

**A study of hospitalisation and  
mortality due to alcohol use  
in the Pilbara region  
and Western Australia, 1989-1993**

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## Note

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## 1 Introduction

This report provides a summary of alcohol-caused health data for the Pilbara region and Western Australia, to assist local planners, health care providers, key departments and community-based groups to identify trends and features of alcohol-caused problems and to support initiatives encouraging less harmful alcohol use. It was commissioned following the success of a similar publication covering the Kimberley region.<sup>1</sup>

## 2 Data sources and methodology

The numbers of deaths and episodes of hospitalisation attributable to alcohol use have been estimated using the aetiologic fractions method developed by Holman, Armstrong and colleagues in 1988<sup>2</sup> and revised by English, Holman and colleagues in 1995.<sup>3</sup> The new aetiologic fractions used in this report were calculated for hazardous and harmful alcohol consumption<sup>4</sup> relative to low alcohol consumption. The new fractions differ from the old version in that low alcohol consumption, not abstinence, is used as the reference category.

The aetiologic fractions method involves the application of fractions (probabilities) to estimate the contribution of the use of alcohol (and other drugs) to mortality and hospitalisation. Some conditions are wholly attributable to the use of alcohol, for example alcoholic liver cirrhosis. In these cases the probability (or aetiologic fraction) of the condition being caused by alcohol is 1.0 and mortality or hospitalisation is quantified simply by enumeration of all cases coded to that condition.

Most conditions, however, cannot be attributed wholly to the use of alcohol, so the impact of these conditions on mortality and hospitalisation cannot be measured directly. For these conditions, English, Holman and colleagues undertook a detailed meta-analysis of the scientific literature to determine the health effects of the use of alcohol and other drugs. By combining estimates of the comparative risks of users and non-users of alcohol developing a particular condition with estimates of the proportion of the population using alcohol, they developed sex- and age-specific estimates of the proportion of occurrences of that condition which could be attributed to the use of alcohol. Thus, for causes of death or hospitalisation not wholly attributable to the use of alcohol, the aetiologic fractions method does not identify individual cases, but provides an indirect estimate of the number of deaths or episodes of hospitalisation attributable to the use of alcohol.

For example, their analysis concluded that for males aged 15 years and above 34 per cent of deaths from falls could be attributed to the use of alcohol. The application of the probability (or aetiologic fraction) of 0.34 to the number of male deaths resulting from falls (eg. 100) estimates that a number (in this case 34) of such deaths could be attributed to the use of alcohol.

Hospitalisation and mortality data for conditions known to be related to alcohol consumption for the period 1989-1993 were extracted from the Hospital Morbidity Data System (HMDS)<sup>5</sup> and the mortality database, which are maintained by the Health Statistics Branch of the Health Department of Western Australia. Although the HMDS records the principal diagnosis and up to eighteen other diagnostic codes, in this report the principal diagnosis only was used.

The mortality and hospitalisation data were analysed to provide measures of the short- and long-term effects of alcohol use on the health of the residents of the Pilbara region and on the population of Western Australia. The short-term effects of alcohol use were determined by estimating the number of alcohol-caused injuries; long-term consequences were determined by enumeration of the number of cases due to conditions known to be wholly attributable to alcohol use (see Appendix 1 for the conditions and ICD9-CM codes). In addition, the numbers of deaths and hospital admissions due to all alcohol-caused conditions were estimated.

Aboriginal people account for more than ten per cent of the population of the Pilbara so comparisons have been made of the impact of alcohol use on Aboriginal and non-Aboriginal populations in the Pilbara region as well as Statewide. For hospitalisation age-standardised rates were calculated,<sup>6</sup> but the numbers of deaths in the Pilbara region were too small to calculate rates.

Originally, it was intended to compare the east and west Pilbara districts, as was done for the Kimberley region in the report *A study of hospitalisation and mortality due to alcohol use in the Kimberley Health Region of Western Australia, 1988-1992*. However, changes in postcodes and health region boundaries<sup>7</sup> over the last five years made it difficult to reconcile the population figures with the health data so the whole of the Pilbara<sup>8</sup> was compared to the total State.

Trends in the incidence of alcohol-caused injuries and conditions were estimated by Poisson regression. Using the GLIM package,<sup>9</sup> average year-to-year ratios were used to establish the nature and significance of trends in rates over the period studied. Age-specific rates were used as the dependent variable.

### 3 Results

#### 3.1 Hospitalisation due to alcohol-caused injuries

##### 3.1.1 Pilbara region

Over the period 1989-1993 an estimated 546 non-Aboriginals (423 males; 123 females) and 560 Aboriginals (228 males; 332 females) in the Pilbara region were admitted to hospital because of alcohol-caused injuries. For Aboriginals, assaults were the most common type of alcohol-caused injury, accounting for 58% of alcohol-caused injuries among males and 79% among females. Falls were the most common type of alcohol-caused injury among non-Aboriginals accounting for 38% of alcohol-caused injuries among males and 42% among females (Table 1).

**Table 1: Estimated number of hospital admissions due to alcohol-caused injuries by Aboriginality, Pilbara region, 1989-1993**

|                     | Non-Aboriginals |            |            |            |           |            | Aboriginals |           |            |            |            |            |
|---------------------|-----------------|------------|------------|------------|-----------|------------|-------------|-----------|------------|------------|------------|------------|
|                     | 1989            | 1990       | 1991       | 1992       | 1993      | 1989-93    | 1989        | 1990      | 1991       | 1992       | 1993       | 1989-93    |
| <b>Males</b>        |                 |            |            |            |           |            |             |           |            |            |            |            |
| Road injuries       | 34              | 30         | 23         | 22         | 18        | 127        | 6           | 6         | 7          | 7          | 5          | 31         |
| Machine injuries    | 3               | 3          | 4          | 3          | 2         | 15         | 1           | 1         | 1          | 1          | 0          | 4          |
| Suicide             | 1               | 3          | 2          | 2          | 1         | 9          | 0           | 0         | 1          | 1          | 1          | 3          |
| Assault             | 17              | 16         | 16         | 17         | 21        | 87         | 23          | 19        | 22         | 35         | 34         | 133        |
| Falls               | 38              | 35         | 29         | 34         | 26        | 162        | 11          | 10        | 7          | 9          | 11         | 48         |
| Other e-codes       | 11              | 4          | 5          | 1          | 2         | 23         | 1           | 3         | 0          | 1          | 4          | 9          |
| <b>All injuries</b> | <b>104</b>      | <b>91</b>  | <b>79</b>  | <b>79</b>  | <b>70</b> | <b>423</b> | <b>42</b>   | <b>39</b> | <b>38</b>  | <b>54</b>  | <b>55</b>  | <b>228</b> |
| <b>Females</b>      |                 |            |            |            |           |            |             |           |            |            |            |            |
| Road injuries       | 8               | 5          | 5          | 4          | 3         | 25         | 1           | 2         | 2          | 2          | 2          | 9          |
| Machine injuries    | 1               | 0          | 0          | 1          | 0         | 2          | 0           | 0         | 1          | 0          | 0          | 1          |
| Suicide             | 2               | 2          | 2          | 2          | 1         | 9          | 1           | 1         | 0          | 0          | 1          | 3          |
| Assault             | 4               | 5          | 7          | 6          | 7         | 29         | 51          | 33        | 63         | 65         | 50         | 262        |
| Falls               | 9               | 7          | 14         | 11         | 11        | 52         | 12          | 13        | 9          | 8          | 5          | 47         |
| Other e-codes       | 0               | 3          | 1          | 0          | 2         | 6          | 2           | 2         | 1          | 1          | 4          | 10         |
| <b>All injuries</b> | <b>24</b>       | <b>22</b>  | <b>29</b>  | <b>24</b>  | <b>24</b> | <b>123</b> | <b>67</b>   | <b>51</b> | <b>76</b>  | <b>76</b>  | <b>62</b>  | <b>332</b> |
| <b>Persons</b>      |                 |            |            |            |           |            |             |           |            |            |            |            |
| Road injuries       | 42              | 35         | 28         | 26         | 21        | 152        | 7           | 8         | 9          | 9          | 7          | 40         |
| Machine injuries    | 4               | 3          | 4          | 4          | 2         | 17         | 1           | 1         | 2          | 1          | 0          | 5          |
| Suicide             | 3               | 5          | 4          | 4          | 2         | 18         | 1           | 1         | 1          | 1          | 2          | 6          |
| Assault             | 21              | 21         | 23         | 23         | 28        | 116        | 74          | 52        | 85         | 100        | 84         | 395        |
| Falls               | 47              | 42         | 43         | 45         | 37        | 214        | 23          | 23        | 16         | 17         | 16         | 95         |
| Other e-codes       | 11              | 7          | 6          | 1          | 4         | 29         | 3           | 5         | 1          | 2          | 8          | 19         |
| <b>All injuries</b> | <b>128</b>      | <b>113</b> | <b>108</b> | <b>103</b> | <b>94</b> | <b>546</b> | <b>109</b>  | <b>90</b> | <b>114</b> | <b>130</b> | <b>117</b> | <b>560</b> |

**Table 2: Age-standardised rates of hospital admissions due to alcohol-caused injuries by Aboriginality, Pilbara region, 1989-1993**

|                        | 1989 |             | 1990 |             | 1991 |             | 1992 |             | 1993 |             | 1989-1993 |             |
|------------------------|------|-------------|------|-------------|------|-------------|------|-------------|------|-------------|-----------|-------------|
|                        | ASR  | CI          | ASR  | CI          | ASR  | CI          | ASR  | CI          | ASR  | CI          | ASR       | CI          |
| <b>Non-Aboriginals</b> |      |             |      |             |      |             |      |             |      |             |           |             |
| Males                  | 432  | (314-550)   | 403  | (291-514)   | 365  | (249-481)   | 354  | (251-456)   | 401  | (195-607)   | 386       | (332-441)   |
| Females                | 121  | (42-201)    | 105  | (56-155)    | 161  | (71-251)    | 121  | (61-180)    | 142  | (64-220)    | 130       | (97-162)    |
| Persons                | 300  | (223-376)   | 273  | (208-339)   | 269  | (196-343)   | 246  | (186-306)   | 263  | (170-356)   | 270       | (237-302)   |
| <b>Aboriginals</b>     |      |             |      |             |      |             |      |             |      |             |           |             |
| Males                  | 1456 | (962-1950)  | 1312 | (824-1801)  | 1531 | (993-2069)  | 2072 | (1488-2655) | 1893 | (1366-2419) | 1658      | (1422-1894) |
| Females                | 2422 | (1811-3033) | 1586 | (1106-2065) | 2685 | (2044-3326) | 2582 | (1969-3195) | 2010 | (1473-2546) | 2256      | (1996-2516) |
| Persons                | 1975 | (1571-2378) | 1443 | (1106-1781) | 2125 | (1704-2546) | 2328 | (1906-2750) | 1942 | (1568-2316) | 1967      | (1791-2143) |

Note: ASR = the age-standardised rate per 100,000 person-years  
CI = 95% confidence intervals

The age-standardised rates (ASRs) for alcohol-caused injuries were higher for Aboriginals than for non-Aboriginals - the ASRs for the period 1989-1993 were 1,967 hospital admissions per 100,000 person-years for Aboriginals and 270 for non-Aboriginals. Among non-Aboriginals the ASR for males was higher than that for females, but the ASR for Aboriginal females was higher than that for Aboriginal males (Table 2; Figures 1 and 2).

Aboriginal:non-Aboriginal rate ratios for alcohol-caused injuries were between 5.3 and 9.5 over the period 1989-1993, with the highest rate ratio occurring in 1992. Non-Aboriginal male:female rate ratios were greater than one, ranging from 2.3 to 3.8, but Aboriginal male:female rate ratios were less than one, ranging from 0.6 to 0.9 (Table 3).

Trend analysis of the hospitalisation rates for alcohol-caused injuries over the five-year period found a statistically significant increase (10.7%) in the rate for male Aboriginals (Table 4).

**Table 3: Rate ratios of age-standardised hospitalisation rates for alcohol-caused injuries, Pilbara region, 1989-1993**

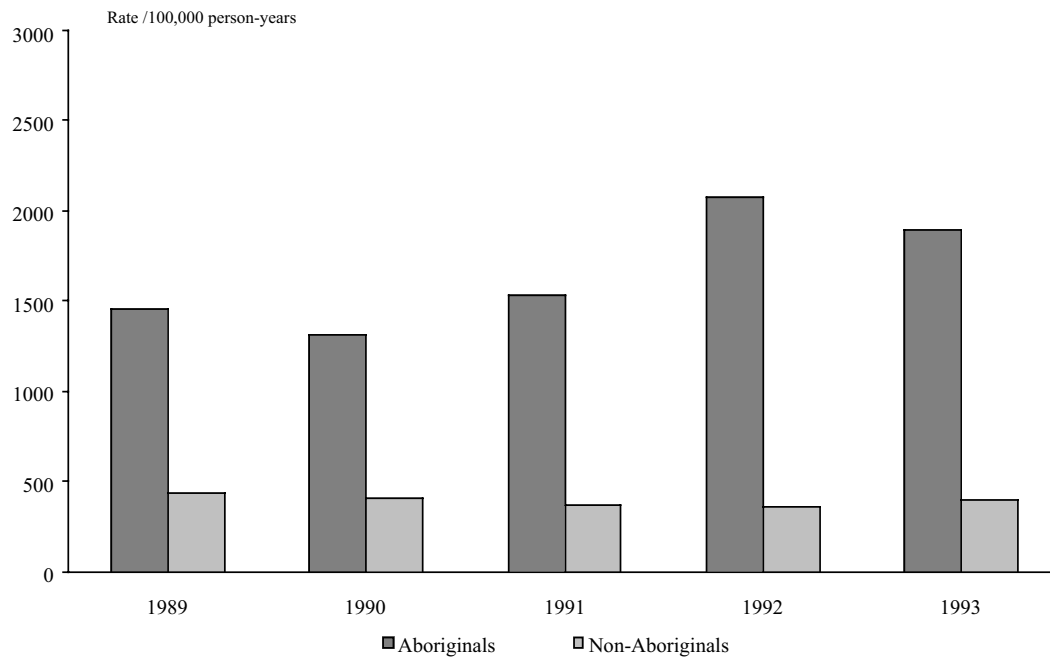
| Rate ratio                 | 1989 | 1990 | 1991 | 1992 | 1993 | 1989-93 |
|----------------------------|------|------|------|------|------|---------|
| Aboriginal:non-Aboriginal  | 6.6  | 5.3  | 7.9  | 9.5  | 7.4  | 7.3     |
| Non Aboriginal male:female | 3.6  | 3.8  | 2.3  | 2.9  | 2.8  | 3.0     |
| Aboriginal male:female     | 0.6  | 0.8  | 0.6  | 0.8  | 0.9  | 0.7     |

**Table 4: Average annual percentage change in hospitalisation rates for alcohol-caused injuries, by Aboriginality, Pilbara region, 1989-1993**

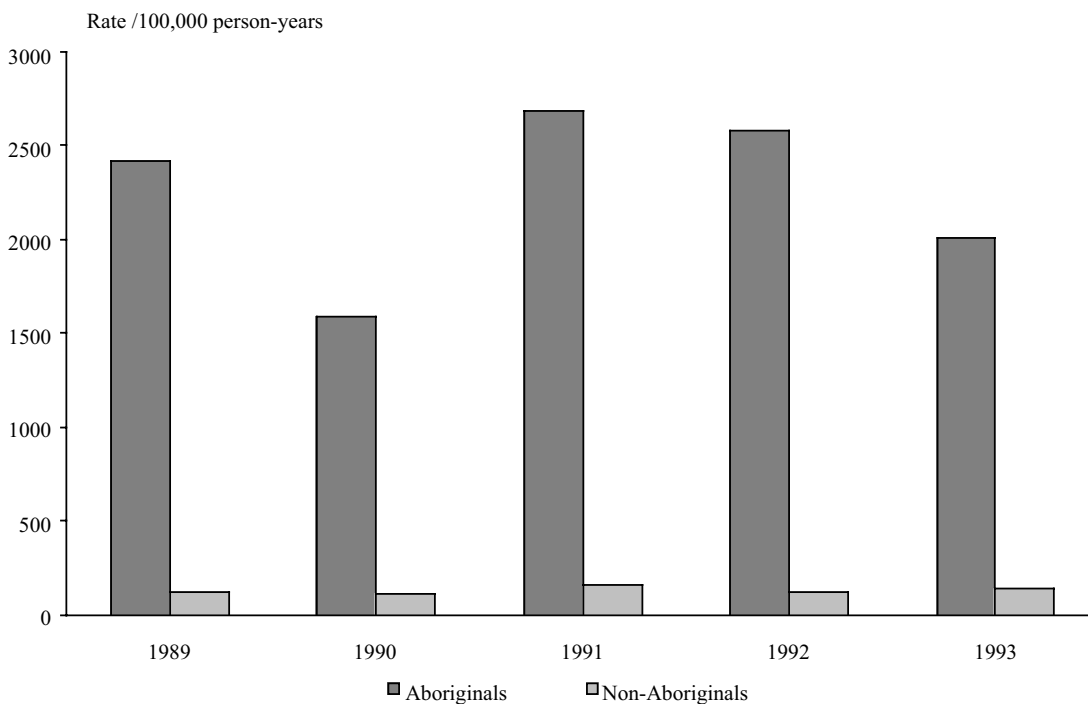
|         | Non-Aboriginal |              | Aboriginal |              |
|---------|----------------|--------------|------------|--------------|
|         | %              | Significance | %          | Significance |
| Males   | -6.3           | NS           | 10.7       | S            |
| Females | 3.1            | NS           | 0.7        | NS           |
| Persons | -4.9           | NS           | 4.6        | NS           |

Note: The rate of change of ASRs is the average per year over the period 1989-93.  
NS = not significant ( $p > 0.05$ ); S = significant ( $p \leq 0.05$ ).

**Figure 1: Age-standardised rates of male hospital admissions due to alcohol-caused injuries, by Aboriginality, Pilbara region, 1989-1993**



**Figure 2: Age-standardised rates of female hospital admissions due to alcohol-caused injuries, by Aboriginality, Pilbara region, 1989-1993**





### 3.1.2 Western Australia

Over the period 1989-1993 an estimated 20,859 non-Aboriginals (12,210 males; 8,649 females) and 3,581 Aboriginals (1,821 males; 1,760 females) in Western Australia were admitted to hospital because of alcohol-caused injuries. For Aboriginals, assaults were the most common type of alcohol-caused injury, accounting for 52% of alcohol-caused injuries among males and 70% among females. Falls were the most common type of alcohol-caused injury among non-Aboriginals accounting for 43% of alcohol-caused injuries among males and 76% among females (Table 5).

The age-standardised rates (ASRs) for alcohol-caused injuries were higher for Aboriginals than for non-Aboriginals - the ASRs for the period 1989-1993 were 1,686 hospital admissions per 100,000 person-years for Aboriginals and 223 for non-Aboriginals. The ASR for males was higher than that for females for both Aboriginals and non-Aboriginals (Table 6; Figures 3 and 4).

Aboriginal:non-Aboriginal rate ratios for alcohol-caused injuries were between 6.4 and 8.8 over the period 1989-1993, with the highest rate ratio occurring in 1993. Non-Aboriginal male:female rate ratios ranged from 1.7 to 1.9, and Aboriginal male:female rate ratios from 1.0 to 1.3 (Table 7).

Trend analysis of the hospitalisation rates for alcohol-caused injuries over the five-year period found statistically significant increases in the rates for Aboriginals (males 7.6%; females 7.0%; persons 7.3%) and a statistically significant decrease in the rate for non-Aboriginal males (4.3%) (Table 8).

**Table 5: Estimated number of hospital admissions due to alcohol-caused injuries, by Aboriginality, Western Australia, 1989-1993**

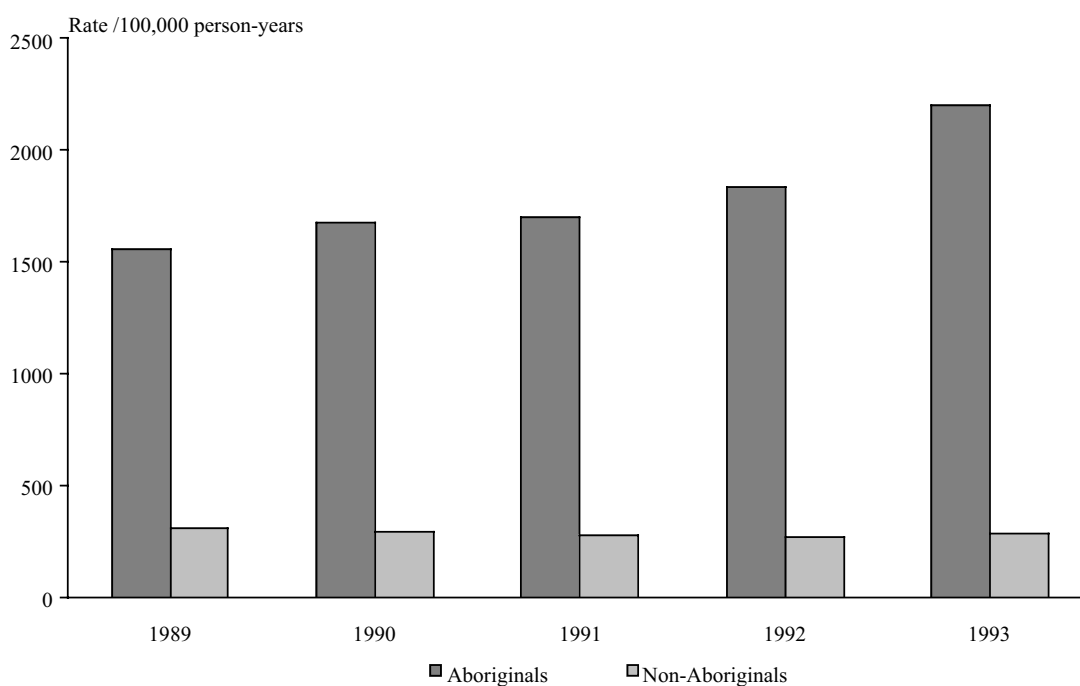
|                  | Non-Aboriginals |      |      |      |      |         | Aboriginals |      |      |      |      |         |
|------------------|-----------------|------|------|------|------|---------|-------------|------|------|------|------|---------|
|                  | 1989            | 1990 | 1991 | 1992 | 1993 | 1989-93 | 1989        | 1990 | 1991 | 1992 | 1993 | 1989-93 |
| <b>Males</b>     |                 |      |      |      |      |         |             |      |      |      |      |         |
| Road injuries    | 736             | 673  | 620  | 596  | 607  | 3232    | 50          | 50   | 60   | 56   | 70   | 286     |
| Machine injuries | 95              | 85   | 82   | 98   | 111  | 471     | 5           | 4    | 5    | 4    | 6    | 24      |
| Suicide          | 102             | 107  | 103  | 109  | 110  | 531     | 7           | 9    | 9    | 10   | 15   | 50      |
| Assault          | 421             | 411  | 433  | 421  | 461  | 2147    | 137         | 156  | 172  | 212  | 272  | 949     |
| Falls            | 1050            | 1073 | 998  | 1022 | 1097 | 5240    | 91          | 88   | 84   | 78   | 80   | 421     |
| Other e-codes    | 148             | 133  | 111  | 96   | 101  | 589     | 15          | 22   | 18   | 16   | 20   | 91      |
| All injuries     | 2552            | 2482 | 2347 | 2342 | 2487 | 12210   | 305         | 329  | 348  | 376  | 463  | 1821    |
| <b>Females</b>   |                 |      |      |      |      |         |             |      |      |      |      |         |
| Road injuries    | 216             | 170  | 175  | 148  | 187  | 896     | 16          | 13   | 19   | 16   | 25   | 89      |
| Machine injuries | 20              | 19   | 18   | 22   | 22   | 101     | 2           | 1    | 3    | 2    | 4    | 12      |
| Suicide          | 84              | 82   | 84   | 90   | 90   | 430     | 8           | 8    | 8    | 7    | 7    | 38      |
| Assault          | 97              | 102  | 89   | 100  | 116  | 504     | 188         | 187  | 237  | 278  | 334  | 1224    |
| Falls            | 1218            | 1254 | 1265 | 1330 | 1464 | 6531    | 81          | 73   | 67   | 61   | 56   | 338     |
| Other e-codes    | 30              | 41   | 47   | 32   | 37   | 187     | 14          | 13   | 11   | 12   | 9    | 59      |
| All injuries     | 1665            | 1668 | 1678 | 1722 | 1916 | 8649    | 309         | 295  | 345  | 376  | 435  | 1760    |
| <b>Persons</b>   |                 |      |      |      |      |         |             |      |      |      |      |         |
| Road injuries    | 952             | 843  | 795  | 744  | 794  | 4128    | 66          | 63   | 79   | 72   | 95   | 375     |
| Machine injuries | 115             | 104  | 100  | 120  | 133  | 572     | 7           | 5    | 8    | 6    | 10   | 36      |
| Suicide          | 186             | 189  | 187  | 199  | 200  | 961     | 15          | 17   | 17   | 17   | 22   | 88      |
| Assault          | 518             | 513  | 522  | 521  | 577  | 2651    | 325         | 343  | 409  | 490  | 606  | 2173    |
| Falls            | 2268            | 2327 | 2263 | 2352 | 2561 | 11771   | 172         | 161  | 151  | 139  | 136  | 759     |
| Other e-codes    | 178             | 174  | 158  | 128  | 138  | 776     | 29          | 35   | 29   | 28   | 29   | 150     |
| All injuries     | 4217            | 4150 | 4025 | 4064 | 4403 | 20859   | 614         | 624  | 693  | 752  | 898  | 3581    |

**Table 6: Age-standardised rates of hospital admissions due to alcohol-caused injuries, by Aboriginality, Western Australia, 1989-1993**

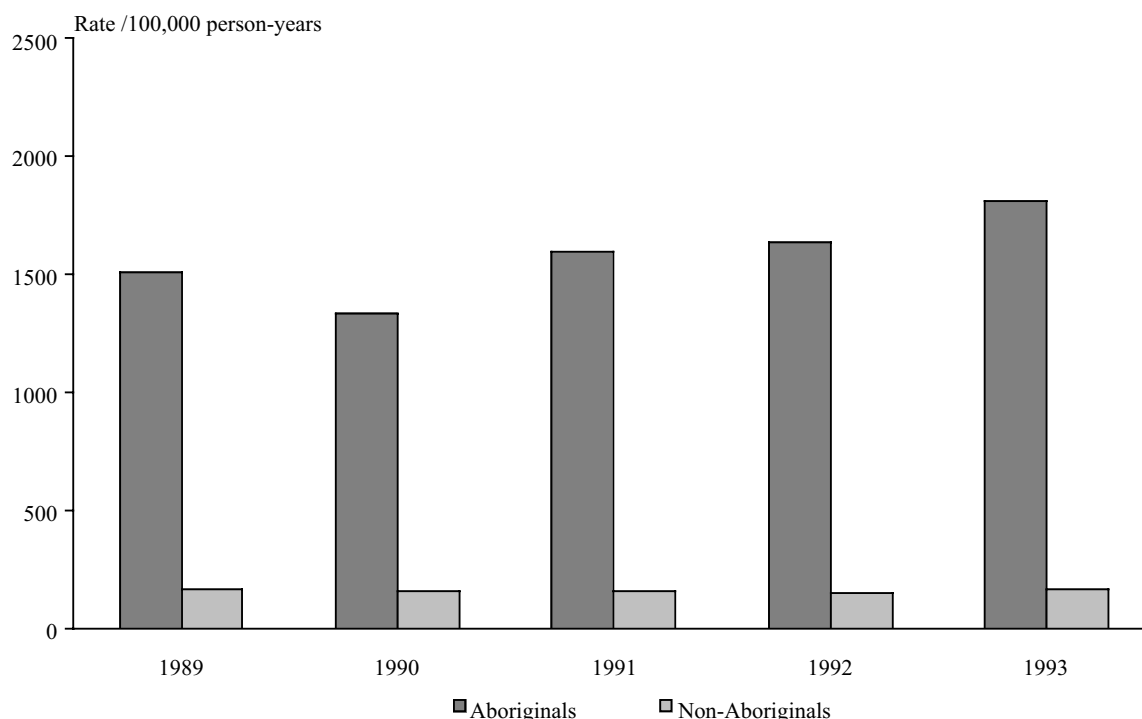
|                        | 1989 |             | 1990 |             | 1991 |             | 1992 |             | 1993 |             | 1989-1993 |             |
|------------------------|------|-------------|------|-------------|------|-------------|------|-------------|------|-------------|-----------|-------------|
|                        | ASR  | CI          | ASR  | CI          | ASR  | CI          | ASR  | CI          | ASR  | CI          | ASR       | CI          |
| <b>Non-Aboriginals</b> |      |             |      |             |      |             |      |             |      |             |           |             |
| Males                  | 305  | (293-316)   | 289  | (277-300)   | 271  | (260-282)   | 265  | (254-276)   | 279  | (268-290)   | 282       | (277-287)   |
| Females                | 163  | (154-171)   | 155  | (147-163)   | 152  | (144-160)   | 150  | (143-158)   | 165  | (157-173)   | 157       | (154-161)   |
| Persons                | 238  | (231-245)   | 226  | (219-233)   | 215  | (209-222)   | 212  | (205-218)   | 226  | (219-232)   | 223       | (220-226)   |
| <b>Aboriginals</b>     |      |             |      |             |      |             |      |             |      |             |           |             |
| Males                  | 1558 | (1366-1751) | 1677 | (1479-1874) | 1700 | (1505-1895) | 1829 | (1624-2033) | 2202 | (1984-2419) | 1802      | (1711-1892) |
| Females                | 1505 | (1325-1685) | 1331 | (1167-1495) | 1596 | (1414-1779) | 1634 | (1457-1811) | 1807 | (1625-1988) | 1580      | (1500-1659) |
| Persons                | 1530 | (1399-1661) | 1496 | (1369-1623) | 1648 | (1515-1781) | 1724 | (1590-1858) | 1995 | (1855-2136) | 1686      | (1626-1745) |

Note: ASR = the age-standardised rate per 100,000 person-years  
CI = 95% confidence intervals

**Figure 3: Age-standardised rates of male hospital admissions due to alcohol-caused injuries, by Aboriginality, Western Australia, 1989-1993**



**Figure 4: Age-standardised rates of female hospital admissions due to alcohol-caused injuries, by Aboriginality, Western Australia, 1989-1993**



**Table 7: Rate ratios of age-standardised hospitalisation rates for alcohol-caused injuries, Western Australia, 1989-1993**

| Rate ratio                 | 1989 | 1990 | 1991 | 1992 | 1993 | 1989-93 |
|----------------------------|------|------|------|------|------|---------|
| Aboriginal:non-Aboriginal  | 6.4  | 6.6  | 7.7  | 8.1  | 8.8  | 7.6     |
| Non Aboriginal male:female | 1.9  | 1.9  | 1.8  | 1.8  | 1.7  | 1.8     |
| Aboriginal male:female     | 1.0  | 1.3  | 1.1  | 1.1  | 1.2  | 1.1     |

**Table 8: Average annual percentage change in hospitalisation rates for alcohol-caused injuries, by Aboriginality, Western Australia, 1989-1993**

|         | Non-Aboriginal |              | Aboriginal |              |
|---------|----------------|--------------|------------|--------------|
|         | %              | Significance | %          | Significance |
| Males   | -4.3           | S            | 7.6        | S            |
| Females | 1.0            | NS           | 7.0        | S            |
| Persons | -0.9           | NS           | 7.3        | S            |

Note: The rate of change of ASRs is the average per year over the period 1989-93.  
 NS = not significant ( $p > 0.05$ ); S = significant ( $p \leq 0.05$ ).

## 3.2 Hospitalisation due to conditions wholly attributable to alcohol

### 3.2.1 Pilbara region

Over the period 1989-1993, 224 non-Aboriginals (173 males; 51 females) and 237 Aboriginals (180 males; 57 females) in the Pilbara region were admitted to hospital because of conditions wholly attributable to alcohol. Of these conditions, alcoholic psychosis was the most common cause of admission for male Aboriginals, accounting for 42% of hospital admissions due to conditions wholly attributable to alcohol. Alcohol dependence was the most common cause of admission for female Aboriginals and male and female non-Aboriginals (28%, 51% and 53% of hospital admissions due to conditions wholly attributable to alcohol respectively) (Table 9).

The ASRs for conditions wholly attributable to alcohol were higher for Aboriginals than for non-Aboriginals - the ASRs for the period 1989-1993 were 979 hospital admissions per 100,000 person-years for Aboriginals and 156 for non-Aboriginals. The ASR for males was higher than that for females for both Aboriginals and non-Aboriginals (Table 10; Figures 5 and 6).

Aboriginal:non-Aboriginal rate ratios for all conditions wholly attributable to alcohol were between 4.3 and 11.2 over the period 1989-1993, with the highest rate ratio occurring in 1993. Non-Aboriginal male:female rate ratios ranged from 1.7 to 4.5, and Aboriginal male:female rate ratios from 2.2 to 4.3 (Table 11).

Trend analysis of the hospitalisation rates for conditions wholly attributable to alcohol in the Pilbara region over the five-year period found statistically significant decreases in the rates for non-Aboriginal males (13.5%) and persons (12.5%) (Table 12).

**Table 9: Estimated number of hospital admissions due to conditions wholly attributable to alcohol, by Aboriginality, Pilbara region, 1989-1993**

|                             | Non-Aboriginals |      |      |      |      |         | Aboriginals |      |      |      |      |         |
|-----------------------------|-----------------|------|------|------|------|---------|-------------|------|------|------|------|---------|
|                             | 1989            | 1990 | 1991 | 1992 | 1993 | 1989-93 | 1989        | 1990 | 1991 | 1992 | 1993 | 1989-93 |
| <b>Males</b>                |                 |      |      |      |      |         |             |      |      |      |      |         |
| Alcoholic psychosis         | 7               | 4    | 2    | 1    | 7    | 21      | 13          | 14   | 18   | 16   | 15   | 76      |
| Alcohol dependence          | 28              | 26   | 10   | 15   | 9    | 88      | 4           | 5    | 10   | 10   | 7    | 36      |
| Alcohol non-dependent abuse | 11              | 4    | 2    | 5    | 9    | 31      | 7           | 10   | 4    | 9    | 6    | 36      |
| Alcoholic polyneuropathy    | 0               | 0    | 0    | 0    | 0    | 0       | 0           | 1    | 0    | 0    | 0    | 1       |
| Alcoholic gastritis         | 1               | 3    | 12   | 3    | 1    | 20      | 4           | 1    | 6    | 8    | 6    | 25      |
| Alcoholic liver cirrhosis   | 2               | 3    | 4    | 2    | 2    | 13      | 0           | 2    | 2    | 0    | 2    | 6       |
| All wholly attributable     | 49              | 40   | 30   | 26   | 28   | 173     | 28          | 33   | 40   | 43   | 36   | 180     |
| <b>Females</b>              |                 |      |      |      |      |         |             |      |      |      |      |         |
| Alcoholic psychosis         | 3               | 1    | 1    | 1    | 1    | 7       | 2           | 3    | 0    | 1    | 3    | 9       |
| Alcohol dependence          | 4               | 7    | 7    | 7    | 2    | 27      | 0           | 3    | 2    | 2    | 9    | 16      |
| Alcohol non-dependent abuse | 3               | 1    | 4    | 3    | 1    | 12      | 1           | 5    | 2    | 3    | 1    | 12      |
| Alcoholic polyneuropathy    | 0               | 0    | 0    | 0    | 0    | 0       | 0           | 0    | 0    | 2    | 0    | 2       |
| Alcoholic gastritis         | 0               | 2    | 1    | 0    | 0    | 3       | 5           | 1    | 2    | 2    | 2    | 12      |
| Alcoholic liver cirrhosis   | 0               | 0    | 0    | 1    | 1    | 2       | 0           | 1    | 3    | 0    | 2    | 6       |
| All wholly attributable     | 10              | 11   | 13   | 12   | 5    | 51      | 8           | 13   | 9    | 10   | 17   | 57      |
| <b>Persons</b>              |                 |      |      |      |      |         |             |      |      |      |      |         |
| Alcoholic psychosis         | 10              | 5    | 3    | 2    | 8    | 28      | 15          | 17   | 18   | 17   | 18   | 85      |
| Alcohol dependence          | 32              | 33   | 17   | 22   | 11   | 115     | 4           | 8    | 12   | 12   | 16   | 52      |
| Alcohol non-dependent abuse | 14              | 5    | 6    | 8    | 10   | 43      | 8           | 15   | 6    | 12   | 7    | 48      |
| Alcoholic polyneuropathy    | 0               | 0    | 0    | 0    | 0    | 0       | 0           | 1    | 0    | 2    | 0    | 3       |
| Alcoholic gastritis         | 1               | 5    | 13   | 3    | 1    | 23      | 9           | 2    | 8    | 10   | 8    | 37      |
| Alcoholic liver cirrhosis   | 2               | 3    | 4    | 3    | 3    | 15      | 0           | 3    | 5    | 0    | 4    | 12      |
| All wholly attributable     | 59              | 51   | 43   | 38   | 33   | 224     | 36          | 46   | 49   | 53   | 53   | 237     |

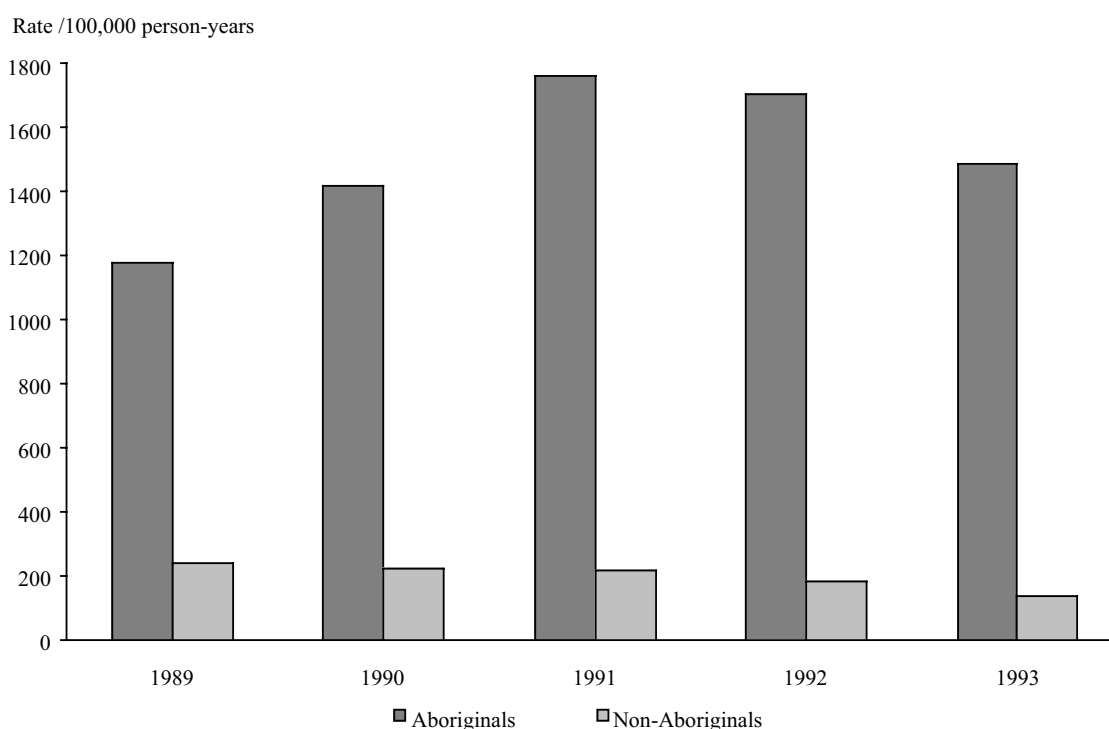
Note: There were no hospital admissions from alcoholic cardiomyopathy, ethanol toxicity, or methanol toxicity in the Pilbara region during the period studied.

**Table 10: Age-standardised rates of hospital admissions wholly attributable to alcohol, by Aboriginality, Pilbara region, 1989-1993**

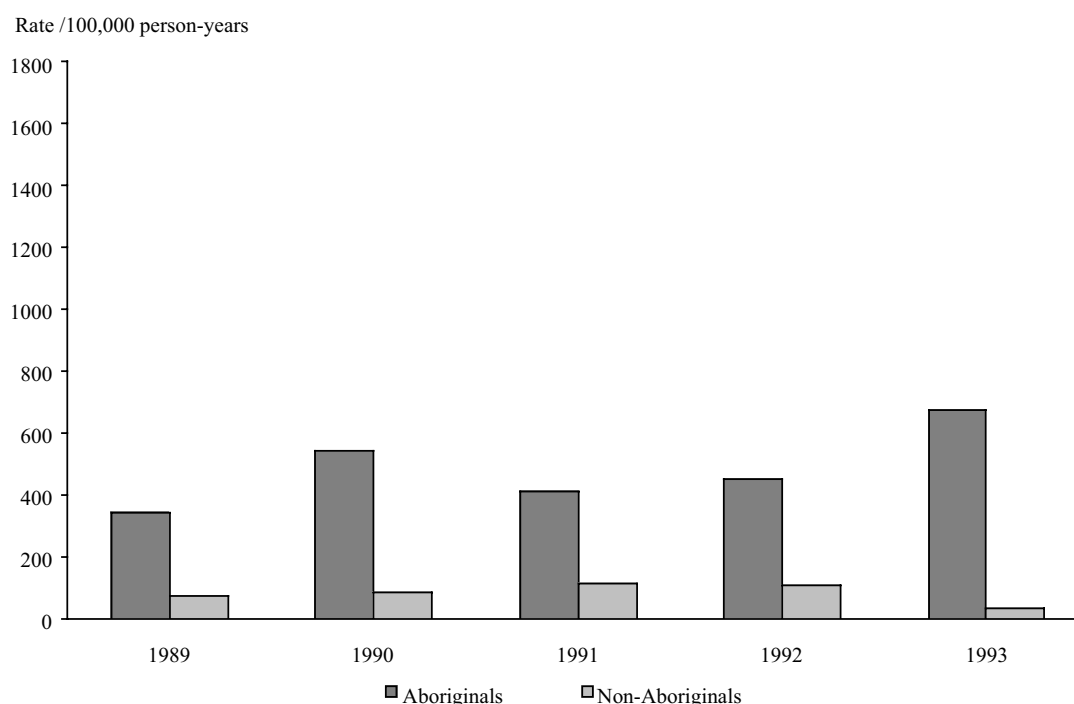
|                        | 1989 |            | 1990 |            | 1991 |             | 1992 |             | 1993 |            | 1989-1993 |             |
|------------------------|------|------------|------|------------|------|-------------|------|-------------|------|------------|-----------|-------------|
|                        | ASR  | CI         | ASR  | CI         | ASR  | CI          | ASR  | CI          | ASR  | CI         | ASR       | CI          |
| <b>Non-Aboriginals</b> |      |            |      |            |      |             |      |             |      |            |           |             |
| Males                  | 238  | (150-326)  | 220  | (124-316)  | 212  | (108-315)   | 183  | (82-283)    | 136  | (80-191)   | 198       | (157-239)   |
| Females                | 72   | (5.6-138)  | 82   | (26-137)   | 113  | (30-196)    | 106  | (0.4-211)   | 30   | (1.4-58)   | 80        | (48-113)    |
| Persons                | 174  | (114-235)  | 167  | (103-232)  | 176  | (103-249)   | 172  | (82-263)    | 94   | (57-131)   | 156       | (127-186)   |
| <b>Aboriginals</b>     |      |            |      |            |      |             |      |             |      |            |           |             |
| Males                  | 1178 | (739-1617) | 1416 | (916-1916) | 1761 | (1199-2323) | 1704 | (1182-2226) | 1483 | (968-1997) | 1507      | (1279-1736) |
| Females                | 339  | (96-581)   | 539  | (240-838)  | 408  | (133-683)   | 448  | (157-739)   | 671  | (337-1005) | 484       | (353-616)   |
| Persons                | 756  | (504-1009) | 962  | (678-1246) | 1050 | (746-1355)  | 1066 | (768-1364)  | 1058 | (758-1359) | 979       | (849-1108)  |

Note: ASR = the age-standardised rate per 100,000 person-years  
CI = 95% confidence intervals

**Figure 5: Age-standardised rates of male hospital admissions wholly attributable to alcohol, by Aboriginality, Pilbara region, 1989-1993**



**Figure 6: Age-standardised rates of female hospital admissions wholly attributable to alcohol, by Aboriginality, Pilbara region, 1989-1993**



**Table 11: Rate ratios of age-standardised hospitalisation rates for conditions wholly attributable to alcohol, Pilbara region, 1989-1993**

| Rate ratio                 | 1989 | 1990 | 1991 | 1992 | 1993 | 1989-93 |
|----------------------------|------|------|------|------|------|---------|
| Aboriginal:non-Aboriginal  | 4.3  | 5.8  | 6.0  | 6.2  | 11.2 | 6.3     |
| Non Aboriginal male:female | 3.3  | 2.7  | 1.9  | 1.7  | 4.5  | 2.5     |
| Aboriginal male:female     | 3.5  | 2.6  | 4.3  | 3.8  | 2.2  | 3.1     |

**Table 12: Average annual percentage change in hospitalisation rates for conditions wholly attributable to alcohol, by Aboriginality, Pilbara region, 1989-1993**

|         | Non-Aboriginal |              | Aboriginal |              |
|---------|----------------|--------------|------------|--------------|
|         | %              | Significance | %          | Significance |
| Males   | -13.5          | S            | 4.4        | NS           |
| Females | -8.4           | NS           | 11.0       | NS           |
| Persons | -12.5          | S            | 5.9        | NS           |

Note: The rate of change of ASRs is the average per year over the period 1989-93.  
NS = not significant ( $p > 0.05$ ); S = significant ( $p \leq 0.05$ ).

### 3.2.2 Western Australia

Over the period 1989-1993, 7,495 non-Aboriginals (5,717 males; 1,778 females) and 2,433 Aboriginals (1,760 males; 673 females) in Western Australia were admitted to hospital because of conditions wholly attributable to alcohol. Of these conditions, alcohol dependence was the most common cause of admission for both Aboriginals and non-Aboriginals, although alcohol abuse accounted for as many admissions among Aboriginal females. Alcohol dependence accounted for 52% of hospital admissions due to conditions wholly attributable to alcohol in non-Aboriginal males and females and 29% and 33% for Aboriginal males and females respectively (Table 13).

The ASRs for conditions wholly attributable to alcohol were higher for Aboriginals than for non-Aboriginals - the ASRs for the period 1989-1993 were 1,308 hospital admissions per 100,000 person-years for Aboriginals and 84 for non-Aboriginals. The ASR for males was higher than that for females for both Aboriginals and non-Aboriginals (Table 14; Figures 7 and 8).

Aboriginal:non-Aboriginal rate ratios for conditions wholly attributable to alcohol were between 13.1 and 19.1 over the period 1989-1993, with the highest rate ratio occurring in 1993. Male:female rate ratios ranged from 2.8 to 3.6 for non-Aboriginals, and from 2.4 to 3.1 for Aboriginals (Table 15).

Trend analysis of the hospitalisation rates for conditions wholly attributable to alcohol in Western Australia over the five-year period found statistically significant decreases in the rates for non-Aboriginals (males 8.1%; females 7.5%; persons 8.0%) (Table 16).

**Table 13: Estimated number of hospital admissions due to conditions wholly attributable to alcohol, by Aboriginality, Western Australia, 1989-1993**

|                             | Non-Aboriginals |      |      |      |      |         | Aboriginals |      |      |      |      |         |
|-----------------------------|-----------------|------|------|------|------|---------|-------------|------|------|------|------|---------|
|                             | 1989            | 1990 | 1991 | 1992 | 1993 | 1989-93 | 1989        | 1990 | 1991 | 1992 | 1993 | 1989-93 |
| <b>Males</b>                |                 |      |      |      |      |         |             |      |      |      |      |         |
| Alcoholic psychosis         | 143             | 129  | 127  | 155  | 191  | 745     | 90          | 68   | 94   | 122  | 124  | 498     |
| Alcohol dependence          | 662             | 611  | 676  | 585  | 442  | 2976    | 85          | 104  | 95   | 108  | 112  | 504     |
| Alcohol non-dependent abuse | 205             | 214  | 165  | 120  | 124  | 828     | 83          | 71   | 75   | 62   | 45   | 336     |
| Alcoholic polyneuropathy    | 5               | 6    | 5    | 3    | 5    | 24      | 1           | 2    | 0    | 3    | 1    | 7       |
| Alcoholic cardiomyopathy    | 19              | 11   | 8    | 10   | 6    | 54      | 5           | 2    | 3    | 8    | 6    | 24      |
| Alcoholic gastritis         | 40              | 37   | 53   | 65   | 31   | 226     | 50          | 38   | 69   | 72   | 54   | 283     |
| Alcoholic liver cirrhosis   | 221             | 151  | 158  | 163  | 170  | 863     | 22          | 14   | 18   | 31   | 22   | 107     |
| Ethanol toxicity            | 0               | 0    | 1    | 0    | 0    | 1       | 0           | 0    | 1    | 0    | 0    | 1       |
| All wholly attributable     | 1295            | 1159 | 1193 | 1101 | 969  | 5717    | 336         | 299  | 355  | 406  | 364  | 1760    |
| <b>Females</b>              |                 |      |      |      |      |         |             |      |      |      |      |         |
| Alcoholic psychosis         | 36              | 35   | 35   | 41   | 42   | 189     | 9           | 16   | 17   | 17   | 21   | 80      |
| Alcohol dependence          | 204             | 204  | 217  | 140  | 153  | 918     | 43          | 44   | 36   | 31   | 65   | 219     |
| Alcohol non-dependent abuse | 71              | 79   | 72   | 63   | 66   | 351     | 42          | 55   | 49   | 51   | 22   | 219     |
| Alcoholic polyneuropathy    | 5               | 1    | 2    | 1    | 0    | 9       | 0           | 4    | 1    | 3    | 2    | 10      |
| Alcoholic cardiomyopathy    | 0               | 1    | 1    | 0    | 0    | 2       | 1           | 1    | 1    | 0    | 1    | 4       |
| Alcoholic gastritis         | 8               | 8    | 9    | 7    | 10   | 42      | 17          | 5    | 13   | 19   | 19   | 73      |
| Alcoholic liver cirrhosis   | 47              | 77   | 41   | 46   | 54   | 265     | 10          | 6    | 9    | 19   | 24   | 68      |
| Ethanol toxicity            | 1               | 0    | 1    | 0    | 0    | 2       | 0           | 0    | 0    | 0    | 0    | 0       |
| All wholly attributable     | 372             | 405  | 378  | 298  | 325  | 1778    | 122         | 131  | 126  | 140  | 154  | 673     |
| <b>Persons</b>              |                 |      |      |      |      |         |             |      |      |      |      |         |
| Alcoholic psychosis         | 179             | 164  | 162  | 196  | 233  | 934     | 99          | 84   | 111  | 139  | 145  | 578     |
| Alcohol dependence          | 866             | 815  | 893  | 725  | 595  | 3894    | 128         | 148  | 131  | 139  | 177  | 723     |
| Alcohol non-dependent abuse | 276             | 293  | 237  | 183  | 190  | 1179    | 125         | 126  | 124  | 113  | 67   | 555     |
| Alcoholic polyneuropathy    | 10              | 7    | 7    | 4    | 5    | 33      | 1           | 6    | 1    | 6    | 3    | 17      |
| Alcoholic cardiomyopathy    | 19              | 12   | 9    | 10   | 6    | 56      | 6           | 3    | 4    | 8    | 7    | 28      |
| Alcoholic gastritis         | 48              | 45   | 62   | 72   | 41   | 268     | 67          | 43   | 82   | 91   | 73   | 356     |
| Alcoholic liver cirrhosis   | 268             | 228  | 199  | 209  | 224  | 1128    | 32          | 20   | 27   | 50   | 46   | 175     |
| Ethanol toxicity            | 1               | 0    | 2    | 0    | 0    | 3       | 0           | 0    | 1    | 0    | 0    | 1       |
| All wholly attributable     | 1667            | 1564 | 1571 | 1399 | 1294 | 7495    | 458         | 430  | 481  | 546  | 518  | 2433    |

Note: There were no hospital admissions from methanol toxicity in Western Australia during the period studied.

**Table 14: Age-standardised rates of hospital admissions due to conditions wholly attributable to alcohol, by Aboriginality, Western Australia, 1989-1993**

|                        | 1989 |             | 1990 |             | 1991 |             | 1992 |             | 1993 |             | 1989-1993 |             |
|------------------------|------|-------------|------|-------------|------|-------------|------|-------------|------|-------------|-----------|-------------|
|                        | ASR  | CI          | ASR  | CI          | ASR  | CI          | ASR  | CI          | ASR  | CI          | ASR       | CI          |
| <b>Non-Aboriginals</b> |      |             |      |             |      |             |      |             |      |             |           |             |
| Males                  | 152  | (143-160)   | 133  | (125-140)   | 133  | (125-141)   | 119  | (112-126)   | 103  | (97-110)    | 128       | (124-131)   |
| Females                | 45   | (40-50)     | 47   | (42-52)     | 42   | (38-47)     | 33   | (29-37)     | 36   | (32-40)     | 40        | (38-42)     |
| Persons                | 99   | (94-104)    | 90   | (86-95)     | 88   | (84-93)     | 76   | (72-80)     | 70   | (66-74)     | 84        | (82-86)     |
| <b>Aboriginals</b>     |      |             |      |             |      |             |      |             |      |             |           |             |
| Males                  | 1983 | (1758-2208) | 1695 | (1489-1901) | 1940 | (1724-2156) | 2245 | (2009-2480) | 1950 | (1732-2167) | 1966      | (1867-2064) |
| Females                | 689  | (559-819)   | 698  | (571-825)   | 642  | (521-762)   | 715  | (587-842)   | 779  | (649-909)   | 707       | (650-764)   |
| Persons                | 1309 | (1182-1436) | 1175 | (1056-1293) | 1262 | (1141-1383) | 1446 | (1315-1576) | 1336 | (1213-1460) | 1308      | (1252-1364) |

Note: ASR = the age-standardised rate per 100,000 person-years  
CI = 95% confidence intervals

**Table 15: Rate ratios of age-standardised hospitalisation rates for conditions wholly attributable to alcohol, Western Australia, 1989-1993**

| Rate ratio                 | 1989 | 1990 | 1991 | 1992 | 1993 | 1989-93 |
|----------------------------|------|------|------|------|------|---------|
| Aboriginal:non-Aboriginal  | 13.2 | 13.1 | 14.3 | 19.0 | 19.1 | 15.6    |
| Non Aboriginal male:female | 3.4  | 2.8  | 3.2  | 3.6  | 2.9  | 3.2     |
| Aboriginal male:female     | 2.9  | 2.4  | 3.0  | 3.1  | 2.5  | 2.8     |

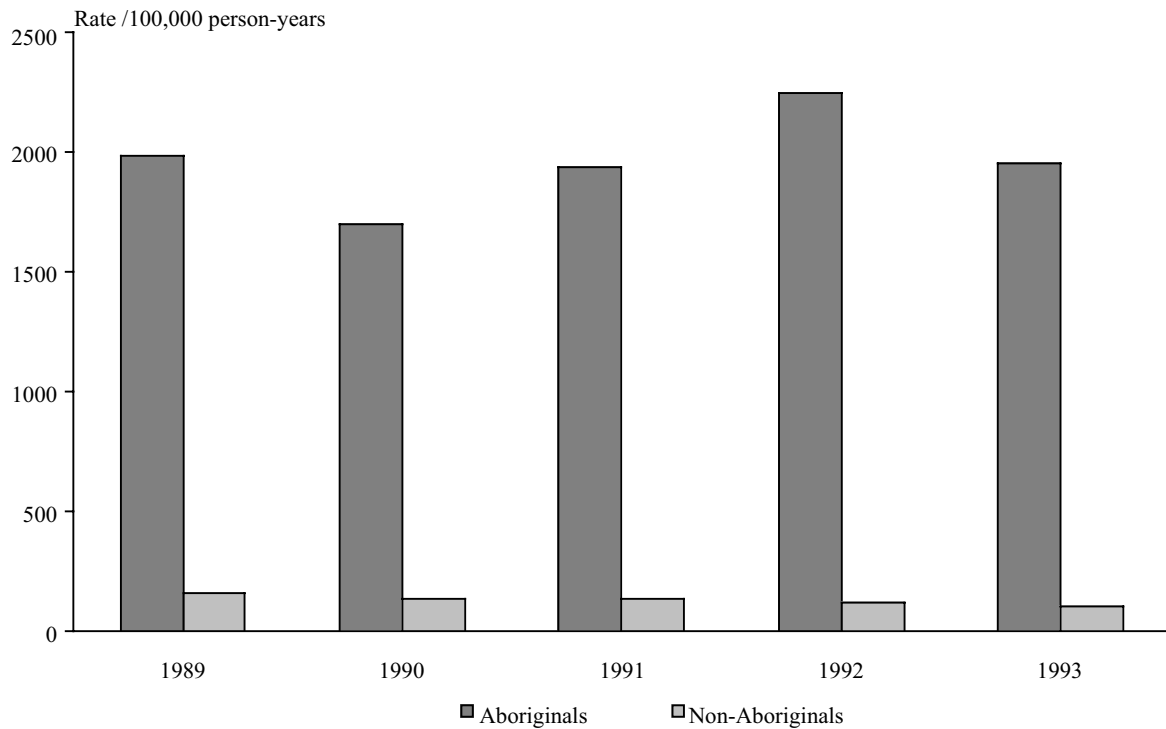
**Table 16: Average annual percentage change in hospitalisation rates for conditions wholly attributable to alcohol, by Aboriginality, Western Australia, 1989-1993**

|         | Non-Aboriginal |              | Aboriginal |              |
|---------|----------------|--------------|------------|--------------|
|         | %              | Significance | %          | Significance |
| Males   | -8.1           | S            | 1.1        | NS           |
| Females | -7.5           | S            | 2.1        | NS           |
| Persons | -8.0           | S            | 1.4        | NS           |

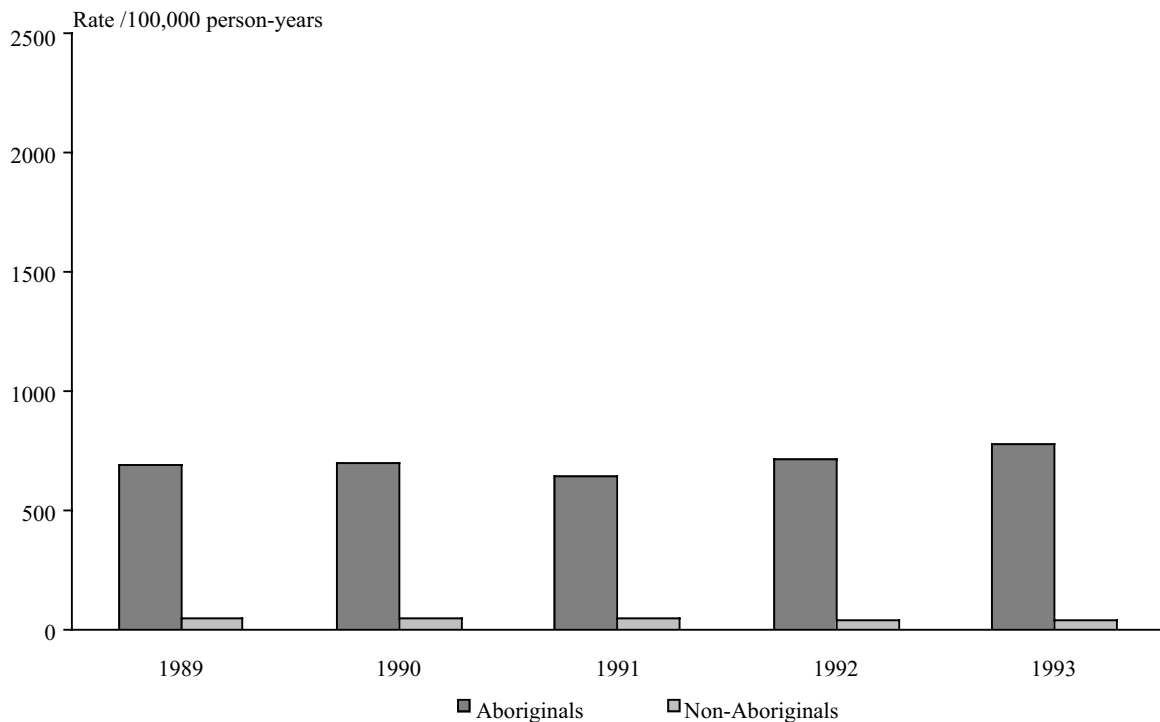
Note: The rate of change of ASRs is the average per year over the period 1989-93.  
NS = not significant ( $p > 0.05$ ); S = significant ( $p \leq 0.05$ ).



**Figure 7: Age-standardised rates of male hospital admissions wholly attributable to alcohol, by Aboriginality, Western Australia, 1989-1993**



**Figure 8: Age-standardised rates of female hospital admissions wholly attributable to alcohol, by Aboriginality, Western Australia, 1989-1993**



## 3.3 Hospitalisation due to all alcohol-caused conditions

### 3.3.1 Pilbara region

Over the period 1989-1993, an estimated 828 non-Aboriginals (638 males; 190 females) and 846 Aboriginals (438 males; 408 females) in the Pilbara region were admitted to hospital due to alcohol-caused conditions (Table 17).

The ASRs for alcohol-caused conditions were higher for Aboriginals than for non-Aboriginals - the ASRs for the period 1989-1993 were 3,452 hospital admissions per 100,000 person-years for Aboriginals and 520 for non-Aboriginals. The ASR for males was higher than that for females for both Aboriginals and non-Aboriginals (Table 18; Figures 9 and 10).

Aboriginal:non-Aboriginal rate ratios for all conditions attributable to alcohol were between 5.6 and 8.6 over the period 1989-1993, with the highest rate ratio occurring in 1993. The male:female rate ratios ranged from 1.6 to 3.0 for non-Aboriginals and from 1.0 to 1.4 for Aboriginals (Table 19).

Trend analysis of the hospitalisation rates for conditions caused by alcohol over the five-year period found statistically significant decreases in the rates for non-Aboriginal males (7.0%) and persons (6.3%) (Table 20).

**Table 17: Estimated number of hospital admissions for all alcohol-caused conditions, by Aboriginality, Pilbara region, 1989-1993**

|         | Non-Aboriginals |      |      |      |      |         | Aboriginals |      |      |      |      |         |
|---------|-----------------|------|------|------|------|---------|-------------|------|------|------|------|---------|
|         | 1989            | 1990 | 1991 | 1992 | 1993 | 1989-93 | 1989        | 1990 | 1991 | 1992 | 1993 | 1989-93 |
| Males   | 163             | 135  | 118  | 116  | 106  | 638     | 75          | 78   | 84   | 102  | 99   | 738     |
| Females | 36              | 37   | 47   | 39   | 31   | 190     | 79          | 67   | 89   | 91   | 82   | 408     |
| Persons | 199             | 172  | 165  | 155  | 137  | 828     | 154         | 145  | 173  | 193  | 181  | 846     |

**Table 18: Age-standardised rates of all alcohol-caused hospital admissions, by Aboriginality, Pilbara region, 1989-1993**

|                        | 1989 |             | 1990 |             | 1991 |             | 1992 |             | 1993 |             | 1989-1993 |             |
|------------------------|------|-------------|------|-------------|------|-------------|------|-------------|------|-------------|-----------|-------------|
|                        | ASR  | CI          | ASR  | CI          | ASR  | CI          | ASR  | CI          | ASR  | CI          | ASR       | CI          |
| <b>Non-Aboriginals</b> |      |             |      |             |      |             |      |             |      |             |           |             |
| Males                  | 714  | (565-864)   | 743  | (566-920)   | 710  | (521-899)   | 664  | (494-835)   | 610  | (392-828)   | 684       | (607-761)   |
| Females                | 235  | (126-343)   | 278  | (146-409)   | 436  | (243-630)   | 278  | (135-421)   | 200  | (112-287)   | 286       | (224-348)   |
| Persons                | 517  | (418-616)   | 549  | (430-668)   | 601  | (461-742)   | 518  | (393-644)   | 416  | (311-521)   | 520       | (467-572)   |
| <b>Aboriginals</b>     |      |             |      |             |      |             |      |             |      |             |           |             |
| Males                  | 3258 | (2495-4022) | 3415 | (2616-4213) | 3612 | (2810-4414) | 4146 | (3335-4956) | 4149 | (3305-4993) | 3719      | (3359-4080) |
| Females                | 3119 | (2412-3827) | 2785 | (2107-3463) | 3550 | (2800-4300) | 3474 | (2743-4204) | 3073 | (2395-3751) | 3203      | (2884-3521) |
| Persons                | 3218 | (2691-3745) | 3083 | (2565-3600) | 3574 | (3027-4122) | 3805 | (3261-4349) | 3558 | (3028-4089) | 3452      | (3213-3691) |

Note: ASR = the age-standardised rate per 100,000 person-years  
CI = 95% confidence intervals

**Table 19: Rate ratios of age-standardised hospitalisation rates for all alcohol-caused conditions, Pilbara region, 1989-1993**

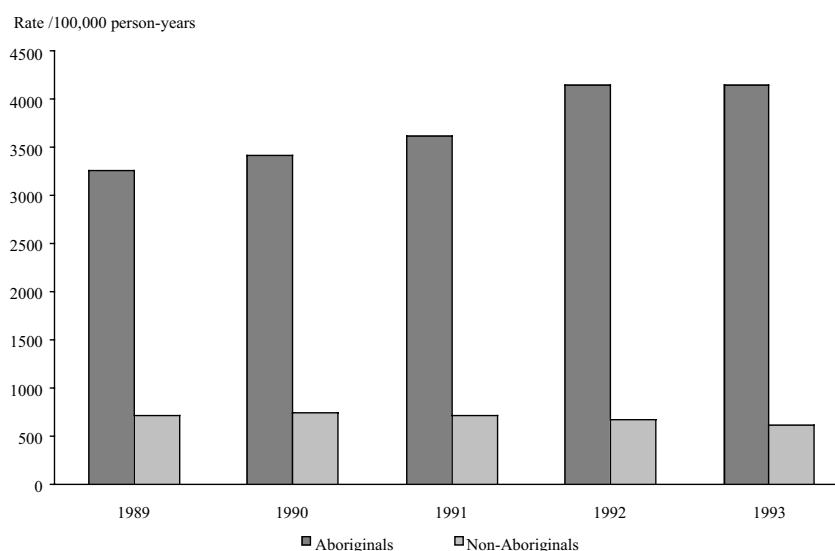
| Rate ratio                 | 1989 | 1990 | 1991 | 1992 | 1993 | 1989-93 |
|----------------------------|------|------|------|------|------|---------|
| Aboriginal:non-Aboriginal  | 6.2  | 5.6  | 5.9  | 7.3  | 8.6  | 6.6     |
| Non Aboriginal male:female | 3.0  | 2.7  | 1.6  | 2.4  | 3.0  | 2.4     |
| Aboriginal male:female     | 1.0  | 1.2  | 1.0  | 1.2  | 1.4  | 1.2     |

**Table 20: Average annual percentage change in hospitalisation rates for all alcohol-caused conditions, by Aboriginality, Pilbara region, 1989-1993**

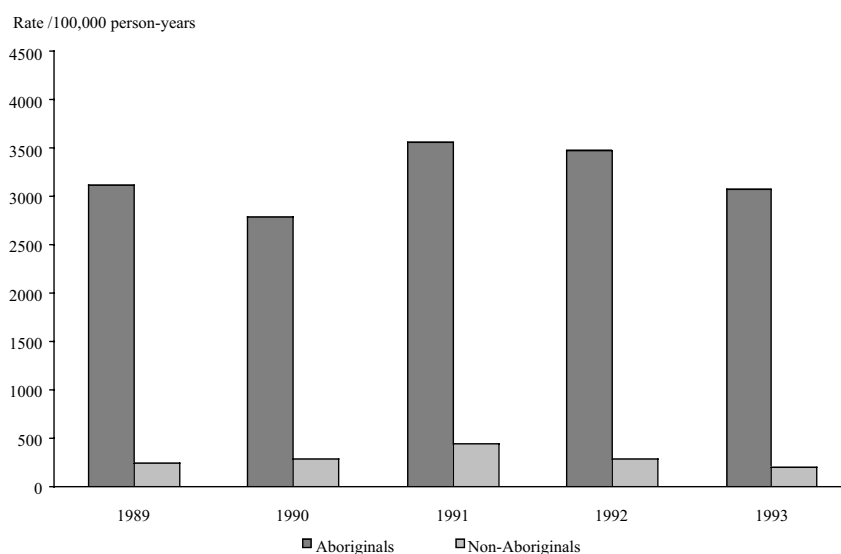
|         | Non-Aboriginal |              | Aboriginal |              |
|---------|----------------|--------------|------------|--------------|
|         | %              | Significance | %          | Significance |
| Males   | -7.0           | S            | 6.7        | NS           |
| Females | -2.2           | NS           | 1.9        | NS           |
| Persons | -6.3           | S            | 4.4        | NS           |

Note: The rate of change of ASRs is the average per year over the period 1989-93.  
NS = not significant ( $p > 0.05$ ); S = significant ( $p \leq 0.05$ ).

**Figure 9: Age-standardised rates of male hospital admissions due to alcohol-caused conditions, by Aboriginality, Pilbara region, 1989-1993**



**Figure 10: Age-standardised rates of female hospital admissions for all alcohol-caused conditions, by Aboriginality, Pilbara region, 1989-1993**



### 3.3.2 Western Australia

Over the period 1989-1993, an estimated 32,222 non-Aboriginals (20,261 males; 11,961 females) and 6,762 Aboriginals (4,105 males; 2,657 females) in Western Australia were admitted to hospital for alcohol-caused conditions (Table 21).

The ASRs for alcohol-caused conditions were higher for Aboriginals than for non-Aboriginals - the ASRs for the period 1989-1993 were 3,492 hospital admissions per 100,000 person-years for Aboriginals and 350 for non-Aboriginals. The ASR for males was higher than that for females for both Aboriginals and non-Aboriginals (Table 22; Figures 11 and 12).

Aboriginal:non-Aboriginal rate ratios for all alcohol-caused conditions were between 8.7 and 11.5 over the period 1989-1993, with the highest rate ratio occurring in 1993. Male:female rate ratios ranged from 1.9 to 2.1 for non-Aboriginals and from 1.6 to 1.8 for Aboriginals (Table 23).

Trend analysis of the hospitalisation rates for all alcohol-caused conditions over the five-year period found statistically significant increases in the rates for Aboriginals (males 4.3%; females 4.6%; persons 4.4%) and statistically significant decreases in the rates for non-Aboriginal males and persons (3.9% and 2.8% respectively) (Table 24).

**Table 21: Estimated number of hospital admissions for all alcohol-caused conditions, by Aboriginality, Western Australia, 1989-1993**

|         | Non-Aboriginals |      |      |      |      | 1989-93 | Aboriginals |      |      |      |      | 1989-93 |
|---------|-----------------|------|------|------|------|---------|-------------|------|------|------|------|---------|
|         | 1989            | 1990 | 1991 | 1992 | 1993 |         | 1989        | 1990 | 1991 | 1992 | 1993 |         |
| Males   | 4306            | 4097 | 4025 | 3922 | 3911 | 20261   | 738         | 712  | 802  | 904  | 949  | 4105    |
| Females | 2344            | 2375 | 2361 | 2335 | 2546 | 11961   | 474         | 475  | 518  | 561  | 629  | 2657    |
| Persons | 6650            | 6472 | 6386 | 6257 | 6457 | 32222   | 1212        | 1187 | 1320 | 1465 | 1578 | 6762    |

**Table 22: Age-standardised rates of all alcohol-caused hospital admissions, by Aboriginality, Western Australia, 1989-1993**

|                        | 1989 |             | 1990 |             | 1991 |             | 1992 |             | 1993 |             | 1989-1993 |             |
|------------------------|------|-------------|------|-------------|------|-------------|------|-------------|------|-------------|-----------|-------------|
|                        | ASR  | CI          | ASR  | CI          | ASR  | CI          | ASR  | CI          | ASR  | CI          | ASR       | CI          |
| <b>Non-Aboriginals</b> |      |             |      |             |      |             |      |             |      |             |           |             |
| Males                  | 510  | (495-526)   | 474  | (459-489)   | 459  | (444-473)   | 436  | (422-450)   | 431  | (417-444)   | 462       | (455-468)   |
| Females                | 242  | (231-252)   | 236  | (226-246)   | 226  | (216-236)   | 216  | (206-225)   | 230  | (220-239)   | 230       | (225-234)   |
| Persons                | 381  | (371-390)   | 359  | (350-368)   | 347  | (338-356)   | 329  | (321-338)   | 334  | (326-343)   | 350       | (346-354)   |
| <b>Aboriginals</b>     |      |             |      |             |      |             |      |             |      |             |           |             |
| Males                  | 4250 | (3927-4573) | 3924 | (3618-4230) | 4310 | (3994-4626) | 4862 | (4526-5197) | 4894 | (4563-5225) | 4462      | (4317-4606) |
| Females                | 2499 | (2260-2739) | 2398 | (2168-2627) | 2588 | (2350-2826) | 2645 | (2412-2878) | 2864 | (2627-3101) | 2605      | (2500-2711) |
| Persons                | 3337 | (3139-3536) | 3127 | (2938-3316) | 3414 | (3218-3610) | 3701 | (3499-3902) | 3830 | (3629-4031) | 3492      | (3403-3580) |

Note: ASR = the age-standardised rate per 100,000 person-years  
CI = 95% confidence intervals

**Table 23: Rate ratios of age-standardised hospitalisation rates for all alcohol-caused conditions, Western Australia, 1989-1993**

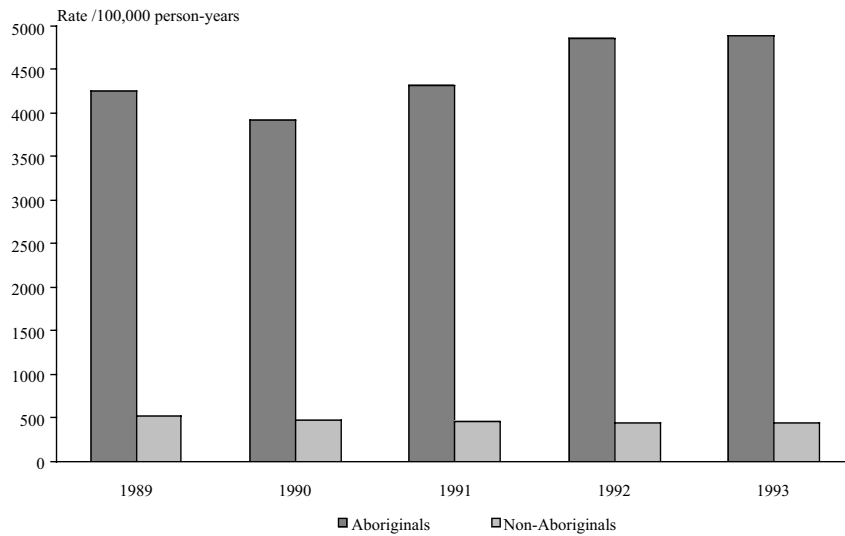
| Rate ratio                 | 1989 | 1990 | 1991 | 1992 | 1993 | 1989-93 |
|----------------------------|------|------|------|------|------|---------|
| Aboriginal:non-Aboriginal  | 8.8  | 8.7  | 9.8  | 11.2 | 11.5 | 10.0    |
| Non Aboriginal male:female | 2.1  | 2.0  | 2.0  | 2.0  | 1.9  | 2.0     |
| Aboriginal male:female     | 1.7  | 1.6  | 1.7  | 1.8  | 1.7  | 1.7     |

**Table 24: Average annual percentage change in hospitalisation rates for all alcohol-caused conditions, by Aboriginality, Western Australia, 1989-1993**

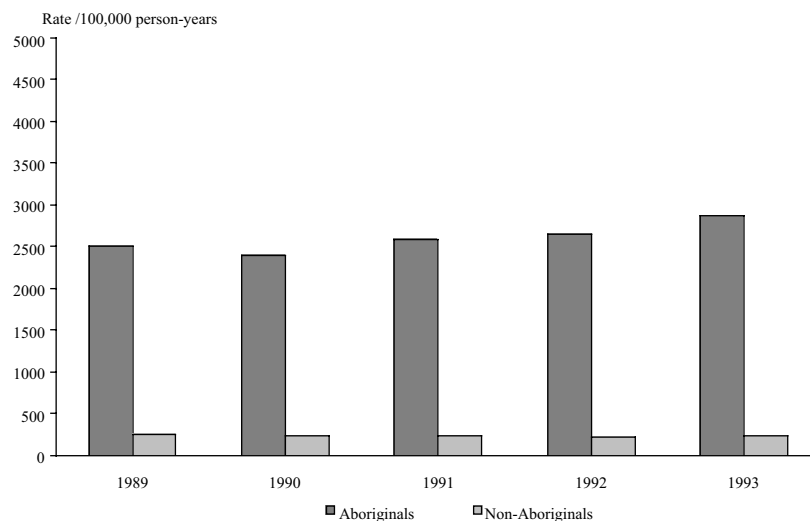
|         | Non-Aboriginal |              | Aboriginal |              |
|---------|----------------|--------------|------------|--------------|
|         | %              | Significance | %          | Significance |
| Males   | -3.9           | S            | 4.3        | S            |
| Females | -0.8           | NS           | 4.6        | S            |
| Persons | -2.8           | S            | 4.4        | S            |

Note: The rate of change of ASRs is the average per year over the period 1989-93.  
NS = not significant ( $p > 0.05$ ); S = significant ( $p \leq 0.05$ ).

**Figure 11: Age-standardised rates of male hospital admissions due to alcohol-caused conditions, by Aboriginality, Western Australia, 1989-1993**



**Figure 12: Age-standardised rates of female hospital admissions for all alcohol-caused conditions, by Aboriginality, Western Australia, 1989-1993**



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## 3.4 Alcohol-caused mortality

### 3.4.1 Pilbara region

#### Fatal alcohol-caused injuries

Over the period 1989-1993, an estimated 16 deaths (13 males; 3 females) in the Pilbara region were due to alcohol-caused injuries. Four of these deaths involved Aboriginals (3 males; 1 female), and 12 involved non-Aboriginals (10 males; 2 females) (Table 25).

The most common cause of death due to alcohol-caused injuries was road injuries, which claimed 13 lives (3 Aboriginals; 10 non-Aboriginals). There were two deaths due to suicides (both non-Aboriginal males) and one death due to assault (a female Aboriginal).

#### Conditions wholly attributable to alcohol

Over the period 1989-1993, there were a total of 14 deaths (10 males; 4 females) in the Pilbara region due to conditions wholly attributable to alcohol. Five deaths involved Aboriginals (2 males; 3 females), and nine involved non-Aboriginals (8 males; 1 female) (Table 26).

Two conditions were responsible for most of these deaths: alcoholic liver cirrhosis claimed seven lives (1 Aboriginal; 6 non-Aboriginals), and alcohol dependence claimed six lives (4 Aboriginals; 2 non-Aboriginals). In addition, one non-Aboriginal male died from alcoholic cardiomyopathy.

#### All alcohol-caused conditions

Over the period 1989-1993, an estimated 41 deaths (29 males; 12 females) in the Pilbara region were due to alcohol-caused conditions. Fifteen of these deaths involved Aboriginals (8 males; 7 females), and 26 involved non-Aboriginals (21 males; 5 females) (Table 27).

### 3.4.2 Western Australia

#### Fatal alcohol-caused injuries

Over the period 1989-1993, an estimated 703 deaths (516 males; 187 females) in Western Australia were due to alcohol-caused injuries. Sixty-four of these deaths involved Aboriginals (51 males; 13 females), and 639 involved non-Aboriginals (465 males; 174 females) (Table 28).

The most common cause of death due to alcohol-caused injuries was road injuries, which claimed 301 lives (28 Aboriginals; 273 non-Aboriginals). The next most common causes of death due to alcohol-caused injuries were suicides, 113 deaths (5 Aboriginals; 108 non-Aboriginals) and falls, 111 deaths (2 Aboriginals; 109 non-Aboriginals).

#### Conditions wholly attributable to alcohol

Over the period 1989-1993, there were a total of 480 deaths (371 males; 109 females) in Western Australia due to conditions wholly attributable to alcohol. Eighty-nine deaths involved Aboriginals (60 males; 29 females), and 391 involved non-Aboriginals (311 males; 80 females) (Table 29).

Two conditions were responsible for most of these deaths: alcoholic liver cirrhosis claimed 312 lives (42 Aboriginals; 270 non-Aboriginals), and alcohol dependence claimed 90 lives (33 Aboriginals; 57 non-Aboriginals).

#### All alcohol-caused conditions

Over the period 1989-1993, an estimated 1,616 deaths (1,112 males; 504 females) in Western Australia were due to alcohol-caused conditions. One hundred and eighty-one of these deaths involved Aboriginals (126 males; 55 females), and 1,435 involved non-Aboriginals (986 males; 449 females) (Table 30).

**Table 25: Estimated number of deaths due to alcohol-caused injuries, by Aboriginality, Pilbara region, 1989-1993**

|                  | Non-Aboriginals |      |      |      |      |         | Aboriginals |      |      |      |      |         |
|------------------|-----------------|------|------|------|------|---------|-------------|------|------|------|------|---------|
|                  | 1989            | 1990 | 1991 | 1992 | 1993 | 1989-93 | 1989        | 1990 | 1991 | 1992 | 1993 | 1989-93 |
| <b>Males</b>     |                 |      |      |      |      |         |             |      |      |      |      |         |
| Road injuries    | 2               | 1    | 2    | 2    | 1    | 8       | 1           | 0    | 1    | 1    | 0    | 3       |
| Machine injuries | 0               | 0    | 0    | 0    | 0    | 0       | 0           | 0    | 0    | 0    | 0    | 0       |
| Suicide          | 0               | 1    | 0    | 1    | 0    | 2       | 0           | 0    | 0    | 0    | 0    | 0       |
| Assault          | 0               | 0    | 0    | 0    | 0    | 0       | 0           | 0    | 0    | 0    | 0    | 0       |
| Falls            | 0               | 0    | 0    | 0    | 0    | 0       | 0           | 0    | 0    | 0    | 0    | 0       |
| Other e-codes    | 0               | 0    | 0    | 0    | 0    | 0       | 0           | 0    | 0    | 0    | 0    | 0       |
| All injuries     | 2               | 2    | 2    | 3    | 1    | 10      | 1           | 0    | 1    | 1    | 0    | 3       |
| <b>Females</b>   |                 |      |      |      |      |         |             |      |      |      |      |         |
| Road injuries    | 1               | 0    | 0    | 0    | 1    | 2       | 0           | 0    | 0    | 0    | 0    | 0       |
| Machine injuries | 0               | 0    | 0    | 0    | 0    | 0       | 0           | 0    | 0    | 0    | 0    | 0       |
| Suicide          | 0               | 0    | 0    | 0    | 0    | 0       | 0           | 0    | 0    | 0    | 0    | 0       |
| Assault          | 0               | 0    | 0    | 0    | 0    | 0       | 0           | 0    | 0    | 1    | 0    | 1       |
| Falls            | 0               | 0    | 0    | 0    | 0    | 0       | 0           | 0    | 0    | 0    | 0    | 0       |
| Other e-codes    | 0               | 0    | 0    | 0    | 0    | 0       | 0           | 0    | 0    | 0    | 0    | 0       |
| All injuries     | 1               | 0    | 0    | 0    | 1    | 2       | 0           | 0    | 0    | 1    | 0    | 1       |
| <b>Persons</b>   |                 |      |      |      |      |         |             |      |      |      |      |         |
| Road injuries    | 3               | 1    | 2    | 2    | 2    | 10      | 1           | 0    | 1    | 1    | 0    | 3       |
| Machine injuries | 0               | 0    | 0    | 0    | 0    | 0       | 0           | 0    | 0    | 0    | 0    | 0       |
| Suicide          | 0               | 1    | 0    | 1    | 0    | 2       | 0           | 0    | 0    | 0    | 0    | 0       |
| Assault          | 0               | 0    | 0    | 0    | 0    | 0       | 0           | 0    | 0    | 1    | 0    | 1       |
| Falls            | 0               | 0    | 0    | 0    | 0    | 0       | 0           | 0    | 0    | 0    | 0    | 0       |
| Other e-codes    | 0               | 0    | 0    | 0    | 0    | 0       | 0           | 0    | 0    | 0    | 0    | 0       |
| All injuries     | 3               | 2    | 2    | 3    | 2    | 12      | 1           | 0    | 1    | 2    | 0    | 4       |

**Table 26: Estimated number of deaths due to conditions wholly attributable to alcohol by Aboriginality, Pilbara region, 1989-1993**

|                             | Non-Aboriginals |      |      |      |      |         | Aboriginals |      |      |      |      |         |
|-----------------------------|-----------------|------|------|------|------|---------|-------------|------|------|------|------|---------|
|                             | 1989            | 1990 | 1991 | 1992 | 1993 | 1989-93 | 1989        | 1990 | 1991 | 1992 | 1993 | 1989-93 |
| <b>Males</b>                |                 |      |      |      |      |         |             |      |      |      |      |         |
| Alcoholic psychosis         | 0               | 0    | 0    | 0    | 0    | 0       | 0           | 0    | 0    | 0    | 0    | 0       |
| Alcohol dependence          | 0               | 0    | 0    | 2    | 0    | 2       | 1           | 0    | 0    | 0    | 1    | 2       |
| Alcohol non-dependent abuse | 0               | 0    | 0    | 0    | 0    | 0       | 0           | 0    | 0    | 0    | 0    | 0       |
| Alcoholic cardiomyopathy    | 0               | 0    | 1    | 0    | 0    | 1       | 0           | 0    | 0    | 0    | 0    | 0       |
| Alcoholic liver cirrhosis   | 1               | 0    | 2    | 1    | 1    | 5       | 0           | 0    | 0    | 0    | 0    | 0       |
| Ethanol toxicity            | 0               | 0    | 0    | 0    | 0    | 0       | 0           | 0    | 0    | 0    | 0    | 0       |
| All wholly attributable     | 1               | 0    | 3    | 3    | 1    | 8       | 1           | 0    | 0    | 0    | 1    | 2       |
| <b>Females</b>              |                 |      |      |      |      |         |             |      |      |      |      |         |
| Alcoholic psychosis         | 0               | 0    | 0    | 0    | 0    | 0       | 0           | 0    | 0    | 0    | 0    | 0       |
| Alcohol dependence          | 0               | 0    | 0    | 0    | 0    | 0       | 0           | 0    | 1    | 0    | 1    | 2       |
| Alcohol non-dependent abuse | 0               | 0    | 0    | 0    | 0    | 0       | 0           | 0    | 0    | 0    | 0    | 0       |
| Alcoholic cardiomyopathy    | 0               | 0    | 0    | 0    | 0    | 0       | 0           | 0    | 0    | 0    | 0    | 0       |
| Alcoholic liver cirrhosis   | 0               | 1    | 0    | 0    | 0    | 1       | 0           | 1    | 0    | 0    | 0    | 1       |
| Ethanol toxicity            | 0               | 0    | 0    | 0    | 0    | 0       | 0           | 0    | 0    | 0    | 0    | 0       |
| All wholly attributable     | 0               | 1    | 0    | 0    | 0    | 1       | 0           | 1    | 1    | 0    | 1    | 3       |
| <b>Persons</b>              |                 |      |      |      |      |         |             |      |      |      |      |         |
| Alcoholic psychosis         | 0               | 0    | 0    | 0    | 0    | 0       | 0           | 0    | 0    | 0    | 0    | 0       |
| Alcohol dependence          | 0               | 0    | 0    | 2    | 0    | 2       | 1           | 0    | 1    | 0    | 2    | 4       |
| Alcohol non-dependent abuse | 0               | 0    | 0    | 0    | 0    | 0       | 0           | 0    | 0    | 0    | 0    | 0       |
| Alcoholic cardiomyopathy    | 0               | 0    | 1    | 0    | 0    | 1       | 0           | 0    | 0    | 0    | 0    | 0       |
| Alcoholic liver cirrhosis   | 1               | 1    | 2    | 1    | 1    | 6       | 0           | 1    | 0    | 0    | 0    | 1       |
| Ethanol toxicity            | 0               | 0    | 0    | 0    | 0    | 0       | 0           | 0    | 0    | 0    | 0    | 0       |
| All wholly attributable     | 1               | 1    | 3    | 3    | 1    | 9       | 1           | 1    | 1    | 0    | 2    | 5       |

Note: There were no deaths from alcoholic polyneuropathy, alcoholic gastritis, or methanol toxicity in the Pilbara region during the period studied.



**Table 27: Estimated number of deaths from all alcohol-caused conditions, by Aboriginality, Pilbara region, 1989-1993**

|         | Non-Aboriginals |      |      |      |      |         | Aboriginals |      |      |      |      |         |
|---------|-----------------|------|------|------|------|---------|-------------|------|------|------|------|---------|
|         | 1989            | 1990 | 1991 | 1992 | 1993 | 1989-93 | 1989        | 1990 | 1991 | 1992 | 1993 | 1989-93 |
| Males   | 4               | 2    | 5    | 6    | 4    | 21      | 3           | -    | 2    | 2    | 1    | 8       |
| Females | 1               | 2    | -    | 1    | 1    | 5       | -           | 2    | 2    | 1    | 2    | 7       |
| Persons | 5               | 4    | 5    | 7    | 5    | 26      | 3           | 2    | 4    | 3    | 3    | 15      |

**Table 28: Estimated number of deaths due to alcohol-caused injuries, by Aboriginality, Western Australia, 1989-1993**

|                  | Non-Aboriginals |      |      |      |      |         | Aboriginals |      |      |      |      |         |
|------------------|-----------------|------|------|------|------|---------|-------------|------|------|------|------|---------|
|                  | 1989            | 1990 | 1991 | 1992 | 1993 | 1989-93 | 1989        | 1990 | 1991 | 1992 | 1993 | 1989-93 |
| <b>Males</b>     |                 |      |      |      |      |         |             |      |      |      |      |         |
| Road injuries    | 53              | 47   | 44   | 41   | 42   | 227     | 4           | 3    | 7    | 3    | 7    | 24      |
| Machine injuries | 1               | 1    | 1    | 0    | 0    | 3       | 0           | 0    | 0    | 0    | 0    | 0       |
| Suicide          | 17              | 19   | 19   | 20   | 19   | 94      | 1           | 1    | 1    | 1    | 1    | 5       |
| Assault          | 6               | 5    | 4    | 5    | 7    | 27      | 2           | 1    | 1    | 2    | 3    | 9       |
| Falls            | 10              | 13   | 8    | 10   | 9    | 50      | 0           | 0    | 0    | 0    | 1    | 1       |
| Other e-codes    | 18              | 16   | 10   | 9    | 11   | 64      | 2           | 6    | 3    | 1    | 0    | 12      |
| All injuries     | 105             | 101  | 86   | 85   | 88   | 465     | 9           | 11   | 12   | 7    | 12   | 51      |
| <b>Females</b>   |                 |      |      |      |      |         |             |      |      |      |      |         |
| Road injuries    | 10              | 9    | 8    | 12   | 7    | 46      | 0           | 1    | 1    | 1    | 1    | 4       |
| Machine injuries | 0               | 0    | 0    | 0    | 0    | 0       | 0           | 0    | 0    | 0    | 0    | 0       |
| Suicide          | 2               | 3    | 3    | 3    | 3    | 14      | 0           | 0    | 0    | 0    | 0    | 0       |
| Assault          | 3               | 4    | 5    | 5    | 5    | 22      | 0           | 3    | 2    | 2    | 1    | 8       |
| Falls            | 11              | 15   | 10   | 11   | 12   | 59      | 1           | 0    | 0    | 0    | 0    | 1       |
| Other e-codes    | 6               | 8    | 10   | 4    | 5    | 33      | 0           | 0    | 0    | 0    | 0    | 0       |
| All injuries     | 32              | 39   | 36   | 35   | 32   | 174     | 1           | 4    | 3    | 3    | 2    | 13      |
| <b>Persons</b>   |                 |      |      |      |      |         |             |      |      |      |      |         |
| Road injuries    | 63              | 56   | 52   | 53   | 49   | 273     | 4           | 4    | 8    | 4    | 8    | 28      |
| Machine injuries | 1               | 1    | 1    | 0    | 0    | 3       | 0           | 0    | 0    | 0    | 0    | 0       |
| Suicide          | 19              | 22   | 22   | 23   | 22   | 108     | 1           | 1    | 1    | 1    | 1    | 5       |
| Assault          | 9               | 9    | 9    | 10   | 12   | 49      | 2           | 4    | 3    | 4    | 4    | 17      |
| Falls            | 21              | 28   | 18   | 21   | 21   | 109     | 1           | 0    | 0    | 0    | 1    | 2       |
| Other e-codes    | 24              | 24   | 20   | 13   | 16   | 97      | 2           | 6    | 3    | 1    | 0    | 12      |
| All injuries     | 137             | 140  | 122  | 120  | 120  | 639     | 10          | 15   | 15   | 10   | 14   | 64      |

**Table 29: Estimated number of deaths due to conditions wholly attributable to alcohol, by Aboriginality, Western Australia, 1989-1993**

|                             | Non-Aboriginals |      |      |      |      |         | Aboriginals |      |      |      |      |         |
|-----------------------------|-----------------|------|------|------|------|---------|-------------|------|------|------|------|---------|
|                             | 1989            | 1990 | 1991 | 1992 | 1993 | 1989-93 | 1989        | 1990 | 1991 | 1992 | 1993 | 1989-93 |
| <b>Males</b>                |                 |      |      |      |      |         |             |      |      |      |      |         |
| Alcoholic psychosis         | 3               | 1    | 1    | 4    | 2    | 11      | 1           | 0    | 0    | 1    | 0    | 2       |
| Alcohol dependence          | 4               | 7    | 10   | 13   | 14   | 48      | 3           | 5    | 4    | 4    | 4    | 20      |
| Alcohol non-dependent abuse | 1               | 0    | 1    | 0    | 2    | 4       | 0           | 0    | 0    | 0    | 0    | 0       |
| Alcoholic cardiomyopathy    | 8               | 6    | 7    | 8    | 7    | 36      | 2           | 1    | 3    | 1    | 1    | 8       |
| Alcoholic liver cirrhosis   | 59              | 34   | 39   | 46   | 31   | 209     | 11          | 3    | 4    | 6    | 6    | 30      |
| Ethanol toxicity            | 0               | 3    | 0    | 0    | 0    | 3       | 0           | 0    | 0    | 0    | 0    | 0       |
| All wholly attributable     | 75              | 51   | 58   | 71   | 56   | 311     | 17          | 9    | 11   | 12   | 11   | 60      |
| <b>Females</b>              |                 |      |      |      |      |         |             |      |      |      |      |         |
| Alcoholic psychosis         | 1               | 0    | 1    | 0    | 2    | 4       | 0           | 0    | 0    | 0    | 0    | 0       |
| Alcohol dependence          | 1               | 1    | 2    | 0    | 5    | 9       | 1           | 2    | 5    | 1    | 4    | 13      |
| Alcohol non-dependent abuse | 0               | 0    | 0    | 0    | 0    | 0       | 0           | 0    | 1    | 1    | 0    | 2       |
| Alcoholic cardiomyopathy    | 1               | 0    | 1    | 1    | 1    | 4       | 0           | 1    | 0    | 0    | 0    | 1       |
| Alcoholic liver cirrhosis   | 10              | 15   | 10   | 14   | 12   | 61      | 4           | 2    | 1    | 3    | 2    | 12      |
| Ethanol toxicity            | 0               | 0    | 1    | 1    | 0    | 2       | 0           | 0    | 0    | 1    | 0    | 1       |
| All wholly attributable     | 13              | 16   | 15   | 16   | 20   | 80      | 5           | 5    | 7    | 6    | 6    | 29      |
| <b>Persons</b>              |                 |      |      |      |      |         |             |      |      |      |      |         |
| Alcoholic psychosis         | 4               | 1    | 2    | 4    | 4    | 15      | 1           | 0    | 0    | 1    | 0    | 2       |
| Alcohol dependence          | 5               | 8    | 12   | 13   | 19   | 57      | 4           | 7    | 9    | 5    | 8    | 33      |
| Alcohol non-dependent abuse | 1               | 0    | 1    | 0    | 2    | 4       | 0           | 0    | 1    | 1    | 0    | 2       |
| Alcoholic cardiomyopathy    | 9               | 6    | 8    | 9    | 8    | 40      | 2           | 2    | 3    | 1    | 1    | 9       |
| Alcoholic liver cirrhosis   | 69              | 49   | 49   | 60   | 43   | 270     | 15          | 5    | 5    | 9    | 8    | 42      |
| Ethanol toxicity            | 0               | 3    | 1    | 1    | 0    | 5       | 0           | 0    | 0    | 1    | 0    | 1       |
| All wholly attributable     | 88              | 67   | 73   | 87   | 76   | 391     | 22          | 14   | 18   | 18   | 17   | 89      |

Note: There were no deaths from alcoholic polyneuropathy, alcoholic gastritis, or methanol toxicity in Western Australia during the period studied.

**Table 30: Estimated number of deaths from all alcohol-caused conditions, by Aboriginality, Western Australia, 1989-1993**

|         | Non-Aboriginals |      |      |      |      |         | Aboriginals |      |      |      |      |         |
|---------|-----------------|------|------|------|------|---------|-------------|------|------|------|------|---------|
|         | 1989            | 1990 | 1991 | 1992 | 1993 | 1989-93 | 1989        | 1990 | 1991 | 1992 | 1993 | 1989-93 |
| Males   | 222             | 191  | 182  | 200  | 191  | 986     | 30          | 22   | 25   | 23   | 26   | 126     |
| Females | 87              | 92   | 88   | 92   | 90   | 449     | 8           | 11   | 13   | 12   | 11   | 55      |
| Persons | 309             | 283  | 270  | 292  | 281  | 1435    | 38          | 33   | 38   | 35   | 37   | 181     |

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## 4 Summary of results

In the Pilbara Statistical Division 17.06 litres of absolute alcohol per adult was consumed in the 1992-1993 financial year.<sup>10</sup> Although this was a reduction of four per cent from the 1991-1992 financial year, it was still much greater than the State average per capita consumption of 10.92 litres and the third highest per capita consumption (after the Kimberley and South Eastern Statistical Divisions). The high level of alcohol consumption in the Pilbara region has resulted in higher rates of alcohol-caused conditions compared with the total population of Western Australia.

### 4.1 Hospitalisation due to alcohol-caused injuries

The ASR for non-Aboriginals in the Pilbara for the period 1989-1993 for hospitalisation due to alcohol-caused injuries was 270 hospital admissions per 100,000 person-years, compared with 223 in Western Australia over the same period. The higher rate in the Pilbara region was due to non-Aboriginal males having a higher ASR than non-Aboriginal males Statewide.

The ASR for Aboriginals in the Pilbara region for the period 1989-1993 was 1,967 hospital admissions per 100,000 person-years, compared with 1,686 in Western Australia for the same period. The higher rate in the Pilbara region was due to Aboriginal females having a much higher ASR than Aboriginal females Statewide: in fact, the ASR for Aboriginal females in the Pilbara was higher than that for Aboriginal males, resulting in a male:female ratio of less than 1.0.

In both the Pilbara and Western Australia as a whole, assaults were the most common type of alcohol-caused injuries for Aboriginals and falls were the most common among non-Aboriginals.

In the Pilbara region the hospitalisation rate for alcohol-caused injuries among male Aboriginals increased significantly by 10.7% over the period 1989-1993. For the State, rates for Aboriginal males and females increased significantly over the same period (by 7.6% and 7.0% respectively) and rates for non-Aboriginal males showed a significant decrease of 4.3%.

### 4.2 Hospitalisation due to conditions wholly attributable to alcohol use

The ASR for non-Aboriginals in the Pilbara for the period 1989-1993 for hospitalisation due to conditions wholly attributable to alcohol use was 156 hospital admissions per 100,000 person-years, nearly double the rate for Western Australia (ASR 84) for the same period. Both male and female non-Aboriginals in the Pilbara region had higher ASRs than their counterparts Statewide.

The ASR for Aboriginals in the Pilbara for the period 1989-1993 was 979 hospital admissions per 100,000 person-years, compared with 1,308 in Western Australia for the same period. Both male and female Aboriginals in the Pilbara region had lower ASRs than their counterparts Statewide.

Of the conditions wholly attributable to alcohol use, alcohol dependence was responsible for the most hospital admissions among non-Aboriginals in the Pilbara and the State. For Aboriginals Statewide, alcohol dependence was also the most common condition wholly attributable to alcohol (although alcohol abuse was equally common for Aboriginal females). For Aboriginals in the Pilbara region, alcoholic psychosis was the most common condition wholly attributable to alcohol for males and alcohol dependence for females.

In the Pilbara region, the hospitalisation rates for conditions wholly attributable to alcohol among non-Aboriginal males decreased significantly by 13.5% over the period 1989-1993. For the State, rates for non-Aboriginal males and females decreased significantly over the same period by 8.1% and 7.5%. Aboriginal hospitalisation rates for conditions wholly attributable to alcohol showed no significant trends.

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### 4.3 Hospitalisation due to all conditions attributable to alcohol use

The ASR for non-Aboriginals in the Pilbara for the period 1989-1993 for hospitalisation due to alcohol-caused conditions was 520 hospital admissions per 100,000 person-years, higher than the rate for Western Australia (ASR 350) for the same period. Both male and female non-Aboriginals in the Pilbara region had higher ASRs than their counterparts Statewide.

The ASR for Aboriginals in the Pilbara for the period 1989-1993 was 3,452 hospital admissions per 100,000 person-years, similar to the rate for Western Australia over the same period (ASR 3,492). Aboriginal males in the Pilbara region had lower ASRs than Aboriginal males Statewide, but Aboriginal females in the Pilbara had higher ASRs than their counterparts Statewide.

In the Pilbara region, the hospitalisation rate for alcohol-caused conditions among non-Aboriginal males and persons decreased significantly by 7.0% over the period 1989-1993. Statewide, the rate for non-Aboriginal males decreased significantly by 3.9%, but rates for Aboriginal males and females increased significantly over the same period by 4.3% and 4.6%.

### References

- <sup>1</sup> Swensen G, Unwin E (1994). *A study of hospitalisation and mortality due to alcohol use in the Kimberley Health Region of Western Australia, 1988-1992*. Occasional Paper No. 57, Health Department of Western Australia, Perth.
- <sup>2</sup> Holman CDJ, Armstrong BK, Arias LN, Martin CA, Hatton WM, Hayward LD, Salmon MA, Shean RE, Waddell VP (1988). *The quantification of drug caused morbidity and mortality in Australia*. Commonwealth Department of Community Services and Health, Canberra.
- <sup>3</sup> English DR, Holman CDJ, Milne E, Winter MG, Hulse GK, Codde JP, Bower CI, Corti B, de Klerk N, Knuiman MW, Kurinczuk JJ, Lewin GF, Ryan GA (1995). *The quantification of drug caused morbidity and mortality in Australia, 1995 edition*. Commonwealth Department of Human Services and Health, Canberra.
- <sup>4</sup> As defined by the National Health and Medical Research Council.
- <sup>5</sup> The HMDS covers all public and private hospitals in Western Australia, including the detoxification program run by the Alcohol and Drug Authority, but excluding psychiatric hospitals. Only episodes of treatment requiring an inpatient stay are captured on the HMDS, therefore alcohol-caused conditions which received outpatient treatment are not included in this report.
- <sup>6</sup> A program called the *Health Statistics Calculator* (written by Dr J Codde, Health Statistics Branch, Health Department of Western Australia, 1993) was used to calculate the age standardised rates (ASRs).
- <sup>7</sup> Roberts M (1994). *Health Authority boundaries, 1994-1995*. Health Department of Western Australia, Perth.
- <sup>8</sup> The postcodes constituting the Pilbara region are 6711-6716, 6718, 6720-6724, 6751-6755, 6758, 6760-6762.
- <sup>9</sup> Payne CD (ed) (1985). *The Generalised Linear Interactive Modelling System, release 3.77*. Numerical Algorithms Group, Oxford
- <sup>10</sup> Daly A, Philp A (1995). *Alcohol consumption in Western Australia, July 1991 to June 1993*. Occasional Paper No. 66, Health Department of Western Australia, Perth.

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<sup>11</sup> For the full list of alcohol-related conditions and the age- and sex-specific aetiologic fractions see: English DR, Holman CDJ, Milne E, Winter MG, Hulse GK, Codde JP, Bower CI, Corti B, de Klerk N, Knuiman MW, Kurinczuk JJ, Lewin GF, Ryan GA (1995). *The quantification of drug caused morbidity and mortality in Australia, 1995 edition*. Commonwealth Department of Human Services and Health, Canberra.

<sup>12</sup> Injuries marked with an asterix are grouped under ‘other e-codes’.

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## Appendix 1

### ICD9-CM codes for alcohol-caused injuries and conditions wholly attributable to alcohol<sup>11</sup>

#### Injuries<sup>12</sup>

|                              |                                |
|------------------------------|--------------------------------|
| E810-E819                    | Road injuries                  |
| E860.0, E860.1, E860.2       | Alcohol and ethanol poisoning* |
| E880-E888                    | Fall injuries                  |
| E890-E899                    | Fire injuries*                 |
| E910                         | Drowning*                      |
| E911                         | Aspiration*                    |
| E919-E920                    | Machine injuries               |
| E950-E959                    | Suicide                        |
| E960, E965, E966, E968, E969 | Assault                        |
| E967                         | Child abuse*                   |

#### Conditions wholly attributable to alcohol use

|             |                             |
|-------------|-----------------------------|
| 291         | Alcoholic psychosis         |
| 303         | Alcohol dependence          |
| 305         | Alcohol non-dependent abuse |
| 357.5       | Alcoholic polyneuropathy    |
| 425.5       | Alcoholic cardiomyopathy    |
| 535.3       | Alcoholic gastritis         |
| 571.0-571.3 | Alcoholic liver cirrhosis   |
| 980.0       | Ethanol toxicity            |
| 980.1       | Methanol toxicity           |