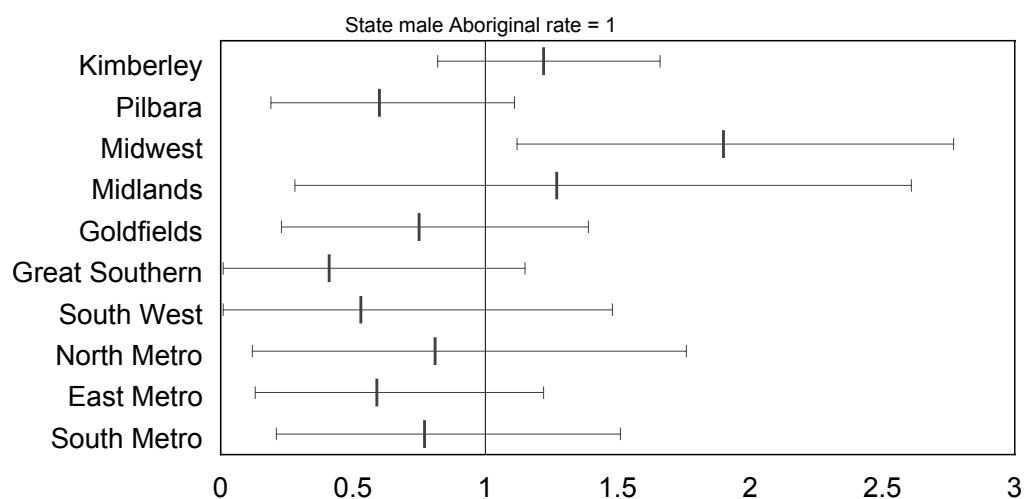


## 7.4 Diabetes in the Health Authorities

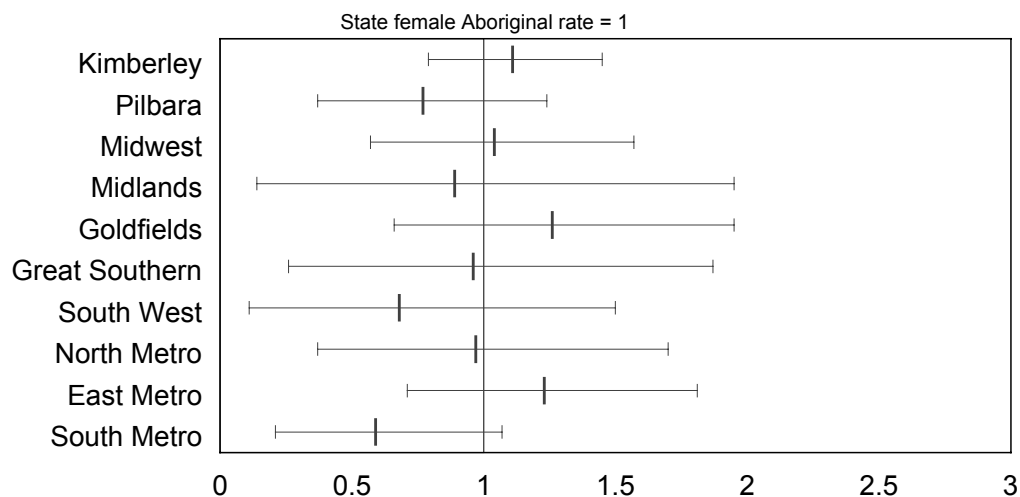
### Mortality

**Figure 39: Aboriginal standardised mortality rate ratios by Health Authority of residence – diabetes (1990–1999)**

#### Males



#### Females



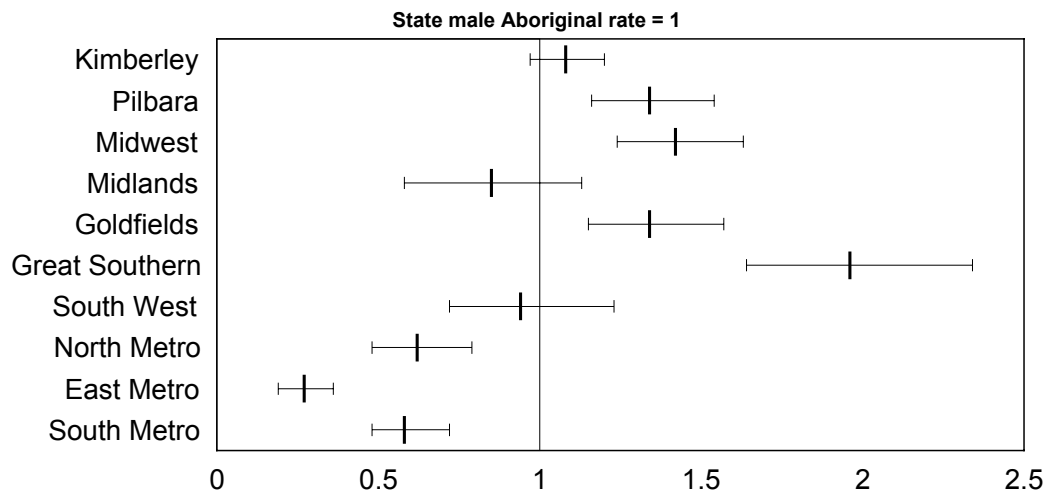
- Aboriginal males in the Midwest Health Authority showed a significantly higher rate of diabetes deaths compared to the State over the 10-year period.
- No area showed a statistically significant variation from the State rate for Aboriginal females.



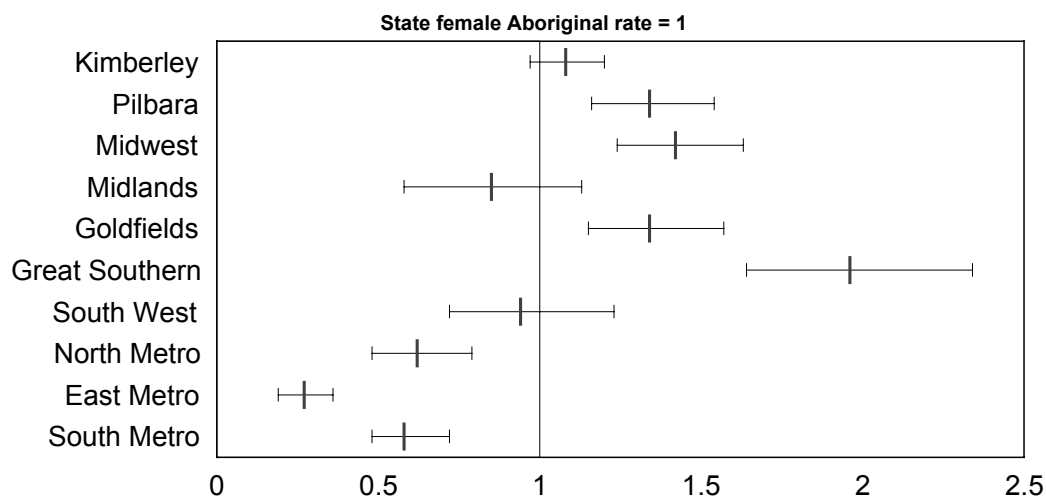
## Morbidity

**Figure 40: Aboriginal standardised hospitalisation rates ratios by Health Authority of residence – diabetes (1994–2000)**

### Males



### Females



- Aboriginal males in the Pilbara, Midwest, Goldfields and Great Southern Health Authorities experienced significantly higher rates of hospitalisation due to diabetes than the State male Aboriginal rate, whereas those residing in the North, East and South Metropolitan areas experienced significantly lower rates.
- Similarly, Aboriginal females in the Pilbara, Midwest, Goldfields and Great Southern Health Authorities experienced significantly higher rates of hospitalisation due to diabetes while those in the North, East and South Metropolitan areas experienced significantly lower rates compared to the State.

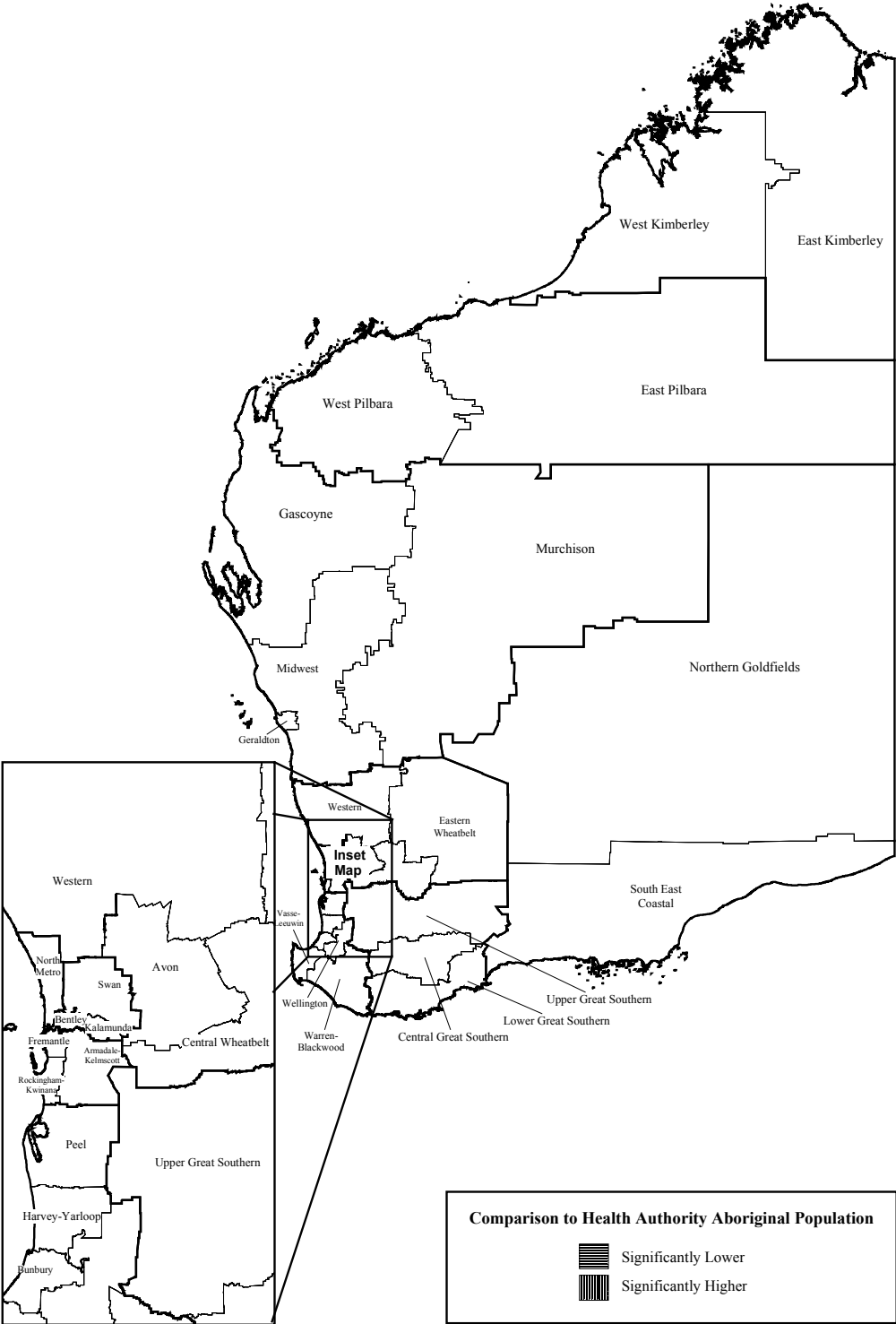
## 7.5 Diabetes in the Health Services

### Mortality

**Table 10: Mortality-related statistics for diabetes by Health Service of residence (1990–1999)**

	Aboriginal					Non-Aboriginal					A/NON-A	
	SMR	SIGN <sup>1</sup>	ASR	PYLL	N	SMR	SIGN <sup>1</sup>	ASR	PYLL	N	RR	SIGN <sup>2</sup>
<b>Kimberley</b>	<b>1.1</b>	<b>NS</b>	<b>153.0</b>	<b>12.1</b>	<b>81</b>	<b>0.9</b>	<b>NS</b>	<b>12.5</b>	<b>7.0</b>	<b>5</b>	<b>12.2</b>	<b>H</b>
East Kimberley	0.7	NS	126.0	13.3	20	0.5	-	5.3	6.8	1	23.8	-
West Kimberley	1.2	NS	177.9	11.7	61	1.3	-	22.7	7.0	4	7.8	-
<b>Pilbara</b>	<b>0.7</b>	<b>NS</b>	<b>94.2</b>	<b>10.2</b>	<b>20</b>	<b>1.3</b>	<b>NS</b>	<b>19.9</b>	<b>10.7</b>	<b>11</b>	<b>4.7</b>	<b>H</b>
East Pilbara	1.0	NS	91.1	9.0	13	1.2	NS	25.2	11.6	7	3.6	NS
West Pilbara	1.1	NS	87.2	11.7	7	0.8	-	11.4	10.2	4	7.6	-
<b>Midwest</b>	<b>1.4</b>	<b>NS</b>	<b>192.9</b>	<b>10.1</b>	<b>40</b>	<b>1.0</b>	<b>NS</b>	<b>11.9</b>	<b>9.9</b>	<b>49</b>	<b>16.2</b>	<b>H</b>
Gascoyne	1.4	NS	274.5	10.7	18	2.0	NS	23.1	12.6	14	11.9	H
Geraldton	0.7	NS	166.2	12.0	9	0.9	NS	11.2	7.0	25	14.8	H
Midwest	0.4	-	83.8	4.4	3	0.8	NS	8.3	9.8	10	10.1	-
Murchison	1.3	NS	275.8	8.5	10	-	-	-	-	0	-	-
<b>Midlands</b>	<b>1.1</b>	<b>NS</b>	<b>147.8</b>	<b>9.6</b>	<b>9</b>	<b>1.1</b>	<b>NS</b>	<b>14.0</b>	<b>11.9</b>	<b>65</b>	<b>10.6</b>	<b>H</b>
Avon	0.9	-	38.0	13.0	2	1.1	NS	14.6	14.7	22	2.6	-
Central Wheatbelt	0.4	-	43.8	10.4	1	0.9	NS	11.5	0.0	9	3.8	-
Western	1.5	-	249.5	7.9	4	0.9	NS	11.1	9.4	15	22.5	-
Eastern Wheatbelt	1.1	-	154.3	10.0	2	1.6	NS	21.2	7.1	19	7.3	-
<b>Goldfields</b>	<b>1.0</b>	<b>NS</b>	<b>150.5</b>	<b>10.1</b>	<b>23</b>	<b>0.9</b>	<b>NS</b>	<b>10.6</b>	<b>11.6</b>	<b>31</b>	<b>14.2</b>	<b>H</b>
Northern Goldfields	1.1	NS	158.2	10.1	22	1.1	NS	11.3	10.6	19	14.0	H
South East Coastal	0.4	-	49.4	0.0	1	1.0	NS	10.6	10.6	12	4.7	-
<b>Great Southern</b>	<b>0.7</b>	<b>NS</b>	<b>126.7</b>	<b>7.6</b>	<b>8</b>	<b>1.0</b>	<b>NS</b>	<b>13.3</b>	<b>7.4</b>	<b>91</b>	<b>9.5</b>	<b>H</b>
Lower Great Southern	-	-	-	-	0	1.0	NS	13.0	8.8	56	-	-
Central Great Southern	2.3	-	420.0	7.4	5	1.1	NS	14.9	3.5	13	28.2	-
Upper Great Southern	0.9	-	139.4	8.3	3	0.9	NS	12.4	4.7	22	11.2	-
<b>South West</b>	<b>0.6</b>	<b>NS</b>	<b>87.3</b>	<b>13.1</b>	<b>6</b>	<b>1.1</b>	<b>NS</b>	<b>14.1</b>	<b>7.1</b>	<b>240</b>	<b>6.2</b>	<b>NS</b>
Peel	-	-	-	-	0	0.8	NS	11.7	5.5	73	-	-
Vasse–Leeuwin	-	-	-	-	0	1.5	H	12.6	6.5	39	-	-
Bunbury	1.3	-	116.6	13.1	2	1.2	NS	16.9	10.9	66	6.9	-
Warren–Blackwood	2.4	-	327.9	7.4	1	0.6	L	17.8	7.9	27	18.4	-
Wellington	1.5	-	81.4	15.1	2	1.3	NS	22.7	4.2	27	3.6	-
Harvey–Yarloop	2.4	-	0.0	0.0	1	0.5	L	7.3	2.4	8	-	-
<b>North Metro</b>	<b>0.9</b>	<b>NS</b>	<b>141.7</b>	<b>14.8</b>	<b>13</b>	<b>0.7</b>	<b>L</b>	<b>8.8</b>	<b>9.9</b>	<b>377</b>	<b>16.1</b>	<b>H</b>
<b>East Metro</b>	<b>1.0</b>	<b>NS</b>	<b>151.7</b>	<b>11.4</b>	<b>26</b>	<b>1.4</b>	<b>H</b>	<b>17.2</b>	<b>8.6</b>	<b>703</b>	<b>8.8</b>	<b>H</b>
Bentley	1.3	NS	218.2	8.1	9	1.1	NS	18.5	11.3	300	11.8	H
Inner City	0.8	-	124.5	12.1	2	1.2	H	44.7	6.3	163	2.8	-
Swan	1.0	NS	130.9	12.9	15	0.9	NS	11.6	7.2	198	11.3	H
Kalamunda	-	-	-	-	0	0.6	L	11.0	9.1	42	-	-
<b>South Metro</b>	<b>0.7</b>	<b>NS</b>	<b>97.2</b>	<b>15.1</b>	<b>14</b>	<b>0.9</b>	<b>NS</b>	<b>11.8</b>	<b>9.0</b>	<b>449</b>	<b>8.2</b>	<b>H</b>
Fremantle	1.6	NS	105.7	13.8	7	1.0	NS	11.6	9.7	219	9.1	H
Armada–Kelmscott	0.7	NS	85.0	19.6	5	1.0	NS	12.1	8.3	150	7.0	NS
Rockingham–Kwinana	0.8	-	54.4	10.9	2	1.0	NS	11.7	9.2	80	4.6	-
<b>State</b>	<b>1.0</b>	<b>NS</b>	<b>137.4</b>	<b>11.5</b>	<b>240</b>	<b>1.0</b>	<b>NS</b>	<b>12.2</b>	<b>8.9</b>	<b>2021</b>	<b>11.3</b>	<b>H</b>

**Map 9:            Aboriginal deaths due to diabetes, 1990–1999**

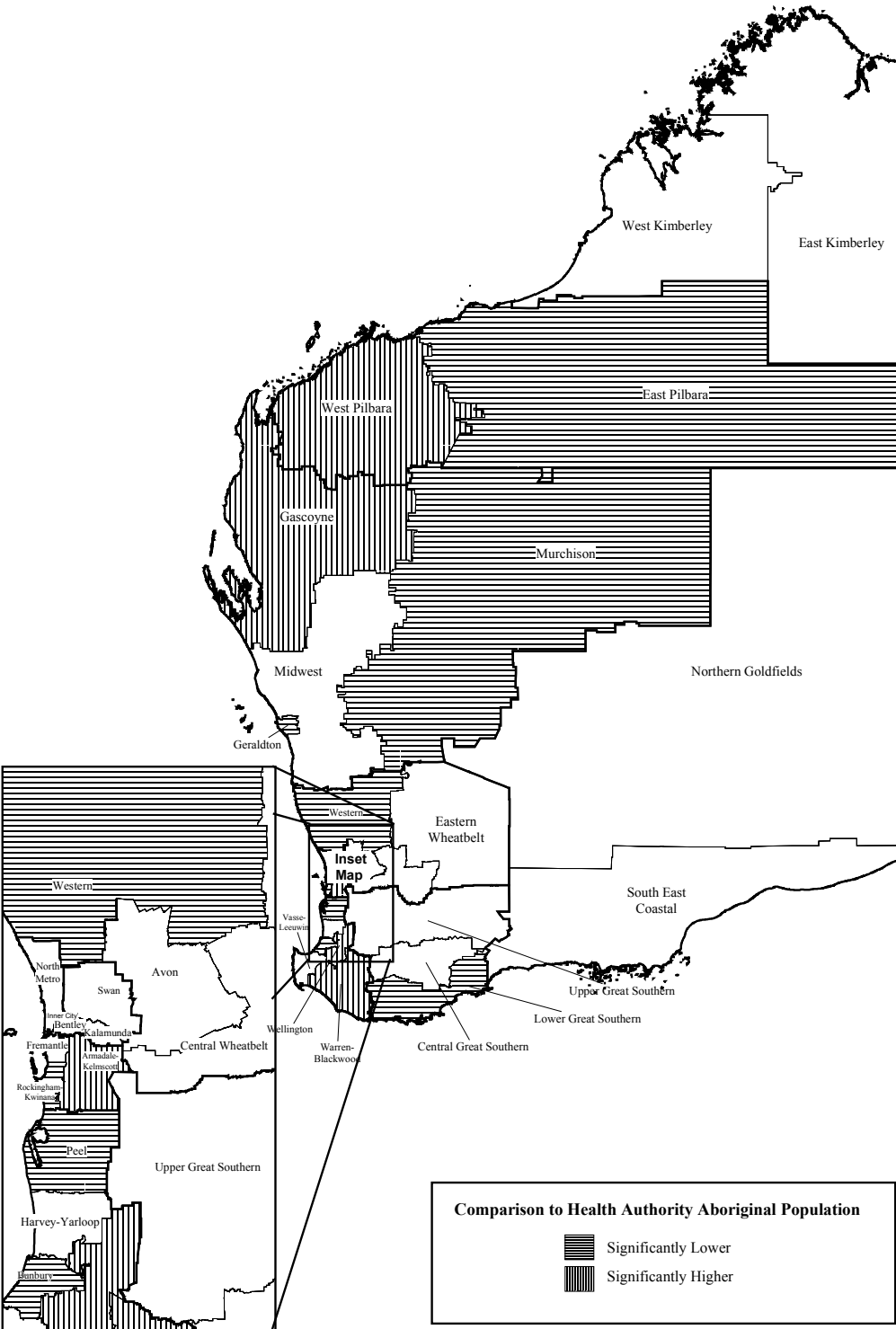


## Morbidity

**Table 11: Hospital-related statistics for diabetes by Health Service of residence (1994–2000)**

	Aboriginal				Non-Aboriginal				A/Non-A	
	SRR	SIGN	ASR	N	SRR	SIGN	ASR	N	RR	SIGN
<b>Kimberley</b>	<b>0.9</b>	<b>L</b>	<b>11.4</b>	<b>551</b>	<b>0.9</b>	<b>NS</b>	<b>0.9</b>	<b>76</b>	<b>12.7</b>	<b>H</b>
East Kimberley	0.9	NS	10.6	176	0.6	L	0.5	17	21.2	H
West Kimberley	1.1	NS	12.2	375	1.2	NS	1.1	59	11.1	H
<b>Pilbara</b>	<b>2.5</b>	<b>H</b>	<b>29.8</b>	<b>705</b>	<b>1.1</b>	<b>NS</b>	<b>1.1</b>	<b>176</b>	<b>27.1</b>	<b>H</b>
East Pilbara	0.4	L	10.1	156	1.1	NS	1.2	89	8.4	H
West Pilbara	2.2	H	65.1	549	1.0	NS	1.0	87	65.1	H
<b>Midwest</b>	<b>1.1</b>	<b>H</b>	<b>15.4</b>	<b>329</b>	<b>1.3</b>	<b>H</b>	<b>1.4</b>	<b>495</b>	<b>11.0</b>	<b>H</b>
Gascoyne	1.6	H	23.9	160	1.5	H	2.0	114	12.0	H
Geraldton	0.7	L	12.1	73	0.9	L	1.2	232	10.1	H
Midwest	1.0	NS	19.0	62	1.0	NS	1.5	129	12.7	H
Murchison	0.6	L	7.9	34	0.8	NS	1.0	20	7.9	H
<b>Midlands</b>	<b>0.7</b>	<b>L</b>	<b>10.8</b>	<b>70</b>	<b>1.4</b>	<b>H</b>	<b>1.5</b>	<b>580</b>	<b>7.2</b>	<b>H</b>
Avon	1.6	NS	13.4	28	1.0	NS	1.5	186	8.9	H
Central Wheatbelt	0.6	NS	8.3	8	1.1	NS	1.8	95	4.6	H
Western	0.5	L	9.5	13	0.6	L	1.0	118	9.5	H
Eastern Wheatbelt	1.5	NS	12.9	21	1.5	H	2.4	181	5.4	H
<b>Goldfields</b>	<b>1.1</b>	<b>H</b>	<b>15.4</b>	<b>292</b>	<b>1.3</b>	<b>H</b>	<b>1.4</b>	<b>378</b>	<b>11.0</b>	<b>H</b>
Northern Goldfields	1.0	NS	16.2	267	1.0	NS	1.5	253	10.8	H
South East Coastal	0.8	NS	8.7	25	0.9	NS	1.3	125	6.7	H
<b>Great Southern</b>	<b>1.5</b>	<b>H</b>	<b>43.5</b>	<b>193</b>	<b>1.3</b>	<b>H</b>	<b>1.4</b>	<b>692</b>	<b>31.1</b>	<b>H</b>
Lower Great Southern	0.6	L	14.2	38	0.6	L	0.8	253	17.8	H
Central Great Southern	1.3	NS	24.4	65	1.2	H	1.6	115	15.3	H
Upper Great Southern	1.2	NS	38.8	90	1.8	H	2.4	324	16.2	H
<b>South West</b>	<b>0.8</b>	<b>L</b>	<b>12.9</b>	<b>102</b>	<b>1.0</b>	<b>NS</b>	<b>1.1</b>	<b>1336</b>	<b>11.7</b>	<b>H</b>
Peel	0.6	L	5.6	16	0.8	L	0.9	399	6.2	H
Vasse–Leeuwin	0.2	-	3.1	3	0.8	L	0.9	181	3.4	-
Bunbury	0.5	L	16.0	17	1.2	H	1.2	357	13.3	H
Warren–Blackwood	4.4	H	22.8	21	1.4	H	1.4	173	16.3	H
Wellington	2.4	H	28.3	35	1.3	H	1.4	126	20.2	H
Harvey–Yarloop	0.9	NS	12.4	10	0.9	NS	1.0	100	12.4	H
<b>North Metro</b>	<b>0.6</b>	<b>L</b>	<b>11.1</b>	<b>117</b>	<b>1.0</b>	<b>L</b>	<b>1.0</b>	<b>3295</b>	<b>11.1</b>	<b>H</b>
<b>East Metro</b>	<b>0.4</b>	<b>L</b>	<b>7.3</b>	<b>165</b>	<b>0.6</b>	<b>L</b>	<b>1.1</b>	<b>1949</b>	<b>6.6</b>	<b>H</b>
Bentley	1.1	NS	8.1	52	1.0	NS	1.1	984	7.4	H
Inner City	2.0	H	16.5	29	1.4	H	1.6	617	10.3	H
Swan	0.9	NS	6.5	82	0.9	L	0.9	1032	7.2	H
Kalamunda	0.2	-	6.8	2	0.9	L	0.9	300	7.6	-
<b>South Metro</b>	<b>0.6</b>	<b>L</b>	<b>5.7</b>	<b>125</b>	<b>1.2</b>	<b>H</b>	<b>1.0</b>	<b>4081</b>	<b>5.7</b>	<b>H</b>
Fremantle	0.8	NS	4.9	28	1.0	NS	1.0	1346	4.9	H
Armadale–Kelmscott	1.5	H	8.6	90	1.0	NS	1.0	1121	8.6	H
Rockingham–Kwinana	0.3	L	4.4	7	1.1	H	1.1	630	4.0	NS
<b>State</b>	<b>1.0</b>	<b>NS</b>	<b>13.2</b>	<b>2649</b>	<b>1.0</b>	<b>NS</b>	<b>1.1</b>	<b>13058</b>	<b>12.0</b>	<b>H</b>

**Map 10:      Aboriginal hospitalisations due to diabetes, 1994–2000**



## 7.6 Summary

### ***Mortality***

Diabetes accounts for more than 7% of all Aboriginal deaths in WA. Compared to the non-Aboriginal population, the rate of diabetes mortality is 11.3 times higher in the Aboriginal population and results in an average of 24 deaths per year.

Results confirm that Aboriginal people experienced higher rates of diabetes deaths than the non-Aboriginal population in all of the Health Authorities. Indeed, the Kimberley, Midwest, Midlands, Goldfields, Great Southern and North Metropolitan areas all experienced rates greater than 10-times that of the non-Aboriginal population. The South West was the only area where the disparity was not statistically significant.

A surprising result was seen in the degree to which diabetes deaths shortened life among the Aboriginal people in the city compared to the country. Residing in the city did not appear to lengthen life for the Aboriginal population; rather, it appears to have marginally shortened it.

There was very little difference in person-years life lost per death in the country areas across populations. That is, non-Aboriginal people lost as many years off their lives in the country areas as their Aboriginal counterparts. This was not the case in the Metropolitan and South West regions, where non-Aboriginal people lost fewer years than Aboriginal people.

Some of the highest rates of diabetes deaths were seen in the Aboriginal population of the Midwest Health Authority, particularly in the Gascoyne and Murchison regions. Although the Gascoyne non-Aboriginal people experienced relatively high rates (in comparison to the State non-Aboriginal population) the Aboriginal rates were still almost 12 times that of the non-Aboriginal population.

### ***Morbidity***

Hospitalisation due to diabetes only accounts for 1.3% and 0.4% of all Aboriginal and non-Aboriginal admissions. Aboriginal people account for almost 17% of all diabetes admissions which is well in excess of their proportion of the population. Overall, the rate of hospitalisation for diabetes in Aboriginal people was 12 times that of the non-Aboriginal population.

Within the Aboriginal population of the State, the Pilbara, Midwest, Goldfields and Great Southern Health Authorities experienced significantly high rates of diabetes hospitalisations while the Kimberley, Midlands, South West, North, East and South Metropolitan areas all experienced significantly lower rates. These areas also experienced lower rates of diabetes deaths although not significantly so.

Among the Aboriginal population of the State, those residing in the country tended to experience greater rates of diabetes-related hospitalisation than those residing in the city areas.

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