Road Injury Information Program
Report Series, Number 4

Road Injury in Australia 1991

by
P.J. O'Connor and R.F. Trembath

AUSTRALIAN INSTITUTE OF
HEALTH & WELFARE

NATIONAL INJURY SURVEILLANCE UNIT

ROAD INJURY INFORMATION PROGRAM
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Abstract:

This report contains information on road injury hospital separations and deaths for 1991. It presents tabulations and limited descriptive commentary on a range of factors including age, sex, road user type, nature and body region of injury, injury severity, length of stay in hospital and State/Territory.

Data on hospital separations was provided by State/Territory health authorities through the Australian Institute of Health and Welfare. Fatality data was provided by the Australian Bureau of Statistics. Some of the more interesting findings are highlighted below:

1. In 1991 more than 12 in every 100,000 Australians were killed in road crashes and more than 200 in every 100,000 were admitted to hospital.
2. Between 1990 and 1991 there was a 10% reduction in the age-standardised road injury hospital separation and fatality rates. The extent of the reduction increased with increasing injury severity. Motorcyclists were the only road user group whose separation rate did not decline.
3. The number of separations for male motorcyclists exceeded, by a third, the number of separations for the known high risk group of young male drivers in the 15-29 age group, demonstrating a characteristic which has not been shown before in the Australian road safety literature.
4. Head injury separation rates were highest in occupants of motor vehicles and pedal cyclists, especially in males. Spinal injury was predominantly a feature of motorised transport (vehicle occupants and motorcyclists).
5. The road user group with the highest average length of stay in hospital (ALOS) was pedestrians (12 days). Pedal cyclists had the lowest ALOS (3.7 days). ALOS was greatest for spinal (14 days) and lower extremity injury (13 days).

FOREWORD

The Road Injury Information Program was initiated by the AIHW National Injury Surveillance Unit through a funding allocation from the Department of Health, Housing, Local Government and Community Services. The program aims to improve the national data on the incidence and severity of road injury and major trauma so as to facilitate improved monitoring and prevention.

This report presents information on road injury hospital separations and fatalities for the calendar year 1991. It is the second report in a series prepared by the National Injury Surveillance Unit (NISU) to monitor road injury at national level. The first report provided information for the calender year 1990 (O'Connor, 1993).

Data on hospital separations was provided by State/Territory health authorities through the Australian Institute of Health & Welfare. Fatality data was provided by the Australian Bureau of Statistics. All data analysis was undertaken at NISU. The scope of the data analysis was restricted to records with an ICD-9 'external cause' code of E-810 to E-819 (Motor vehicle traffic accidents) or E-826 (Pedal cycle accidents).

The report is essentially a series of tabulations with limited descriptive commentary and a few figures and diagrams. The tabulations present information on a range of factors including age, sex, road user type, nature and body region of injury, injury severity, length of stay in hospital and State/Territory.

This information will enable a better targeting of safety problems. For example, information on the rate of head injury in road crashes in Australia will enable development of goals for a targeted level of reduction of such injury. The information can also be used to monitor the effectiveness of road injury prevention programs and to influence priority setting eg. information on the apparent severity of pedestrian injury and lower limb injuries and high separation rates for young male motorcyclists may lead to a shift in priorities in treatment and prevention.

The assistance of Dr. Tony Ryan, Director of the W.A. Road Accident Prevention Research Unit, in reviewing the report and providing valuable commentary on its style and content, is gratefully acknowledged.

Requests for further information should be addressed to:

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SUMMARY OF MAIN FINDINGS

1. In 1991 more than 12 in every 100,000 Australians were killed in road crashes and more than 200 in every 100,000 were admitted to hospital.

2. Between 1990 and 1991 there was a 10% reduction in the age-standardised road injury hospital separation and fatality rates. The extent of the reduction increased with increasing injury severity. Comparison of the 1990-91 trend with the 1988 vs.1990 trend reported in O'Connor (1993) demonstrated a recently accelerated reduction in hospital separations with serious, severe and critical injury. For example, critical injury declined by an average of 15% pa 1988 vs. 90 and 26% 1990-91. Motorcyclists were the only road user group whose separation rate did not decline.

3. Occupants of motor vehicles accounted for over 40% of road injury separations and two thirds of road fatalities .

4. Approximately one quarter of deaths and hospital separations were males aged 15-24 years and the all ages male rate was much higher than the female rate, especially so for fatalities.

5. A high ratio of deaths to hospital separations (D:H) in the elderly was notable. The ratio D:H for the oldest group (70+ yrs.) was more than five times that of the 5-14 age group and more than twice as high as the age group which has the highest hospital separation rate (i.e. 15-19 year olds).

6. The number of separations for male motorcycle riders or pillion passengers exceeded by a third the number of separations for the known high risk group of male drivers in the 15-29 age group, demonstrating a characteristic which to the authors' knowledge has not been shown before in the Australian road safety literature.

7. When each separation was assessed in terms of the body region of most severe injury (or body regions, in the case of multiple injuries at the same level of severity), it was found that the most frequently involved regions were head (17%), lower extremity (16%) and multiple regions (18%).

8. Head injury separation rates were highest in occupants of motor vehicles and pedal cyclists and especially in young males (age 15-24 yrs). High rates of lower extremity injury in male motorcyclists and both male and female pedestrians were observed. Injury rates to the upper extremity were particularly high in male pedal cyclists. Spinal injury was predominantly a feature of motorised transport (vehicle occupants and motorcyclists).

9. Whilst most body regions showed heightened rates for 15-24 year olds, the chest injury rate was highest at age 70+ in both males and females and the lower extremity rate in females was highest at age 70+.

10. The road user group with the highest average length of stay (ALOS) in hospital was pedestrians (12 days). Pedal cyclists had the lowest ALOS (3.7 days). ALOS was greatest for spinal (14 days) and lower extremity injury (13 days). The ALOS of males with spinal injury was much greater than the ALOS of females (17 days & 10 respectively). Males had a slightly lower ALOS for lower limb injury than females (12 days & 14 days respectively).

1. INTRODUCTION

This report presents information on road injury hospital separations and fatalities for the calender year 1991. It is the second report in a series prepared by the National Injury Surveillance Unit (NISU) to monitor road injury at national level. The first report provided information for the year 1990 (O'Connor, 1993).

Data on hospital separations was provided by State/Territory health authorities through the Australian Institute of Health & Welfare. Fatality data was provided by the Australian Bureau of Statistics. All data analysis was undertaken at NISU. The scope of the data analysis was restricted to records with an ICD-9 'external cause' code between E-810 to E-819 (Motor vehicle traffic accidents) or E-826 (Pedal cycle accidents).

The report is essentially a series of tabulations with limited descriptive commentary and a few figures and diagrams. The tabulations present information on road injury hospital separations and deaths on a range of variables including age, sex, road user type and State/Territory. Separations data is also presented on the basis of injury severity (AIS & ISS), body region associated with the most severe injury and length of stay in hospital. The selection of tables is designed to meet the needs of most readers. In section 2 case numbers and percentages, population based crude rates and percentage change in number between 1990 and 1991 are all presented. In later sections, the percentage change 1990-1991 is omitted. Crude rates are calculated on the basis of the estimated resident population (ERP) from the 1991 Census (Australian Bureau of Statistics, 1993). Age standardised rates are presented in two tables (i.e. Tables 3 & 4) using the 1991 ERP as the "standard population".

The report is divided into a number of sections. Section 2 presents an overview of information on frequencies and rates, simple breakdowns and trends by age, sex, road user type, nature of injury, external cause, body region, injury severity and State/Territory. Later sections provide a selection of detailed breakdowns using three variables, organised on the basis of the pair of variables which remains fixed across the tables in each section. For example, in Section 3 variables are cross tabulated by the age/sex pair of variables whereas in Section 4 variables are cross tabulated by the road user type/sex pair. Within all sections, parallel information is presented on hospital separations and fatalities, with the hospital information presented first. There are a few instances where a tabulation is presented for either hospital separations or fatalities but not for both. Where the tabulation of fatality data is missing, the reason for this is that one of the variables being considered is not available in the ABS fatality data (e.g. injury severity and length of stay in hospital). Where the tabulation of hospital separation data is missing (for State/Territory in Sections 3-6), the reason for this is that the State/Territory data may not be readily comparable across all levels of injury severity, a matter which is discussed in Appendix B.

In Section 1 the left page presents tabular information while the right page presents a diagram and basic descriptive commentary for a particular variable. In later sections this format is retained except that the right page diagram is replaced by a tabulation of rate data.

In reading the tables and figures the following technical factors should be kept in mind.

- Injury diagnoses for 1991 provided for Queensland were coded to ICD-9 and not to ICD-9-CM. As a consequence information on injury severity and the body region of injury having the highest AIS level could not be estimated for these cases.

- Repeat admissions and transfers: some road injuries lead to more than one episode of in-patient care, either at the same hospital or at another. Thus the hospitalisation data represent episodes of inpatient care rather than the incidence of road injury. Available information suggests that less than 8% of road injury in-patient episodes of care are due to readmission to the same hospital (see O'Connor, 1992).

- Differences between States and Territories in road injury hospital separation rates may be due to several factors, including differences in hospital admission practices and data recording practices as well as differences in the incidence of road injury. See Appendix B for a discussion of these issues.

- Some hospitals in New South Wales report a sample of separations and these records must be weighted by a sample factor when generating the State total. As a result of the weighting procedure the cell counts within each table may not sum exactly to the margin totals.

- Percentage and rate calculations are subject to rounding errors.

- The case counts in tabulations of hospital separations based on injury severity (i.e. AIS, ISS and body region of most severe injury) cannot be compared with counts presented in the earlier report (O'Connor, 1993) because estimates for Queensland were included in tabulations of the earlier report but were excluded from tabulations of the current report. Also, Western Australia was excluded from ISS tabulations of the current report. The reasons why data from Queensland and Western Australia were excluded is explained in Appendix A. In the current report, tabulations which report the percentage change in the number of cases from 1990 to 1991 by severity level (AIS and ISS) and body region of most severe injury utilise data from the same set of States/Territories for both years.

- Information presented in this report on deaths in 1991, including the percentage change in deaths from 1990 to 1991, was based on ABS data whereas the earlier report (O'Connor, 1993) presented information based on the Federal Office of Road Safety "Fatal File" (FORS, 1990). These data collections are subject to different scope and criteria and are not directly comparable. Therefore, the information on fatalities cannot be compared across the two reports.

2. ROAD INJURY SEPARATIONS AND FATALITIES - OVERVIEW

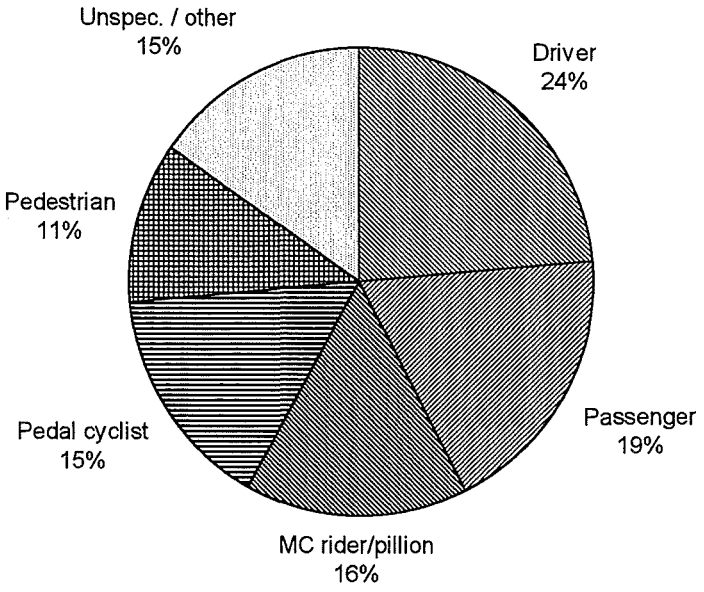
2.1 Road User Type

Table 1. Road injury hospital separations by road user type, Australia, 1991
(Case number, Rate per 100,000 pop. and % change in number since 1990)

Road user type	Cases	Percentage	Crude rate per 100,000 pop.*	% change in case count 1990 to 1991
Driver	8,554	23.7%	49.5	-17.3%
Passenger in a motor vehicle	6,762	18.7%	39.1	-11.0%
Motor cycle rider/ pillion passenger	5,647	15.7%	32.7	0.3%
Pedal cyclist	5,565	15.4%	32.2	-11.2%
Pedestrian	3,991	11.1%	23.1	-16.0%
Other road user	286	0.8%	1.6	-22.9%
Unspecified	5,274	14.6%	30.5	13.0%
Australia	36,079	100%	208.7	-9.0%

Source: State and Territory hospital separation data. See Appendix A for details.
* Denominator for rate calculation was 'Estimated resident population' for 1991 from the 1991 Census of Population and Housing (ABS, 1993).

Figure 1. Road injury hospital separations by road user type, Australia, 1991
(% based on case number)



Main Points:

- Overall there was a 9% decline in the number of hospital separations for road injury between 1990 and 1991.

- Occupants of motor vehicles accounted for over 40% of all road injury separations. Drivers accounted for approximately one quarter (24%) of all separations while passengers accounted for a further 19%. In 15% of separations the road user type was not classified.

- There was a decline in the number of separations between 1990 and 1991 across all road user categories with the exception of motorcycle riders/pillion passengers for which a small increase was observed.

- When the ctegory 'other road user' was excluded, the highest percentage reduction in separations was for drivers (down 17%) followed by pedestrians (down 16%).

- In contrast the greatest proportional decrease between 1988 and 1990 was observed for passengers in motor vehicles (down 17%) and motor cycle riders (down 17%) (O'Connor, 1993).

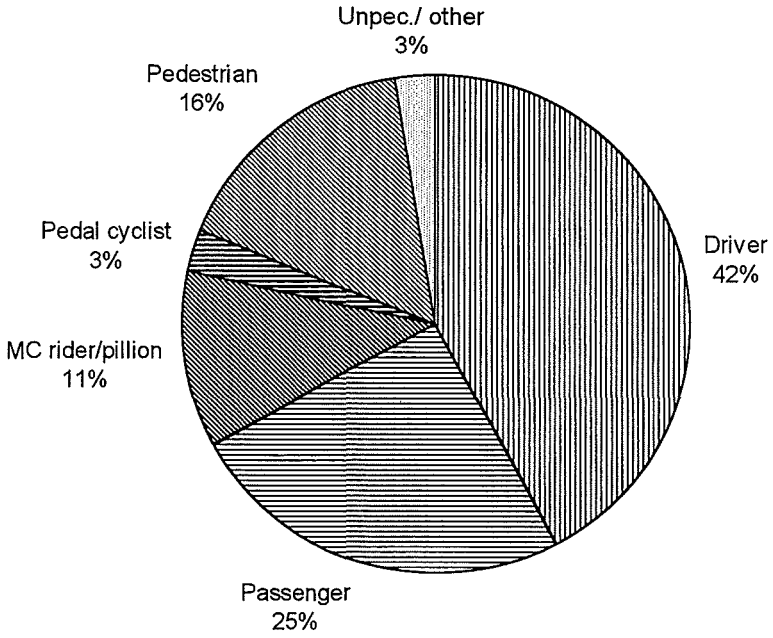
- The crude rate of hospital separation for road injury in Australia in 1991 was more than two per thousand of population or 1 in every 500.

Table 2. Road fatalities by road user type, Australia, 1991
(Case number, Rate per 100,000 pop. and % change in number since 1990)

Road user type	Cases	Percentage	Crude rate per 100,000 pop.*	% change in case count 1990 to 1991
Driver	914	42.3%	5.3	- 3.6%
Passenger in a motor vehicle	534	24.7%	3.1	- 12.3%
Motor cycle rider/ pillion passenger	243	11.2%	1.4	- 5.8%
Pedal cyclist	63	2.9%	0.4	- 22.2%
Pedestrian	350	16.2%	2.0	- 19.9%
Other road user	1	< 0.1%	< 0.1	. .
Unspecified	56	2.6%	0.3	. .
Total	2,161	100%	12.5	- 9.0%

Source: NISU based on ABS mortality data. See Appendix A for details.
* Denominator for rate calculation was the 'Estimated resident population' for 1991 from the 1991 Census of Population and Housing (ABS, 1993).
. . Percentage base less than 50 cases for 1990.
Note: The fatality data presented in this report was made available by the Australian Bureau of Statistics. It cannot be compared with the number of fatalities recorded in the publication 'Road Injury in Australia, 1990' because the fatality data presented in that report was made available from a different source (ie. Federal Office of Road Safety) using slightly different definitions.

Figure 2. Road fatalities by road user type, Australia, 1991
(% based on case number)



Main Points:

- Occupants of motor vehicles accounted for two thirds of all road fatalities in 1991. Drivers comprised the greatest proportion of road fatalities (42%) followed by motor vehicle passengers (25%) and pedestrians (16%).

- When fatalities were compared with hospital separations in terms of the proportional representation of different road user categories it was evident that fatally injured road users were more likely to be vehicle occupants, especially drivers, or pedestrians and less likely to be pedal cyclists.

- There was a 9% decline in the number of road fatalities between 1990 and 1991 which was equivalent to the reduction observed for hospital separations..

- The reduction in the number of fatalities was recorded across all road user categories between 1990 and 1991 and was most pronounced for pedal cyclists (22%) and pedestrians (20%) and smallest for drivers (4%).

- Differences in trends between hospital separations and fatalities by road user type were evident. For example, whilst the number of drivers killed decreased by only 4% between 1990 and 1991, the number separated from hospitals decreased by 17%. Also, whereas fatalities involving motorcyclists declined by 6%, separations for this group increased slightly (0.3%). The causes of these variations have not been determined.

2.2 Age and Sex

Table 3. Road injury hospital separations by age and sex, Australia, 1991
(Case number, Rate per 100,000 pop. and % change in rate since 1990)

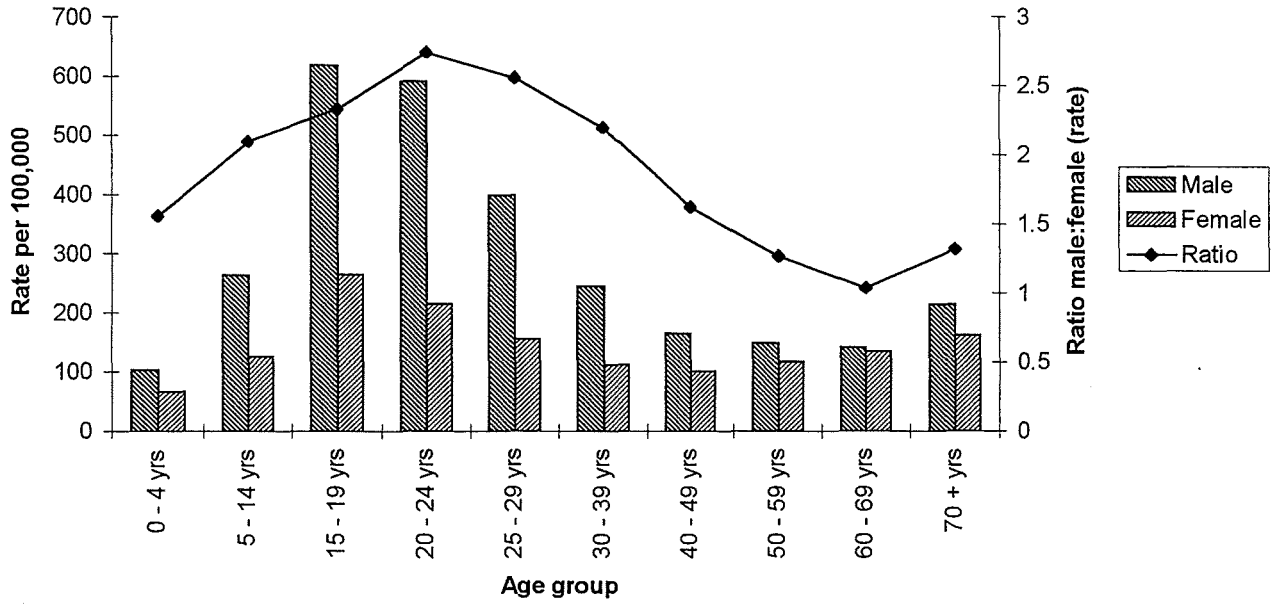
Age/sex category	Cases	Percentage	Crude rate per 100,000 pop*	% change in rate 1990 to 1991**
Male				
0 - 4 years	671	2.8%	102.9	na
5 - 14 years	3,411	14.2%	264.3	na
15 - 19 years	4,318	18.0%	617.9	na
20 - 24 years	4,180	17.4%	591.1	na
25 - 29 years	2,797	11.7%	398.0	na
30 - 39 years	3,377	14.1%	245.1	na
40 - 49 years	1,950	8.1%	165.0	na
50 - 59 years	1,193	5.0%	148.9	na
60 - 69 years	969	4.0%	141.1	na
70 or more years	1,104	4.6%	213.9	na
Unspecified	12	0.1%		
Total	23,982	100%	278.2	na
Female				
0 - 4 years	409	3.4%	66.0	na
5 - 14 years	1,539	12.7%	125.8	na
15 - 19 years	1,762	14.6%	264.8	na
20 - 24 years	1,485	12.3%	215.3	na
25 - 29 years	1,083	9.0%	155.4	na
30 - 39 years	1,532	12.7%	111.3	na
40 - 49 years	1,160	9.6%	101.6	na
50 - 59 years	904	7.5%	117.1	na
60 - 69 years	980	8.1%	135.9	na
70 or more years	1,237	10.2%	162.1	na
Unspecified	7	0.1%		
Total	12,096	100%	139.5	na
Person				
0 - 4 years	1,080	3.0%	84.9	- 7.2%
5 - 14 years	4,949	13.7%	196.9	- 14.9%
15 - 19 years	6,079	16.9%	445.7	- 14.0%
20 - 24 years	5,666	15.7%	405.6	- 10.2%
25 - 29 years	3,879	10.8%	277.2	- 6.5%
30 - 39 years	4,909	13.6%	178.2	- 9.2%
40 - 49 years	3,110	8.6%	133.9	- 9.3%
50 - 59 years	2,097	5.8%	133.3	- 9.8%
60 - 69 years	1,949	5.4%	138.4	1.4%
70 or more years	2,341	6.5%	183.0	- 0.2%
Unspecified	19	0.1%		
Total	36,079	100%	208.7	- 9.7%

Source: State and Territory hospital separation data. See Appendix A for details.

* Denominator for rate calculation was the 'Estimated resident population' for 1991 from the 1991 Census of Population and Housing (ABS, 1993).

** Sex specific counts were not obtained for 1990 preventing tabulation of change for males and females. Comparison is for age specific rates for 'Person' and age standardised rates for 'Person - Total'. The reference year for age standardisation was the 1991 'Estimated resident population'.

Figure 3. Road injury hospital separations by age and sex, Australia, 1991
(Crude rate per 100,000 pop.)



Main Points:

- Approximately one quarter of all road injury separations were males aged 15-24 years (24%).

- The hospital separation rate for 'person' peaked in the age group 15-19 years then decreased until age 60-69 years after which a slight increase in the rate of admissions was observed. The increase in the separation rate of the elderly began at age 50 years for females and 70 years for males.

- The total separation rate for males was nearly twice as high as the female rate and was higher in every age group. The differential in the male and female rates was highest in the 20-24 age group, where the ratio of the rates was 2.75:1, while the smallest difference was observed in the 60-69 age group where the female rate was almost equivalent to the male rate.

- There was a decline in the age standardised rate of hospital separation due to road injury for "person" between 1990 and 1991 (-9.7%). The decline was observed across all age categories with the exception of 60-69 year olds where there was a slight increase in the separation rate. The greatest reduction was observed in the age groups 5-14 and 15-19 years.

Table 4. Road fatalities by age and sex, Australia, 1991
(Case number, Rate per 100,000 pop. and % change in rate since 1990)

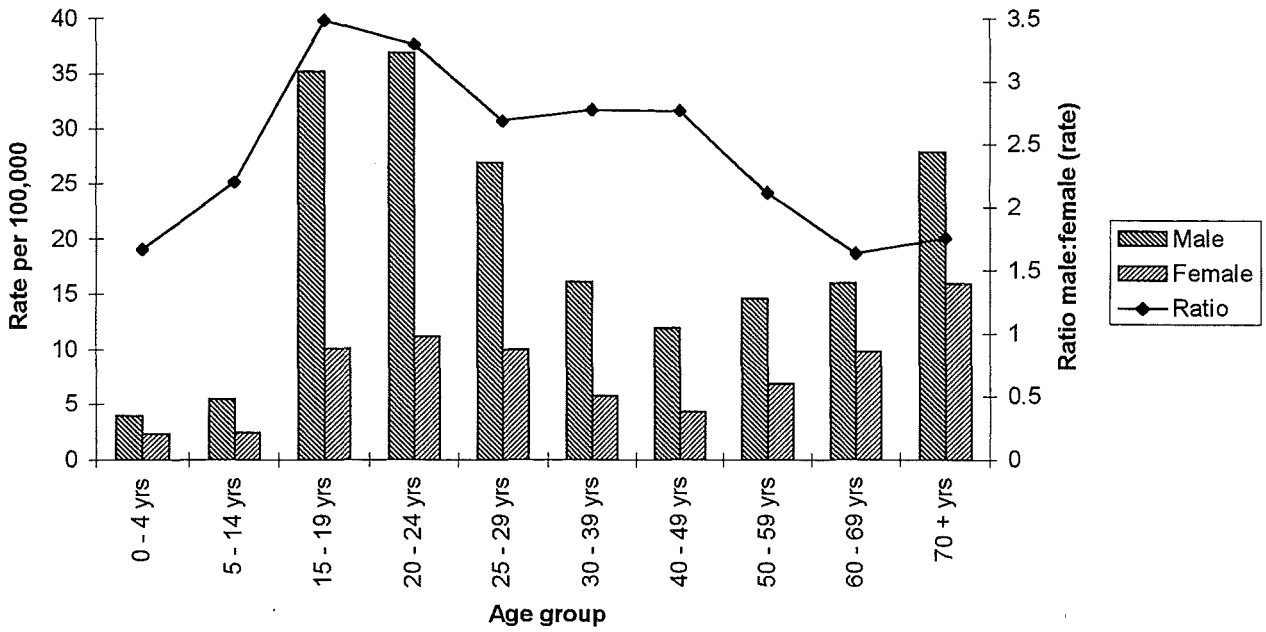
Age/sex category	Cases	Percentage	Crude rate per 100,000 pop*	% change in rate 1990 to 1991**
Male				
0 - 4 years	26	1.7%	4.0	- 28.6%
5 - 14 years	71	4.6%	5.5	- 18.0%
15 - 19 years	246	16.1%	35.2	- 1.3%
20 - 24 years	261	17.1%	36.9	- 15.6%
25 - 29 years	189	12.4%	26.9	- 12.9%
30 - 39 years	222	14.5%	16.1	- 6.7%
40 - 49 years	141	9.2%	11.9	- 15.2%
50 - 59 years	117	7.7%	14.6	10.6%
60 - 69 years	110	7.2%	16.0	7.0%
70 or more years	144	9.4%	27.9	-17.8%
Total	1,527	100%	17.7	- 9.6%
Female				
0 - 4 years	15	2.4%	2.4	- 21.9%
5 - 14 years	31	4.9%	2.5	-34.5%
15 - 19 years	67	10.6%	10.1	-34.9%
20 - 24 years	77	12.1%	11.2	- 18.7%
25 - 29 years	70	11.0%	10.0	42.0%
30 - 39 years	80	12.6%	5.8	3.3%
40 - 49 years	49	7.7%	4.3	- 26.4%
50 - 59 years	53	8.4%	6.9	8.7%
60 - 69 years	71	11.2%	9.8	- 12.6%
70 or more years	121	19.1%	15.9	- 5.1%
Total	634	100%	7.3	- 11.4%
Person				
0 - 4 years	41	1.9%	3.2	- 26.2%
5 - 14 years	102	4.7%	4.1	- 23.8%
15 - 19 years	313	14.5%	22.9	-11.1%
20 - 24 years	338	15.6%	24.2	-16.4%
25 - 29 years	259	12.0%	18.5	-2.9%
30 - 39 years	302	14.0%	11.0	-4.3%
40 - 49 years	190	8.8%	8.2	-18.5%
50 - 59 years	170	7.9%	10.8	10.0%
60 - 69 years	181	8.4%	12.9	-1.6%
70 or more years	265	12.3%	20.7	-12.4%
Total	2,161	100%	12.5	-10.0%

Source: NISU based on ABS mortality data. See Appendix A for details.

* Denominator for rate calculation was the 'Estimated resident population' for 1991 from the 1991 Census of Population and Housing (ABS, 1993).

** Age and sex specific rates are presented as well as an age standardised rate for 'Person - Total'. The reference year for age standardisation was the 1991 'Estimated resident population'.

Figure 4. Road fatalities by age and sex, Australia, 1991
(Crude rate per 100,000 pop.)



Main Points:

- The age and sex characteristics of road fatalities and hospital separations demonstrated many similarities. For example, approximately one quarter of deaths and hospital separations were males aged 15-24 years; the male rate was much higher than the female rate, especially so for fatalities (ratio of rates M:F was 2.42:1 for fatalities cf. 1.99 for hospital separations); and the percentage change in the age standardised rates between 1990 and 1991 was about the same (-10%). The most noticeable difference in the age and sex characteristics of road fatalities and hospital separations was the substantially higher ratio of the male : female rates for the former when compared with the latter, across all age groups.

- The ratio of the number of fatalities to hospital separations (expressed as fatalities per hundred separations) can be calculated from Tables 3 & 4:

	AGE GROUP (years)									
	0-4	5-14	15-19	20-24	25-29	30-39	40-49	50-59	60-69	70+
RATIO	3.8	2.06	5.15	5.97	6.68	6.15	6.11	8.11	9.29	11.3

The distribution of the ratio across age was similar to that found in 1990 (O'Connor, 1993, p3) demonstrating the lowest rate for 5-14 year olds and the highest rates in the elderly. The ratio for the oldest group (70+ yrs.) was more than five times that of the 5-14 age group and more than twice a high as the ratio for the age group which has the highest hospital separation rate (i.e. 15-19 year olds).

2.3 Nature of Injury

Table 5. Road injury hospital separations by nature of injury (principal diagnosis), Australia, 1991 *

(Case number, Rate per 100,000 pop. and % change in number since 1990)

Nature of Injury	Cases	Percentage	Crude rate per 100,000 pop.**	% change in case count 1990 to 1991
Fracture of the skull	2,236	6.2%	12.9	- 12.1%
Fracture of the spine/trunk	4,011	11.1%	23.2	- 9.2%
Fracture of upper limb	4,364	12.1%	25.2	- 7.0%
Fracture of lower limb	5,435	15.1%	31.4	- 9.5%
Dislocation	728	2.0%	4.2	- 6.2%
Sprains/strains of joints and adjacent muscles	853	2.4%	4.9	- 1.0%
Intracranial injury - excl. skull fracture	6,020	16.7%	34.8	- 6.9%
Internal injury of chest, abdomen & pelvis	1,244	3.4%	7.2	- 13.7%
Open wound of head, neck and trunk	2,587	7.2%	15.0	- 8.9%
Open wound of upper limb	751	2.1%	4.3	- 6.9%
Open wound of lower limb	1,256	3.5%	7.3	6.1%
Injury to blood vessels	67	0.2%	0.4	-27.2%
Superficial injury	759	2.1%	4.4	- 10.1%
Contusion with intact skin surface	1,825	5.1%	10.6	- 1.7%
Crushing injury	70	0.2%	0.4	6.1%
Foreign body through orifice	12	< 0.1%	< 0.1	. .
Injury to nerves/ spinal cord	224	0.6%	1.3	9.8%
Other	3,636	10.1%	21.0	- 19.5%
Total	36,079	100%	208.6	- 9.0%

Source: State and Territory hospital separation data. See Appendix A for details.

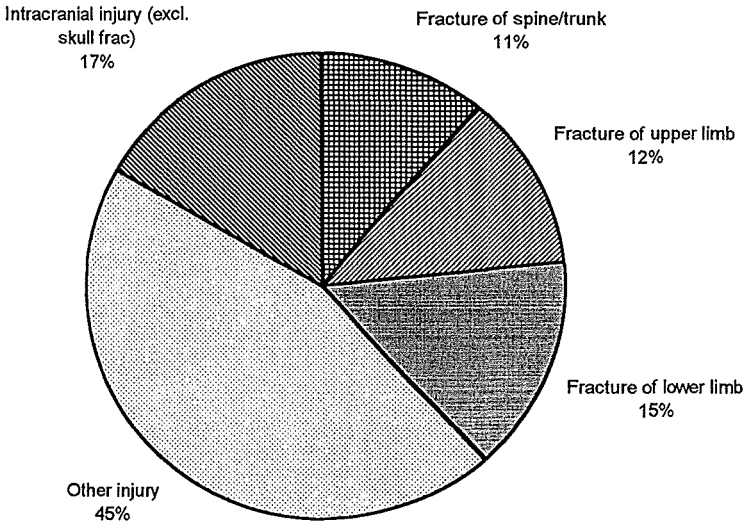
* Nature of injury = Major 30 categories from the ICD-9 'Injury and Poisoning' chapter.

** Denominator for rate calculation was the 'Estimated resident population' for 1991 from the 1991 Census of Population and Housing (ABS, 1993)

. . Percentage base less than 50 cases for 1990.

Note: Fatality data which was provided to NISU by the Australian Bureau of Statistics does not contain ICD-9 diagnosis codes and an equivalent tabulation of 'nature of injury' for fatalities could not therefore be generated.

Figure 5. Road injury hospital separations by nature of injury, Australia, 1991: Principal diagnosis (% based on case number)



Main Points:

- The most frequently occurring injuries amongst these hospital separations were: intracranial injury, excluding skull fracture (17%); a fracture of the lower limb (15%); fracture of the upper limb (12%); and fracture of the spine or trunk (11%).

- The 1990-91 trend in the case count of the most frequent injuries (i.e. those which accounted for at least 10% of separations in 1991) was a reduction of between 7% and 12%, with the largest reduction occurring for 'fracture of lower limb'. When the 1990-91 trend was compared with the 1988 vs. 1990 trend reported in O'Connor 1993, the accelerated recent reduction of three of the four most frequent injuries was notable. The exception was 'intracranial injury excluding skull fracture' which decreased only 6.9% between 1990 and 1991 but decreased 12.5% annually between 1988 and 1990. When considered in relation to an accelerated reduction in skull fracture, this exception may indicate difficulties in coding intracranial injury between "Fracture of Skull" (codes 800-804) and "Intracranial injury, excluding those with skull fracture" (codes 850-854) where presence of skull fracture was not noted in the medical report.

- Other notable reductions across all injury types were: 'fracture of spine/trunk' down 9% (-1% annually 1988 vs. 1990); 'fracture of lower limb' down 9.5% (-3% annually 1988 vs. 1990); 'fracture of upper limb' down 7% (-1.5% annually 1988 vs. 1990); and 'fracture of skull' down 12% (-7.4% annually 1988 vs. 1990).

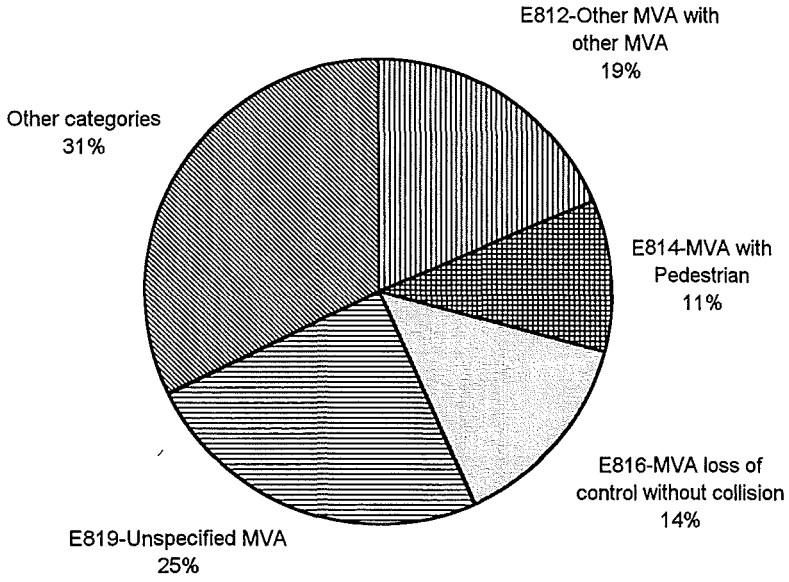
2.4 External Cause

Table 6. Road injury hospital separations by external cause, Australia, 1991
(Case number, Rate per 100,000 pop. and % change in number since 1990)

External cause**	Cases	Percentage	Crude rate per 100,000 pop*	% change in case count 1990 to 1991
Motor vehicle accident with train (E810)	51	0.1%	0.3	2.0%
Re-entrant motor vehicle accident with other motor vehicle (E811)	105	0.3%	0.6	-1.0%
Other motor vehicle accident with other motor vehicle (E812)	6,752	18.7%	39.1	-5.3%
Motor vehicle accident with other (non-motor) vehicle (E813)	1,976	5.5%	11.4	-20.9%
Motor vehicle accident with pedestrian (E814)	3,788	10.5%	21.9	-12.1%
Other motor vehicle collision on highway (E815)	2,235	6.2%	12.9	-0.9%
Motor vehicle accident due to loss of control - without collision (E816)	5,086	14.1%	29.4	-1.1%
Non collision motor vehicle traffic accident while boarding/alighting (E817)	367	1.0%	2.1	-3.9%
Other non-collision motor vehicle traffic accident (E818)	1,896	5.3%	11.0	-6.3%
Unspecified motor vehicle accident (E819)	8,885	24.6%	51.4	-10.5%
Pedal cycle accident (E826)	4,937	13.7%	28.6	-14.9%
Total	36,079	100%	208.6	-9.0%

Source: State and Territory hospital separation data. See Appendix A for details.
* Denominator for rate calculation was the 'Estimated resident population' for 1991 from the 1991 Census of Population and Housing (ABS, 1993).
** See ICD manual for a fuller description of terms used.

Figure 6. Road injury hospital separations by external cause, Australia, 1991
(% based on case number)



Main Points

- The external cause category that accounted for the largest proportion of road injury hospital separations was E819 - unspecified motor vehicle accident (25%), followed by E812 - motor vehicle accidents with other motor vehicles (19%).

- There was a reduction in the number of road injury separations across all external cause categories, with the exception of E810 - motor vehicle accident with train (up 2%). It should be noted that there was only a small number of cases in this category (51). The largest decreases in the number of cases were observed in the external cause categories E813 - motor vehicle accident with other non-motor vehicle (down 21%), E826 - pedal cycle accident (down 15%), E814 - motor vehicle accident with pedestrian (down 12%) and E819 - unspecified motor vehicle accident (down 10%).

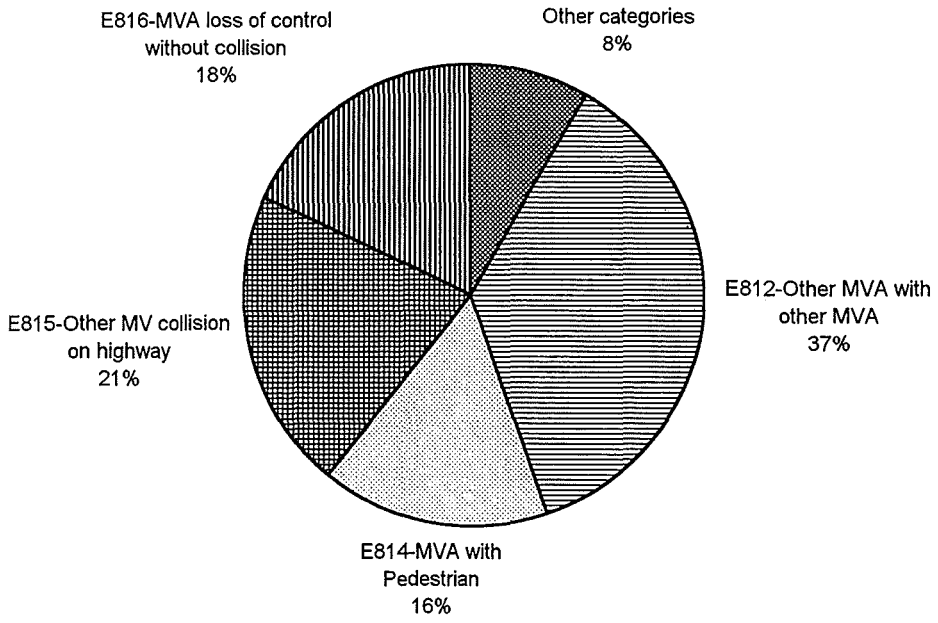
- A number of observations can be made when comparing trends for 1990-91 with 1988 vs. 1990 trends reported in O'Connor (1993):
  - Annual reductions have continued at a similar rate for E812 - motor vehicle accidents with other motor vehicle (-7% pa 1988 vs. 1990 cf. -5% 1990-91).
  - Annual reductions have accelerated for E814 - motor vehicle accident with pedestrian (-6% pa 1988 vs. 1990 cf. -12% 1990-91).
  - Annual reductions have slowed for E816 - motor vehicle accident due to loss of control without collision (-4%pa 1988 vs. 1990 cf. -1% 1990-91).
  - The increasing trend in E826 - pedal cycle accident 1988 vs. 1990 (+4%pa) has been reversed in 1990-91 (-15%)

Table 7. Road fatalities by external cause, Australia, 1991
(Case number, Rate per 100,000 pop. and % change in number since 1990)

External cause**	Cases	Percentage	Crude rate per 100,000 pop*	% change in case count 1990 to 1991
Motor vehicle accident with train (E810)	33	1.5%	0.2	. .
Re-entrant motor vehicle accident with other motor vehicle (E811)	5	0.2%	< 0.1	. .
Other motor vehicle accident with other motor vehicle (E812)	789	36.5%	4.6	- 11.4%
Motor vehicle accident with other (non-motor) vehicle (E813)	59	2.7%	0.3	- 29.8%
Motor vehicle accident with pedestrian (E814)	347	16.1%	2.0	- 20.6%
Other motor vehicle collision on highway (E815)	456	21.1%	2.6	- 10.1%
Motor vehicle accident due to loss of control - without collision (E816)	390	18.0%	2.3	6.8%
Non collision motor vehicle traffic accident while boarding/alighting (E817)	6	0.3%	< 0.1	. .
Other non-collision motor vehicle traffic accident (E818)	17	0.8%	< 0.1	. .
Unspecified motor vehicle accident (E819)	52	2.4%	0.3	. .
Pedal cycle accident (E826)	7	0.3%	< 0.1	. .
Total	2,161	100%	12.5	- 9.0%

Source: NISU based on ABS mortality data. See Appendix A for details.
* Denominator for rate calculation was the 'Estimated resident population' for 1991 from the 1991 Census of Population and Housing (ABS, 1993)
** See ICD manual for a fuller description of terms used.
. . Percentage base less than 50 cases for 1990.

Figure 7. Road fatalities by external cause, Australia, 1991
(% based on case number)



Main Points

- Road fatalities were most frequently coded as E812 - motor vehicle accident with another motor vehicle (37%), E815 - other motor vehicle collision on a highway (21%), E816 - motor vehicle accident due to loss of control (18%) and E814 - motor vehicle accident with pedestrian (16%).

- Between 1990 and 1991 there was a reduction in the number of fatalities across the most frequently occurring categories, with the exception of E816 - motor vehicle accident due to loss of control without collision (up 7%). Within this set of categories, the largest reduction was observed for E814 - motor vehicle accident with pedestrian (down 21%).

- Comparison of the external cause categories in terms of proportion of road injury separations and fatalities indicated a much lower proportion of fatal cases within the pedal cycle accident category (E826) and the unspecified (E819) category.

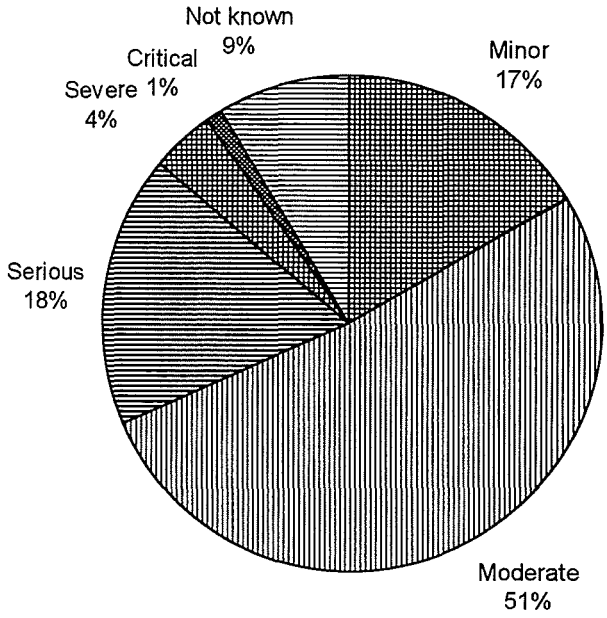
2.5 Injury Severity (maximum AIS)

Table 8. Road injury hospital separations by injury severity (max. AIS)*, All States and Territories excluding Queensland, 1991 **
(Case number, Rate per 100,000 pop. and % change in number since 1990)

Maximum AIS	Cases	Percentage	Crude rate per 100,000 pop.***	% change in case count 1990 to 1991****
Minor	4,720	16.7%	33.0	-5.3%
Moderate	14,603	51.7%	102.0	-7.2%
Serious	5,034	17.8%	35.1	-12.6%
Severe	1,105	3.9%	7.7	-13.5%
Critical	344	1.2%	2.4	-26.4%
Unspecified	2,435	8.6%	17.0	-16.0%
Total	28,242	100%	197.2	-9.3%

Source: State and Territory hospital separation data. See Appendix A for details.
* AIS (AAAM Committee on Injury Scaling, 1985) scoring was as follows: 1 - Minor, 2 - Moderate, 3 - Serious, 4 - Severe, 5 - Critical, 6 - Maximum Injury, 9 - Unspecified.
** Injury severity could not be mapped for Queensland (See Appendix A for details)
*** Denominator for rate calculation was the 'Estimated resident population' for 1991 from the 1991 Census of Population and Housing (ABS, 1993).
**** The case count for 1990 excludes Queensland separations. The number of separations published in a similar table in the report 'Road Injury in Australia, 1990' provided an estimate for Australia as a whole.
Note: Fatality data which was provided to NISU by the Australian Bureau of Statistics does not contain ICD-9 diagnosis codes and an equivalent tabulation of 'injury severity' for fatalities could not therefore be generated.

Figure 8. Road injury hospital separations by injury severity (Maximum AIS), All States and Territories excluding Queensland, 1991
(% based on case number)



Main Points:

- The majority of road injury hospital separations (52%) were classified as moderately severe on the Abbreviated Injury Scale. The proportion of minor and serious injuries was 17% and 18% respectively. Severe and critical injury accounted for only 5% of separations.

- Between 1990 and 1991 there was a decrease in the number of cases across all severity levels with the magnitude of the change increasing with severity.

- Comparison of the 1990-91 trend with the 1988 vs. 1990 trend reported in O'Connor (1993) demonstrated a recently accelerated reduction in serious, severe and critical injury. For example, critical injury declined by 15% pa 1988 vs. 1990 and 26% 1990-91.

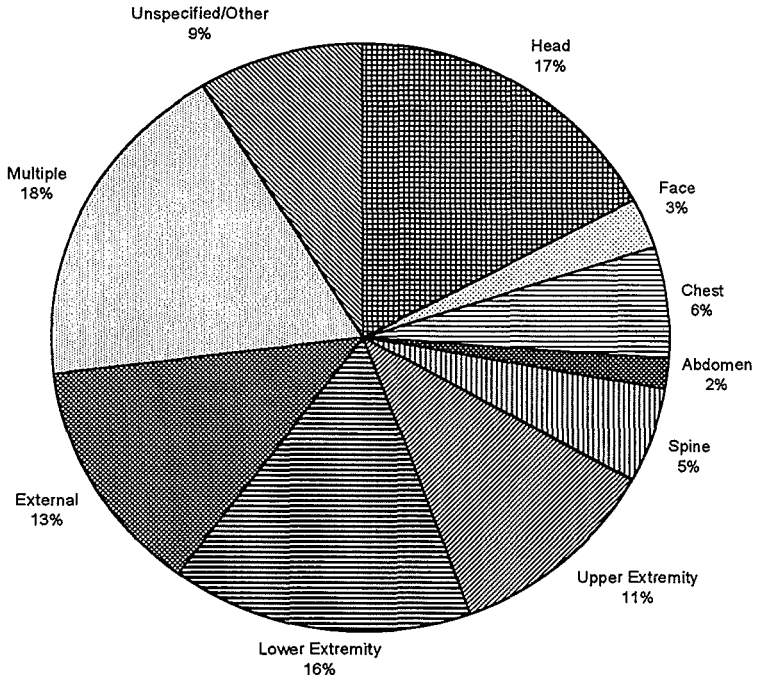
2.6. Body Region of Most Severe Injury

Table 9. Road injury hospital separations by body region of most severe injury*, All States and Territories excluding Queensland, 1991 **
(Case number, Rate per 100,000 pop. and % change in number since 1990)

Body region	Cases	Percentage	Crude rate per 100,000 pop.***	% change in case count 1990 to 1991*****
External	3,612	12.8%	25.2	9.1%
Head	4,878	17.3%	34.1	-2.9%
Face	752	2.7%	5.3	12.1%
Chest	1,716	6.1%	12.0	-1.3%
Abdomen	492	1.7%	3.4	-11.4%
Spine	1,459	5.2%	10.2	5.4%
Upper extremity	3,230	11.4%	22.6	2.3%
Lower extremity	4,496	15.9%	31.4	-1.4%
Multiple ****	5,135	18.2%	35.9	-34.3%
Unspecified/other	2,472	8.7%	17.3	-15.8%
Total	28,242	100%	197.2	-9.3%

Source: State and Territory hospital separation data. See Appendix A for details.
* Body region of most severe injury was defined on the basis of the maximum AIS body region.
** Injury severity could not be mapped for Queensland. See Appendix A for details.
*** Denominator for rate calculation was the 'Estimated resident population' for 1991 from the 1991 Census of Population and Housing (ABS, 1993).
**** Cases for which the maximum Abbreviated Injury Score (AIS) was tied for two or more body regions were allocated to the 'multiple' body region category.
***** The case count for 1990 excludes Queensland separations. The number of separations published in a similar table in the report 'Road Injury in Australia, 1990' provided an estimate for Australia as a whole.
Note: 1. Fatality data which was provided to NISU by the Australian Bureau of Statistics does not contain ICD-9 diagnosis codes and an equivalent tabulation of 'body region of most severe injury' for fatalities could not therefore be generated.
2. "External" is the surface or integumentary (skin) of any body region.

Figure 9. Road injury hospital separations by body region of most severe injury, All States and Territories excluding Queensland , 1991 (% based on case number)



Main Points:

- When each separation was assessed in terms of the body region of most severe injury (or body regions, in the case of multiple injuries at the same level of severity), it was found that the most frequently involved regions were head (17%), lower extremity (16%) and multiple regions (18%).

- Between 1990 and 1991 the largest decrease in the number of separations occurred in the 'multiple' category (-34%) and 'unspecified/other' category (-16%). Abdominal injury declined by 11% and head injury declined by 3%.

- It should be noted that comparison of counts for specific body regions will be confounded by the high proportion of cases coded as 'multiple' and 'unspecified/other'.

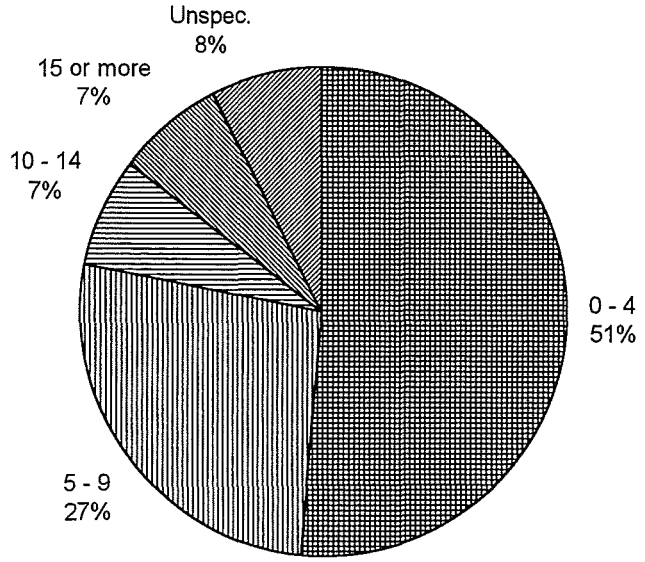
2.7 Injury severity (ISS)

Table 10. Road injury hospital separations by Injury Severity Score (ISS), All States and Territories excluding Qld and WA, 1991*
(Case number, Rate per 100,000 pop. and % change in number since 1990)

Injury Severity Score	Cases	Percentage	Crude rate per 100,000 pop.**	% change in case count 1990 to 1991***
0 - 4	12,535	51.5%	98.8	-11.8%
5 - 9	6,495	26.7%	51.2	-6.6%
10 - 14	1,694	7.0%	13.4	-10.0%
15 - 19	838	3.4%	6.6	-19.2%
20 - 24	386	1.6%	3.0	-11.6%
25 - 29	344	1.4%	2.7	-21.2%
30 - 34	103	0.4%	0.8	-5.6%
35 - 39	54	0.2%	0.4	-34.0%
40 - 44	26	0.1%	0.2	. .
45 - 64	11	< 0.1%	< 0.1	. .
65 - 74	1	< 0.1%	< 0.1	. .
Unspecified	1,852	7.6%	na	-11.8%
Total	24,340	100%	191.6	-10.8%

Source: State and Territory hospital separation data. See Appendix A for details.
* ISS not calculated for Qld or WA records See Appendix A for details.
** Denominator for rate calculation was the 'Estimated resident population' for 1991 from the 1991 Census of Population and Housing (ABS, 1993).
*** The case count for 1990 excludes Queensland and Western Australian separations although the number of separations published for 1990 in the report 'Road Injury in Australia, 1990' was an estimate for Australia as a whole.
. . Percentage base less than 50 cases for 1990.
Note: Fatality data which was provided to NISU by the Australian Bureau of Statistics does not contain ICD-9 diagnosis codes and an equivalent tabulation of 'Injury Severity Score' for fatalities could not therefore be generated.

Figure 10. Road injury hospital separations by Injury Severity Score (ISS), All States and Territories excluding Qld and WA, 1991
(% based on case count)



Main Points:

- The Injury Severity Score (ISS) has been found to be a good predictor of the probability of death as a result of injuries received in road crashes (Bull, 1975). Between 1990 and 1991 decreases in the number of cases at all levels of the ISS were observed. The greatest reductions occurred in a number of the high threat to life categories above ISS 15.

- Comparison of table 2.11 in 'Road Injury in Australia, 1990' (O'Connor, 1990) with table 10 in the present report reveals some instability in the short term trends. For example whilst a 1% annual reduction occurred between 1988 and 1990 in the number of cases in the lowest severity category (i.e. ISS 0-4), which comprised over half of separations in 1991, a 12% reduction occurred between 1990 and 1991. This variation could reflect one or more of a number of factors, for example real reduction in the incidence of low severity injury and changes in admission priorities for low severity injury.

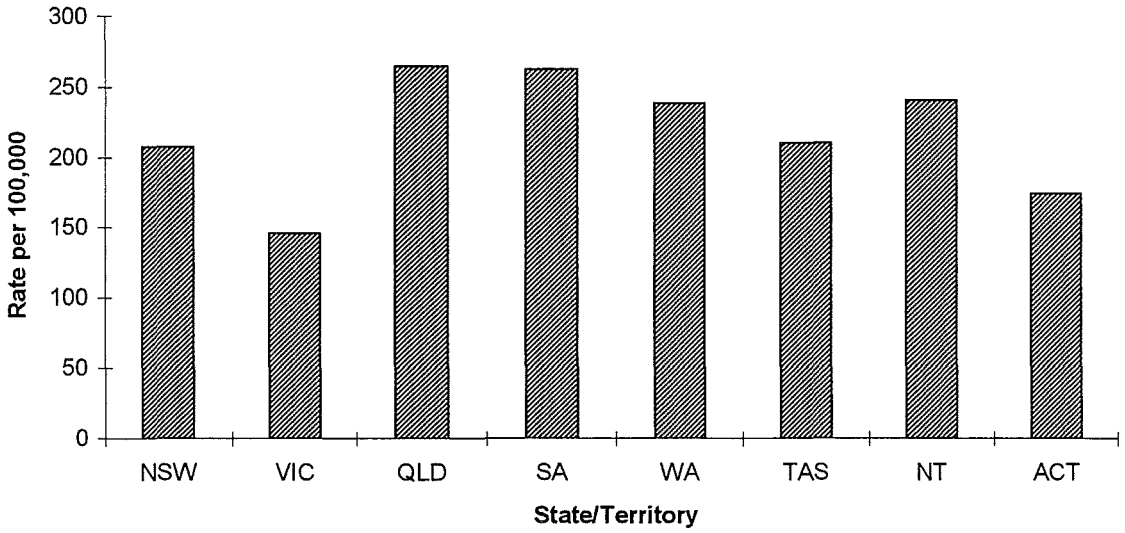
2.8 State/Territory

Table 11. Road injury hospital separations by State/Territory, Australia, 1991
(Case number, Rate per 100,000 pop. and % change in number since 1990)

State/Territory	Cases	Percentage	Crude rate per 100,000 pop*	% change in case count 1990 to 1991
New South Wales	12,224	33.9%	207.2	- 15.8%
Victoria	6,438	17.8%	145.6	- 10.3%
Queensland	7,837	21.7%	264.7	- 7.5%
South Australia	3,796	10.5%	262.5	2.9%
Western Australia	3,902	10.8%	238.5	0.8%
Tasmania	981	2.7%	210.2	3.3%
Northern Territory	398	1.1%	240.5	**
Australian Capital Territory ***	503	1.4%	173.9	- 10.7%
Total	36,079	100%	208.7	- 9.0%

Source: State and Territory hospital separation data. See Appendix A for details.
* Denominator for rate calculation was the 'Estimated resident population' for 1991 from the 1991 Census of Population and Housing (ABS, 1993).
** Data unavailable for the Northern Territory for 1990.
*** Includes an unknown number of cases where the road crash occurred in NSW areas adjacent to ACT and treatment occurred at an ACT hospital. The case count and rate thus over-estimate the incidence of road injuries in the ACT population.

Figure 11. Road injury hospital separations by State/Territory, Australia, 1991
(Crude rate per 100,000 pop.)



Main Points:

- The decline in the number of separations between 1990 and 1991 was most evident in the larger States with the smaller States of South Australia, Western Australia and Tasmania recording small increases.

- The percentage of separations recorded for Victoria was well below that States' proportional share of national road fatalities over the equivalent period (18% of separations compared to 24% of fatalities).

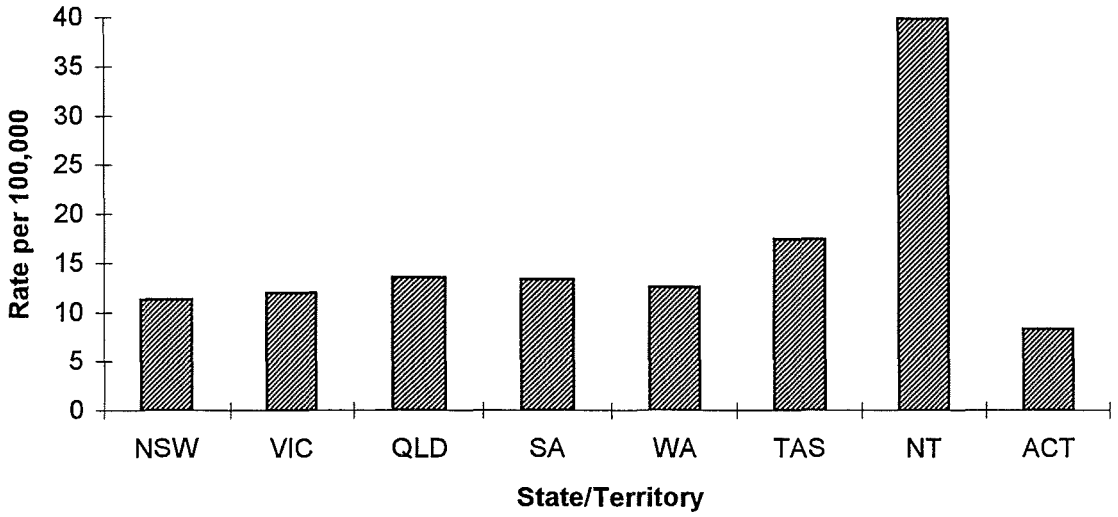
- Differences in rates between States and Territories may be due to differences in hospital admission practices (eg. decision whether to keep a person with a relatively minor injury in hospital overnight), to data recording practices (eg. whether a six hour period of observation in an emergency Department was recorded as an admission), and cross-border transport of cases (notably treatment in Canberra hospitals of cases occurring in nearby parts of NSW), as well as differences in the incidence of injuries. Appendix B provides further information on State/Territory variations and should be consulted before quoting State/Territory level data from this report.

Table 12. Road fatalities by State/Territory, Australia, 1991
(Case number, Rate per 100,000 pop. and % change in number since 1990)

State/Territory	Cases	Percentage	Crude rate per 100,000 pop*	% change in case count 1990 to 1991
New South Wales	668	30.9%	11.3	- 15.4%
Victoria	525	24.3%	11.9	- 7.9%
Queensland	401	18.6%	13.5	- 2.4%
South Australia	192	8.9%	13.3	- 15.0%
Western Australia	204	9.4%	12.5	- 3.8%
Tasmania	81	3.7%	17.4	11.0%
Northern Territory	66	3.1%	39.9	- 5.7%
Australian Capital Territory	24	1.1%	8.3	. .
Total	2,161	100%	12.5	- 9.0%

Source: NISU based on ABS mortality data. See Appendix A for details.
* Denominator for rate calculation was 'Estimated resident population' for 1991 from the 1991 Census of Population and Housing (ABS, 1993).
. . Percentage base less than 50 cases for 1990.

Figure 12. Road fatalities, by State/Territory, Australia, 1991
(Crude rate per 100,000 pop.)



Main Points:

- New South Wales had the largest proportion of road deaths (31%) but had the lowest crude death rate (11.3/100,000) except for the ACT.

- The population based death from road crashes was relatively similar across the mainland States, excluding Territories. The Northern Territory death rate was dramatically different from the other States/Territories, being three times higher than the national rate. The lowest death rate in 1991 was in the ACT followed by NSW then Victoria.

- The inconsistency in the pattern of death and hospital separation rates in some States/Territories was puzzling. In New South Wales the percentage reduction in fatalities from 1990 to 1991 was 15% compared with 16% for separations and in Victoria the reductions were 8% and 10% respectively. However, in other States the trends were different, substantially so in some States, either in extent or direction. For example, in South Australia fatalities decreased by 15% while hospital separations increased by 3%. These variations could reflect a number of factors including hospital admission practices.

3. ROAD INJURY SEPARATIONS AND FATALITIES BY AGE AND SEX

3.1 Road User Type

Table 13a. Road injury hospital separations, road user type by age and sex, Australia, 1991 (Case number and row percentage) *

	0 - 4 yrs	5 - 14 yrs	15 - 19 yrs	20 - 24 yrs	25 - 29 yrs	30 - 49 yrs	50 - 69 yrs	70 or more yrs	Total
Male									
Driver	1 **	12 **	799	997	742	1702	869	404	5526
	0.0%	0.2%	14.5%	18.0%	13.4%	30.8%	15.7%	7.3%	100.0%
Passenger in motor vehicle	174	427	752	589	316	492	243	124	3116
	5.6%	13.7%	24.1%	18.9%	10.1%	15.8%	7.8%	4.0%	100.0%
Motor cycle rider/ pillion	9	215	1106	1347	936	1256	183	31	5082
	0.2%	4.2%	21.8%	26.5%	18.4%	24.7%	3.6%	0.6%	100.0%
Pedal cyclist	227	2070	725	309	229	478	161	73	4273
	5.3%	48.4%	17.0%	7.2%	5.3%	11.2%	3.8%	1.7%	100.0%
Pedestrian	187	478	297	259	171	488	344	285	2511
	7.5%	19.0%	11.8%	10.3%	6.8%	19.4%	13.7%	11.4%	100.0%
Other road user	20	26	30	25	18	34	20	17	190
	10.5%	13.7%	16.0%	13.1%	9.5%	17.9%	10.5%	8.9%	100.0%
Unspecified	53	183	607	654	386	878	342	170	3273
	1.6%	5.6%	18.6%	20.0%	11.8%	26.8%	10.5%	5.2%	100.0%
Total	671	3411	4318	4180	2797	5328	2162	1104	23970
	2.8%	14.2%	18.0%	17.4%	11.7%	22.2%	9.0%	4.6%	100.0%
Female									
Driver	1 **	11 **	346	489	379	1019	537	247	3028
	0.0%	0.4%	11.4%	16.2%	12.5%	33.6%	17.7%	8.2%	100.0%
Passenger in motor vehicle	148	398	651	407	258	656	636	479	3633
	4.1%	10.9%	17.9%	11.2%	7.1%	18.0%	17.5%	13.2%	100.0%
Motor cycle rider/pillion	9	35	128	139	76	138	30	9	564
	1.6%	6.2%	22.8%	24.7%	13.5%	24.4%	5.3%	1.6%	100.0%
Pedal cyclist	104	686	157	62	55	139	72	16	1291
	8.1%	53.1%	12.2%	4.8%	4.3%	10.8%	5.6%	1.2%	100.0%
Pedestrian	96	282	161	93	81	227	238	301	1479
	6.5%	19.1%	10.9%	6.3%	5.5%	15.3%	16.1%	20.4%	100.0%
Other road user	7	16	5	7	9	24	15	12	95
	7.3%	16.8%	5.2%	7.3%	9.4%	25.2%	16.1%	12.6%	100.0%
Unspecified	43	111	313	288	224	490	356	173	1999
	2.2%	5.6%	15.7%	14.4%	11.2%	24.5%	17.8%	8.6%	100.0%
Total	409	1539	1762	1485	1083	2692	1883	1237	12089
	3.4%	12.7%	14.6%	12.3%	9.0%	22.3%	15.6%	10.2%	100.0%
Person									
Driver	2 **	23 **	1145	1486	1121	2720	1406	651	8554
	0.0%	0.3%	13.4%	17.4%	13.1%	31.8%	16.4%	7.6%	100.0%
Passenger in motor vehicle	322	825	1403	996	574	1148	878	604	6749
	4.8%	12.2%	20.8%	14.8%	8.5%	17.0%	13.0%	8.9%	100.0%
Motor cycle rider/pillion	18	250	1234	1486	1012	1393	213	40	5646
	0.3%	4.4%	21.9%	26.3%	17.9%	24.7%	3.8%	0.7%	100.0%
Pedal cyclist	331	2755	883	371	284	617	233	89	5564
	6.0%	49.5%	15.9%	6.7%	5.1%	11.1%	4.2%	1.6%	100.0%
Pedestrian	283	760	458	352	253	715	582	586	3989
	7.1%	19.1%	11.5%	8.8%	6.3%	17.9%	14.6%	14.7%	100.0%
Other road user	27	42	35	32	27	58	35	29	286
	9.4%	14.7%	12.4%	11.2%	9.4%	20.3%	12.4%	10.1%	100.0%
Unspecified	96	295	921	942	610	1368	698	343	5272
	1.8%	5.6%	17.5%	17.9%	11.6%	25.9%	13.2%	6.5%	100.0%
Total	1080	4949	6079	5666	3879	8019	4045	2341	36060
	3.0%	13.7%	16.9%	15.7%	10.8%	22.2%	11.2%	6.5%	100.0%

Source data: State and Territory hospital separation data. See Appendix A.

* 19 Queensland separations for which age was unspecified have been excluded from the tabulation.

** A small number of children were recorded in the State/Territory separation data as drivers of motor vehicles involved in traffic accidents.

Table 13b. Road injury hospital separations, road user type by age and sex, Australia, 1991 (Rate per 100,000 pop.)

	0 - 4 yrs	5 - 14 yrs	15 - 19 yrs	20 - 24 yrs	25 - 29 yrs	30 - 49 yrs	50 - 69 yrs	70 or more yrs	Total
Male									
Driver	0.2 *	0.9 *	114.3	141.0	105.6	66.5	58.4	78.3	64.1
Passenger in motor vehicle	26.7	33.1	107.6	83.3	45.0	19.2	16.3	24.0	36.2
Motorcycle rider/ pillion	1.4	16.7	158.3	190.5	133.2	49.1	12.3	6.0	59.0
Pedal cyclist	34.8	160.4	103.8	43.7	32.6	18.7	10.8	14.1	49.6
Pedestrian	28.7	37.0	42.5	36.6	24.3	19.1	23.1	55.2	29.1
Other road user	3.1	2.0	4.3	3.5	2.6	1.3	1.3	3.3	2.2
Unspecified	8.1	14.2	86.9	92.5	54.9	34.3	23.0	32.9	38.0
Total	102.9	264.3	617.9	591.1	398.0	208.2	145.3	213.9	278.2
Female									
Driver	0.2 *	0.9 *	52.0	70.9	54.4	40.5	36.0	32.4	34.9
Passenger in motor vehicle	23.9	32.5	97.9	59.0	37.0	26.1	42.6	62.8	41.9
Motor cycle rider/ pillion	1.5	2.9	19.2	20.2	10.9	5.5	2.0	1.2	6.5
Pedal cyclist	16.8	56.1	23.6	9.0	7.9	5.5	4.8	2.1	14.9
Pedestrian	15.5	23.1	24.2	13.5	11.6	9.0	15.9	39.4	17.1
Other road user	1.1	1.3	0.8	1.0	1.3	1.0	1.0	1.6	1.1
Unspecified	6.9	9.1	47.0	41.8	32.1	19.5	23.8	22.7	23.0
Total	66.0	125.8	264.8	215.3	155.4	106.9	126.1	162.1	139.5
Person									
Driver	0.2 *	0.9 *	83.9	106.4	80.1	53.6	47.2	50.9	49.5
Passenger in motor vehicle	25.3	32.8	102.9	71.3	41.0	22.6	29.5	47.1	39.1
Motorcycle rider/ pillion	1.4	9.9	90.5	106.4	72.3	27.5	7.1	3.1	32.7
Pedal cyclist	26.0	109.6	64.7	26.6	20.3	12.2	7.8	7.0	32.2
Pedestrian	22.3	30.2	33.6	25.2	18.0	14.1	19.5	45.8	23.1
Other road user	2.1	1.7	2.6	2.3	1.9	1.1	1.2	2.3	1.6
Unspecified	7.5	11.7	67.4	67.4	43.6	26.9	23.4	26.8	30.5
Total	84.9	196.9	445.7	405.6	277.2	158.0	135.7	183.0	208.6

Source data: State and Territory hospital separation data and 1991 population data from the 1991 Census of Housing and Population.
* A small number of children were recorded in the State/Territory separation data as drivers of motor vehicles involved in traffic accidents.

Main Points:

- The number of male separations exceeded female separations in nearly all age/road user type categories. The number of separations for male motorcycle riders or pillion passengers exceeded, by a third, the number of separations for the known high risk group of male drivers in the 15-29 age group, demonstrating a characteristic which was not evident in the fatality data (see Table 14a) nor in the separations data for females and to the authors' knowledge has not been shown before in the Australian road safety literature. The separation rate for male motorcyclists was more than nine times the rate for females over all ages and more than twelve times larger in the age group 25-29 yrs.

- Motorcycle riders/pillion passengers were more likely to be aged between 15 and 29 years than all road users (66% cf. 43% for all), pedal cyclists were more likely to be aged between 5 and 14 years (50% cf. 14% for all), while pedestrians were more likely to be aged between 5 and 14 years or more than 50 years (48% cf. 31% for all).

- The highest 'person' separation rates were observed for pedal cyclists aged between 5 and 14 years, motor vehicle drivers and motorcycle riders/pillion passengers aged 20 to 24 years and motor vehicle passengers aged between 15 and 19 years.

Table 14a. Road fatalities, road user type by age and sex, Australia, 1991 (Case number and row percentage)

	0 - 4 yrs	5 - 14 yrs	15 - 19 yrs	20 - 24 yrs	25 - 29 yrs	30 - 49 yrs	50 - 69 yrs	70 or more yrs	Total
Male									
Driver	0	0	90	118	94	181	117	70	670
	0.0%	0.0%	13.4%	17.6%	14.0%	27.0%	17.5%	10.4%	100.0%
Passenger	16	28	68	55	26	48	32	12	285
	5.6%	9.8%	23.9%	19.3%	9.1%	16.8%	11.2%	4.2%	100.0%
Motor cycle rider/ pillion	0	4	48	62	40	64	8	3	229
	0.0%	1.7%	21.0%	27.1%	17.5%	27.9%	3.5%	1.3%	100.0%
Pedal cyclist	2	14	14	2	7	6	6	3	54
	3.7%	25.9%	25.9%	3.7%	13.0%	11.1%	11.1%	5.6%	100.0%
Pedestrian	8	24	22	18	16	47	60	50	245
	3.3%	9.8%	9.0%	7.3%	6.5%	19.2%	24.5%	20.4%	100.0%
Other road user	0	0	0	0	0	1	0	0	1
	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%
Unspecified	0	1	4	6	6	16	4	6	43
	0.0%	2.3%	9.3%	14.0%	14.0%	37.2%	9.3%	14.0%	100.0%
Total	26	71	246	261	189	363	227	144	1527
	1.7%	4.6%	16.1%	17.1%	12.4%	23.8%	14.9%	9.4%	100.0%
Female									
Driver	0	2	15	40	39	66	61	21	244
	0.0%	0.8%	6.1%	16.4%	16.0%	27.0%	25.0%	8.6%	100.0%
Passenger	10	18	38	29	16	45	39	54	249
	4.0%	7.2%	15.3%	11.6%	6.4%	18.1%	15.7%	21.7%	100.0%
Motor cycle rider/ pillion	0	2	5	5	2	0	0	0	14
	0.0%	14.3%	35.7%	35.7%	14.3%	0.0%	0.0%	0.0%	100.0%
Pedal cyclist	0	2	2	1	2	2	0	0	9
	0.0%	22.2%	22.2%	11.1%	22.2%	22.2%	0.0%	0.0%	100.0%
Pedestrian	5	7	7	2	7	14	22	41	105
	4.8%	6.7%	6.7%	1.9%	6.7%	13.3%	21.0%	39.0%	100.0%
Unspecified	0	0	0	0	4	2	2	5	13
	0.0%	0.0%	0.0%	0.0%	30.8%	15.4%	15.4%	38.5%	100.0%
Total	15	31	67	77	70	129	124	121	634
	2.4%	4.9%	10.6%	12.1%	11.0%	20.3%	19.6%	19.1%	100.0%
Person									
Driver	0	2	105	158	133	247	178	91	914
	0.0%	0.2%	11.5%	17.3%	14.6%	27.0%	19.5%	10.0%	100.0%
Passenger	26	46	106	84	42	93	71	66	534
	4.9%	8.6%	19.9%	15.7%	7.9%	17.4%	13.3%	12.4%	100.0%
Motor cycle rider/ pillion	0	6	53	67	42	64	8	3	243
	0.0%	2.5%	21.8%	27.6%	17.3%	26.3%	3.3%	1.2%	100.0%
Pedal cyclist	2	16	16	3	9	8	6	3	63
	3.2%	25.4%	25.4%	4.8%	14.3%	12.7%	9.5%	4.8%	100.0%
Pedestrian	13	31	29	20	23	61	82	91	350
	3.7%	8.9%	8.3%	5.7%	6.6%	17.4%	23.4%	26.0%	100.0%
Other road user	0	0	0	0	0	1	0	0	1
	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%
Unspecified	0	1	4	6	10	18	6	11	56
	0.0%	1.8%	7.1%	10.7%	17.9%	32.1%	10.7%	19.6%	100.0%
Total	41	102	313	338	259	492	351	265	2161
	1.9%	4.7%	14.5%	15.6%	12.0%	22.8%	16.2%	12.3%	100.0%

Source: NISU based on ABS mortality data. See Appendix A.

Table 14b. Road fatalities, road user type by age and sex, Australia, 1991 (Rate per 100,000 pop.)

	0 - 4 yrs	5 - 14 yrs	15 - 19 yrs	20 - 24 yrs	25 - 29 yrs	30 - 49 yrs	50 - 69 yrs	70 or more yrs	Total
Male									
Driver	0.0	0.0	12.9	16.7	13.4	7.1	7.9	13.6	7.8
Passenger in motor vehicle	2.5	2.2	9.7	7.8	3.7	1.9	2.2	2.3	3.3
Motor cycle rider/ pillion	0.0	0.3	6.9	8.8	5.7	2.5	0.5	0.6	2.7
Pedal cyclist	0.3	1.1	2.0	0.3	1.0	0.2	0.4	0.6	0.6
Pedestrian	1.2	1.9	3.1	2.5	2.3	1.8	4.0	9.7	2.8
Other road user	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Unspecified	0.0	0.1	0.6	0.8	0.9	0.6	0.3	1.2	0.5
Total	4.0	5.5	35.2	36.9	26.9	14.2	15.3	27.9	17.7
Female									
Driver	0.0	0.2	2.3	5.8	5.6	2.6	4.1	2.8	2.8
Passenger in motor vehicle	1.6	1.5	5.7	4.2	2.3	1.8	2.6	7.1	2.9
Motor cycle rider/ pillion	0.0	0.2	0.8	0.7	0.3	0.0	0.0	0.0	0.2
Pedal cyclist	0.0	0.2	0.3	0.1	0.3	0.1	0.0	0.0	0.1
Pedestrian	0.8	0.6	1.1	0.3	1.0	0.6	1.5	5.4	1.2
Other road user	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Unspecified	0.0	0.0	0.0	0.0	0.6	0.1	0.1	0.7	0.1
Total	2.4	2.5	10.1	11.2	10.0	5.1	8.3	15.8	7.3
Person									
Driver	0.0	0.1	7.7	11.3	9.5	4.9	6.0	7.1	5.3
Passenger in motor vehicle	2.0	1.8	7.8	6.0	3.0	1.8	2.4	5.2	3.1
Motor cycle rider/ pillion	0.0	0.2	3.9	4.8	3.0	1.3	0.3	0.2	1.4
Pedal cyclist	0.2	0.6	1.2	0.2	0.6	0.2	0.2	0.2	0.4
Pedestrian	1.0	1.2	2.1	1.4	1.6	1.2	2.8	7.1	2.0
Other road user	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Unspecified	0.0	0.0	0.3	0.4	0.7	0.4	0.2	0.9	0.3
Total	3.2	4.1	23.0	24.2	18.5	9.7	11.8	20.7	12.5

Source: NISU based on ABS mortality data and 1991 population data from the 1991 Census of Housing and Population

Main Points:

- Fatally injured motorcycle riders/pillion passengers were more likely to be aged between 15 and 29 years than all road users (67% cf. 42% for all), pedal cyclists were more likely to be aged between 5 and 19 years (51% cf. 19%) while pedestrians were more likely to be 50 or more years of age (49% cf. 29%).

- Drivers and passengers in motor vehicles had higher death rates than other road user categories at age 15+ in both males and females. Fatality rates were highest for male drivers aged 15-29 years - approximately double the motorcyclist fatality rate in this age/sex category (in contrast to the separations data).

- At young age (<15), passenger and pedestrian fatalities predominate for both males and females. In old age (70+), the number of pedestrian deaths for 'person' was the same as the number of driver deaths, in males driver deaths were more frequent and in females pedestrian deaths predominate.

3.2 Injury Severity (maximum AIS)

Table 15a. Road injury hospital separations, injury severity (max. AIS) by age and sex, All States and Territories excluding Queensland*, 1991 (Case number and row percentage)

	0 - 4 yrs	5 - 14 yrs	15 - 19 yrs	20 - 24 yrs	25 - 29 yrs	30 - 49 yrs	50 - 69 yrs	70 or more yrs	Total
Male									
Minor	137	401	499	504	347	607	267	138	2900
	4.7%	13.8%	17.2%	17.4%	12.0%	20.9%	9.2%	4.8%	100.0%
Moderate	268	1739	1770	1654	1134	2028	764	376	9733
	2.8%	17.9%	18.2%	17.0%	11.7%	20.8%	7.9%	3.9%	100.0%
Serious	76	321	604	640	439	894	355	213	3544
	2.2%	9.1%	17.1%	18.1%	12.4%	25.2%	10.0%	6.0%	100.0%
Severe	14	62	140	119	77	205	113	80	811
	1.7%	7.6%	17.3%	14.7%	9.5%	25.3%	14.0%	9.9%	100.0%
Critical	10	26	55	54	27	46	30	12	260
	3.8%	10.0%	21.2%	20.8%	10.4%	17.7%	11.5%	4.6%	100.0%
Unspecified	32	89	198	238	166	394	220	71	1408
	2.3%	6.4%	14.0%	16.9%	11.8%	28.0%	15.6%	5.1%	100.0%
Total	537	2639	3267	3208	2191	4175	1750	890	18656
	2.9%	14.1%	17.5%	17.2%	11.7%	22.4%	9.4%	4.8%	100.0%
Female									
Minor	82	223	259	248	159	432	259	158	1820
	4.5%	12.3%	14.2%	13.6%	8.7%	23.7%	14.3%	8.7%	100.0%
Moderate	160	747	680	534	393	1067	756	534	4870
	3.3%	15.3%	14.0%	11.0%	8.1%	21.9%	15.5%	11.0%	100.0%
Serious	34	112	197	178	124	311	306	228	1490
	2.3%	7.5%	13.2%	11.9%	8.3%	20.9%	20.5%	15.3%	100.0%
Severe	11	23	48	31	27	63	57	33	294
	3.7%	7.8%	16.4%	10.5%	9.2%	21.5%	19.4%	11.4%	100.0%
Critical	6	10	13	11	12	10	13	9	84
	7.1%	11.9%	15.5%	13.1%	14.3%	11.9%	15.5%	10.7%	100.0%
Unspecified	19	54	148	188	136	265	147	70	1027
	1.8%	5.3%	14.4%	18.3%	13.3%	25.8%	14.3%	6.8%	100.0%
Total	312	1170	1345	1189	851	2149	1538	1032	9585
	3.3%	12.2%	14.0%	12.4%	8.9%	22.4%	16.1%	10.8%	100.0%
Person									
Minor	219	625	758	752	506	1039	526	296	4720
	4.6%	13.2%	16.1%	15.9%	10.7%	22.0%	11.2%	6.3%	100.0%
Moderate	428	2486	2450	2187	1527	3096	1521	910	14603
	2.9%	17.0%	16.8%	15.0%	10.5%	21.2%	10.4%	6.2%	100.0%
Serious	110	433	802	818	563	1205	661	441	5034
	2.2%	8.6%	15.9%	16.3%	11.2%	23.9%	13.1%	8.8%	100.0%
Severe	25	85	189	150	104	268	171	113	1105
	2.3%	7.7%	17.1%	13.6%	9.4%	24.3%	15.4%	10.3%	100.0%
Critical	16	36	68	65	39	56	43	21	344
	4.7%	10.5%	19.8%	18.9%	11.3%	16.3%	12.5%	6.1%	100.0%
Unspecified	51	144	346	426	302	659	367	142	2435
	2.1%	5.9%	14.2%	17.5%	12.4%	27.1%	15.1%	5.8%	100.0%
Total	849	3808	4611	4398	3041	6323	3288	1922	28242
	3.0%	13.5%	16.3%	15.6%	10.8%	22.4%	11.6%	6.8%	100.0%

Source data: State and Territory hospital separation data. See Appendix A.
* Injury severity could not be imputed for Queensland records. See Appendix A.

Table 15b. Road injury hospital separations, injury severity (max. AIS) by age and sex, All States and Territories excluding Queensland*, 1991 (Rate per 100,000 pop.)

	0 - 4 yrs	5 - 14 yrs	15 - 19 yrs	20 - 24 yrs	25 - 29 yrs	30 - 49 yrs	50 - 69 yrs	70 or more yrs	Total
Male									
Minor	25.4	37.9	87.1	86.0	59.3	28.6	21.6	32.2	40.7
Moderate	49.7	164.4	308.9	282.4	193.7	95.5	61.7	87.7	136.5
Serious	14.1	30.3	105.4	109.3	75.0	42.1	28.7	49.7	49.7
Severe	2.6	5.9	24.4	20.3	13.2	9.7	9.1	18.7	11.4
Critical	1.9	2.5	9.6	9.2	4.6	2.2	2.4	2.8	3.6
Unspecified	5.9	8.4	34.6	40.6	28.4	18.6	17.8	16.6	19.7
Total	99.6	249.4	570.2	547.6	374.3	196.7	141.3	207.7	261.6
Female									
Minor	16.0	22.2	47.5	43.4	27.4	20.7	20.7	24.7	25.3
Moderate	31.2	74.4	124.8	93.5	67.8	51.1	60.5	83.4	67.7
Serious	6.6	11.2	36.2	31.2	21.4	14.9	24.5	35.6	20.7
Severe	2.1	2.3	8.8	5.4	4.7	3.0	4.6	5.2	4.1
Critical	1.2	1.0	2.4	1.9	2.1	0.5	1.0	1.4	1.2
Unspecified	3.7	5.4	27.2	32.9	23.4	12.7	11.8	10.9	14.3
Total	60.9	116.5	246.8	208.2	146.7	102.9	123.2	161.8	133.3
Person									
Minor	20.8	30.3	67.8	65.0	43.4	24.7	21.1	27.7	33.0
Moderate	40.7	120.6	219.2	189.1	131.0	73.5	61.1	85.1	102.0
Serious	10.5	21.0	71.7	70.7	48.3	28.6	26.6	41.2	35.1
Severe	2.4	4.1	16.8	13.0	8.9	6.4	6.8	10.6	7.7
Critical	1.5	1.7	6.1	5.6	3.3	1.3	1.7	2.0	2.4
Unspecified	4.8	6.9	31.0	36.8	25.9	15.6	14.8	13.2	17.0
Total	80.7	184.7	412.6	380.1	261.0	150.1	132.2	179.8	197.2

Source data: State and Territory hospital separation data and 1991 population data from the 1991 Census of Housing and Population.
* Injury severity could not be imputed for Queensland records. See Appendix A.

Main Points:

- 15-24 year olds had a higher rate of separations than other age groups at all severity levels, particularly at higher severity levels. This pattern was particularly strong in males.

- The male - female differential in the separation rates increased with increasing severity for all ages, particularly for 15-24 year olds. The male rate was three times higher than the female rate in the severe and critical injury categories across all ages. In 20-24 year olds the M:F ratio was 2 at the minor injury level and climbed to nearly five at the critical injury level.

3.3 Body Region of Most Severe Injury

Table 16a. Road injury hospital separations, body region of most severe injury* by age and sex, All States and Territories excluding Queensland**, 1991 (Case number and row percentage)

	0 - 4 yrs	5 - 14 yrs	15 - 19 yrs	20 - 24 yrs	25 - 29 yrs	30 - 49 yrs	50 - 69 yrs	70 or more yrs	Total
Male									
External	111	339	386	407	268	503	182	89	2285
	4.8%	14.9%	16.9%	17.8%	11.7%	22.0%	8.0%	3.9%	100.0%
Head	172	662	742	555	345	547	220	133	3376
	5.1%	19.6%	22.0%	16.4%	10.2%	16.2%	6.5%	3.9%	100.0%
Face	22	60	117	98	82	122	22	7	529
	4.2%	11.3%	22.1%	18.5%	15.5%	23.0%	4.2%	1.3%	100.0%
Chest	5	16	92	90	61	284	244	162	955
	0.5%	1.7%	9.6%	9.4%	6.4%	29.8%	25.5%	17.0%	100.0%
Abdomen	7	67	74	55	41	66	24	9	344
	2.0%	19.5%	21.6%	16.1%	11.9%	19.2%	7.1%	2.6%	100.0%
Spine	5	15	137	166	128	262	103	59	876
	0.6%	1.7%	15.6%	19.0%	14.7%	29.9%	11.8%	6.7%	100.0%
Upper extremity	62	639	384	394	262	438	126	44	2348
	2.6%	27.2%	16.3%	16.8%	11.1%	18.7%	5.4%	1.9%	100.0%
Lower extremity	76	434	547	549	411	699	257	146	3119
	2.4%	13.9%	17.5%	17.6%	13.2%	22.4%	8.2%	4.7%	100.0%
Multiple	46	314	586	653	428	850	349	167	3393
	1.4%	9.3%	17.3%	19.2%	12.6%	25.1%	10.3%	4.9%	100.0%
Unspec./other	32	91	202	241	166	403	222	74	1431
	2.2%	6.3%	14.1%	16.8%	11.6%	28.2%	15.5%	5.2%	100.0%
Total	537	2639	3267	3208	2191	4175	1750	890	18656
	2.9%	14.1%	17.5%	17.2%	11.7%	22.4%	9.4%	4.8%	100.0%
Female									
External	72	171	194	173	117	271	189	141	1326
	5.4%	12.9%	14.6%	13.0%	8.8%	20.4%	14.2%	10.6%	100.0%
Head	97	272	272	187	141	328	140	65	1502
	6.5%	18.1%	18.1%	12.4%	9.4%	21.8%	9.3%	4.4%	100.0%
Face	8	30	46	25	22	69	18	5	222
	3.6%	13.5%	20.9%	11.2%	9.7%	30.8%	8.0%	2.2%	100.0%
Chest	6	11	45	45	30	198	276	150	761
	0.8%	1.4%	5.9%	5.9%	3.9%	26.0%	36.3%	19.7%	100.0%
Abdomen	4	38	22	16	13	30	14	10	148
	2.7%	25.9%	15.1%	11.0%	8.8%	20.3%	9.5%	6.8%	100.0%
Spine	2	15	94	79	59	178	114	41	583
	.3%	2.6%	16.1%	13.6%	10.2%	30.5%	19.6%	7.1%	100.0%
Upper extremity	26	280	88	100	53	138	117	81	883
	2.9%	31.7%	10.0%	11.3%	6.0%	15.6%	13.2%	9.2%	100.0%
Lower extremity	44	151	187	143	119	257	224	251	1377
	3.2%	11.0%	13.6%	10.4%	8.7%	18.7%	16.2%	18.2%	100.0%
Multiple	33	142	247	233	159	411	299	217	1742
	1.9%	8.2%	14.2%	13.4%	9.1%	23.6%	17.1%	12.5%	100.0%
Unspec./other	19	58	149	188	137	271	149	70	1041
	1.8%	5.6%	14.3%	18.1%	13.2%	26.0%	14.3%	6.7%	100.0%
Total	312	1170	1345	1189	851	2149	1538	1032	9585
	3.3%	12.2%	14.0%	12.4%	8.9%	22.4%	16.1%	10.8%	100.0%
Person									
External	183	511	580	579	384	774	371	230	3612
	5.1%	14.1%	16.1%	16.0%	10.6%	21.4%	10.3%	6.4%	100.0%
Head	269	934	1014	742	487	875	360	198	4878
	5.5%	19.2%	20.8%	15.2%	10.0%	17.9%	7.4%	4.1%	100.0%
Face	30	90	163	123	104	190	40	12	752
	4.0%	11.9%	21.7%	16.4%	13.8%	25.3%	5.3%	1.6%	100.0%
Chest	11	27	137	135	91	482	520	313	1716
	0.6%	1.6%	8.0%	7.9%	5.3%	28.1%	30.3%	18.2%	100.0%
Abdomen	11	105	97	72	54	96	38	19	492
	2.2%	21.4%	19.6%	14.6%	11.0%	19.5%	7.8%	3.9%	100.0%
Spine	7	30	231	246	188	440	218	100	1459
	0.5%	2.1%	15.8%	16.8%	12.9%	30.1%	14.9%	6.9%	100.0%
Upper extremity	88	919	472	494	315	575	242	125	3230
	2.7%	28.5%	14.6%	15.3%	9.8%	17.8%	7.5%	3.9%	100.0%
Lower extremity	121	586	734	693	530	956	481	397	4496
	2.7%	13.0%	16.3%	15.4%	11.8%	21.3%	10.7%	8.8%	100.0%
Multiple	79	457	833	886	587	1261	648	384	5135
	1.5%	8.9%	16.2%	17.3%	11.4%	24.6%	12.6%	7.5%	100.0%
Unspec./other	51	150	351	429	303	674	371	145	2472
	2.1%	6.1%	14.2%	17.4%	12.3%	27.3%	15.0%	5.9%	100.0%
Total	849	3808	4611	4398	3041	6323	3288	1922	28242
	3.0%	13.5%	16.3%	15.6%	10.8%	22.4%	11.6%	6.8%	100.0%

Source data: State and Territory hospital separation data. See Appendix A.

* Body region of most severe injury was defined on the basis of the maximum AIS body region.

** Body region of most severe injury could not be imputed for Queensland records.

Table 16b. Road injury hospital separations, body region of most severe injury* by age and sex, All States and Territories excluding Queensland**, 1991 (Rate per 100,000 pop.)

	0 - 4 yrs	5 - 14 yrs	15 - 19 yrs	20 - 24 yrs	25 - 29 yrs	30 - 49 yrs	50 - 69 yrs	70 or more yrs	Total
Male									
External	20.6	32.0	67.4	69.5	45.8	23.7	14.7	20.8	32.0
Head	31.9	62.6	129.5	94.7	58.9	25.8	17.8	31.0	47.3
Face	4.1	5.7	20.4	16.7	14.0	5.7	1.8	1.6	7.4
Chest	0.9	1.5	16.1	15.4	10.4	13.4	19.7	37.8	13.4
Abdomen	1.3	6.3	12.9	9.4	7.0	3.1	1.9	2.1	4.8
Spine	0.9	1.4	23.9	28.3	21.9	12.3	8.3	13.8	12.3
Upper extremity	11.5	60.4	67.0	67.3	44.8	20.6	10.2	10.3	32.9
Lower extremity	14.1	41.0	95.5	93.7	70.2	32.9	20.7	34.1	43.7
Multiple	8.5	29.7	102.3	111.5	73.1	40.0	28.2	39.0	47.6
Unspecified/ other	5.9	8.6	35.3	41.1	28.4	19.0	17.9	17.3	20.1
Total	99.6	249.4	570.2	547.6	374.3	196.7	141.3	207.7	261.6
Female									
External	14.0	17.0	35.6	30.3	20.2	13.0	15.1	22.0	18.5
Head	18.9	27.1	49.9	32.7	24.3	15.7	11.2	10.1	20.9
Face	1.6	3.0	8.4	4.4	3.8	3.3	1.4	0.8	3.1
Chest	1.2	1.1	8.3	7.9	5.2	9.5	22.1	23.4	10.6
Abdomen	0.8	3.8	4.0	2.8	2.2	1.4	1.1	1.6	2.0
Spine	0.4	1.5	17.2	13.8	10.2	8.5	9.1	6.4	8.1
Upper extremity	5.1	27.9	16.1	17.5	9.1	6.6	9.4	12.6	12.3
Lower extremity	8.6	15.0	34.3	25.0	20.5	12.3	17.9	39.2	19.1
Multiple	6.4	14.1	45.3	40.8	27.4	19.7	23.9	33.9	24.2
Unspecified/other	3.7	5.8	27.3	32.9	23.6	13.0	11.9	10.9	14.5
Total	60.9	116.5	246.8	208.2	146.7	102.9	123.2	161.8	133.3
Person									
External	17.4	24.7	51.9	50.1	33.0	18.4	14.9	21.5	25.2
Head	25.6	45.3	90.7	64.1	41.7	20.8	14.5	18.5	34.1
Face	2.9	4.4	14.6	10.6	8.9	4.5	1.6	1.1	5.3
Chest	1.0	1.3	12.3	11.7	7.8	11.4	20.9	29.2	12.0
Abdomen	1.0	5.1	8.6	6.1	4.6	2.3	1.5	1.8	3.4
Spine	0.7	1.5	20.7	21.2	16.0	10.4	8.7	9.4	10.2
Upper extremity	8.4	44.6	42.2	42.7	27.0	13.7	9.8	11.7	22.6
Lower extremity	11.4	28.4	65.7	59.8	45.5	22.7	19.3	37.1	31.4
Multiple	7.5	22.1	74.5	76.6	50.4	29.9	26.0	35.9	35.8
Unspecified/ other	4.8	7.2	31.4	37.1	26.0	16.0	14.9	13.5	17.3
Total	80.7	184.7	412.6	380.1	261.0	150.1	132.2	179.8	197.2

Source data: State and Territory hospital separation data and 1991 population data from the 1991 Census of Housing and Population.
* Body region of most severe injury was defined on the basis of the maximum AIS body region.
** Injury severity could not be imputed for Queensland records.

Main Points:

- The most severe injury amongst road injury separations was most frequently the head (17%), more than one body region (18%), the lower extremity (16%) and upper extremity (11%). Interpretation of data on body region of injury was complicated by the presence of multiple body regions with injury at the same severity level.

- A high head injury rate was particularly a feature of 15-24 year old males. The highest male-female differential in head injury rates was at age 70+ (>3:1).

- Whilst most body regions showed heightened rates for 15-24 year olds, the chest injury rate was highest at age 70+ in both males and females and the lower extremity rate in females was highest at age 70+.

3.4 State/Territory

Table 17a. Road fatalities, State/Territory by age and sex, Australia, 1991 (Case number and row percentage)

	0 - 4 yrs	5 - 14 yrs	15 - 19 yrs	20 - 24 yrs	25 - 29 yrs	30 - 49 yrs	50 - 69 yrs	70 or more yrs	Total
Male									
NSW	9	25	84	56	53	116	70	48	461
	2.0%	5.4%	18.2%	12.1%	11.5%	25.2%	15.2%	10.4%	100.0%
VIC	4	22	62	68	45	76	53	36	366
	1.1%	6.0%	16.9%	18.6%	12.3%	20.8%	14.5%	9.8%	100.0%
QLD	6	15	37	45	36	75	45	25	284
	2.1%	5.3%	13.0%	15.8%	12.7%	26.4%	15.8%	8.8%	100.0%
SA	1	1	21	35	14	33	25	11	141
	0.7%	0.7%	14.9%	24.8%	9.9%	23.4%	17.7%	7.8%	100.0%
WA	4	4	26	35	21	31	20	13	154
	2.6%	2.6%	16.9%	22.7%	13.6%	20.1%	13.0%	8.4%	100.0%
TAS	0	1	7	13	10	14	7	9	61
	0.0%	1.6%	11.5%	21.3%	16.4%	23.0%	11.5%	14.8%	100.0%
NT	2	2	4	6	9	17	5	0	45
	4.4%	4.4%	8.9%	13.3%	20.0%	37.8%	11.1%	0.0%	100.0%
ACT	0	1	5	3	1	1	2	2	15
	0.0%	6.7%	33.3%	20.0%	6.7%	6.7%	13.3%	13.3%	100.0%
Total	26	71	246	261	189	363	227	144	1527
	1.7%	4.6%	16.1%	17.1%	12.4%	23.8%	14.9%	9.4%	100.0%
Female									
NSW	4	7	29	24	22	36	43	42	207
	1.9%	3.4%	14.0%	11.6%	10.6%	17.4%	20.8%	20.3%	100.0%
VIC	3	8	10	23	12	34	40	29	159
	1.9%	5.0%	6.3%	14.5%	7.5%	21.4%	25.2%	18.2%	100.0%
QLD	2	6	13	13	16	31	16	20	117
	1.7%	5.1%	11.1%	11.1%	13.7%	26.5%	13.7%	17.1%	100.0%
SA	2	4	7	4	6	11	4	13	51
	3.9%	7.8%	13.7%	7.8%	11.8%	21.6%	7.8%	25.5%	100.0%
WA	1	3	4	8	8	9	10	7	50
	2.0%	6.0%	8.0%	16.0%	16.0%	18.0%	20.0%	14.0%	100.0%
TAS	1	0	0	2	0	3	9	5	20
	5.0%	0.0%	0.0%	10.0%	0.0%	15.0%	45.0%	25.0%	100.0%
NT	2	1	3	2	6	5	1	1	21
	9.5%	4.8%	14.3%	9.5%	28.6%	23.8%	4.8%	4.8%	100.0%
ACT	0	2	1	1	0	0	1	4	9
	0.0%	22.2%	11.1%	11.1%	0.0%	0.0%	11.1%	44.4%	100.0%
Total	15	31	67	77	70	129	124	121	634
	2.4%	4.9%	10.6%	12.1%	11.0%	20.3%	19.6%	19.1%	100.0%
Person									
NSW	13	32	113	80	75	152	113	90	668
	1.9%	4.8%	16.9%	12.0%	11.2%	22.8%	16.9%	13.5%	100.0%
VIC	7	30	72	91	57	110	93	65	525
	1.3%	5.7%	13.7%	17.3%	10.9%	21.0%	17.7%	12.4%	100.0%
QLD	8	21	50	58	52	106	61	45	401
	2.0%	5.2%	12.5%	14.5%	13.0%	26.4%	15.2%	11.2%	100.0%
SA	3	5	28	39	20	44	29	24	192
	1.6%	2.6%	14.6%	20.3%	10.4%	22.9%	15.1%	12.5%	100.0%
WA	5	7	30	43	29	40	30	20	204
	2.5%	3.4%	14.7%	21.1%	14.2%	19.6%	14.7%	9.8%	100.0%
TAS	1	1	7	15	10	17	16	14	81
	1.2%	1.2%	8.6%	18.5%	12.3%	21.0%	19.8%	17.3%	100.0%
NT	4	3	7	8	15	22	6	1	66
	6.1%	4.5%	10.6%	12.1%	22.7%	33.3%	9.1%	1.5%	100.0%
ACT	0	3	6	4	1	1	3	6	24
	0.0%	12.5%	25.0%	16.7%	4.2%	4.2%	12.5%	25.0%	100.0%
Total	41	102	313	338	259	492	351	265	2161
	1.9%	4.7%	14.5%	15.6%	12.0%	22.8%	16.2%	12.3%	100.0%

Source data: NISU based on ABS mortality data. See Appendix A.
Note: Refer to Appendix C for comparative data on hospital separations with ISS 15+

Table 17b. Road fatalities, State/Territory by age and sex, Australia, 1991 (Rate per 100,000 pop.)

	0 - 4 yrs	5 - 14 yrs	15 - 19 yrs	20 - 24 yrs	25 - 29 yrs	30 - 49 yrs	50 - 69 yrs	70 or more years	Total
Male									
NSW	4.1	5.8	36.0	24.0	22.1	13.3	13.3	26.3	15.7
VIC	2.4	6.9	34.8	36.4	24.9	11.7	13.8	27.1	16.7
QLD	5.3	6.4	29.4	37.1	30.7	17.2	18.1	28.5	19.1
SA	2.0	1.0	37.8	59.9	24.1	15.6	19.1	22.2	19.6
WA	6.1	3.1	39.2	51.7	31.1	12.3	15.2	30.4	18.7
TAS	0.0	2.7	37.6	73.9	57.2	20.8	17.3	60.3	26.4
NT	23.5	13.1	56.8	73.1	100.6	59.4	55.8	0.0	51.9
ACT	0.0	4.3	36.0	22.0	8.1	2.2	10.3	46.5	10.4
Total	4.0	5.5	35.2	36.9	26.9	14.2	15.3	27.9	17.7
Female									
NSW	1.9	1.7	13.1	10.6	9.3	4.2	8.1	15.3	7.0
VIC	1.9	2.6	5.9	12.5	6.6	5.3	10.3	14.4	7.1
QLD	1.9	2.7	10.8	11.0	13.7	7.2	6.5	16.3	7.9
SA	4.2	4.1	13.3	7.1	10.5	5.2	3.0	17.7	7.0
WA	1.6	2.5	6.3	12.3	12.0	3.7	7.8	11.4	6.1
TAS	5.8	0.0	0.0	11.6	0.0	4.5	22.0	23.1	8.5
NT	25.0	7.0	46.2	23.8	69.9	19.9	15.0	78.1	26.6
ACT	0.0	9.0	7.4	7.4	0.0	0.0	5.3	61.3	6.2
Total	2.4	2.5	10.1	11.2	10.0	5.1	8.3	15.8	7.3
Person									
NSW	3.0	3.8	24.9	17.4	15.7	8.8	10.7	19.7	11.3
VIC	2.2	4.8	20.6	24.5	15.7	8.5	12.0	19.5	11.9
QLD	3.6	4.6	20.3	24.2	22.2	12.2	12.4	21.4	13.5
SA	3.0	2.5	25.9	34.1	17.4	10.4	11.0	19.5	13.3
WA	3.9	2.8	23.2	32.4	21.6	8.1	11.5	19.2	12.5
TAS	2.8	1.4	19.2	43.0	28.3	12.7	19.7	38.3	17.4
NT	24.2	10.1	51.7	48.2	85.6	40.9	38.4	41.4	39.9
ACT	0.0	6.6	21.9	14.8	4.0	1.1	7.8	55.4	8.3
Total	3.2	4.1	23.0	24.2	18.5	9.7	11.8	20.7	12.5

Source: NISU based on ABS mortality data and 1991 population data from the 1991 Census of Housing and Population
Note: Refer to Appendix C for comparative data on hospital separations with ISS 15+

Main Points:

- The highest death rates were found in males aged between 20 and 29 years in the Northern Territory and Tasmania. Care should be taken when interpreting death rates in smaller States and Territories as the number of cases may be small and rates will be subject to greater levels of variation due to chance factors when compared to the rates observed in larger States.

4. ROAD INJURY SEPARATIONS AND FATALITIES BY ROAD USER TYPE AND SEX

4.1 Injury Severity (maximum AIS)

Table 18a. Road injury hospital separations, injury severity (max. AIS) by road user type and sex, All States and Territories excluding Queensland*, 1991 (Case number and column percentage)

	Driver	Passenger in motor vehicle	Motor cycle rider/ pillion	Pedal cyclist	Pedestrian	Other road user	Unspecified	Total
Male								
Minor	822	489	400	505	229	26	431	2900
	17.0%	18.5%	10.4%	15.8%	10.9%	16.6%	22.6%	15.5%
Moderate	2286	1212	2151	2103	1013	81	887	9733
	47.4%	45.9%	55.9%	66.0%	48.4%	51.6%	46.6%	52.2%
Serious	913	553	975	352	505	27	219	3544
	18.9%	21.0%	25.3%	11.0%	24.1%	17.2%	11.5%	19.0%
Severe	268	132	120	70	174	8	39	811
	5.6%	5.0%	3.1%	2.2%	8.3%	5.1%	2.0%	4.3%
Critical	80	38	44	18	64	2	14	260
	1.7%	1.4%	1.1%	0.6%	3.1%	1.3%	0.7%	1.4%
Unspecified	458	216	161	138	108	13	313	1408
	9.5%	8.2%	4.2%	4.3%	5.2%	8.3%	16.4%	7.5%
Total	4827	2639	3851	3187	2093	157	1903	18656
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0	100.0%
Female								
Minor	498	639	51	177	148	14	294	1820
	18.8%	21.0%	11.5%	18.7%	11.6%	16.3%	25.6%	19.0%
Moderate	1381	1376	253	637	687	43	495	4870
	52.3%	45.3%	57.1%	67.1%	53.8%	50.0%	43.1%	50.8%
Serious	378	544	92	66	295	12	103	1490
	14.3%	17.9%	20.8%	7.0%	23.1%	14.0%	9.0%	15.5%
Severe	86	108	11	20	56	1	11	294
	3.3%	3.6%	2.5%	2.1%	4.4%	1.2%	1.0%	3.1%
Critical	24	21	3	2	30	0	4	84
	0.9%	0.7%	0.7%	0.2%	2.4%	0.0%	0.3%	0.9%
Unspecified	277	351	33	47	60	16	243	1027
	10.5%	11.5%	7.4%	5.0%	4.7%	18.6%	21.1%	10.7%
Total	2643	3039	443	949	1276	86	1149	9585
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Person								
Minor	1320	1127	451	682	377	40	724	4720
	17.7%	19.8%	10.5%	16.5%	11.2%	16.4%	23.7%	16.7%
Moderate	3666	2588	2403	2740	1700	124	1381	14603
	49.1%	45.6%	56.0%	66.2%	50.5%	50.8%	45.2%	51.7%
Serious	1291	1097	1067	418	800	39	322	5034
	17.3%	19.3%	24.8%	10.1%	23.8%	16.0%	10.6%	17.8%
Severe	354	240	132	90	230	9	50	1105
	4.7%	4.2%	3.1%	2.2%	6.8%	3.7%	1.6%	3.9%
Critical	104	59	47	20	94	2	18	344
	1.4%	1.0%	1.1%	0.5%	2.8%	0.8%	0.6%	1.2%
Unspecified	735	567	194	186	168	29	556	2435
	9.8%	10.0%	4.5%	4.5%	5.0%	11.9%	18.2%	8.6%
Total	7470	5678	4294	4136	3368	244	3052	28242
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Source data: State and Territory hospital separation data. See Appendix A.
* Injury severity could not be imputed for Queensland records. See Appendix A.

Table 18b. Road injury hospital separations, injury severity (max. AIS) by road user type and sex, All States and Territories excluding Queensland*, 1991 (Rate per 100,000 pop.)

	Driver	Passenger in motor vehicle	Motor cycle rider/ pillion	Pedal cyclists	Pedestrian	Other road user	Unspecified	Total
Male								
Minor	11.5	6.9	5.6	7.1	3.2	0.4	6.0	40.7
Moderate	32.1	17.0	30.2	29.5	14.2	1.1	12.4	136.5
Serious	12.8	7.8	13.7	4.9	7.1	0.4	3.1	49.7
Severe	3.8	1.9	1.7	1.0	2.4	0.1	0.5	11.4
Critical	1.1	0.5	0.6	0.3	0.9	0.0	0.2	3.6
Mot known	6.4	3.0	2.3	1.9	1.5	0.2	4.4	19.7
Total	67.7	37.0	54.0	44.7	29.4	2.2	26.7	261.6
Female								
Minor	6.9	8.9	0.7	2.5	2.1	0.2	4.1	25.3
Moderate	19.2	19.1	3.5	8.9	9.6	0.6	6.9	67.7
Serious	5.3	7.6	1.3	0.9	4.1	0.2	1.4	20.7
Severe	1.2	1.5	0.2	0.3	0.8	0.0	0.2	4.1
Critical	0.3	0.3	0.0	0.0	0.4	0.0	0.1	1.2
Unspecified	3.9	4.9	0.5	0.7	0.8	0.2	3.4	14.3
Total	36.8	42.3	6.2	13.2	17.7	1.2	16.0	133.3
Person								
Minor	9.2	7.9	3.1	4.8	2.6	0.3	5.1	33.0
Moderate	25.6	18.1	16.8	19.1	11.9	0.9	9.6	102.0
Serious	9.0	7.7	7.4	2.9	5.6	0.3	2.2	35.1
Severe	2.5	1.7	0.9	0.6	1.6	0.1	0.3	7.7
Critical	0.7	0.4	0.3	0.1	0.7	0.0	0.1	2.4
Unspecified	5.1	4.0	1.4	1.3	1.2	0.2	3.9	17.0
Total	52.2	39.6	30.0	28.9	23.5	1.7	21.3	197.2

Source data: State and Territory hospital separation data and 1991 population data from the 1991 Census of Housing and Population
* Injury severity could not be imputed for Queensland records. See Appendix A.

Main Points:

- Separation rates were highest for moderately injured road users across all road user categories.
- Rates of 'critical' injury were higher in pedestrians and drivers, especially in males. 'Severe' injury rates were highest in vehicle occupants and pedestrians.

4.2 Body Region of Most Severe Injury

Table 19a. Road injury hospital separations, body region of most severe injury* by road user type and sex, All States and Territories excluding Queensland**, 1991 (Case number and column percentage)

	Driver	Passenger in motor vehicle	Motor cycle rider/ pillion	Pedal cyclist	Pedestrian	Other road user	Un - specified	Total
Male								
External	554	360	423	386	164	21	377	2285
	11.5%	13.6%	11.0%	12.1%	7.8%	13.4%	19.8%	12.2%
Head	886	560	387	722	494	21	306	3376
	18.4%	21.2%	10.0%	22.7%	23.6%	13.4%	16.1%	18.1%
Face	168	97	38	109	39	2	76	529
	3.5%	3.7%	1.0%	3.4%	1.9%	1.3%	4.0%	2.8%
Chest	512	164	117	36	43	7	74	955
	10.6%	6.2%	3.0%	1.1%	2.1%	4.5%	3.9%	5.1%
Abdomen	86	69	66	72	29	2	19	344
	1.8%	2.6%	1.7%	2.3%	1.4%	1.3%	1.0%	1.8%
Spine	320	194	141	52	35	9	124	876
	6.6%	7.4%	3.7%	1.6%	1.7%	5.7%	6.5%	4.7%
Upper extremity	292	196	643	846	127	23	220	2348
	6.0%	7.4%	16.7%	26.5%	6.1%	14.6%	11.6%	12.6%
Lower extremity	494	295	1046	425	612	31	216	3119
	10.2%	11.2%	27.2%	13.3%	29.2%	19.7%	11.4%	16.7%
Multiple	1051	485	820	397	440	27	173	3393
	21.8%	18.4%	21.3%	12.5%	21.0%	17.2%	9.1%	18.2%
Unspec./other	463	218	169	141	109	14	316	1431
	9.6%	8.3%	4.4%	4.4%	5.2%	8.9%	16.6%	7.7%
Total	4827	2639	3851	3187	2093	157	1903	18656
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Female								
External	360	443	51	153	106	8	205	1326
	13.6%	14.6%	11.5%	16.1%	8.3%	9.3%	17.8%	13.8%
Head	418	407	45	209	256	11	155	1502
	15.8%	13.4%	10.2%	22.0%	20.1%	12.8%	13.5%	15.7%
Face	49	68	14	28	16	2	46	222
	1.9%	2.2%	3.2%	3.0%	1.3%	2.3%	4.0%	2.3%
Chest	326	330	13	5	17	1	70	761
	12.3%	10.9%	2.9%	0.5%	1.3%	1.2%	6.1%	7.9%
Abdomen	36	69	4	16	13	0	9	148
	1.4%	2.3%	0.9%	1.7%	1.0%	0.0%	0.8%	1.5%
Spine	203	243	9	8	23	2	94	583
	7.7%	8.0%	2.0%	0.8%	1.8%	2.3%	8.2%	6.1%
Upper extremity	123	206	67	285	103	13	86	883
	4.7%	6.8%	15.1%	30.0%	8.1%	15.1%	7.5%	9.2%
Lower extremity	287	323	113	107	397	18	131	1377
	10.9%	10.6%	25.5%	11.3%	31.1%	20.9%	11.4%	14.4%
Multiple	558	594	94	90	284	15	107	1742
	21.1%	19.5%	21.2%	9.5%	22.3%	17.4%	9.3%	18.2%
Unspec./other	282	355	33	48	60	16	247	1041
	10.7%	11.7%	7.4%	5.1%	4.7%	18.6%	21.5%	10.9%
Total	2643	3039	443	949	1276	86	1149	9585
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Person								
External	914	803	474	539	270	29	582	3612
	12.2%	14.1%	11.0%	13.0%	8.0%	11.9%	19.1%	12.8%
Head	1305	967	432	931	750	32	461	4878
	17.5%	17.0%	10.1%	22.5%	22.3%	13.1%	15.1%	17.3%
Face	218	165	52	137	55	4	122	752
	2.9%	2.9%	1.2%	3.3%	1.6%	1.6%	4.0%	2.7%
Chest	838	494	130	41	60	8	144	1716
	11.2%	8.7%	3.0%	1.0%	1.8%	3.3%	4.7%	6.1%
Abdomen	123	139	70	88	42	2	28	492
	1.6%	2.4%	1.6%	2.1%	1.2%	0.8%	0.9%	1.7%
Spine	523	438	150	60	58	11	218	1459
	7.0%	7.7%	3.5%	1.5%	1.7%	4.5%	7.1%	5.2%
Upper extremity	415	402	710	1131	230	36	306	3230
	5.6%	7.1%	16.5%	27.3%	6.8%	14.8%	10.0%	11.4%
Lower extremity	781	619	1159	532	1009	49	347	4496
	10.5%	10.9%	27.0%	12.9%	30.0%	20.1%	11.4%	15.9%
Multiple	1609	1080	914	487	725	42	280	5135
	21.5%	19.0%	21.3%	11.8%	21.5%	17.2%	9.2%	18.2%
Unspec./other	745	573	202	190	169	30	563	2472
	10.0%	10.1%	4.7%	4.6%	5.0%	12.3%	18.4%	8.8%
Total	7470	5678	4294	4136	3368	244	3052	28242
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Source data: State and Territory hospital separation data. See Appendix A.
* Body region of most severe injury was defined on the basis of the maximum AIS body region.
** Injury severity could not be imputed for Queensland records. See Appendix A.
Note: Comparative data for deaths was not available

Table 19b. Road injury hospital separations, body region of most severe injury* by road user type and sex, All States and Territories excluding Queensland**, 1991 (Rate per 100,000 pop.)

	Driver	Passenger in motor vehicle	Motor cycle rider/ pillion	Pedal cyclist	Pedestrian	Other road user	Un-specified	Total
Male								
External	7.8	5.0	5.9	5.4	2.3	0.3	5.3	32.0
Head	12.4	7.9	5.4	10.1	6.9	0.3	4.3	47.3
Face	2.4	1.4	0.5	1.5	0.5	0.0	1.1	7.4
Chest	7.2	2.3	1.6	0.5	0.6	0.1	1.0	13.4
Abdomen	1.2	1.0	0.9	1.0	0.4	0.0	0.3	4.8
Spine	4.5	2.7	2.0	0.7	0.5	0.1	1.7	12.3
Upper extremity	4.1	2.7	9.0	11.9	1.8	0.3	3.1	32.9
Lower extremity	6.9	4.1	14.7	6.0	8.6	0.4	3.0	43.7
Multiple	14.7	6.8	11.5	5.6	6.2	0.4	2.4	47.6
Unspec./ other	6.5	3.1	2.4	2.0	1.5	0.2	4.4	20.1
Total	67.7	37.0	54.0	44.7	29.4	2.2	26.7	261.6
Female								
External	5.0	6.2	0.7	2.1	1.5	0.1	2.9	18.4
Head	5.8	5.7	0.6	2.9	3.6	0.2	2.2	20.9
Face	0.7	0.9	0.2	0.4	0.2	0.0	0.6	3.1
Chest	4.5	4.6	0.2	0.1	0.2	0.0	1.0	10.6
Abdomen	0.5	1.0	0.1	0.2	0.2	0.0	0.1	2.0
Spine	2.8	3.4	0.1	0.1	0.3	0.0	1.3	8.1
Upper extremity	1.7	2.9	0.9	4.0	1.4	0.2	1.2	12.3
Lower extremity	4.0	4.5	1.6	1.5	5.5	0.3	1.8	19.1
Multiple	7.8	8.3	1.3	1.3	3.9	0.2	1.5	24.2
Unspec./ other	3.9	4.9	0.5	0.7	0.8	0.2	3.4	14.5
Total	36.8	42.3	6.2	13.2	17.7	1.2	16.0	133.3
Person								
External	6.4	5.6	3.3	3.8	1.9	0.2	4.1	25.2
Head	9.1	6.8	3.0	6.5	5.2	0.2	3.2	34.0
Face	1.5	1.2	0.4	1.0	0.4	0.0	0.9	5.3
Chest	5.9	3.4	0.9	0.3	0.4	0.1	1.0	12.0
Abdomen	0.9	1.0	0.5	0.6	0.3	0.0	0.2	3.4
Spine	3.7	3.1	1.0	0.4	0.4	0.1	1.5	10.2
Upper extremity	2.9	2.8	5.0	7.9	1.6	0.3	2.1	22.6
Lower extremity	5.5	4.3	8.1	3.7	7.0	0.3	2.4	31.4
Multiple	11.2	7.5	6.4	3.4	5.1	0.3	2.0	35.9
Unspec./ other	5.2	4.0	1.4	1.3	1.2	0.2	3.9	17.3
Total	52.2	39.6	30.0	28.9	23.5	1.7	21.3	197.2

Source data: State and Territory hospital separation data and 1991 population data from the 1991 Census of Housing and Population.
* Body region of most severe injury was defined on the basis of the maximum AIS body region.
** Injury severity could not be imputed for Queensland records. See Appendix A.
Note: Comparative data for deaths was not available

Main Points:

- Head injury separation rates were highest in occupants of vehicles and pedal cyclists, especially in males.
- High rates of lower extremity injury in male motorcyclists and both male and female pedestrians were observed. Injury rates to the upper extremity were particularly high in male pedal cyclists.
- Spinal injury was predominantly a feature of motorised transport (vehicle occupants and motorcyclists).
- Multiple injury complicates interpretation of information about body region of most severe injury.

4.3 State/Territory

Table 20a. Road fatalities, State/Territory by road user type and sex, Australia, 1991 (Case number and column percentage)

	Driver	Passenger in motor vehicle	Motor cycle rider/ pillion	Pedal cyclist	Pedestrian	Other road user	Unspecified	Total
Male								
NSW	220	92	56	9	75	1	8	461
	32.8%	32.3%	24.5%	16.7%	30.6%	100.0%	18.6%	30.2%
VIC	155	69	50	14	71	0	7	366
	23.1%	24.2%	21.8%	25.9%	29.0%	0.0%	16.3%	24.0%
QLD	118	55	37	14	49	0	11	284
	17.6%	19.3%	16.2%	25.9%	20.0%	0.0%	25.6%	18.6%
SA	69	17	24	11	16	0	4	141
	10.3%	6.0%	10.5%	20.4%	6.5%	0.0%	9.3%	9.2%
WA	58	31	41	5	15	0	4	154
	8.7%	10.9%	17.9%	9.3%	6.1%	0.0%	9.3%	10.1%
TAS	29	12	8	0	9	0	3	61
	4.3%	4.2%	3.5%	0.0%	3.7%	0.0%	7.0%	4.0%
NT	15	9	7	0	8	0	6	45
	2.2%	3.2%	3.1%	0.0%	3.3%	0.0%	14.0%	2.9%
ACT	6	0	6	1	2	0	0	15
	0.9%	0.0%	2.6%	1.9%	0.8%	0.0%	0.0%	1.0%
Total	670	285	229	54	245	1	43	1527
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Female								
NSW	80	78	4	1	43	0	1	207
	32.8%	31.3%	28.6%	11.1%	41.0%	0.0%	7.7%	32.6%
VIC	66	60	5	1	24	0	3	159
	27.0%	24.1%	35.7%	11.1%	22.9%	0.0%	223.1%	25.1%
QLD	43	46	4	3	17	0	4	117
	17.6%	18.5%	28.6%	33.3%	16.2%	0.0%	30.8%	18.5%
SA	19	21	1	0	9	0	1	51
	7.8%	8.4%	7.1%	0.0%	8.6%	0.0%	7.7%	8.0%
WA	19	23	0	3	4	0	1	50
	7.8%	9.2%	0.0%	33.3%	3.8%	0.0%	7.7%	7.9%
TAS	11	7	0	0	2	0	0	20
	4.5%	2.8%	0.0%	0.0%	1.9%	0.0%	0.0%	3.2%
NT	4	8	0	0	6	0	3	21
	1.6%	3.2%	0.0%	0.0%	5.7%	0.0%	23.1%	3.3%
ACT	2	6	0	1	0	0	0	9
	0.8%	2.4%	0.0%	11.1%	0.0%	0.0%	0.0%	1.4%
Total	244	249	14	9	105	0	13	634
	100.0%	100.0%	100.0%	100.0%	100.0%	0.0%	100.0%	100.0%
Person								
NSW	300	170	60	10	118	1	9	668
	32.8%	31.8%	24.7%	15.9%	33.7%	100.0%	16.1%	30.9%
VIC	221	129	55	15	95	0	10	525
	24.2%	24.2%	22.6%	23.8%	27.1%	0.0%	17.9%	24.3%
QLD	161	101	41	17	66	0	15	401
	17.6%	18.9%	16.9%	27.0%	18.9%	0.0%	26.8%	18.6%
SA	88	38	25	11	25	0	5	192
	9.6%	7.1%	10.3%	17.5%	7.1%	0.0%	8.9%	8.9%
WA	77	54	41	8	19	0	5	204
	8.4%	10.1%	16.9%	12.7%	5.4%	0.0%	8.9%	9.4%
TAS	40	19	8	0	11	0	3	81
	4.4%	3.6%	3.3%	0.0%	3.1%	0.0%	5.4%	3.7%
NT	19	17	7	0	14	0	9	66
	2.1%	3.2%	2.9%	0.0%	4.0%	0.0%	16.1%	3.1%
ACT	8	6	6	2	2	0	0	24
	0.9%	1.1%	2.5%	3.2%	0.6%	0.0%	0.0%	1.1%
Total	914	534	243	63	350	1	56	2161
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Source: NISU based on ABS mortality data. See Appendix A.
Note: Refer to Appendix C for comparative data on hospital separations with ISS 15+

Table 20b. Road fatalities, State/Territory by road user type and sex, Australia, 1991 (Rate per 100,000 pop.)

	Driver	Passenger	Motor cycle rider/ pillion	Pedal cyclist	Pedestrian	Other road user	Unspecified	Total
Male								
NSW	7.5	3.1	1.9	0.3	2.6	0.0	0.3	15.7
VIC	7.1	3.1	2.3	0.6	3.2	0.0	0.3	16.7
QLD	8.0	3.7	2.5	0.9	3.3	0.0	0.7	19.1
SA	9.6	2.4	3.3	1.5	2.2	0.0	0.6	19.6
WA	7.0	3.8	5.0	0.6	1.8	0.0	0.5	18.7
TAS	12.5	5.2	3.5	0.0	3.9	0.0	1.3	26.4
NT	17.3	10.4	8.1	0.0	9.2	0.0	6.9	51.9
ACT	4.1	0.0	4.1	0.7	1.4	0.0	0.0	10.4
Total	7.8	3.3	2.7	0.6	2.8	0.0	0.5	17.7
Female								
NSW	2.7	2.6	0.1	0.0	1.5	0.0	0.0	7.0
VIC	3.0	2.7	0.2	0.0	1.1	0.0	0.1	7.1
QLD	2.9	3.1	0.3	0.2	1.2	0.0	0.3	7.9
SA	2.6	2.9	0.1	0.0	1.2	0.0	0.1	7.0
WA	2.3	2.8	0.0	0.4	0.5	0.0	0.1	6.1
TAS	4.7	3.0	0.0	0.0	0.8	0.0	0.0	8.5
NT	5.1	10.1	0.0	0.0	7.6	0.0	3.8	26.6
ACT	1.4	4.1	0.0	0.7	0.0	0.0	0.0	6.2
Total	2.8	2.9	0.2	0.1	1.2	0.0	0.2	7.3
Person								
NSW	5.1	2.9	1.0	0.2	2.0	0.0	0.2	11.3
VIC	5.0	2.9	1.2	0.3	2.1	0.0	0.2	11.9
QLD	5.4	3.4	1.4	0.6	2.2	0.0	0.5	13.5
SA	6.1	2.6	1.7	0.8	1.7	0.0	0.3	13.3
WA	4.7	3.3	2.5	0.5	1.2	0.0	0.3	12.5
TAS	8.6	4.1	1.7	0.0	2.4	0.0	0.6	17.4
NT	11.5	10.3	4.2	0.0	8.5	0.0	5.4	39.9
ACT	2.8	2.1	2.1	0.7	0.7	0.0	0.0	8.3
Total	5.3	3.1	1.4	0.4	2.0	0.0	0.3	12.5

Source: NISU based on ABS mortality data and 1991 population data from the 1991 Census of Housing and Population
Note: Refer to Appendix C for comparative data on hospital separations with ISS 15+

Main Points:

- The deaths rates for vehicle occupants, motorcyclists and pedestrians in the Northern Territory were the highest in the nation. Male drivers in the Northern Territory and Tasmania had particularly high death rates. Care should be taken when interpreting death rates in smaller States and Territories as the number of cases may be small and rates will be subject to greater levels of variation due to chance factors when compared to the rates observed in larger States.

- Amongst the larger States (NSW, Vic. and Qld.) there was little variation in the death rates of any road user group.

5. ROAD INJURY SEPARATIONS BY BODY REGION OF MOST SEVERE INJURY AND SEX

5.1 Injury Severity (maximum AIS)

Table 21a Road injury hospital separations, Injury severity (max. AIS) by body region of most severe injury* and sex, All States and Territories excluding Queensland**, 1991 (Case number and row percentage)

	External	Head	Face	Chest	Abdo-men	Spine	Upper extrem.	Lower extrem.	Multiple	Unspec./ other	Total
Male											
Minor	1530	0	219	51	0	140	131	52	771	6	2900
	52.7%	0.0%	7.5%	1.8%	0.0%	4.8%	4.5%	1.8%	26.6%	0.2%	100.0%
Moderate	753	2443	297	382	215	94	2014	1557	1972	7	9733
	7.7%	25.1%	3.0%	3.9%	2.2%	1.0%	20.7%	16.0%	20.3%	0.1%	100.0%
Serious	1	285	14	421	37	549	201	1502	531	3	3544
	0.0%	8.0%	0.4%	11.9%	1.1%	15.5%	5.7%	42.4%	15.0%	0.1%	100.0%
Severe	0	460	0	100	84	81	1	8	72	5	811
	0.0%	56.7%	0.0%	12.3%	10.4%	9.9%	0.1%	1.0%	8.9%	0.6%	100.0%
Critical	2	188	0	1	8	13	0	0	46	2	260
	0.8%	72.3%	0.0%	0.4%	3.1%	5.0%	0.0%	0.0%	17.7%	0.8%	100.0%
Unspecified	0	0	0	0	0	0	0	0	0	1408	1408
	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	100.0%
Total	2285	3376	529	955	344	876	2348	3119	3393	1431	18656
	12.2%	18.1%	2.8%	5.1%	1.8%	4.7%	12.6%	16.7%	18.2%	7.7%	100.0%
Female											
Minor	964	1	103	37	9	168	41	0	472	7	1820
	53.0%	0.1%	5.6%	2.0%	0.5%	9.2%	2.3%	0.0%	25.9%	0.4%	100.0%
Moderate	360	1185	115	484	99	49	782	0	994	4	4870
	7.4%	24.3%	2.4%	9.9%	2.0%	1.0%	16.1%	0.0%	20.4%	0.1%	100.0%
Serious	2	102	5	197	7	330	59	0	229	1	1490
	0.1%	6.8%	0.3%	13.2%	0.5%	22.2%	4.0%	0.0%	15.4%	0.1%	100.0%
Severe	0	152	0	43	31	31	0	0	32	1	294
	0.0%	51.8%	0.0%	14.8%	10.5%	10.7%	0.0%	0.0%	10.9%	0.3%	100.0%
Critical	0	62	0	0	2	4	0	0	15	1	84
	0.0%	73.8%	0.0%	0.0%	2.4%	4.8%	0.0%	0.0%	17.9%	1.2%	100.0%
Unspecified	0	0	0	0	0	0	0	0	0	1027	1027
	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	100.0%
Total	1326	1502	222	761	148	583	883	0	1742	1041	9585
	13.8%	15.7%	2.3%	7.9%	1.5%	6.1%	9.2%	0.0%	18.2%	10.8%	100.0%
Person											
Minor	2494	1	321	88	9	308	173	70	1243	13	4720
	52.8%	0.0%	6.8%	1.9%	0.2%	6.5%	3.7%	1.5%	26.3%	0.3%	100.0%
Moderate	1113	3628	412	866	314	143	2797	2355	2966	11	14603
	7.6%	24.8%	2.8%	5.9%	2.1%	1.0%	19.2%	16.1%	20.3%	0.1%	100.0%
Serious	3	387	19	618	44	879	260	2060	760	4	5034
	0.1%	7.7%	0.4%	12.3%	0.9%	17.5%	5.2%	40.9%	15.1%	0.1%	100.0%
Severe	0	612	0	143	115	112	1	11	104	6	1105
	0.0%	55.4%	0.0%	13.0%	10.4%	10.1%	0.1%	1.0%	9.4%	0.5%	100.0%
Critical	2	250	0	1	10	17	0	0	61	3	344
	0.6%	72.7%	0.0%	0.3%	2.9%	4.9%	0.0%	0.0%	17.7%	0.9%	100.0%
Unspecified	0	0	0	0	0	0	0	0	0	2435	2435
	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	100.0%
Total	3612	4878	752	1716	492	1459	3230	4496	5135	2472	28242
	12.8%	17.3%	2.7%	6.1%	1.7%	5.2%	11.4%	15.9%	18.2%	8.7%	100.0%

Source data: State and Territory hospital separation data. See Appendix A.
* Body region of most severe injury was defined on the basis of the maximum AIS body region.
** Injury severity could not be imputed for Queensland records. See Appendix A.

Table 21b. Road injury hospital separations, Injury severity (max AIS) by body region of most severe injury* and sex, All States/Territories excluding Queensland**, 1991 (Rate per 100,000 pop.)

	External	Head	Face	Chest	Abdo-men	Spine	Upper extrem.	Lower extrem.	Multiple	Unspec./ other	Total
Male											
Minor	21.5	0.0	3.1	0.7	0.0	2.0	1.8	0.7	10.8	0.1	40.7
Moderate	10.6	34.3	4.2	5.4	3.0	1.3	28.2	21.8	27.7	0.1	136.5
Serious	0.0	4.0	0.2	5.9	0.5	7.7	2.8	21.1	7.4	0.0	49.7
Severe	0.0	6.5	0.0	1.4	1.2	1.1	0.0	0.1	1.0	0.1	11.4
Critical	0.0	2.6	0.0	0.0	0.1	0.2	0.0	0.0	0.6	0.0	3.6
Unspecified	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	19.7	19.7
Total	32.0	47.3	7.4	13.4	4.8	12.3	32.9	43.7	47.6	19.9	261.6
Female											
Minor	13.4	0.0	1.4	0.5	0.1	2.3	0.6	0.3	6.6	0.1	25.3
Moderate	5.0	16.5	1.6	6.7	1.4	0.7	10.9	11.1	13.8	0.1	67.7
Serious	0.0	1.4	0.1	2.7	0.1	4.6	0.8	7.8	3.2	0.0	20.7
Severe	0.0	2.1	0.0	0.6	0.4	0.4	0.0	0.0	0.4	0.0	4.1
Critical	0.0	0.9	0.0	0.0	0.0	0.1	0.0	0.0	0.2	0.0	1.2
Unspecified	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.3	14.3
Total	18.4	20.9	3.1	10.6	2.1	8.1	12.3	19.1	24.2	14.4	133.3
Person											
Minor	17.4	0.0	2.2	0.6	0.1	2.2	1.2	1.2	1.2	1.2	33.0
Moderate	7.8	25.3	2.9	6.0	2.2	1.0	19.5	19.5	19.5	19.5	102.0
Serious	0.0	2.7	0.1	4.3	0.3	6.1	1.8	1.8	1.8	1.8	35.1
Severe	0.0	4.3	0.0	1.0	0.8	0.8	0.0	0.0	0.0	0.0	7.7
Critical	0.0	1.7	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	2.4
Unspecified	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.0
Total	25.2	34.1	5.3	12.0	3.4	10.2	22.6	31.4	35.9	17.2	197.2

Source data: State and Territory hospital separation data and 1991 population data from the 1991 Census of Housing and Population
* Body region of most severe injury was defined on the basis of the maximum AIS body region.
** Injury severity could not be imputed for Queensland records. See Appendix A.

Main Points:

- Assessment of injury rates for various body regions within categories of injury severity (max. AIS) for 'person' reveals high rates of injury for:
  - external areas of 'minor' severity
  - head and upper extremity of 'moderate' severity
  - lower extremity, spine and chest of 'serious' severity
  - head of 'severe' and 'critical' injury.
- Injury rates were highest for head injury of moderate severity, especially in males.

6. ROAD INJURY SEPARATIONS BY LENGTH OF HOSPITAL STAY
6.1 Road User Type

Table 22a Road injury hospital separations, Road user type by length of hospital stay (days) and sex, Australia, 1991 (Case number and row percentage)

	Mean stay	1 to 2 days	3 to 6 days	7 or more days	Unspecified	Total
Male						
Driver	8.1	2747	1171	1576	32	5526
		49.7%	21.2%	28.5%	0.6%	100.0%
Passenger in motor vehicle	7.6	1563	690	859	12	3123
		50.0%	22.1%	27.5%	0.4%	100.0%
Motor cycle rider/pillion	8.4	2046	1315	1693	28	5083
		40.3%	25.9%	33.3%	0.6%	100.0%
Pedal cyclist	3.9	2949	745	574	6	4274
		69.0%	17.4%	13.4%	0.1%	100.0%
Pedestrian	11.7	984	476	1029	22	2512
		39.2%	18.9%	41.0%	0.9%	100.0%
Other road user	6.1	95	37	56	2	190
		50.0%	19.5%	29.5%	1.1%	100.0%
Unspecified	5.0	1985	684	556	50	3275
		60.6%	20.9%	17.0%	1.5%	100.0%
Total	7.3	12369	5118	6343	152	23982
		51.6%	21.3%	26.4%	0.6%	100.0%
Female						
Driver	6.9	1435	750	825	18	3028
		47.4%	24.8%	27.2%	0.6%	100.0%
Passenger in motor vehicle	7.9	1737	846	1035	22	3639
		47.7%	23.2%	28.4%	0.6%	100.0%
Motor cycle rider/pillion	8.0	237	142	182	4	564
		42.0%	25.2%	32.3%	0.7%	100.0%
Pedal cyclist	3.0	929	244	118	0	1291
		72.0%	18.9%	9.1%	0.0%	100.0%
Pedestrian	12.5	514	320	636	10	1480
		34.7%	21.6%	43.0%	0.7%	100.0%
Other road user	4.7	46	28	21	0	95
		48.4%	29.5%	22.1%	0.0%	100.0%
Unspecified	5.3	1214	369	411	6	1999
		60.7%	18.5%	20.6%	0.3%	100.0%
Total	7.2	6111	2699	3227	60	12096
		50.5%	22.3%	26.7%	0.5%	100.0%
Person						
Driver	7.7	4182	1920	2401	50	8554
		48.9%	22.4%	28.1%	0.6%	100.0%
Passenger in motor vehicle	7.8	3299	1536	1893	34	6762
		48.8%	22.7%	28.0%	0.5%	100.0%
Motor cycle rider/pillion	8.4	2283	1457	1875	32	5647
		40.4%	25.8%	33.2%	0.6%	100.0%
Pedal cyclist	3.7	3877	990	692	6	5565
		69.7%	17.8%	12.4%	0.1%	100.0%
Pedestrian	12.0	1498	796	1665	32	3991
		37.5%	19.9%	41.7%	0.8%	100.0%
Other road user	5.7	141	65	77	2	286
		49.3%	22.7%	26.9%	0.7%	100.0%
Unspecified	5.1	3198	1053	967	56	5274
		60.6%	20.0%	18.3%	1.1%	100.0%
Total	7.3	18480	7817	9570	212	36079
		51.2%	21.7%	26.5%	0.6%	100.0%

Source data: State and Territory hospital separation data. See Appendix A.

Table 22b. Road injury hospital separations, Road user type by length of hospital stay (days) and sex, Australia, 1991 (Rate per 100,000 pop.)

	1 to 2 days	3 to 6 days	7 or more days	Unspecified	Total
Male					
Driver	31.9	13.6	18.3	0.4	64.1
Passenger in motor vehicle	18.1	8.0	10.0	0.1	36.3
Motor cycle rider/ pillion	23.7	15.3	19.6	0.3	59.0
Pedal cyclist	34.2	8.6	6.7	0.1	49.6
Pedestrian	11.4	5.5	11.9	0.3	29.1
Other road user	1.1	0.4	0.6	0.0	2.2
Un--specified	23.0	7.9	6.4	0.6	38.0
Total	143.6	59.4	73.5	1.8	278.4
Female					
Driver	16.6	8.7	9.5	0.2	34.9
Passenger in motor vehicle	20.0	9.8	11.9	0.2	42.0
Motor cycle rider/ pillion	2.7	1.6	2.1	0.1	6.5
Pedal cyclist	10.7	2.8	1.4	0.0	14.9
Pedestrian	5.9	3.7	7.3	0.1	17.1
Other road user	0.5	0.3	0.2	0.0	1.1
Unspecified	14.0	4.3	4.7	0.1	23.1
Total	70.5	31.1	37.1	0.7	139.6
Person					
Driver	24.2	11.1	13.9	0.3	49.5
Passenger in motor vehicle	19.1	8.9	11.0	0.2	39.1
Motor cycle rider/ pillion	13.2	8.4	10.8	0.2	32.7
Pedal cyclist	22.4	5.7	4.0	0.0	32.2
Pedestrian	8.7	4.6	9.6	0.2	23.1
Other road user	0.8	0.4	0.4	0.0	1.6
Unspecified	18.5	6.1	5.6	0.3	30.5
Total	106.9	45.2	55.3	1.2	208.7

Source data: State and Territory hospital separation data and 1991 population data from the 1991 Census of Housing and Population.

Main Points:

- Length of hospital stay is often used in the hospital sector as an index of the approximate level of resource consumption for an episode of care. Comparison of the average length of stay of different road user categories indicates the relative level of resource consumption within hospitals.

- For all road injury separations the average length of hospital stay (ALOS) was 7 days. The road user group with the highest ALOS was pedestrians (12 days) which probably reflects their high rates of severe and critical injury (see Tables 18a & 18b) and possibly also the impact of high rates of lower extremity injury which might require long convalescence (see Tables 23a & 23b). The high percentage of elderly (70+ yrs.) amongst pedestrians may also be a factor (see Table 13a).

- Pedal cyclists had the lowest ALOS (3.7 days) probably reflecting the lower severity of their injuries (see Tables 18a & 18b).

6.2 Body Region of Most Severe Injury

Table 23a. Road injury hospital separations, body region of most severe injury* by length of hospital stay (days) and sex, All States and Territories excluding Queensland**, 1991 (Case numbers and column percentage)

	Mean stay	1 to 2 days	3 to 6 days	7 or more days	Unspecified	Total
Male						
External	3.3	1513	499	253	20	2285
		16.0%	12.5%	5.0%	15.4%	12.2%
Head	6.1	2388	378	600	10	3376
		25.3%	9.4%	11.8%	7.7%	18.1%
Face	3.6	294	162	63	10	529
		3.1%	4.0%	1.2%	7.7%	2.8%
Chest	7.1	306	305	331	12	955
		3.2%	7.6%	6.5%	9.2%	5.1%
Abdomen	8.9	113	72	156	2	344
		1.2%	1.8%	3.1%	1.5%	1.8%
Spine	17.4	289	208	372	8	876
		3.1%	5.2%	7.3%	6.2%	4.7%
Upper extremity	3.5	1559	521	258	10	2348
		16.5%	13.0%	5.1%	7.7%	12.6%
Lower extremity	12.3	696	790	1591	42	3119
		7.4%	19.8%	31.4%	32.3%	16.7%
Multiple	9.1	1323	809	1260	0	3393
		14.0%	20.2%	24.9%	0.0%	18.2%
Unspec./ other	4.4	973	257	185	16	1431
		10.3%	6.4%	3.7%	12.3%	7.7%
Total	7.4	9456	4000	5070	130	18656
		100.0%	100.0%	100.0%	100.0%	100.0%
Female						
External	3.7	855	273	177	22	1326
		18.0%	12.5%	6.8%	36.7%	13.8%
Head	4.9	1052	238	210	2	1502
		22.2%	10.9%	8.0%	3.3%	15.7%
Face	3.2	118	85	20	0	222
		2.5%	3.9%	0.8%	0.0%	2.3%
Chest	6.4	264	271	222	4	761
		5.6%	12.4%	8.5%	6.7%	7.9%
Abdomen	8.6	50	34	64	0	148
		1.0%	1.6%	2.5%	0.0%	1.5%
Spine	9.7	237	124	222	0	583
		5.0%	5.7%	8.5%	0.0%	6.1%
Upper extremity	3.7	545	207	124	6	883
		11.5%	9.5%	4.8%	10.0%	9.2%
Lower extremity	14.3	270	351	736	20	1377
		5.7%	16.1%	28.2%	33.3%	14.4%
Multiple	10.7	608	409	723	2	1742
		12.8%	18.8%	27.7%	3.3%	18.2%
Unspec./ other	3.3	738	188	112	4	1041
		15.6%	8.6%	4.3%	6.7%	10.8%
Total	7.3	4736	2180	2610	60	9585
		100.0%	100.0%	100.0%	100.0%	100.0%
Person						
External	3.4	2368	771	430	42	3612
		16.7%	12.5%	5.6%	22.1%	12.8%
Head	5.8	3441	615	810	12	4878
		24.2%	10.0%	10.5%	6.3%	17.3%
Face	3.5	412	247	83	10	752
		2.9%	4.0%	1.1	5.3%	2.7%
Chest	6.8	570	576	553	16	1716
		4.0%	9.3%	7.2%	8.4%	6.1%
Abdomen	8.8	163	107	220	2	492
		1.1%	1.7%	2.9%	1.1%	1.7%
Spine	14.3	526	331	594	8	1459
		3.7%	5.4%	7.7%	4.2%	5.2%
Upper extremity	3.5	2104	728	382	16	3230
		14.8%	11.8%	5.0%	8.4%	11.4%
Lower extremity	12.9	965	1142	2327	62	4496
		6.8%	18.5%	30.3%	32.6%	15.9%
Multiple	9.7	1932	1218	1984	2	5135
		13.6%	19.7%	25.8%	1.1%	18.2%
Unspec./ other	3.9	1711	444	297	20	2472
		12.0%	7.2%	3.9%	10.5%	8.7%
Total	7.4	14192	6180	7680	190	28242
		100.0%	100.0%	100.0%	100.0%	100.0%

Source data: State and Territory hospital separation data. See Appendix A.

* Body region of most severe injury was defined on the basis of the maximum AIS body region.

** Injury severity was not imputed for Queensland records. See Appendix A.

Table 23b Road injury hospital separations, body region of most severe injury* by length of stay (days) and sex, All States and Territories excluding Queensland**, 1991 (Rate per 100,000 pop.)

	1 to 2 days	3 to 6 days	7 or more days	Unspecified	Total
Male					
External	21.2	7.0	3.6	0.3	32.0
Head	33.5	5.3	8.4	0.1	47.3
Face	4.1	2.3	0.9	0.1	7.4
Chest	4.3	4.3	4.6	0.2	13.4
Abdomen	1.6	1.0	2.2	0.0	4.8
Spine	4.1	2.9	5.2	0.1	12.3
Upper extremity	21.9	7.3	3.6	0.1	32.9
Lower extremity	9.8	11.1	22.3	0.6	43.7
Multiple	18.6	11.3	17.7	0.0	47.6
Unspec./ other	13.6	3.6	2.6	0.2	20.1
Total	132.6	56.1	71.1	1.7	261.6
Female					
External	11.9	3.8	2.5	0.3	18.5
Head	14.6	3.3	2.9	0.0	20.9
Face	1.6	1.2	0.3	0.0	3.1
Chest	3.7	3.8	3.1	0.1	10.6
Abdomen	0.7	0.5	0.9	0.0	2.1
Spine	3.3	1.7	3.1	0.0	8.1
Upper extremity	7.6	2.9	1.7	0.1	12.3
Lower extremity	3.8	4.9	10.2	0.3	19.1
Multiple	8.5	5.7	10.1	0.0	24.2
Unspec./ other	10.3	2.6	1.6	0.1	14.5
Total	65.9	30.3	36.4	0.9	133.3
Person					
External	16.5	5.4	3.0	0.3	25.2
Head	24.0	4.3	5.7	0.1	34.1
Face	2.9	1.7	0.6	0.1	5.3
Chest	4.0	4.0	3.9	0.1	12.0
Abdomen	1.1	0.7	1.5	0.0	3.4
Spine	3.7	2.3	4.2	0.1	10.2
Upper extremity	14.7	5.1	2.7	0.1	22.6
Lower extremity	6.7	8.0	16.2	0.4	31.4
Multiple	13.5	8.5	13.8	0.0	35.8
Unspec./ other	11.9	3.1	2.1	0.1	17.3
Total	99.1	43.2	53.7	1.3	197.2

Source data: State and Territory hospital separation data and 1991 population data from the 1991 Census of Housing and Population
* Body region of most severe injury was defined on the basis of the maximum AIS body region.
** Injury severity could not be imputed for Queensland records. See Appendix A.

Main Points:

- The ALOS was greatest for road users for whom the body region associated with the most severe injury received was either the spine (14 days) or lower extremity (13 days).

- The ALOS of males with spinal injury was much greater than the ALOS of females (17 days & 10 respectively).

- Males had a slightly lower ALOS for lower limb injury than females (12 days & 14 days respectively).

7. REFERENCES:

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APPENDIX A: TECHNICAL NOTES

1. Data Sources

Hospital separations

The tabulations of hospital separations data presented in this report were derived from unit record hospital morbidity data collections maintained by State and Territory Health Authorities. The scope of these collections is described in Cooper-Stanbury et al (1994).

A small number of cases were also provided by the Commonwealth Department of Veterans Affairs for road injury cases separated from repatriation hospitals.

The data requested was restricted to those cases for which an ICD-9 'external cause' code (World Health Organisation, 1977) related to a road crash (i.e. E810-819 and E826) was recorded in any field of the morbidity record.

Diagnosis data provided by most States and Territories had been classified according to the clinical modification to the ninth revision of the International Classification of Disease ie. ICD-9-CM (Commission on Professional and Hospital Activities, 1980). Data from Queensland was classified according to the less detailed standard ICD-9 (World Health Organisation, 1977).

The number of diagnoses contained in the available hospital morbidity data sets was restricted to primary diagnosis and a maximum of four secondary diagnoses. Road user status was coded on the basis of the 4th digit of the ICD-9 'external cause' code.

It should be noted that hospital separation data includes a small proportion of cases (1.4%) that die in hospital (490 cases out of 35681 separations nationally, excluding NT separations). These cases are not evenly distributed throughout the cells of the tabulations presented in this report. Rather they are distributed toward categories of high severity injury. For example, over 40% of the separations having injuries recorded as 'critical' using the Abbreviated Injury Scale died in hospital.

Fatalities

Unit record mortality data was supplied to the Institute of Health and Welfare by the Australian Bureau of Statistics. It included ICD-9 'external cause' codes. The fatality records selected for analysis were cases with cause of death 'external cause' codes E810 to E819 and E826 which occurred during 1991 and had been registered by the end of 1992.

Comparison of hospital separation data and ABS data reveals that about a quarter of the deaths from road injury that were recorded by the ABS occurred in hospital.

Population data

The population data used as the denominator for rate calculations throughout the report was the 'estimated resident population' of Australia for 1991 based on the 1991 Census of Population and Housing (Australian Bureau of Statistics, 1993).

2. Data Manipulation

Hospital morbidity data was processed using the ICDMAP software (MacKenzie et al, 1989) to produce Abbreviated Injury Scale codes and Injury Severity Scores on the basis of ICD-9-CM diagnosis codes. The software maps each ICD-9-CM code to an AIS-85 code. The AIS-85 code cannot be mapped from ICD-9 codes which do not have the clinical modification. The software was developed using a modified Delphi technique to rate the ICD-9-CM to AIS-85 assignments and involved a panel from the Injury Scaling Committee of the American Association for Automotive Medicine. Unambiguous mapping of AIS-85 codes was possible for most ICD-9-CM codes.

The reliability of the mapping was lowest for injuries in the head/neck body region. Percent agreement amongst the panel members in the assignment of maximum AIS scores in the head/neck body region was 48% compared to 62% found in studies involving direct coding of AIS from hospital medical charts. Based on a number of studies by the authors (eg. MacKenzie et al, 1986; Steinwachs et al, 1987), MacKenzie et al (1989) consider that the map "provides reasonably good information on severity that might otherwise be unavailable for large population based research and evaluation". The satisfactory performance of the map is supported by The Association for the Advancement of Automotive Medicine (see The Abbreviated Injury Scale, 1990 Revision).

The Injury Severity Score was calculated from the separate AIS scores for each case, using the method proposed by Baker et al (1974). ISS has been shown to predict probability of survival well , particularly for road injury (Bull, 1975) although other methods may be better for injury more generally (Copes et al, 1990).

The data provided by Western Australia contained principal diagnosis only. Therefore an Injury Severity Score could not be calculated for these records. Diagnosis codes provided by Queensland for 1991 were ICD-9 codes and therefore could not be mapped for injury severity (AIS or ISS) using the ICDMAP which requires ICD-9-CM codes.

The separation data collected by New South Wales was provided by some hospitals as a sample of records. New South Wales separation data contains therefore a sample weighting factor which must be applied to each record prior to data analysis. The data that was provided for the Northern Territory and the hospitals managed by the Department of Veterans Affairs covered a 6 month period rather than the full 12 months. These records were also weighted prior to analysis to provide estimates for the full year.

As a result of the weighting procedure the sum of the cell counts within some tables may not exactly match the margin totals.

3. Statistical Considerations

In this publication, age specific rates have been computed for road injury hospital separations and fatalities. Since these rates were calculated from the complete enumeration of the injury experience of the respective populations there were no sampling errors (except for NSW where sampling of hospital separations was conducted). However just as a sample derived statistic is subject to chance variation, so too is a population parameter. Random variation in the number of hospital separations and fatalities experienced by populations has the potential to distort separation and mortality rates, particularly when the number of separations or deaths is small.

APPENDIX B: COMPARISON OF STATE/TERRITORY MORBIDITY DATA

The number of hospital separations reported for a particular injury category within a particular jurisdiction may be influenced by a range of factors. Therefore care must be taken when comparing jurisdictions.

Factors that may influence separation rates include:

- the incidence of injury within the population
- more generally, differences in admission policy between States/Territories influenced by differences in the availability of emergency beds
- differences in data gathering and reporting procedures (e.g. definition of in-patients, exclusion of some or all private hospitals from the morbidity collection in some states, lack of electronic data processing capabilities in some hospitals, sampling of data in NSW)

To investigate these factors road injury separation data was compared across State/Territory on the basis of injury severity. It was hypothesised that differences in rates of high severity injury would be more likely to reflect true differences in the incidence of road injury within the population while differences in the rates of low severity injury would be confounded to a greater degree by other factors such as differences in policy.

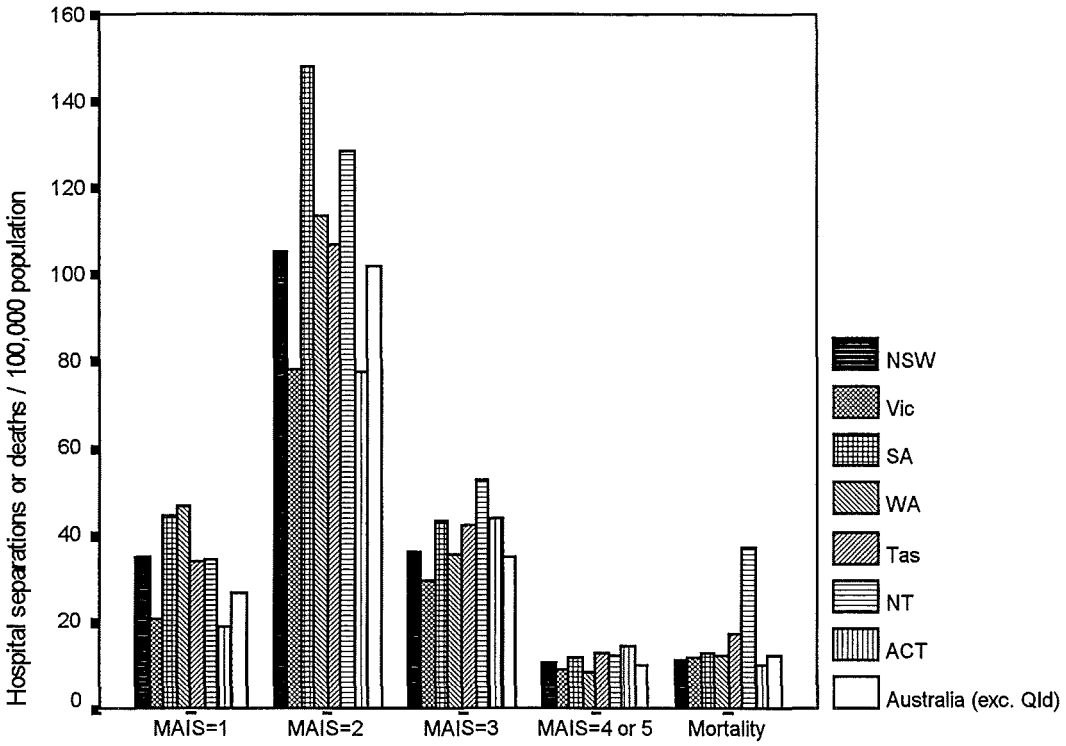
Figure 12 provides a comparison of crude road fatality rates per 100,000 pop. between States/Territories. It indicates that, at least for the States of New South Wales, Victoria, Queensland, Western Australia and South Australia the rates were relatively similar, leading to the expectation that rates for hospital separations would follow a similar pattern.

Figure 11 illustrates crude admission rates for road injury hospital separation and shows, in contrast to Figure 12, somewhat greater variation between the States. In particular, the separation rate for Victoria was well below the rate observed for the other States.

The data presented in Figures B1 and B2 provide a comparison of age standardised road injury separation rates on the basis of injury severity (maximum AIS), and of road injury death rates, for each State/Territory, with the exception of Queensland. Figure B1 shows State/Territory to State/Territory variation of rates by severity level. Figure B2 shows standardised rate ratios for each State/Territory and severity level. Rates for each State/Territory are presented as a ratio of the overall State/Territory rate. These figures tend to support the hypothesis of the investigation, with the ratio in most States/Territories trending toward the national ratio as severity increases, particularly in Victoria and South Australia. One implication of this finding is that State comparisons of road injury hospital separations may be most valid for the most severely injured cases (eg. maximum AIS 4+ or ISS 15+). For the purpose of such comparison, Appendix C provides a selection of State/Territory tables for cases with ISS 15+.

While this analysis represents a useful starting point in the comparison of State differences, there is clearly more work required. For example, the apparently high ACT rates for severe injury (MAIS 3+) may reflect the fact that the catchment area of ACT hospitals for such cases extends beyond the border of the ACT.

Figure B1. Road injury hospital separations (by severity) and death registrations, State/Territory (excluding Qld.), Australia, 1991: Age standardised rates.

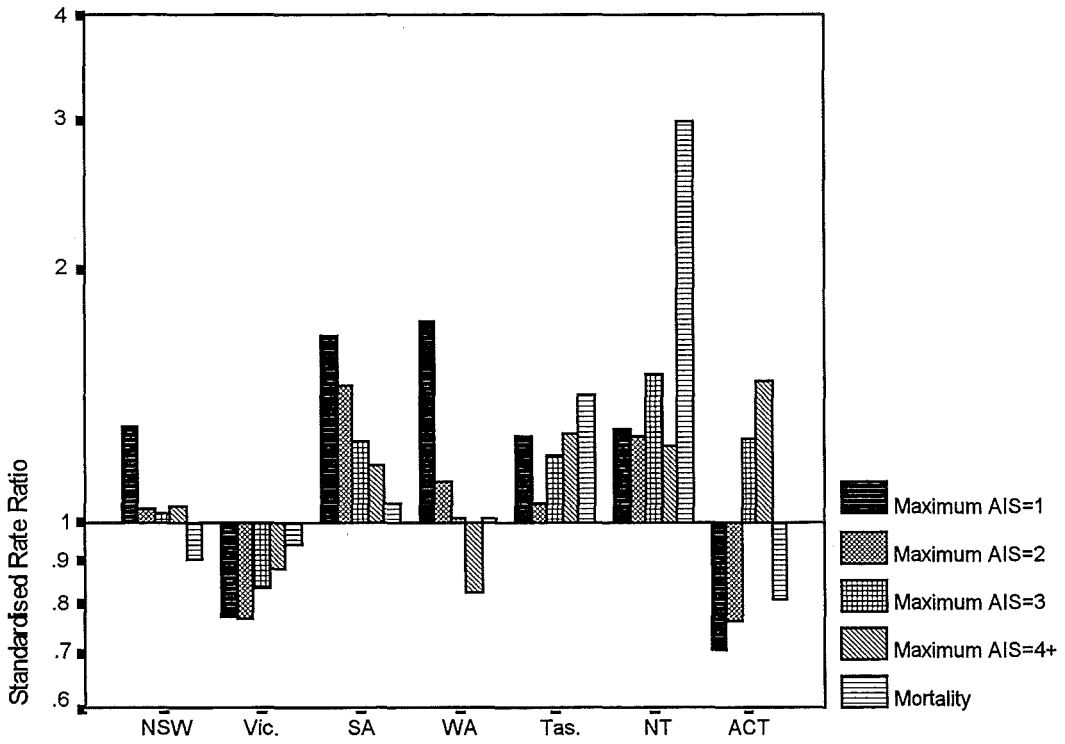


MAIS: most severe injury recorded for each hospital separation.

'Mortality' from ABS deaths data. Other data from hospital separations.

Approximately one quarter of 'mortality' cases were also recorded as hospital separations.

Figure B2. Road injury hospital separations (by severity) and death registrations, State/Territory (excluding Qld.), Australia, 1991: Standardised rate ratios.



Ratios are based on values for Australia (excl. Queensland).

MAIS derived from hospital separations. Mortality from ABS deaths data.

Approximately one quarter of 'mortality' cases were also recorded as hospital separations.

APPENDIX C - TABULATION OF SEPARATION DATA FOR CASES WITH AN INJURY SEVERITY SCORE (ISS) OF 15 OR MORE

Table C.1a Road injury hospital separations, State/Territory by age and sex, All separations with Injury Severity Score (ISS) of 15 or more, All States and Territories excluding Queensland and Western Australia*, (Case count and row percentage)

	0 - 4 yrs	5 - 14 yrs	15 - 19 yrs	20 - 24 yrs	25 - 29 yrs	30 - 49 yrs	50 - 69 yrs	70 or more yrs	Total
Male									
NSW	16	47	101	103	55	143	91	66	623
	2.6%	7.5%	16.3%	16.5%	8.9%	23.0%	14.7%	10.6%	100.0%
VIC	7	28	60	70	45	95	44	27	376
	1.9%	7.4%	16.0%	18.6%	12.0%	25.3%	11.7%	7.2%	100.0%
SA	0	10	35	29	16	45	24	7	166
	0.0%	6.0%	21.1%	17.5%	9.6%	27.1%	14.5%	4.2%	100.0%
TAS	0	4	13	12	3	10	6	3	51
	0.0%	7.8%	25.5%	23.5%	5.9%	19.6%	11.8%	5.9%	100.0%
NT**	0	2	2	0	0	10	4	0	18
	0.0%	11.1%	11.1%	0.0%	0.0%	55.6%	22.2%	0.0%	100.0%
ACT	1	3	11	9	7	10	7	2	50
	2.0%	6.0%	22.0%	18.0%	14.0%	20.0%	14.0%	4.0%	100.0%
Total	24	94	222	223	126	313	176	105	1284
	1.9%	7.3%	17.3%	17.3%	9.8%	24.4%	13.7%	8.2%	100.0%
Female									
NSW	4	15	30	33	23	45	51	27	229
	1.7%	6.5%	13.2%	14.6%	10.0%	19.6%	22.3%	12.0%	100.0%
VIC	4	10	24	23	15	27	24	14	141
	2.8%	7.1%	17.0%	16.3%	10.6%	19.1%	17.0%	9.9%	100.0%
SA	4	4	9	8	4	11	8	11	59
	6.8%	6.8%	15.3%	13.6%	6.8%	18.6%	13.6%	18.6%	100.0%
TAS	2	0	4	3	6	3	3	3	24
	8.3%	0.0%	16.7%	12.5%	25.0%	12.5%	12.5%	12.5%	100.0%
NT**	4	2	0	0	0	2	2	0	10
	40.0%	20.0%	0.0%	0.0%	0.0%	20.0%	20.0%	0.0%	100.0%
ACT	0	2	2	3	3	2	2	2	16
	0.0%	12.5%	12.5%	18.8%	18.8%	12.5%	12.5%	12.5%	100.0%
Total	18	33	69	70	51	90	90	57	479
	3.8%	6.9%	14.5%	14.7%	10.6%	18.8%	18.8%	12.0%	100.0%
Person									
NSW	20	62	132	136	78	188	143	93	852
	2.4%	7.3%	15.5%	15.9%	9.2%	22.0%	16.7%	11.0%	100.0%
VIC	11	38	84	93	60	122	68	41	517
	2.1%	7.4%	16.2%	18.0%	11.6%	23.6%	13.2%	7.9%	100.0%
SA	4	14	44	37	20	56	32	18	225
	1.8%	6.2%	19.6%	16.4%	8.9%	24.9%	14.2%	8.0%	100.0%
TAS	2	4	17	15	9	13	9	6	75
	2.7%	5.3%	22.7%	20.0%	12.0%	17.3%	12.0%	8.0%	100.0%
NT**	4	4	2	0	0	12	6	0	28
	14.3%	14.3%	7.1%	0.0%	0.0%	42.9%	21.4%	0.0%	100.0%
ACT	1	5	13	12	10	12	9	4	66
	1.5%	7.6%	19.7%	18.2%	15.2%	18.2%	13.6%	6.1%	100.0%
Total	42	127	292	293	177	403	267	162	1763
	2.4%	7.2%	16.5%	16.6%	10.1%	22.9%	15.1%	9.2%	100.0%

Source data: State and Territory hospital morbidity data. See Appendix A.

* ISS could not be mapped for Queensland or Western Australia.

** Care must be taken when interpreting NT data as the number of cases is an estimate based on 6mths data and the numbers are small.

Table C.1b Road injury hospital separations, State/Territory by age and sex, All separations with Injury Severity Score (ISS) of 15 or more, All States and Territories excluding Queensland and Western Australia*, (Rate per 100,000 pop.)

	0 - 4 yrs	5 - 14 yrs	15 - 19 yrs	20 - 24 yrs	25 - 29 yrs	30 - 49 yrs	50 - 69 yrs	70 or more yrs	Total
Male									
NSW	7.2	10.9	43.3	44.1	22.9	16.4	17.4	36.1	21.2
VIC	4.3	8.8	33.6	37.5	24.9	14.7	11.5	20.3	17.2
SA	0.0	9.7	63.0	49.6	27.6	21.3	18.3	14.1	23.1
TAS	0.0	10.8	69.8	68.2	17.1	14.9	14.9	20.1	22.0
NT**	0.0	13.1	28.4	0.0	0.0	0.0	111.7	352.7	20.8
ACT	8.7	12.9	79.1	66.1	56.4	21.6	36.2	46.5	34.6
Total	5.1	10.1	15.8	43.0	24.3	29.2	16.4	28.3	20.3
Female									
NSW	1.9	3.7	13.6	14.5	9.7	5.3	9.6	9.8	7.7
VIC	2.6	3.3	14.1	12.5	8.3	4.2	6.2	7.0	6.3
SA	8.3	4.1	17.1	14.3	7.0	5.2	6.0	15.0	8.1
TAS	11.5	0.0	22.5	17.3	33.7	4.5	7.3	13.9	10.2
NT**	50.0	14.0	0.0	0.0	0.0	8.0	30.0	0.0	12.7
ACT	0.0	9.0	14.9	22.3	23.8	4.3	10.5	30.7	11.1
Total	4.0	3.7	5.2	13.8	9.9	8.8	8.0	9.8	7.5
Person									
NSW	4.6	7.4	29.1	29.5	16.4	10.9	13.5	20.3	14.4
VIC	3.4	6.1	24.1	25.1	16.6	9.5	8.8	12.3	11.7
SA	4.0	7.0	40.7	32.3	17.4	13.3	12.1	14.6	15.6
TAS	5.6	5.5	46.7	43.0	25.5	9.7	11.1	16.4	16.1
NT**	24.2	13.5	14.8	0.0	0.0	22.3	38.4	0.0	16.9
ACT	4.4	11.0	47.5	44.3	40.0	12.9	23.5	37.0	22.8
Total	4.5	7.0	10.7	28.6	17.2	19.6	12.0	16.8	13.9

Source data: State and Territory hospital morbidity data and 1991 population data from the 1991 Census of Housing and Population.
* ISS could not be mapped for Queensland or Western Australia.
** Care must be taken when interpreting NT data as the number of cases is an estimate based on 6mths data and the numbers are small.

Table C.2a Road injury hospital separations, road user type by age and sex, All separations with Injury Severity Score (ISS) of 15 or more, All States and Territories excluding Queensland and Western Australia*, (Case count and row percentage)

	0 - 4 yrs	5 - 14 yrs	15 - 19 yrs	20 - 24 yrs	25 - 29 yrs	30 - 49 yrs	50 - 69 yrs	70 or more yrs	Total
Male									
Driver	0	1	60	79	39	123	85	31	419
	0.0%	0.2%	14.4%	18.9%	9.3%	29.4%	20.4%	7.4%	100.0%
Passenger in	7	20	53	44	17	32	21	9	204
motor vehicle	3.4%	9.8%	26.0%	21.6%	8.4%	15.9%	10.4%	4.4%	100.0%
Motor cycle	0	3	53	56	41	71	4	1	230
rider / pillion	0.0%	1.3%	23.1%	24.4%	18.0%	31.1%	1.7%	0.4%	100.0%
Pedal cyclist	1	27	16	6	8	16	10	6	90
	1.1%	30.0%	17.8%	6.7%	8.9%	17.8%	11.1%	6.7%	100.0%
Pedestrian	16	41	34	19	17	52	43	54	277
	5.9%	14.8%	12.3%	7.0%	6.1%	18.8%	15.5%	19.5%	100.0%
Other road user	0	1	1	4	0	0	4	1	11
	0.0%	9.1%	9.1%	36.4%	0.0%	0.0%	36.4%	9.1%	100.0%
Unspecified	0	1	5	14	4	18	9	3	54
	0.0%	1.8%	9.2%	25.8%	7.4%	33.6%	16.6%	5.5%	100.0%
Total	24	94	222	223	126	313	176	105	1284
	1.9%	7.3%	17.3%	17.3%	9.8%	24.4%	13.7%	8.2%	100.0%
Female									
Driver	0	0	13	25	22	40	20	15	135
	0.0%	0.0%	9.6%	18.5%	16.3%	29.7%	14.8%	11.1%	100.0%
Passenger in	9	10	32	26	15	30	41	20	183
motor vehicle	4.9%	5.5%	17.5%	14.4%	8.2%	16.2%	22.4%	10.9%	100.0%
Motor cycle	1	0	7	8	5	0	1	0	22
rider / pillion	4.5%	0.0%	32.9%	35.8%	22.4%	0.0%	4.5%	0.0%	100.0%
Pedal cyclist	3	4	3	3	1	2	3	0	19
	15.8%	21.1%	15.8%	15.8%	5.3%	10.5%	15.8%	0.0%	100.0%
Pedestrian	5	19	13	7	6	14	21	17	102
	4.9%	18.6%	12.7%	6.9%	5.9%	13.7%	20.6%	16.7%	100.0%
Other road user	0	0	0	0	0	0	1	0	1
	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	100.0%
Unspecified	0	0	1	1	2	4	3	5	16
	0.0%	0.0%	6.1%	6.1%	12.2%	24.3%	18.3%	33.0%	100.0%
Total	18	33	69	70	51	90	90	57	479
	3.8%	6.9%	14.5%	14.7%	10.6%	18.8%	18.8%	12.0%	100.0%
Person									
Driver	0	1	73	104	61	163	105	46	554
	0.0%	0.2%	13.2%	18.8%	11.0%	29.4%	19.0%	8.3%	100.0%
Passenger in	16	30	85	70	32	62	62	29	387
motor vehicle	4.1%	7.8%	22.0%	18.2%	8.3%	16.1%	16.1%	7.5%	100.0%
Motor cycle	1	3	60	64	46	71	5	1	252
rider / pillion	0.4%	1.2%	23.9%	25.4%	18.4%	28.3%	2.0%	0.4%	100.0%
Pedal cyclist	4	31	19	9	9	18	13	6	109
	3.7%	28.4%	17.4%	8.3%	8.3%	16.5%	11.9%	5.5%	100.0%
Pedestrian	21	60	47	26	23	66	64	71	379
	5.6%	15.8%	12.4%	7.0%	6.1%	17.4%	16.9%	18.7%	100.0%
Other road user	0	1	1	4	0	0	5	1	12
	0.0%	8.3%	8.3%	33.3%	0.0%	0.0%	41.7%	8.3%	100.0%
Unspecified	0	1	6	15	6	22	12	8	71
	0.0%	1.4%	8.5%	21.2%	8.5%	31.4%	17.0%	11.9%	100.0%
Total	42	127	292	293	177	403	267	162	1763
	2.4%	7.2%	16.5%	16.6%	10.1%	22.9%	15.1%	9.2%	100.0%

Source data: State and Territory hospital morbidity data. See Appendix A.
* ISS could not be mapped for Queensland or Western Australia.

Table C.2b Road injury hospital separations, road user type by age and sex, All separations with Injury Severity Score (ISS) of 15 or more, All States and Territories excluding Queensland and Western Australia*, (Rate per 100,000 pop.)

	0 - 4 yrs	5 - 14 yrs	15 - 19 yrs	20 - 24 yrs	25 - 29 yrs	30 - 49 yrs	50 - 69 yrs	70 or more yrs	Total
Male									
Driver	0.0	0.1	11.8	15.2	7.5	6.6	7.7	8.0	6.6
Passenger in motor vehicle	1.5	2.2	10.5	8.5	3.3	1.7	1.9	2.3	3.2
Motor cycle rider/ pillion	0.0	0.3	10.5	10.8	7.9	3.8	0.4	0.3	3.6
Pedal cyclist	0.2	2.9	3.2	1.2	1.5	0.9	0.9	1.6	1.4
Pedestrian	3.4	4.4	6.7	3.7	3.3	2.8	3.9	14.0	4.4
Other road user	0.0	0.1	0.2	0.8	0.0	0.0	0.4	0.3	0.2
Unspecified	0.0	0.1	1.0	2.7	0.8	1.0	0.8	0.8	0.9
Total	5.1	10.1	15.8	43.0	24.3	29.2	16.4	28.3	20.3
Female									
Driver	0.0	0.0	2.7	4.9	4.3	2.2	1.8	2.6	2.1
Passenger in motor vehicle	2.0	1.1	6.6	5.1	2.9	1.6	3.7	3.5	2.9
Motor cycle rider/ pillion	0.2	0.0	1.5	1.6	1.0	0.0	0.1	0.0	0.3
Pedal cyclist	0.7	0.5	0.6	0.6	0.2	0.1	0.3	0.0	0.3
Pedestrian	1.1	2.2	2.7	1.4	1.2	0.8	1.9	2.9	1.6
Other road user	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Unspecified	0.0	0.0	0.2	0.2	0.4	0.2	0.3	0.9	0.3
Total	4.0	3.7	5.2	13.8	9.9	8.8	8.0	9.8	7.5
Person									
Driver	0.0	0.1	7.4	10.2	5.9	4.4	4.7	4.8	4.4
Passenger in motor vehicle	1.7	1.7	8.6	6.8	3.1	1.7	2.8	3.0	3.0
Motor cycle rider/ pillion	0.1	0.2	6.1	6.2	4.5	1.9	0.2	0.1	2.0
Pedal cyclist	0.4	1.7	1.9	0.9	0.9	0.5	0.6	0.6	0.9
Pedestrian	2.3	3.3	4.8	2.5	2.2	1.8	2.9	7.4	3.0
Other road user	0.0	0.1	0.1	0.4	0.0	0.0	0.2	0.1	0.1
Unspecified	0.0	0.1	0.6	1.5	0.6	0.6	0.5	0.8	0.6
Total	4.5	7.0	10.7	28.6	17.2	19.6	12.0	16.8	13.9

Source data: State and Territory hospital morbidity data and 1991 population data from the 1991 Census of Housing and Population
* ISS could not be mapped for Queensland or Western Australia.

Table C.3a Road injury hospital separations, Injury severity (Max AIS) by age and sex, All separations with Injury Severity Score (ISS) of 15 or more, All States and Territories excluding Queensland and Western Australia*, (Case count and row percentage)

	0 - 4 yrs	5 - 14 yrs	15 - 19 yrs	20 - 24 yrs	25 - 29 yrs	30 - 49 yrs	50 - 69 yrs	70 or more yrs	Total
Male									
Serious	2	19	57	68	38	95	42	22	343
	0.7%	5.5%	16.6%	19.9%	11.1%	27.5%	12.2%	6.4%	100.0%
Severe	14	51	118	107	66	178	107	74	717
	2.0%	7.1%	16.5%	14.9%	9.2%	24.9%	15.0%	10.3%	100.0%
Critical	8	24	47	47	22	40	27	9	224
	3.6%	10.7%	21.0%	21.0%	9.8%	17.9%	12.1%	4.0%	100.0%
Total	24	94	222	223	126	313	176	105	1284
	1.9%	7.3%	17.3%	17.3%	9.8%	24.4%	13.7%	8.2%	100.0%
Female									
Serious	1	6	19	29	17	32	27	22	153
	0.7%	3.9%	12.4%	19.2%	11.1%	20.7%	17.6%	14.4%	100.0%
Severe	11	18	39	30	25	51	50	27	252
	4.4%	7.1%	15.6%	11.9%	9.9%	20.3%	19.9%	10.9%	100.0%
Critical	6	9	11	11	9	7	13	8	74
	8.1%	12.2%	14.9%	14.9%	12.2%	9.5%	17.6%	10.8%	100.0%
Total	18	33	69	70	51	90	90	57	479
	3.8%	6.9%	14.5%	14.7%	10.6%	18.8%	18.8%	12.0%	100.0%
Person									
Serious	3	25	76	98	55	126	69	44	496
	0.7%	5.0%	15.3%	19.7%	11.1%	25.4%	13.9%	8.9%	100.0%
Severe	25	69	158	137	91	230	158	101	969
	2.6%	7.1%	16.3%	14.2%	9.4%	23.7%	16.3%	10.5%	100.0%
Critical	14	33	58	58	31	47	40	17	298
	4.7%	11.1%	19.5%	19.5%	10.4%	15.8%	13.4%	5.7%	100.0%
Total	42	127	292	293	177	403	267	162	1763
	2.4%	7.2%	16.5%	16.6%	10.1%	22.9%	15.1%	9.2%	100.0%

Source data: State and Territory hospital morbidity data. See Appendix A.
* ISS could not be mapped for Queensland or Western Australia.

Table C.3b Road injury hospital separations, Injury severity (Max AIS) by age and sex, All separations with Injury Severity Score (ISS) of 15 or more, All States and Territories excluding Queensland and Western Australia*, (Rate per 100,000 pop.)

	0 - 4 yrs	5 - 14 yrs	15 - 19 yrs	20 - 24 yrs	25 - 29 yrs	30 - 49 yrs	50 - 69 yrs	70 or more yrs	Total
Male									
Serious	0.4	2.0	11.3	13.1	7.3	5.1	3.8	5.7	5.4
Severe	3.0	5.5	23.3	20.7	12.7	9.5	9.7	19.2	11.3
Critical	1.7	2.6	9.3	9.1	4.2	2.1	2.4	2.3	3.6
Total	5.1	10.1	15.8	43.0	24.3	29.2	16.4	28.3	20.3
Female									
Serious	0.2	0.7	3.9	5.7	3.3	1.7	2.4	3.8	2.4
Severe	2.4	2.0	8.1	5.9	4.9	2.8	4.5	4.7	3.9
Critical	1.3	1.0	2.3	2.2	1.8	0.4	1.2	1.4	1.2
Total	4.0	3.7	5.2	13.8	9.9	8.8	8.0	9.8	7.5
Person									
Serious	0.3	1.4	7.7	9.5	5.3	3.4	3.1	4.6	3.9
Severe	2.7	3.8	15.9	13.4	8.8	6.2	7.0	10.5	7.6
Critical	1.5	1.8	5.9	5.7	3.0	1.3	1.8	1.8	2.3
Total	4.5	7.0	10.7	28.6	17.2	19.6	12.0	16.8	13.9

Source data: State and Territory hospital morbidity data and 1991 population data from the 1991 Census of Housing and Population
* ISS could not be mapped for Queensland or Western Australia.

Table C.4a Road injury hospital separations, body region of most severe injury*, by age and sex, all separations with Injury Severity Score (ISS) of 15 or more, All States and Territories excluding Queensland and Western Australia,**(Case count and row percentage)

	0 - 4 yrs	5 - 14 yrs	15 - 19 yrs	20 - 24 yrs	25 - 29 yrs	30 - 49 yrs	50 - 69 yrs	70 or more yrs	Total
Male									
External	0	0	0	0	0	1	0	0	1
	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%
Head	15	59	107	104	58	99	80	46	569
	2.6%	10.4%	18.9%	18.3%	10.2%	17.4%	14.1%	8.1%	100.0%
Face	0	0	0	0	0	0	1	0	1
	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	100.0%
Chest	0	3	12	13	6	39	37	23	133
	0.0%	2.3%	9.0%	9.8%	4.5%	29.3%	27.8%	17.3%	100.0%
Abdomen	1	9	21	17	8	22	8	3	89
	1.1%	10.1%	23.6%	19.1%	9.0%	24.7%	9.0%	3.4%	100.0%
Spine	2	1	11	16	14	47	6	8	106
	1.9%	0.9%	10.4%	15.3%	13.5%	44.6%	5.8%	7.6%	100.0%
Upper extremity	0	0	0	3	0	1	0	1	5
	0.0%	0.0%	0.0%	62.8%	0.0%	18.6%	0.0%	18.6%	100.0%
Lower extremity	2	3	6	6	5	8	6	1	37
	6.4%	8.0%	16.1%	16.1%	13.4%	21.4%	16.1%	2.7%	100.0%
Multiple	4	19	65	63	35	93	36	22	337
	1.2%	5.6%	19.3%	18.7%	10.4%	27.6%	10.7%	6.5%	100.0%
Unspec./ other	0	0	0	0	0	3	2	1	6
	0.0%	0.0%	0.0%	0.0%	0.0%	50.0%	33.3%	16.7%	100.0%
Total	24	94	222	223	126	313	176	105	1284
	1.9%	7.3%	17.3%	17.3%	9.8%	24.4%	13.7%	8.2%	100.0%
Female									
Head	16	23	31	21	23	31	22	21	189
	8.5%	12.2%	16.6%	11.3%	12.2%	16.4%	11.7%	11.1%	100.0%
Face	0	0	0	0	0	0	1	0	1
	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	100.0%
Chest	0	1	6	5	1	13	18	11	55
	0.0%	1.8%	10.8%	9.0%	1.8%	23.5%	32.5%	20.6%	100.0%
Abdomen	0	1	3	6	3	10	6	1	30
	0.0%	3.3%	10.0%	20.0%	10.0%	33.3%	20.0%	3.3%	100.0%
Spine	0	0	7	10	1	9	14	5	46
	0.0%	0.0%	15.1%	21.6%	2.2%	19.9%	30.5%	10.8%	100.0%
Upper extremity	0	0	0	0	0	1	1	1	3
	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	33.3%	33.3%	100.0%
Lower extremity	0	1	1	1	2	0	1	3	9
	0.0%	11.1%	11.1%	11.1%	22.2%	0.0%	11.1%	33.3%	100.0%
Multiple	2	7	21	27	21	26	26	15	145
	1.4%	4.8%	14.5%	18.7%	14.5%	17.7%	18.0%	10.4%	100.0%
Unspec./ other	0	0	0	0	0	0	1	0	1
	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	100.0%
Total	18	33	69	70	51	90	90	57	479
	3.8%	6.9%	14.5%	14.7%	10.6%	18.8%	18.8%	12.0%	100.0%
Person									
External	0	0	0	0	0	1	0	0	1
	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%
Head	31	82	139	125	81	130	102	67	758
	4.1%	10.8%	18.3%	16.6%	10.7%	17.2%	13.5%	8.8%	100.0%
Face	0	0	0	0	0	0	2	0	2
	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	100.0%
Chest	0	4	18	18	7	52	55	34	188
	0.0%	2.1%	9.6%	9.6%	3.7%	27.6%	29.2%	18.3%	100.0%
Abdomen	1	10	24	23	11	32	14	4	119
	0.8%	8.4%	20.2%	19.3%	9.2%	26.9%	11.8%	3.4%	100.0%
Spine	2	1	18	26	15	56	20	13	152
	1.3%	0.7%	11.9%	17.2%	10.0%	37.0%	13.3%	8.6%	100.0%
Upper extremity	0	0	0	3	0	2	1	2	8
	0.0%	0.0%	0.0%	40.3%	0.0%	23.9%	11.9%	23.9%	100.0%
Lower extremity	2	4	7	7	7	8	7	4	46
	5.1%	8.6%	15.1%	15.1%	15.1%	17.2%	15.1%	8.6%	100.0%
Multiple	6	26	86	90	56	119	62	37	482
	1.2%	5.4%	17.9%	18.7%	11.6%	24.6%	12.9%	7.7%	100.0%
Unspec./ other	0	0	0	0	0	3	3	1	7
	0.0%	0.0%	0.0%	0.0%	0.0%	42.9%	42.9%	14.3%	100.0%
Total	42	127	292	293	177	403	267	162	1763
	2.4%	7.2%	16.5%	16.6%	10.1%	22.9%	15.1%	9.2%	100.0%

Source data: State and Territory hospital morbidity data. See Appendix A.

* Body region of most severe injury was defined on the basis of the maximum AIS body region.

** ISS could not be mapped for Queensland or Western Australia.

Table C.4b Road injury hospital separations, Injury severity (Max AIS) by age and sex, All separations with Injury Severity Score (ISS) of 15 or more, All States and Territories excluding Queensland and Western Australia*, (Rate per 100,000 pop.)

	0 - 4 yrs	5 - 14 yrs	15 - 19 yrs	20 - 24 yrs	25 - 29 yrs	30 - 49 yrs	50 - 69 yrs	70 or more yrs	Total
Male									
External	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
Head	3.2	6.4	21.1	20.1	11.2	5.3	7.2	11.9	9.0
Face	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Chest	0.0	0.3	2.4	2.5	1.2	2.1	3.3	6.0	2.1
Abdomen	0.2	1.0	4.1	3.3	1.5	1.2	0.7	0.8	1.4
Spine	0.4	0.1	2.2	3.1	2.7	2.5	0.5	2.1	1.7
Upper extremity									
Upper extremity	0.0	0.0	0.0	0.6	0.0	0.1	0.0	0.3	0.1
Lower extremity	0.4	0.3	1.2	1.2	1.0	0.4	0.5	0.3	0.6
Multiple	0.8	2.0	12.8	12.2	6.8	5.0	3.3	5.7	5.3
Unspec./ other	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.3	0.1
Total	5.1	10.1	15.8	43.0	24.3	29.2	16.4	28.3	20.3
Female									
External	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Head	3.5	2.6	6.4	4.2	4.5	1.7	2.0	3.6	2.9
Face	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Chest	0.0	0.1	1.2	1.0	0.2	0.7	1.6	1.9	0.9
Abdomen	0.0	0.1	0.6	1.2	0.6	0.5	0.5	0.2	0.5
Spine	0.0	0.0	1.5	2.0	0.2	0.5	1.2	0.9	0.7
Upper extremity	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.0
Lower extremity	0.0	0.1	0.2	0.2	0.4	0.0	0.1	0.5	0.1
Multiple	0.4	0.8	4.4	5.3	4.1	1.4	2.3	2.6	2.3
Unspec. / other	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Total	4.0	3.7	5.2	13.8	9.9	8.8	8.0	9.8	7.5
Person									
External	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Head	3.4	4.5	14.0	12.2	7.9	3.5	4.6	6.9	6.0
Face	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Chest	0.0	0.2	1.8	1.8	0.7	1.4	2.5	3.5	1.5
Abdomen	0.1	0.6	2.4	2.2	1.1	0.9	0.6	0.4	0.9
Spine	0.2	0.1	1.8	2.5	1.5	1.5	0.9	1.3	1.2
Upper extremity	0.0	0.0	0.0	0.3	0.0	0.1	0.0	0.2	0.1
Lower extremity	0.2	0.2	0.7	0.7	0.7	0.2	0.3	0.4	0.4
Multiple	0.6	1.4	8.7	8.8	5.4	3.2	2.8	3.8	3.8
Unspec. / other	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1
Total	4.5	7.0	10.7	28.6	17.2	19.6	12.0	16.8	13.9

Source data: State and Territory hospital morbidity data and 1991 population data from the 1991 Census of Housing and Population

* ISS could not be mapped for Queensland or Western Australia.

APPENDIX D: GLOSSARY OF TERMS

WORD/ PHRASE	DESCRIPTION
Abbreviated Injury Scale (AIS)	The Abbreviated Injury Scale is the most widely used severity scoring system. Severity is assigned based on anatomical descriptors of the injury. AIS scoring is as follows: 1 - Minor, 2 - Moderate, 3 - Serious, 4 - Severe, 5 - Critical, 6 - Maximum Injury, 9 - Unspecified. For further information see "The Abbreviated Injury Scale, 1990 Revision. Association for the Advancement of Automotive Medicine, Des Plaines, Illinois".
Age specific rate	The rate for a specified age group. The numerator and denominator refer to the same age group. Example: Age specific fatality rate = No. of deaths 0-4 yr. olds x 100,000 (age 0-4 yrs.) Population of 0-4 yr. olds
Age standardised rate	To standardise rates for 1990 against the reference year 1991 the age specific rates for 1990 were multiplied by the number of persons in each age-category in the total population in 1991. The results for each category were then added up and divided by the total population in the reference year ie 1991.
Diagnoses	The diagnoses or conditions (including principal diagnosis) that existed at the time of the patient's admission to the hospital and for which treatment was given; that affected the patient's treatment and/or length of stay in hospital by greater than one day; that arose during the patient's stay in hospital - see National Health Data Dictionary (1993) AIH&W, Canberra. They are coded according to ICD-9-CM in most States & Territories. See also "Principal Diagnosis".
Bed occupancy or Bed days	The total number of days of stay for patients who were formally admitted to hospital for at least one day and underwent separation during the year (calendar year for the purposes of this report).
Body region	The Abbreviated Injury Scale identifies 9 body regions of injury ie. head, face, neck, thorax, abdomen, spine, upper extremity, lower extremity and unspecified region. See "The abbreviated injury scale - 1990 revision (1990) Association for the Advancement of Automotive Medicine, Des Plaines, Illinois".
External cause code	External cause of injury and poisoning is coded by hospitals according to a classification that is part of the International Classification of Diseases. See "Supplementary classification of external cause of injury and poisoning" on pages 547-634 of the International Classification of Diseases, Ninth revision, Volume 1 (1977) World Health Organisation, Geneva.
Hospital morbidity collection	All States and Territories maintain information on patients admitted to hospital. They are progressively moving towards collection of a nationally agreed dataset the scope of which is detailed in the National Health Data Dictionary (1993) AIH&W, Canberra.

Hospital in-patient separation	The formal definition is "the administrative process by which a hospital records the completion of treatment and/or care and accommodation of a patient (discharge, transfer or death)" - see the National Health Data Dictionary (1993) AIH&W, Canberra.
ICD	International Classification of Diseases.
ICD-9	The 9th. revision of the International Classification of Diseases.
ICD-9-CM	Clinical modification of the ninth revision of the International Classification of Diseases. See Commission on professional and hospital activities (1980): the international classification of diseases, 9th revision - clinical modification, Ann Arbor.
ICD Map	Software which enables AIS codes to be mapped from ICD-9-CM codes. See MacKenzie, E.J., Steinwachs, D.M. and Shankar, B. (1989). Classifying Trauma Severity Based on Hospital Discharge Diagnosis. Validation of an ICD-9-CM to AIS-85 Conversion Table. Medical Care. Vol. 27, No. 4.
ISS	See "Injury Severity Score".
Injury Severity Score	The ISS is defined as the sum of the squares of the highest AIS for each of the three most severely injured body regions. It is the most widely used AIS-based measure for rating overall case severity that takes into account the combined effect of injuries to multiple body systems. For further information see Baker et al (1974) and Baker & O'Neill (1974).
Maximum AIS	Is the maximum value of the AIS for any patient. In this report, cases for which the maximum AIS was tied for two or more body regions were allocated to the 'multiple' body region category.
Mean length of stay	Is the average bed occupancy for a group of cases (ie. the total number of bed days for the group divided by the number of patients in the group). See "Bed occupancy".
Nature of injury	Refers to the details of anatomical injury coded according to chapter XVII of the International Classification of Diseases, Ninth revision, Volume 1 (1977) World Health Organisation, Geneva. (pp 473-546).
Principal diagnosis	The diagnosis or condition established after study to be chiefly responsible for occasioning the admission of the patient to hospital. It is coded according to ICD-9-CM in most States & Territories.
Road User type	Defines the road users use of the road at the time of injury: driver of a motor vehicle, passenger in a motor vehicle, a motorcycle rider, motorcycle passenger, pedal cyclist or pedestrian.