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Serious injury due to land transport accidents, Australia 2007–08



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INJURY RESEARCH AND STATISTICS SERIES NUMBER 59



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Australian Institute of
Health and Welfare

*Authoritative information and statistics
to promote better health and wellbeing*

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Abbreviations

4WD	Four-wheel drive
ABS	Australian Bureau of Statistics
AIHW	Australian Institute of Health and Welfare
ARIA	Accessibility/Remoteness Index of Australia
ASGC	Australian Standard Geographical Classification
CI	Confidence interval
DIT	Department of Infrastructure and Transport
ICD	International Classification of Diseases
ICD-10-AM	International statistical classification of diseases and related health problems, 10th revision, Australian modification
ICISS	ICD-based Injury Severity Score
NHMD	National Hospital Morbidity Database
SLA	Statistical Local Area
SRR	Survival Risk Ratio

Symbols

n	number
n.p.	not published (data cannot be released due to quality issues, confidentiality, or permission not granted)

Summary

This report presents information on serious injury, that is, injury resulting in hospitalisation but not in-hospital death, due to land transport accidents in 2007–08. There is a focus on road vehicle traffic crashes which accounted for nearly two-thirds of all serious injury. This is a companion report to the reports on serious injury due to land transport accidents in Australia for the 2008–09 financial year and on the trends in serious injury due to land transport accidents in Australia 2000–01 to 2008–09.

Land transport accidents

Land transport accidents accounted for 0.7% of all hospitalisations and 10.9% of all hospitalisations due to injury in Australia during 2007–08. There were 51,710 persons seriously injured due to land transport injury, resulting in 224,171 patient days in hospital and a mean length of stay of 4.3 days.

Of those seriously injured, 62.9% ($n = 32,543$) were due to traffic (on-road) accidents, while 26.9% ($n = 13,900$) were due to non-traffic (off-road) accidents. For 10.2% ($n = 5,267$) of serious injury cases, the location was not specified.

Males were 2.3 times more likely than females to be seriously injured as a result of a land transport accident, while just over 50% of those seriously injured were aged less than 30 years.

Nationally, and in each jurisdiction, the age-specific rates of serious injury due to land transport accidents were highest at ages 15–24 years.

When looking at mode of transport, car occupants accounted for 34.3% ($n = 17,749$) of all serious injury cases, followed by motorcyclists (27.2%, $n = 14,084$) and pedal cyclists (17.6%, $n = 9,102$).

Road vehicle traffic crashes

For traffic (on-road) accidents, 48.5% of those seriously injured were car occupants, 23.1% were motorcyclists and 14.8% were pedal cyclists. For those seriously injured due to traffic (on-road) accidents, 25.8% were judged to be suffering from injuries which were considered to be high threat to life.

When looking at injury rates in relation to the number of registered vehicles, motorcyclists had by far the highest rate of 1,330 serious injury cases per 100,000 registered vehicles. This was almost ten times the corresponding rate for car occupants.

The Northern Territory had by far the highest rates of serious injury per 100,000 vehicle type for cars, motorcycles and pick-up trucks or vans. Conversely, the Northern Territory had by far the lowest rate of serious injury for buses. The Northern Territory also had easily the highest age-standardised rates of serious injury and serious injury with high threat to life for road vehicle traffic accidents.

Age-standardised rates of serious injury increased according to remoteness of the person's usual residence from an urban centre. For persons with serious injuries that posed a high threat to life, the mean length of stay in hospital (11.4 days) was more than double that of seriously injured persons and was greater across all age groups.

1 Introduction

The primary purpose of this publication is to present estimates of the number of persons seriously injured in Australia due to transport accidents that occurred on land in the one-year period 2007–08.

The main focus is on accidents involving road vehicles travelling on public roads (called travelling in ‘traffic’). This is the subject of Chapter 3. Road vehicles include motor vehicles, pedal cycles and other road vehicles such as trams, animals and animal-drawn vehicles (when they travel on the road). Injured pedestrians are also included.

Serious injury is defined for this report as an injury which results in the person being admitted to hospital, and subsequently discharged alive either on the same day or after a stay of one or more nights in a hospital bed (i.e. deaths in hospital are excluded). Calculations of hospital patient days used in this report include the total number of hospitalised days for patients who were transferred from one acute care hospital to one or more other acute care hospitals. These hospitalised days are included to provide an overall measure of burden for serious injuries associated with land transport accidents. The definition of transport injury used in this report includes only unintentional injuries. Hence, cases given an external cause of intentional self-harm, assault or undetermined intent are excluded. Readers should consult the appendix for notes on the methodology employed and for the meaning of technical terms used in this report such as ‘separations’.

This report also provides analysis on cases of serious injury resulting from road traffic crashes which are defined as being high threat to life. These cases are selected on the basis of having an ICD-based Injury Severity Score (ICISS) of less than 0.941. ICISS is a measure of injury severity based upon a patient’s injury diagnoses. The ICISS measure for this report is based upon International statistical classification of diseases and related health problems, 10th revision, Australian modification (ICD-10-AM) coding and was derived using Australian hospital separations data (Stephenson et al. 2004). More detail on the ICISS method is provided in the appendix of this report.

Confidence intervals are provided in some tables to show non-sampling variation, which is largest where case counts are small. Further information is provided in the Data issues section.

Overview of all serious injury due to transport

The main topic of this report is serious injury due to land transport accidents. Table 1.1 puts this topic into the context of serious injury due to all forms of transport accidents. During 2007–08 there were an estimated 53,293 serious injury cases due to some form of transport accident. Most transport serious injury cases (97%; $n = 51,710$) are known to have involved land transport. Almost two-thirds of those seriously injured in a land transport accident were injured in traffic conditions (i.e. on public roads).

Table 1.1: Mode of transport for serious injury, Australia, 2007–08

Seriously injured person	Count^(a)	Per cent	Rate^(b)
<i>Car occupant</i>	17,749	33.3	82.9
traffic	15,795	29.6	73.9
non-traffic	1,365	2.6	6.4
<i>Motorcyclist</i>	14,084	26.4	67.3
traffic	7,524	14.1	35.8
non-traffic	6,025	11.3	29.0
<i>Pedal cyclist</i>	9,102	17.1	43.9
traffic	4,814	9.0	23.1
non-traffic	3,955	7.4	19.2
<i>Pedestrian</i>	3,756	7.0	17.6
traffic	2,730	5.1	12.8
non-traffic	705	1.3	3.3
<i>Occupant of pick-up truck or van</i>	479	0.9	2.2
traffic	298	0.6	1.4
non-traffic	133	0.2	0.6
<i>Occupant of heavy transport vehicle</i>	813	1.5	3.8
traffic	497	0.9	2.3
non-traffic	213	0.4	1.0
<i>Bus occupant</i>	477	0.9	2.1
traffic	204	0.4	0.9
non-traffic	85	0.2	0.4
Animal rider or occupant of animal-drawn vehicle	2,877	5.4	13.8
Occupant of special all-terrain or off-road vehicle	987	1.9	4.7
Occupant of three-wheeled motor vehicle	62	0.1	0.3
Occupant of a tram	70	0.1	0.3
Occupant of a train	97	0.2	0.5
Occupant of special industrial vehicle	167	0.3	0.8
Occupant of special agricultural vehicle	221	0.4	1.0
Occupant of special construction vehicle	70	0.1	0.3
Other land transport	699	1.3	3.3
Total (Land transport)	51,710	97.0	246.9
Occupant of watercraft	891	1.7	4.2
Occupant of aircraft	156	0.3	0.7
Other and unspecified	536	1.0	2.6
Total (All transport)	53,293	100.0	252.3

(a) Totals for road user groups stratified by traffic and non-traffic include cases that are unspecified as to whether traffic or non-traffic.

(b) Per 100,000 population, adjusted by direct standardisation to the Australian population in June 2001.

Notes

1. Shading denotes the 3 highest figures for a column.
2. 'Mode of transport' here means the vehicle the person was travelling in at the time of being injured in a transport accident. 'Other and unspecified' includes V87, V88, V89, and V98 for ICD-10-AM. A 'special all-terrain or off-road motor vehicle' refers only to such vehicles that are not registrable for on-road use and does not include registrable 4WD vehicles which are included under 'car occupants'.
3. A traffic accident is any vehicle accident occurring on a public road (i.e. originating on, terminating on, or involving a vehicle partially on the road). A non-traffic accident is any accident that occurs entirely at any place other than a public road.

2 Serious injury due to land transport accidents in 2007–08

This section examines non-fatal injury due to road and rail transport accidents. It includes cases specified as occurring in traffic (i.e. occurring on a public road) and non-traffic cases. The section also includes cases unspecified as to whether they occurred in traffic or not.

The number of persons seriously injured during 2007–08 was 51,710 (Table 2.1). For road traffic crashes, twice as many males than females were seriously injured while for non-traffic (off-road) crashes, almost five times as many males than females were seriously injured.

There was a total of 7,873,946 hospital separations during 2007–08 from public and private hospitals in Australia corresponding to a total of 25,642,518 patient days (AIHW 2009). Land transport accidents accounted for 0.7% of these separations and 10.9% of all injury-related hospital separations (Table 2.2).

During 2007–08, there were 2,108,472 injury-related patient days in hospital, with a mean length of stay of 4.4 days. There were 227,936 land transport-related patient days, with a mean length of stay of 4.4 days. They accounted for 0.9% of all patient days in Australia and 10.8% of all injury-related patient days.

In 32% of serious injury cases, the injured person was discharged on the same day as they were admitted (32% for both traffic and non-traffic). Nearly two-thirds (63%) of serious injury cases due to land transport accidents occurred in traffic conditions, that is, they resulted from road vehicle traffic crashes (see Section 3).

The age-standardised rate of land transport serious injury cases was 247 per 100,000 population. The male:female age-standardised rate ratio was 2.3:1.0, indicating that, after accounting for any difference in age composition, more than twice as many males as females were seriously injured as a result of land transport injury (344 per 100,000 population compared with 150 per 100,000 population).

Table 2.1: Land transport injury, Australia, 2007–08

Seriously injured ^(a)	Males	Females	Persons
Road traffic crashes	21,855	10,688	32,543
Non-traffic crashes	11,494	2,406	13,900
Unspecified as to whether traffic or non-traffic	2,593	2,674	5,267
Total	35,942	15,768	51,710

(a) In this report 'seriously injured' means admitted to hospital due to injury (see the Data issues section under 'Serious injury').

Table 2.2: Key indicators for serious land transport injury, Australia, 2007–08

Indicator	Persons				Total
	Males	Females	Traffic	Non-traffic	
Seriously injured^(a)					
Person admitted to hospital ^(b)	35,942	15,768	32,543	13,900	51,710 ^(c)
Percentage of all hospital separations	1.1	0.4	0.4	0.2	0.7
Percentage of all hospital separations due to injury	13.4	7.7	6.8	3.0	10.9
Same day hospitalisations	11,392	5,213	10,514	4,439	16,605 ^(b)
Mean length stay in hospital (days) ^(d)	4.3	4.4	4.8	3.4	4.3
Total patient days (including same day)	155,284	68,887	155,790	47,287	224,171 ^(b)
Crude rate/100,000 population ^(e)	337.1	145.3	153.2	65.4	242.7
Age-standardised rate/100,000 population ^(f)	344.2	149.9	153.4	66.6	246.9

(a) In this report 'seriously injured' means admitted to hospital due to injury (see the Data issues section under 'Serious injury').

(b) In total, there were 57,132 admissions to hospital for land transport injury for an estimated 52,081 persons, of whom 371 (0.7%) died while in hospital. These deaths are included in estimates of fatal transport injury provided elsewhere by organisations such as the Department of Infrastructure and Transport (DIT) and are omitted from the seriously injured counts in Table 2.1 and throughout Section 2 in order to avoid double-counting. The estimate of total patient days excludes separations in which the person died in hospital.

(c) This includes 5,267 hospital cases (including 1,652 same day hospitalisations) and 21,094 total patient days where it is unspecified as to whether the crash occurred in traffic or non-traffic conditions.

(d) This is the average number of days a person stayed in hospital when seriously injured. Refer to the Data issues section of this report for details on how mean length of stay is calculated.

(e) Using population denominators in December 2007.

(f) Adjusted by direct standardisation to the Australian population in June 2001.

State and territory of usual residence

Nationally, and in each jurisdiction, the rates of serious injury due to land transport accidents were highest at ages 15–24 years (Table 2.3).

The Northern Territory had the highest age-standardised rate of serious injury due to land transport accidents (365 per 100,000 population) and Western Australia had the lowest rate (212 per 100,000 population). Of the 826 persons seriously injured in the Northern Territory, 260 (31.5%) were Aboriginal and Torres Strait Islander peoples. Transport injury among Aboriginal and Torres Strait Islander peoples during 2007–08 has been the subject of a previous report in this series (Henley & Harrison 2010).

Table 2.3: Land transport – age-specific rates of serious injury per 100,000 population by state/territory of residence, Australia, 2007–08

State and Territory	Age group (years)																		Age Std ^(a)	Total case numbers
	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84	85+		
NSW	56.9	129.4	295.9	421.8	328.3	266.2	237.5	237.2	210.7	184.5	178.4	162.3	139.9	137.0	149.5	184.7	216.4	206.6	216.7	14,964
Vic	48.7	145.2	295.8	461.2	440.0	349.4	303.4	270.6	256.3	224.2	209.4	177.0	183.0	162.9	177.6	216.9	194.4	209.8	254.4	13,377
Qld	80.5	215.1	448.4	598.3	452.1	371.3	293.7	279.5	253.2	220.4	190.5	162.8	144.8	117.1	161.5	151.9	179.6	169.2	275.1	11,615
WA	54.2	121.1	286.0	444.3	404.4	310.7	232.4	236.2	213.1	173.7	142.6	119.2	107.3	89.0	115.3	115.7	153.7	203.7	212.4	4,546
SA	89.4	147.5	344.1	510.7	397.9	325.8	267.3	258.9	226.4	203.0	164.7	152.9	132.1	126.0	125.1	141.7	198.6	194.5	240.6	3,756
Tas	44.5	133.7	353.8	666.1	578.1	404.4	295.5	236.8	218.4	216.5	133.6	150.7	105.4	136.1	103.4	104.2	183.9	131.5	260.9	1,239
ACT	40.9	132.4	277.3	531.9	377.6	311.4	270.6	237.4	269.2	208.9	261.4	218.7	192.0	184.6	87.4	192.6	224.0	284.6	249.3	875
NT	77.8	253.1	491.4	823.7	614.4	431.0	372.8	491.7	331.9	292.9	323.9	165.0	212.7	182.9	337.7	n.p.	n.p.	n.p.	365.4	826
Total	61.7	153.4	334.3	491.8	413.3	329.4	272.9	259.7	236.1	205.2	187.4	163.1	149.6	136.8	153.3	175.4	196.9	198.5	246.9	
Total case numbers	838	2,063	4,684	7,165	6,258	4,877	4,018	4,111	3,584	3,153	2,619	2,083	1,640	1,122	1,004	967	825	699		51,710

(a) Adjusted by direct standardisation to the Australian population in June 2001.

Age and sex distribution

Just on half (50%; $n = 25,885$) of the persons seriously injured in a land transport accident were less than 30 years of age. Young people aged 15–24 years represented over one-quarter (26%) of all land transport-related serious injury cases (Table 2.4).

Table 2.4: Serious injury due to land transport by age group, Australia, 2007–08

Age group	Males		Females		Persons	
	Count	Per cent	Count	Per cent	Count	Per cent
0–4 years	521	1.4	317	2.0	838	1.6
5–14 years	4,891	13.6	1,856	11.8	6,747	13.0
15–24 years	9,848	27.4	3,575	22.7	13,423	26.0
25–44 years	12,079	33.6	4,511	28.6	16,590	32.1
45–64 years	6,301	17.5	3,194	20.3	9,495	18.4
65+ years	2,302	6.4	2,315	14.7	4,617	8.9
Total	35,942	100.0	15,768	100.0	51,710	100.0

Circumstances of serious injury for young children aged 0–4 years

Table 2.5 shows the place of occurrence and road user group for children aged 0–4 years seriously injured in a land transport accident. For more than one-third of the records ($n = 311$), the place of occurrence was not specified, so results should be interpreted with caution (proportions could be underestimates or the distribution of cases across the different circumstances might not be the same if the circumstances of all the cases were known).

Just under 35% ($n = 290$) of children aged 0–4 years seriously injured due to a land transport accident were riding a pedal cycle at the time they sustained their injuries (Table 2.5). Just over one-quarter (26%) of these cases were reported as having occurred somewhere in the home, including the driveway to the home. A slightly smaller proportion (29%) of children aged 0–4 years sustained injuries while occupants of a car, and 19% were seriously injured as pedestrians. Of those injured as car occupants, just over three-quarters were involved in an on-road collision. Of those injured as pedestrians, 31% were injured while on a roadway, with a further 24% were injured in the driveway to a home.

Table 2.5: Place of occurrence and road user group for young children aged 0–4 years seriously injured due to a land transport accident, Australia, 2007–08

Place	Count	Per cent	Road user group			
			Pedestrian	Pedal cycle	Car	Other
Driveway to home	52	6.2	39	6	n.p.	n.p.
Other and unspecified place in home	120	14.3	17	70	9	24
<i>Street and highway</i>	<i>288</i>	<i>34.4</i>	<i>54</i>	<i>24</i>	<i>196</i>	<i>14</i>
Roadway	267	31.9	51	14	189	13
Footpath next to road	6	0.7	n.p.	n.p.	n.p.	n.p.
Other and unspecified street and highway	15	1.8	n.p.	6	7	n.p.
Farm	14	1.7	n.p.	n.p.	n.p.	10
School	14	1.7	n.p.	14	n.p.	n.p.
Other specified place of occurrence	39	4.7	15	14	n.p.	n.p.
Unspecified place of occurrence	311	37.1	35	161	36	79
Total	838	100.0	163	290	246	139

Circumstances of serious injury for children aged 5–17 years

Table 2.6 shows the place of occurrence and road user group for children aged 5–17 years seriously injured in a land transport accident in Australia during the one-year period 2007–08. For 43% ($n = 4,625$) of the records, the place of occurrence was not specified, so results should be interpreted with caution.

Just over 37% ($n = 3,980$) of children aged 5–17 years seriously injured due to a land transport accident were riding a pedal cycle at the time they sustained their injuries (Table 2.6). Just over one-quarter (26%) of these cases were reported as having occurred on a street or highway with three-quarters of these involving an on-road accident. A further 9% were reported as having occurred on a sports or athletics arena with close to 45% of these occurring in a skate park or arena. Place of occurrence was unspecified for 53% ($n = 2,127$) of these cases, with almost 58% of these unspecified cases recorded as involving an off-road incident.

A smaller proportion (28%) of children aged 5–17 years sustained injuries while riding on a motorcycle, while a further 16% were seriously injured while as an occupant of a car. Of motorcyclists, 15% were injured in incidents occurring in a sports or athletics arena, predominantly on a racetrack, while 14% were injured in incidents occurring on a street or highway, four-fifths of which involved on-road incidents. Over 3% ($n = 242$) of injuries involving a motorcycle occurred in a farm setting. Of car occupants, 87% were injured in accidents occurring on a street or highway, of which 93% involved an on-road collision.

Table 2.6: Place of occurrence and road user group for young children aged 5–17 years seriously injured due to a land transport accident, Australia, 2007–08

Place	Count	Per cent	Road user group						
			Pedestrian	Pedal cycle	Car	Motorcycle	Animal or animal-drawn vehicle	Bus	Other
Driveway to home	87	0.8	46	22	11	6	n.p.	n.p.	n.p.
Other and unspecified place in home	427	4.0	11	153	17	172	31	0	43
<i>Street and highway</i>	<i>3,542</i>	<i>33.0</i>	<i>423</i>	<i>1,033</i>	<i>1,539</i>	<i>423</i>	<i>17</i>	<i>26</i>	<i>81</i>
Roadway	3,169	29.5	395	823	1,468	377	10	24	72
Footpath next to road	121	1.1	16	90	n.p.	10	n.p.	0	n.p.
Cycleway	33	0.3	n.p.	30	n.p.	n.p.	n.p.	0	0
Other specified public highway, street or road	84	0.8	8	20	33	18	n.p.	n.p.	5
Unspecified public highway, street or road	135	1.3	n.p.	70	33	18	7	n.p.	n.p.
Parking place	17	0.2	6	5	n.p.	n.p.	0	n.p.	0
Farm	391	3.6	5	6	24	242	48	0	66
School	40	0.4	7	27	n.p.	n.p.	n.p.	0	n.p.
Sports and athletics area	961	8.9	13	366	8	460	82	n.p.	n.p.
Forest, beach, area of water and other specified countryside	304	2.8	n.p.	66	11	191	14	n.p.	22
Other specified place of occurrence	345	3.2	n.p.	175	9	110	25	n.p.	20
Unspecified place of occurrence	4,625	43.1	92	2,127	137	1,415	570	n.p.	n.p.
Total	10,739	100.0	609	3,980	1,760	3,024	789	30	547

Circumstances of serious injury for adults aged 18 years and older

Table 2.7 shows the place of occurrence and road user group for adults aged 18 years and over seriously injured in a land transport accident in Australia during the one-year period 2007–08. For 21% ($n = 8,394$) of the records, the place of occurrence was not specified, so results should be interpreted with caution.

Just over 39% ($n = 15,743$) of adults aged 18 years and over seriously injured due to a land transport accident were occupants of a car at the time they sustained their injuries (Table 2.7). Over 91% of these adults were involved in accidents which occurred on a street or highway, with almost 90% of these involving an on-road collision.

A smaller proportion (27%) of adults sustained injuries while riding on a motorcycle, while a further 12% were seriously injured while riding a bicycle. Of motorcyclists, 50% were injured while on a street or highway with 90% of these involving on-road incidents. While only 6% of motorcyclists were injured while on a sports or athletics arena, over 90% of these occurred on a racetrack. Of pedal cyclists, close to 55% were injured while on a street or highway with 82% of these involving on-road incidents. For motorcyclists and pedal cyclists, the place of occurrence was not specified in 28% and 34% of records respectively.

Road user group by state and territory of residence

The three most common road user groups involved in serious injury were car occupants (34.3% of cases), motorcyclists (27.2%) and pedal cyclists (17.6%) (Table 2.8). Over three-quarters (77%) of the persons seriously injured resided in the three most populous jurisdictions: New South Wales, Victoria and Queensland. These three jurisdictions constitute 77.5% of the population of Australia.

Table 2.7: Place of occurrence and road user group for adults aged 18 years and older seriously injured due to a land transport accident, Australia, 2007–08

Place	Count	Per cent	Road user group						
			Pedestrian	Pedal cycle	Car	Motorcycle	Animal or animal-drawn vehicle	Heavy transport vehicle	Other
Driveway to home	287	0.7	103	15	100	54	n.p.	n.p.	10
Other and unspecified place in home	443	1.1	46	19	64	186	72	n.p.	n.p.
<i>Street and highway</i>	<i>26,344</i>	<i>65.6</i>	<i>2,180</i>	<i>2,655</i>	<i>14,386</i>	<i>5,529</i>	<i>24</i>	<i>511</i>	<i>1,059</i>
Roadway	24,959	62.2	2,003	2,314	13,926	5,275	20	496	925
Footpath next to road	449	1.1	129	117	95	39	n.p.	n.p.	65
Cycleway	124	0.3	n.p.	115	n.p.	n.p.	0	0	0
Other specified public highway, street or road	426	1.1	25	45	187	128	n.p.	9	n.p.
Unspecified public highway, street or road	386	1.0	n.p.	64	n.p.	n.p.	0	n.p.	39
Parking place	143	0.4	56	7	59	15	0	n.p.	n.p.
Farm	1,184	3.0	18	n.p.	66	563	259	n.p.	268
School	16	0.0	n.p.	n.p.	n.p.	n.p.	n.p.	0	n.p.
Sports and athletics area	1,271	3.2	21	189	76	613	301	n.p.	n.p.
Forest, beach, area of water and other specified countryside	989	2.5	n.p.	144	51	659	41	n.p.	83
Other specified place of occurrence	1,062	2.6	155	134	119	269	57	59	269
Unspecified place of occurrence	8,394	20.9	390	1,666	n.p.	n.p.	1,298	210	900
Total	40,133	100.0	2,984	4,832	15,743	10,999	2,060	797	2,718

Table 2.8: Land transport – serious injury cases by road user group and state/territory of usual residence, Australia, 2007–08

Road user group	Serious injury case counts														Total
	Car	Motor-cycle	Pedal cycle	Pedestrian	Animal or animal-drawn vehicle	Heavy transport vehicle	Pick-up truck or van	Special all-terrain or off-road vehicle	Bus	Special industrial, agricultural or construction vehicle	Train	Three-wheeled motor vehicle	Tram	Unknown	
State/territory															
NSW	5,218	4,006	2,520	1,299	753	242	109	226	191	118	38	18	4	222	14,964
VIC	5,016	3,244	2,548	980	672	185	143	143	96	102	38	14	62	134	13,377
QLD	3,226	3,819	1,994	681	901	224	67	257	86	141	13	n.p.	n.p.	193	11,615
WA	1,535	1,268	771	292	200	73	63	191	42	32	n.p.	n.p.	n.p.	74	4,546
SA	1,463	944	605	276	176	61	43	58	39	34	5	10	0	42	3,756
TAS	433	337	209	78	56	17	18	n.p.	6	20	n.p.	n.p.	n.p.	16	1,239
ACT	306	213	255	29	30	n.p.	9	n.p.	n.p.	n.p.	0	n.p.	0	n.p.	875
NT	300	182	131	59	66	n.p.	20	54	n.p.	n.p.	0	0	0	n.p.	826
Total	17,749	14,084	9,102	3,756	2,877	813	479	987	477	458	97	62	70	699	51,710

Notes

1. A 'special all-terrain or off-road motor vehicle' refers only to such vehicles that are not registrable for on-road use and does not include registrable 4WD passenger vehicles, which are included under 'Car'.
2. Total includes other territories such as Cocos (Keeling) Islands, Christmas Island and Jervis Bay as well as cases where state/territory of residence are not reported.

Mechanism of injury

Many injuries result from a collision between a person's mode of transport and another vehicle, or collision with some other object. In this report, the other vehicle or object is called the counterpart. The counterpart in land transport crashes that resulted in the serious injury of Australians is presented in Tables 2.9 (for events recorded as occurring in traffic), 2.10 (for events recorded as occurring in non-traffic, codes provided in the ICD-10-AM for injuries to animal riders and occupants of animal-drawn vehicles do not allow traffic/non-traffic to be recorded, all cases of these types are in Table 2.10) and 2.11 (for instances where it is unspecified as to whether it was traffic or non-traffic). Note that ICD-10-AM does not allow 'heavy transport vehicle' to be distinguished from 'bus' as a counterpart, nor 'pedestrian' to be disaggregated from 'animal'.

Some of the notable differences between traffic accidents and non-traffic accidents include:

- Almost half (49%) of those injured in a traffic accident were occupants of a car compared to only 10% of those injured in a non-traffic accident.
- Cases involving motorcyclists and pedal cyclists made up 43% and 28% respectively of all those seriously injured in a non-traffic accident compared to only 23% and 15% respectively for those injured in traffic accidents.
- Almost half of the car occupants injured in a traffic accident were involved in a collision with another motor vehicle, and a further 24% were involved in a collision with a fixed or stationary object. In contrast, only 11% of car occupants injured in a non-traffic accident were involved in a collision with another motor vehicle, while half were involved in a non-collision accident.
- Around one-third of motorcyclists and pedal cyclists injured in traffic accidents were involved in non-collision accidents and close to one-quarter were injured in collisions with other motor vehicles. In contrast, over two-thirds (68%) of motorcyclists and three-quarters of pedal cyclists injured in non-traffic accidents were involved in non-collision accidents.
- Persons seriously injured while riding in special all-terrain or off-road vehicles made up over 6% of all persons injured in non-traffic accidents but less than 0.3% of all persons injured in traffic accidents.

Almost 55% of cases which were unspecified as to whether they occurred in traffic or non-traffic conditions involved a person riding an animal or an occupant of an animal-drawn vehicle, with almost 70% of these cases involving a non-collision accident.

Table 2.9: Traffic serious injury – mechanism of serious injury for land transport accidents, Australia, 2007–08

Injured person	Counterpart in collision										Total
	Car, pick-up truck or van	2- or 3-wheeled motor vehicle	Pedal cycle	Pedestrian or animal	Heavy transport vehicle or bus	Train	Other non-motor vehicle	Fixed or stationary object	Non-collision transport accident ^(a)	Other and unspecified transport accidents	
Car occupant	7,138	29	n.p.	136	597	13	n.p.	3,864	2,969	1,029	15,795
Motorcyclist	1,723	139	n.p.	139	80	n.p.	14	688	2,569	2,169	7,524
Pedal cyclist	1,076	11	146	24	55	n.p.	n.p.	217	1,595	1,682	4,814
Pedestrian	2,332	58	33	7	103	17	13	0	0	167	2,730
Occupant of pick-up truck or van	72	n.p.	0	n.p.	27	0	n.p.	64	105	24	298
Occupant of heavy transport vehicle	52	0	0	n.p.	59	n.p.	0	66	256	57	497
Bus occupant	33	0	0	n.p.	14	n.p.	0	14	105	31	204
Animal rider or occupant of animal-drawn vehicle	0	0	0	0	0	0	0	0	0	0	0
Occupant of special all-terrain or off-road vehicle	0	0	0	0	0	0	0	0	0	83	83
Occupant of three-wheeled motor vehicle	11	n.p.	0	0	0	n.p.	0	0	6	6	26
Occupant of a tram	0	0	0	0	0	0	0	0	0	n.p.	n.p.
Occupant of a train	0	0	0	0	0	0	0	0	0	n.p.	n.p.
Occupant of special agricultural or industrial or construction vehicle	0	0	0	0	0	0	0	0	0	37	37
Unknown	0	0	0	0	0	0	0	0	50	478	528
Total	12,437	240	184	318	935	42	49	4,913	7,655	5,770	32,543

(a) Includes non-collision accidents such as overturning, falling or being thrown from a vehicle.

Notes

1. Shading denotes categories included in the seven most common types of land transport accidents resulting in serious injury as listed in the 'mechanism of injury' section.
2. A 'special all-terrain or off-road vehicle' refers only to such vehicles that are no longer registrable for on-road use and does not include registrable 4WD passenger vehicles, which are included under 'car occupants'.

Table 2.10: Non-traffic serious injury – mechanism of serious injury for land transport accidents, Australia, 2007–08

Injured person	Counterpart in collision										Total
	Car, pick-up truck or van	2- or 3-wheeled motor vehicle	Pedal cycle	Pedestrian or animal	Heavy transport vehicle or bus	Train	Other non-motor vehicle	Fixed or stationary object	Non-collision transport accident ^(a)	Other and unspecified transport accidents	
Car occupant	135	n.p.	n.p.	17	10	n.p.	n.p.	395	676	124	1,365
Motorcyclist	56	255	n.p.	77	n.p.	0	6	895	4,074	658	6,025
Pedal cyclist	43	n.p.	116	28	n.p.	n.p.	n.p.	239	2,985	538	3,955
Pedestrian	365	25	36	46	25	7	21	0	0	180	705
Occupant of pick-up truck or van	n.p.	0	0	n.p.	0	0	0	n.p.	99	26	133
Occupant of heavy transport vehicle	n.p.	0	0	n.p.	n.p.	n.p.	0	8	151	47	213
Bus occupant	0	0	0	0	n.p.	0	0	n.p.	57	26	85
Animal rider or occupant of animal-drawn vehicle	0	0	0	0	0	0	0	0	0	n.p.	n.p.
Occupant of special all-terrain or off-road vehicle	0	0	0	0	0	0	0	0	0	898	898
Occupant of three-wheeled motor vehicle	n.p.	0	0	n.p.	0	0	0	6	19	n.p.	33
Occupant of a tram	0	0	0	0	0	0	0	0	0	n.p.	n.p.
Occupant of a train	0	0	0	0	0	0	0	0	0	n.p.	n.p.
Occupant of special agricultural or industrial or construction vehicle	0	0	0	0	0	0	0	0	0	387	387
Unknown	0	0	0	0	0	0	0	0	14	87	101
Total	600	285	153	175	43	11	32	1,551	8,075	2,975	13,900

(a) Includes non-collision accidents such as overturning, falling or being thrown from a vehicle.

Notes

1. Shading denotes categories included in the seven most common types of land transport accidents resulting in serious injury as listed in the 'mechanism of injury' section.
2. A 'special all-terrain or off-road vehicle' refers only to such vehicles that are no longer registrable for on-road use and does not include registrable 4WD passenger vehicles, which are included under 'car occupants'.

Table 2.11: Unspecified as to whether traffic or non-traffic serious injury – mechanism of serious injury for land transport accidents, Australia, 2007–08

Injured person	Counterpart in collision										Total
	Car, pick-up truck or van	2- or 3-wheeled motor vehicle	Pedal cycle	Pedestrian or animal	Heavy transport vehicle or bus	Train	Other non-motor vehicle	Fixed or stationary object	Non-collision transport accident ^(a)	Other and unspecified transport accidents	
Car occupant	22	0	0	n.p.	n.p.	0	0	n.p.	335	225	589
Motorcyclist	n.p.	n.p.	0	n.p.	0	0	0	0	23	510	535
Pedal cyclist	0	0	0	0	0	0	n.p.	n.p.	17	315	333
Pedestrian	178	15	24	9	12	n.p.	7	0	n.p.	75	321
Occupant of pick-up truck or van	0	0	0	0	n.p.	n.p.	0	0	17	30	48
Occupant of heavy transport vehicle	0	0	0	0	n.p.	0	n.p.	0	51	51	103
Bus occupant	n.p.	0	0	n.p.	n.p.	0	0	0	134	50	188
Animal rider or occupant of animal-drawn vehicle	0	0	0	5	0	0	5	37	1,980	850	2877
Occupant of special all-terrain or off-road vehicle	0	n.p.	0	0	0	0	0	0	0	n.p.	n.p.
Occupant of three-wheeled motor vehicle	0	n.p.	0	0	0	0	0	0	n.p.	n.p.	n.p.
Occupant of a tram	0	0	0	0	0	0	0	0	0	66	66
Occupant of a train	0	0	0	0	0	n.p.	0	0	n.p.	90	94
Occupant of special agricultural or industrial or construction vehicle	0	0	0	0	0	0	0	0	0	34	34
Unknown	0	0	0	0	0	0	0	0	0	70	70
Total	202	16	24	16	18	n.p.	n.p.	42	2,559	2,374	5,267

(a) Includes non-collision accidents such as overturning, falling or being thrown from a vehicle.

Note: A 'special all-terrain or off-road vehicle' refers only to such vehicles that are no longer registrable for on-road use and does not include registrable 4WD passenger vehicles, which are included under 'car occupants'.

3 Serious injury due to road vehicle traffic crashes, Australia, 2007–08

The remainder of this report is restricted to road vehicle traffic crashes only, i.e. crashes involving a motor vehicle, pedal cycle or other road vehicle such as an animal, animal-drawn vehicle or tram on a public road. These are crashes that road safety authorities focus on in their development of safety programmes. The definition of 'road vehicle traffic' used in this report has been aligned as much as possible with that used in the ABS document entitled *Guidelines for reporting and classifying road vehicle crashes* (ABS 1983). Cases unspecified as to whether they occurred in traffic or non-traffic are excluded, even though some will have occurred in traffic.

In the 1-year period 2007–08, land transport accidents that involved road vehicles on a public road accounted for 0.4% of all hospital separations in Australia and 6.3% of all injury-related hospital separations (Table 3.1).

During 2007–08, there were 155,790 patient days attributable to road vehicle traffic crashes, with a mean length of stay of 4.8 days. They accounted for 0.6% of all patient days in Australia and 7.5% of all injury-related patient days. In 32% of serious injury cases, the injured person was discharged on the same day as they were admitted.

The male:female age-standardised rate ratio was 2.1:1, indicating that, after accounting for any difference in age composition, more than twice as many males as females were seriously injured as a result of road vehicle traffic crashes (207 per 100,000 population, compared with 100 per 100,000 population for females).

Table 3.1: Key indicators for serious injury due to road vehicle traffic crashes, Australia, 2007–08

Indicator	Males	Females	Persons
Seriously injured^(a)			
Persons admitted to hospital ^(b)	21,855	10,688	32,543
Percentage of all hospital separations	0.6	0.3	0.4
Percentage of all hospital separations due to injury	7.4	4.8	6.3
Same day hospitalisations	6,952	3,562	10,514
Mean length of stay in hospital (days) ^(c)	4.9	4.6	4.8
Total patient days (including same day)	106,285	48,505	155,790
Crude rate/100,000 population ^(d)	207.0	100.1	153.2
Age-standardised rate/100,000 population ^(e)	206.7	99.6	153.4

(a) In this report 'seriously injured' means admitted to hospital due to injury (see the Data issues section under 'Serious injury').

(b) In total, there were 35,742 admissions to hospital for road vehicle traffic crashes for an estimated 32,848 persons, of whom 305 (0.9%) died while in hospital. These deaths are included in estimates of fatal transport injury provided elsewhere by organisations such as the DIT and are omitted from the seriously injured counts in Table 3.1 and throughout Section 3 in order to avoid double counting. The estimate of total patient days excludes separations in which the person died in hospital.

(c) This is the average number of days a person stayed in hospital when seriously injured. Refer to the Data issues section of this report for details on how mean length of stay is calculated.

(d) Using population denominators in December 2007.

(e) Adjusted by direct standardisation to the Australian population in June 2001.

Age and sex distribution

The burden of injury due to road vehicle traffic crashes was mainly among those of 'working age'; 81% of persons seriously injured were aged 15–64 years (Table 3.2). Males accounted for just over two-thirds (67%) of serious injury cases due to road vehicle traffic crashes in 2007–08.

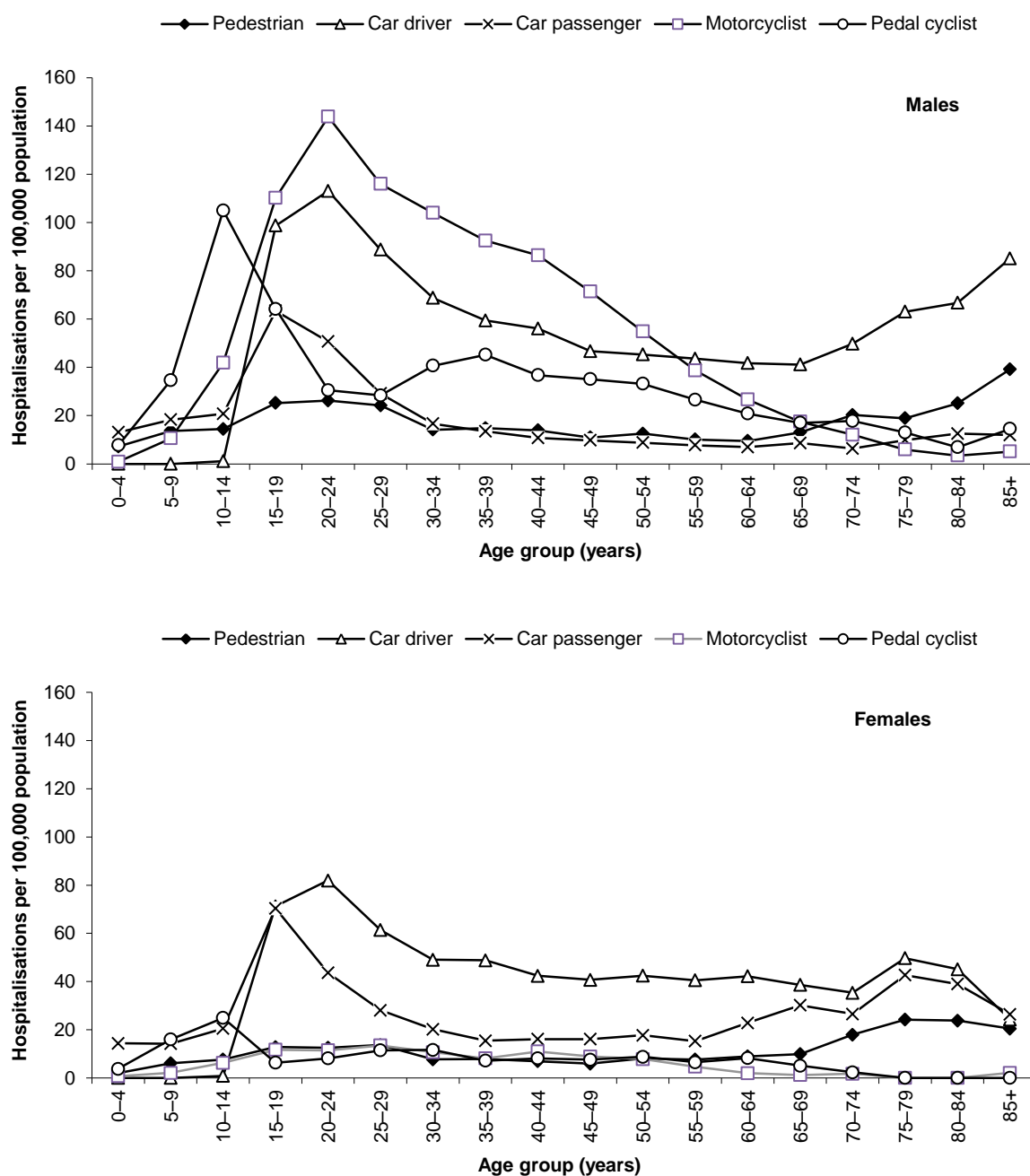
Table 3.2: Serious injury due to road vehicle traffic crashes by age group, Australia, 2007–08

Age group	Males		Females		Persons	
	Count	Per cent	Count	Per cent	Count	Per cent
0–4 years	211	1.0	149	1.4	360	1.1
5–14 years	1,931	8.8	709	6.6	2,640	8.1
15–24 years	5,971	27.3	2,621	24.5	8,592	26.4
25–44 years	7,920	36.2	3,271	30.6	11,191	34.4
45–64 years	4,259	19.5	2,328	21.8	6,587	20.2
65+ years	1,563	7.2	1,610	15.1	3,173	9.8
Total	21,855	100.0	10,688	100.0	32,543	100.0

Age-specific serious injury male rates for car drivers and motorcyclists peaked in the 20–24 year age group (Figure 3.1). Male rates for car passengers peaked in those aged 15–19 years, while rates for pedal cyclists peaked at 10–14 years of age. Rates for pedestrians were slightly elevated from 15–19 years of age through to 25–29 years of age and in those aged 65 years and over.

Similar patterns were observed for females, although peaks were generally less pronounced. However, in contrast to males, there was no distinct peak in age-specific rates for female motorcyclists.

Age-specific male rates for motorcyclists and pedal cyclists were much higher than female rates across nearly all age groups. Rates for male car drivers were moderately higher than female rates across nearly all age groups. Rates for male car passengers were similar to rates for females from ages 0–4 years through to ages 35–39 years. At older age groups, female rates were higher than male rates, especially in the oldest age group. Rates for male pedestrians were moderately higher than rates for females from ages 0–4 years through to ages 50–54 years and similar to rates for females in older age groups.



Note: Rates based on small counts have been set to zero.

Figure 3.1: Road vehicle traffic crashes – age-specific serious injury rates by sex, Australia, 2007-08

Mechanism of injury

In 2007–08, nine circumstances accounted for about 80% of all persons seriously injured in road vehicle traffic crashes (Table 3.3). Collisions of a car with a car, pick-up truck or van accounted for almost 22% ($n = 7,138$) of all serious injury cases due to road vehicle traffic crashes.

Table 3.3: Nine most common mechanisms of serious injury for road vehicle traffic crashes, Australia, 2007-08

Road user type of injured person	Type of collision	Seriously injured	
		Count	Per cent of road vehicle traffic serious injury cases ($n = 32,543$)
Car occupant	Car in collision with car, pick-up truck or van	7,138	21.9
	Car in collision with fixed or stationary object	3,864	11.9
	Car in non-collision transport accident	2,969	9.1
Motorcyclist	Motorcycle in non-collision transport accident	2,569	7.9
	Motorcycle in other and unspecified transport accident	2,169	6.7
	Motorcycle in collision with car, pick-up truck or van	1,723	5.3
Pedestrian	Pedestrian in collision with a car, pick-up truck or van	2,332	7.2
Pedal cyclist	Pedal cycle in other and unspecified transport accident	1,682	5.2
	Pedal cycle in non-collision transport accident	1,595	4.9
Total of most common mechanisms		26,041	80

Road user group

Almost half (49%) of the persons seriously injured in road vehicle traffic crashes were car occupants (Table 3.4). There was a large discrepancy between sexes with 38% of seriously injured males being car occupants, compared with 70% of females. Large discrepancies were also observed for motorcyclists (31% of seriously injured males compared to 7% of females) and pedal cyclists (18% of seriously injured males compared to 9% of females). Similar patterns were also observed for high threat to life cases.

Twenty-six per cent of serious injury cases due to road vehicle traffic crashes presented a high threat to life (Table 3.4). A slightly larger proportion of males (27%) sustained a high threat to life injury than females (23%). Of all the road user groups, pedestrians (35%) had the highest proportion of cases with high threat to life injury, while pedal cyclists (18%) had the lowest proportion.

Table 3.4: Serious injury due to road vehicle traffic crashes by road user group, Australia, 2007–08

Road user group	Seriously injured						Per cent high threat- to-life
	All cases			High threat-to-life cases ^(a)			
	Count	Per cent	Rate ^(a)	Count	Per cent	Rate ^(b)	
Males							
Car occupant ^(c)	8,263	37.8	77.9	2,511	42.7	23.7	30.4
Car driver	5,560	25.4	52.4	1,701	28.9	16.1	30.6
Car passenger	2,098	9.6	19.7	681	11.6	6.4	32.5
Motorcyclist	6,781	31.0	64.1	1,704	29.0	16.1	25.1
Pedal cyclist	3,875	17.7	36.9	754	12.8	7.1	19.5
Pedestrian	1,687	7.7	16.1	592	10.1	5.7	35.1
Heavy transport vehicle occupant	468	2.1	4.4	134	2.3	1.2	28.6
Pick-up truck or van occupant	239	1.1	2.2	85	1.4	0.8	35.6
Bus occupant	98	0.4	0.9	20	0.3	0.2	20.4
Other or unknown	444	2.0	4.2	86	1.5	0.8	19.4
Total	21,855	100.0	206.7	5,886	100.0	55.6	26.9
Females							
Car occupant ^(c)	7,532	70.5	69.9	1,796	71.7	16.5	23.8
Car driver	4,346	40.7	40.2	992	39.6	9.1	22.8
Car passenger	2,722	25.5	25.3	735	29.3	6.8	27.0
Motorcyclist	743	7.0	7.1	140	5.6	1.3	18.8
Pedal cyclist	939	8.8	9.1	126	5.0	1.2	13.4
Pedestrian	1,043	9.8	9.5	354	14.1	3.2	33.9
Heavy transport vehicle occupant	29	0.3	2.8	9	0.4	0.1	31.0
Pick-up truck or van occupant	59	0.6	0.6	13	0.5	0.1	22.0
Bus occupant	106	1.0	0.9	31	1.2	0.3	29.2
Other or unknown	237	2.2	2.2	37	1.5	0.3	15.6
Total	10,688	100	99.6	2,506	100	23.0	23.4
Persons							
Car occupant ^(c)	15,795	48.5	73.9	4,307	51.3	20.1	27.3
Car driver	9,906	30.4	46.2	2,693	32.1	12.5	27.2
Car passenger	4,820	14.8	22.7	1,416	16.9	6.7	29.4
Motorcyclist	7,524	23.1	35.8	1,844	22.0	8.7	24.5
Pedal cyclist	4,814	14.8	23.1	880	10.5	4.1	18.3
Pedestrian	2,730	8.4	12.8	946	11.3	4.4	34.7
Heavy transport vehicle occupant	497	1.5	2.3	143	1.7	0.7	28.8
Pick-up truck or van occupant	298	0.9	1.4	98	1.2	0.5	32.9
Bus occupant	204	0.6	0.9	51	0.6	0.2	25.0
Other or unknown	681	2.1	3.2	123	1.5	0.6	18.1
Total	32,543	100.0	153.4	8,392	100.0	39.3	25.8

(a) Cases for which the ICD-based Injury Severity Score (ICISS) <0.941.

(b) Per 100,000 population, adjusted by direct standardisation to the Australian population in June 2001.

(c) 'Car occupants' includes cases for which the position of the injured person within the car is unspecified.

Vehicle type by number of registered vehicles

This section shows injury rates for the different types of vehicles registered in Australia. Registered vehicles are those authorised to travel on public roads. The numerator is the number of serious injury cases among the occupants of each vehicle type due to traffic accidents (on public roads). The denominator is the number of each vehicle type registered by state and territory, sourced from the Australian Bureau of Statistics' *Motor Vehicle Census* (ABS 2009).

Serious injury rates are restricted to the occupants of the types of registered vehicles within the scope of the ABS publications. Hence, serious injury rates for special all-terrain and off-road vehicles, pedal cycles, pedestrians, animal riders or occupants of animal-drawn vehicles, occupants of special agricultural, industrial or construction vehicles and trams or trains are not presented.

Motorcyclists had by far the highest serious injury rate per 100,000 registered vehicle type recording 1,330 injuries per 100,000 registered motorcycles (Table 3.5). This was almost ten times the corresponding rate for cars (134 serious injuries per 100,000 registered cars).

Overall, the Northern Territory had by far the highest rate with 315 persons seriously injured per 100,000 registered vehicles. This was more than 80% higher than the next highest rate of 174 cases per 100,000 population recorded by the Australian Capital Territory. Western Australia recorded the lowest rate of 124 serious injury cases per 100,000 motor vehicle registrations. Notably, the Northern Territory had by far the highest rates of serious injury per 100,000 vehicle type for cars, motorcycles and pick-up trucks or vans.

It should be noted that these rates do not take into account the average distance travelled by each type of vehicle per year and the average number of occupants per vehicle. This is likely to contribute to the relatively high rate for buses. A perhaps more useful denominator would be passenger-kilometres but this is not available for Australian road transport.

Table 3.5: Road vehicle traffic crashes – serious injury rate per 100,000 registered vehicles by vehicle type and state/territory, Australia, 2007–08

State and territory	Crude injury rate per 100,000 vehicles (95% CI ^(a))						Total case numbers
	Cars‡	Motorcycles*	Pick-up trucks or vans**	Heavy transport vehicles† ^(b)	Buses	Total ^(c)	
NSW	129 (125–133)	1,416 (1,357–1,478)	10.0 (7.77–12.8)	98.3 (82.9–117)	392 (317–485)	155 (151–158)	6,991
Vic	147 (142–151)	1,283 (1,224–1,345)	20.0 (16.4–24.2)	97.7 (81.6–117)	224 (164–307)	168 (164–172)	6,575
Qld	122 (118–127)	1,474 (1,412–1,539)	6.32 (4.58–8.72)	119 (100–140)	171 (120–243)	160 (156–164)	5,075
WA	105 (100–111)	905 (840–975)	12.4 (8.87–17.2)	77.1 (58.8–101)	198 (133–296)	124 (119–129)	2,168
SA	141 (133–148)	1,261 (1,155–1,377)	16.3 (11.0–24.1)	133 (99.4–177)	213 (115–396)	161 (154–169)	1,902
Tas	124 (112–138)	1,326 (1,137–1,545)	12.7 (6.83–23.6)	57.4 (27.4–120)	n.p.	136 (125–148)	532
ACT	131 (116–147)	1,408 (1,195–1,659)	n.p.	n.p.	518 (215–1,244)	174 (158–192)	421
NT	342 (304–386)	2,028 (1,667–2,468)	57.0 (35.9–90.4)	n.p.	n.p.	315 (286–348)	388
Total	134 (132–136)	1,330 (1,301–1,361)	13.0 (11.6–14.6)	101 (92.9–111)	253 (221–290)	159 (157–161)	
Total case numbers	15,795	7,550	298	497	204		24,344

(a) Confidence intervals are provided to show by about how much rates might be expected to vary (between years, for example) in view of the number of cases. See the Data issues section of this report for further information.

(b) For trucks, data are presented for state/territory of operation rather than state and territory of registration.

(c) Includes in the denominator the ABS Motor Vehicle Census data for campervans and non-freight carrying trucks as these would be coded using ICD-10-AM variously as cars, trucks, pick-up trucks or vans and hence included in the numerator.

Notes

1. Case numbers grouped by state and territory of usual residence and vehicle denominators grouped by state/territory of registration of vehicle.
2. The vehicle types in this table are defined according to ICD-10-AM, which are very close to the definitions used by the ABS from which the denominators are derived.
3. Defined in the ABS Motor Vehicle Census as ‡ Passenger vehicles, ** Light commercial vehicle and † Rigid truck and articulated truck. * Motorcycles as defined in the ABS Motor Vehicle Census include two or three-wheeled motor vehicles, so three-wheeled motor vehicles are also included in the numerator for this table.

Road user group by state and territory of residence

The hospital dataset used for this report does not contain specific information on the crash location. There are two options for presenting the hospital data on location: by state and territory of hospitalisation or by state and territory of residence. Presenting serious injury cases by the state and territory of the hospital where the person was treated may give a better indication of place of occurrence. This would be the case if a person was treated in a hospital close to the crash site. However, the practice of airlifting (or driving) seriously injured patients to major metropolitan hospitals, sometimes across borders, complicates such analyses. Table 3.6 shows that most persons who were seriously injured were hospitalised in the same state in which they resided, but about 27% of persons hospitalised in the Australian Capital Territory were residents of New South Wales. For patients hospitalised in a state other than their state of residence, it is unknown whether the location of the crash was interstate or the crash occurred in the same state that the patient resided in but they were transferred to an interstate hospital.

Table 3.6: Serious injury due to road vehicle traffic crashes – state/territory of hospitalisation versus state and territory of usual residence, Australia, 2007–08

State or territory of residence	State or territory of hospitalisation								
	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	National
NSW	8,949	106	161	10	22	9	193	16	9,466
Vic	158	8,517	44	20	64	18	14	14	8,849
Qld	195	19	6,461	10	5	10	7	10	6,717
WA	n.p.	n.p.	7	2,782	18	0	n.p.	16	2,840
SA	34	33	10	7	2,365	n.p.	n.p.	23	2,475
Tas	6	8	n.p.	n.p.	n.p.	692	0	0	714
ACT	43	13	n.p.	0	n.p.	n.p.	506	0	568
NT	n.p.	n.p.	9	n.p.	16	n.p.	n.p.	476	511
Not reported	81	64	119	50	17	10	n.p.	43	386
National^(a)	9,479	8,782	6,818	2,888	2,510	744	724	598	32,543

(a) Includes other territories such as Cocos (Keeling) Islands, Christmas Island and Jervis Bay ($n = 17$).

Just over 29% of the cases of persons seriously injured resided in New South Wales, over a quarter resided in Victoria (27%) and 21% resided in Queensland (Table 3.7). Notably, the number of car drivers seriously injured was roughly double that for car passengers in all jurisdictions except for the Northern Territory, where the numbers were similar.

Table 3.7: Serious injury due to road vehicle traffic crashes by sex and state/territory of residence, Australia, 2007–08

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Total
Males									
<i>Car occupant^(a)</i>	2,346	2,275	1,578	758	695	185	125	173	8,263
Car driver	1,673	1,595	1,003	458	471	127	95	87	5,560
Car passenger	514	548	413	221	191	43	24	81	2,098
Motorcyclist	1,892	1,570	1,831	638	462	141	127	88	6,781
Pedal cyclist	1,097	1,107	792	327	279	98	89	49	3,875
Pedestrian	600	447	297	129	116	25	9	31	1,687
Heavy transport vehicle occupant	125	111	129	46	43	n.p.	n.p.	n.p.	468
Pick-up truck or van occupant	46	86	26	30	23	n.p.	n.p.	14	239
Bus occupant	41	18	16	14	n.p.	n.p.	n.p.	n.p.	98
Other or unknown	141	86	127	37	n.p.	18	6	n.p.	444
Total	6,288	5,700	4,796	1,979	1,644	483	362	361	21,855^(b)
Females									
<i>Car occupant^(a)</i>	2,266	2,296	1,241	602	628	164	143	93	7,532
Car driver	1,345	1,415	651	310	372	103	88	35	4,346
Car passenger	795	771	471	239	227	55	47	50	2,722
Motorcyclist	202	166	221	58	31	21	15	12	743
Pedal cyclist	200	295	207	83	74	17	30	21	939
Pedestrian	379	301	153	70	70	22	10	15	1,043
Heavy transport vehicle occupant	7	7	5	6	n.p.	n.p.	0	0	29
Pick-up truck or van occupant	16	16	11	5	n.p.	n.p.	n.p.	n.p.	59
Bus occupant	44	21	15	10	7	n.p.	n.p.	n.p.	106
Other or unknown	64	47	68	27	16	n.p.	n.p.	n.p.	237
Total	3,178	3,149	1,921	861	831	231	206	150	10,688^(b)
Persons									
<i>Car occupant^(a)</i>	4,612	4,571	2,819	1,360	1,323	349	268	266	15,795
Car driver	3,018	3,010	1,654	768	843	230	183	122	9,906
Car passenger	1,309	1,319	884	460	418	98	71	131	4,820
Motorcyclist	2,094	1,736	2,052	696	493	162	142	100	7,524
Pedal cyclist	1,297	1,402	999	410	353	115	119	70	4,814
Pedestrian	979	748	450	199	186	47	19	46	2,730
Heavy transport vehicle occupant	132	118	134	52	n.p.	n.p.	n.p.	n.p.	497
Pick-up truck or van occupant	62	102	37	35	n.p.	n.p.	n.p.	n.p.	298
Bus occupant	85	39	31	24	n.p.	n.p.	5	n.p.	204
Other or unknown	205	133	195	64	n.p.	n.p.	n.p.	7	681
Total	9,466	8,849	6,717	2,840	2,475	714	568	511	32,543^(b)

(a) 'Car occupants' includes cases for which the position of the injured person within the car is unspecified.

(b) There were 386 (male=228, female=158) cases missing data on state/territory of usual residence and 17 cases (male=14, female=3) that were 'other territories'. 'Other territories' include Cocos (Keeling) Islands, Christmas Island and Jervis Bay.

On a population basis, age-standardised rates of hospitalised serious injury were markedly greater than the national rate for most road user groups for residents of Victoria and the Northern Territory (Table 3.8 and Figures 3.2 to 3.4). In Victoria, the only exception was for motorcyclists where rates were markedly lower than the national average, while for the Northern Territory, rates for motorcyclists and pedal cyclists did not vary markedly from the national average.

Population-based rates for most road user groups for residents of New South Wales, Queensland, Western Australia and the Australian Capital Territory were not markedly greater than the national rate. In New South Wales, only pedestrians recorded rates higher than the national rate, while in the Australian Capital Territory only rates for pedal cyclists were higher than the national rate. For New South Wales and Western Australia, rates for most road user groups were markedly below the national rate.

In South Australia, population-based rates for car drivers and car passengers were markedly above the national rate, while rates for all other road user groups did not vary markedly from the national average. Tasmania was the only jurisdiction where rates for all road user groups did not vary markedly from the national average.

Table 3.8: Road vehicle traffic crashes – age-standardised rates of serious injury by road user group and state/territory of residence, Australia, 2007–08

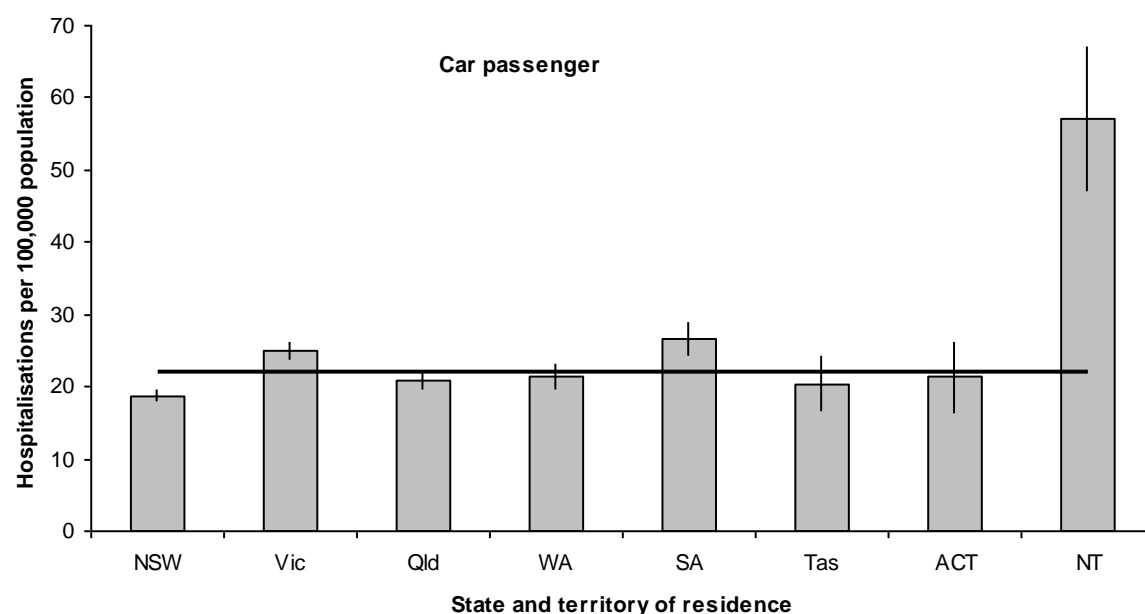
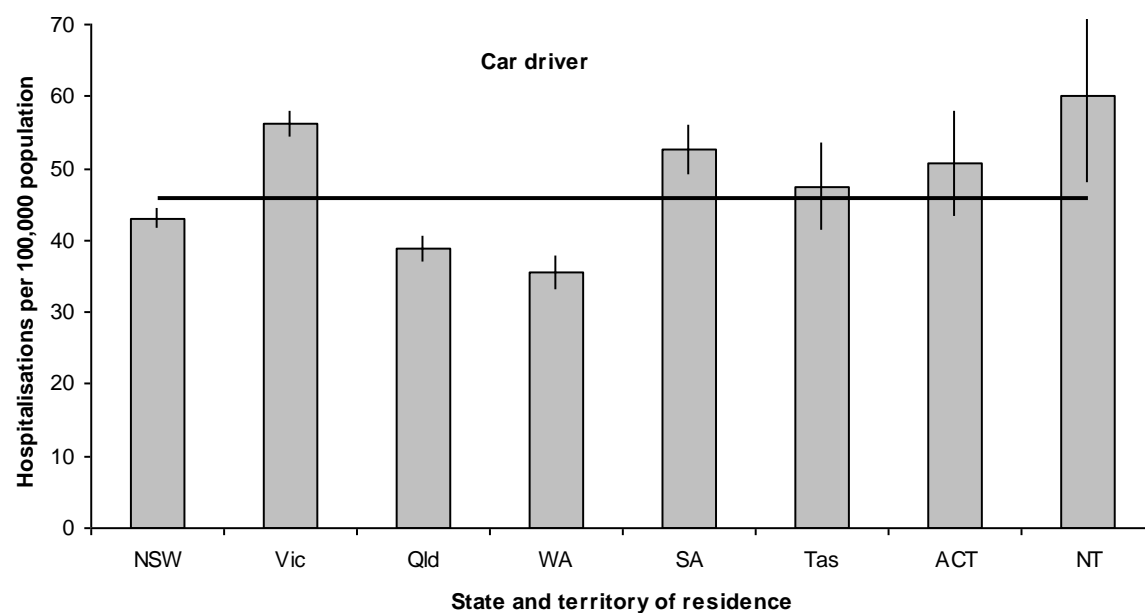
Road user group	Age-standardised rate per 100,000 population (95% CI ^(a))								Total
	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	
Car occupant ^(b)	66 (64–68)	86 (83–88)	66 (64–69)	63 (60–67)	83 (79–88)	72 (65–80)	76 (67–85)	124 (108–140)	73 (72–74)
Car driver	43 (41–45)	56 (54–58)	39 (37–41)	36 (33–38)	53 (49–56)	47 (41–54)	51 (43–58)	60 (48–72)	46 (45–47)
Car passenger	19 (18–20)	25 (24–26)	21 (19–22)	21 (20–23)	27 (24–29)	20 (16–24)	21 (16–26)	57 (47–67)	22 (21–23)
Motorcyclist	31 (29–32)	33 (32–35)	49 (47–51)	32 (30–35)	32 (29–35)	35 (29–40)	39 (32–45)	42 (34–51)	36 (35–36)
Pedal cyclist	19 (18–20)	27 (26–29)	24 (22–25)	19 (17–21)	23 (21–26)	24 (19–28)	34 (28–41)	30 (23–38)	23 (22–24)
Pedestrian	14 (13–15)	14 (13–15)	11 (10–12)	9 (8–11)	11 (10–13)	10 (7–12)	6 (3–8)	21 (15–27)	13 (12–13)
Total for road traffic crashes	137 (134–139)	167 (164–171)	159 (155–163)	132 (127–137)	157 (151–163)	149 (138–160)	161 (147–174)	231 (210–253)	151 (150–153)
Total case numbers	9,466	8,849	6,717	2,840	2,475	714	568	511	32,543^(c)

(a) Confidence intervals are provided to show by about how much rates might be expected to vary (between years, for example) in view of the number of cases. See the Data issues section of this report for further information.

(b) 'Car occupants' includes cases for which the position of the injured person within the car is unspecified.

(c) There were 386 (male=228, female=158) cases missing data on state/territory of usual residence and 17 (male=14, female=3) cases that were 'other territories'. 'Other territories' include Cocos (Keeling) Islands, Christmas Island and Jervis Bay.

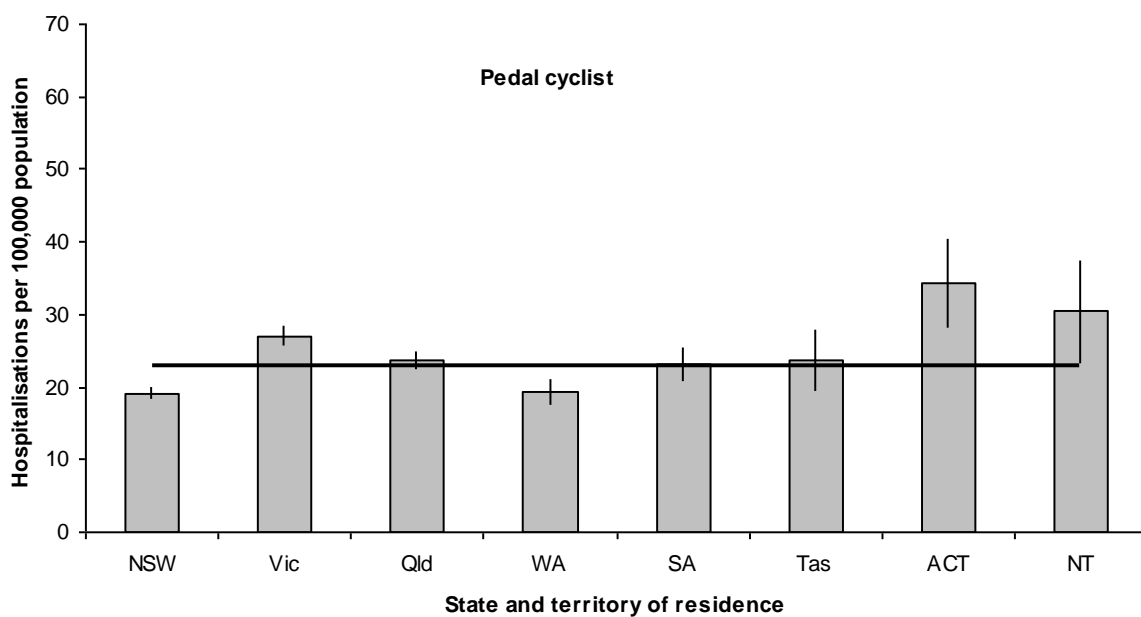
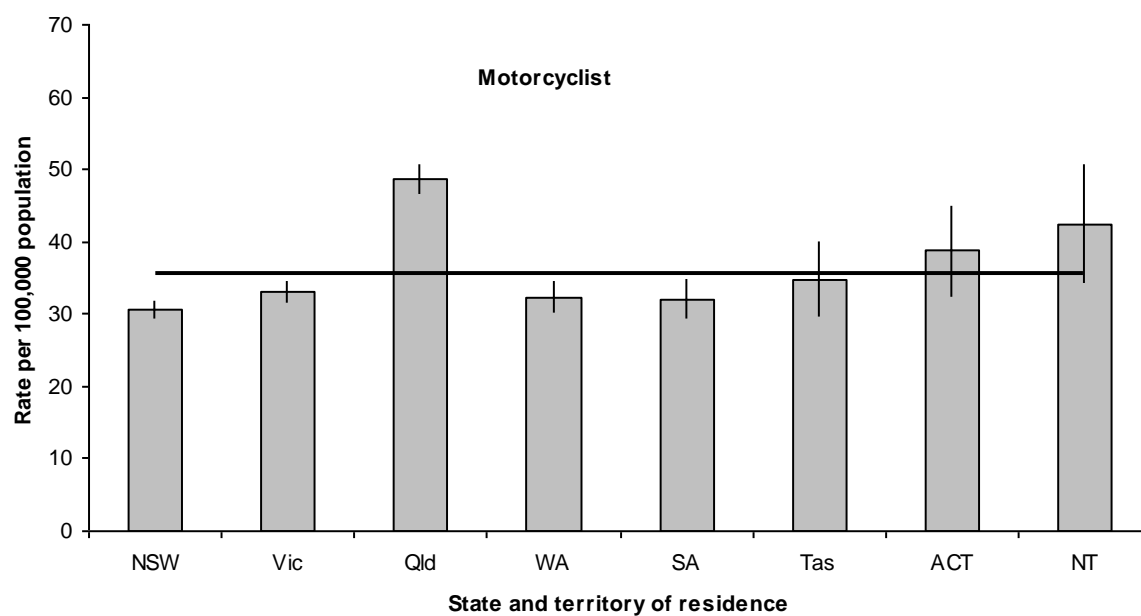
Note: Shaded areas indicate jurisdictions with rates markedly above the national rate.



Notes

1. The thick horizontal line shows the rate for all people in Australia.
2. Confidence intervals are provided to show by about how much rates might be expected to vary (between years, for example) in view of the number of cases. See the Data issues section of this report for further information.

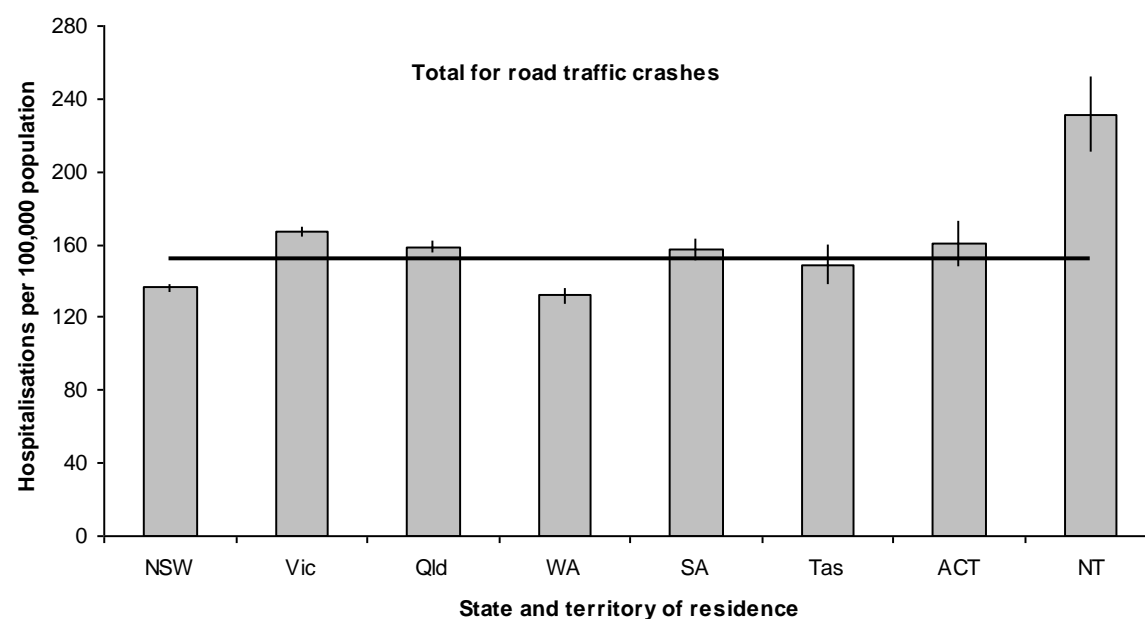
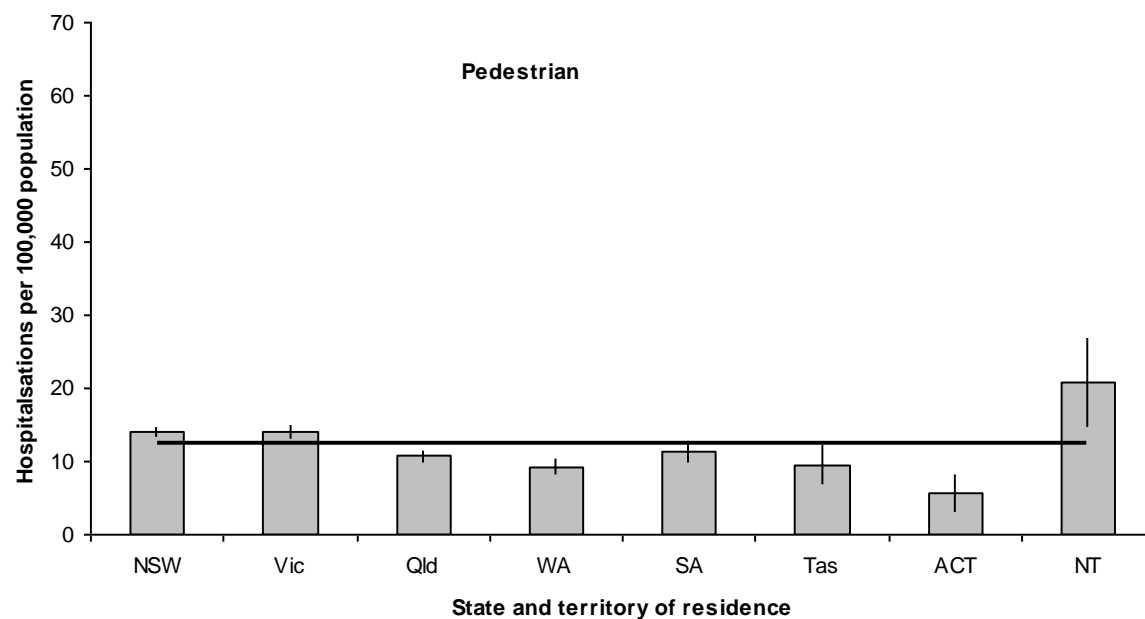
Figure 3.2: Road vehicle traffic crashes – age-standardised rates of serious injury for car drivers and car passengers by state/territory of residence, Australia, 2007–08



Notes

1. The thick horizontal line shows the rate for all people in Australia.
2. Confidence intervals are provided to show by about how much rates might be expected to vary (between years, for example) in view of the number of cases. See the Data issues section of this report for further information.

Figure 3.3: Road vehicle traffic crashes – age-standardised rates of serious injury for motorcyclists and pedal cyclists by state/territory of residence, Australia, 2007–08



Notes

1. The thick horizontal line shows the rate for all people in Australia.
2. Confidence intervals are provided to show by about how much rates might be expected to vary (between years, for example) in view of the number of cases. See the Data issues section of this report for further information.

Figure 3.4: Road vehicle traffic crashes – age-standardised rates of serious injury for pedestrians and all road traffic crashes by state/territory of residence, Australia, 2007–08

High threat to life injury by road user group and state and territory of residence

Differences in rates between jurisdictions can reflect differences in transport-related injury, but they can also reflect differences in practice concerning hospital admission. Cases with highly life-threatening injuries are normally admitted to hospital unless they die too soon for that to happen. However, most injuries present quite low threat to life and can often be treated without being admitted to hospital. Various factors can influence whether injury cases with low threat to life are admitted, including emergency department practices and hospital admission procedures. This section presents similar data to the previous one, but is restricted to more severe cases, which are likely to be less subject to data variation due to such factors, than are data on all admissions.

On a population basis, age-standardised rates for serious injury with a high threat to life were less likely to vary markedly from the national rate when compared to the rates for serious injury only (Table 3.9 and Figures 3.5 to 3.7). Rates for Western Australia and Tasmania for all road user groups did not vary markedly from the national average. In Queensland, only the rate for motorcyclists was markedly above the national rate, while for the Australian Capital Territory, the only rate that varied markedly from the national rate was for pedestrians, where the rate was markedly below the national rate.

For Victoria and South Australia, population-based rates for car drivers with high threat to life injury were markedly higher than the national rate with South Australia also recording a rate for all road traffic crashes markedly higher than the national rate. Rates for most road user groups in New South Wales were markedly lower than the national rates, while for the Northern Territory rates for all road user groups, except pedal cyclists, were markedly higher than the national average.

Table 3.9: Serious injury with a high threat to life – age-standardised rates for road vehicle traffic crashes by road user group and state/territory of residence, Australia, 2007–08

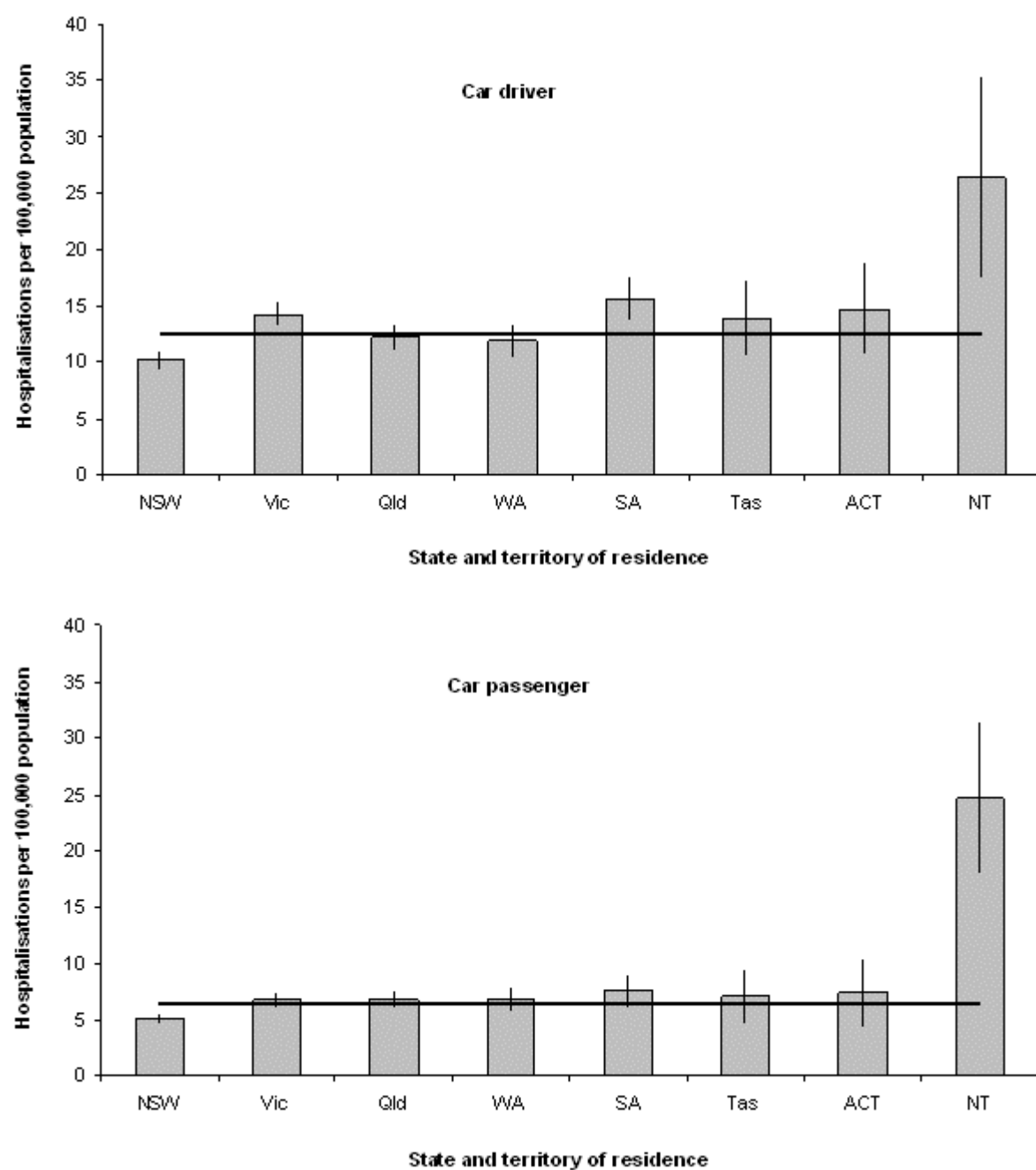
Road user group	Age-standardised rate per 100,000 population (95% CI ^(a))								Total
	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	
<i>Car occupant^(b)</i>	16 (15–17)	22 (20–23)	20 (19–21)	20 (18–21)	24 (22–26)	22 (18–26)	22 (17–28)	54 (43–66)	20 (19–20)
Car driver	10 (9–11)	14 (13–15)	12 (11–13)	12 (10–13)	16 (14–18)	14 (11–17)	15 (11–19)	26 (17–35)	12 (12–13)
Car passenger	5 (5–6)	7 (6–7)	7 (6–8)	7 (6–8)	8 (6–9)	7 (5–9)	7 (4–10)	25 (18–31)	6 (6–7)
Motorcyclist	7 (7–8)	8 (7–8)	11 (10–12)	9 (8–10)	9 (7–10)	9 (6–11)	12 (9–16)	14 (9–18)	9 (8–9)
Pedal cyclist	4 (3–4)	5 (4–5)	4 (3–5)	3 (2–4)	5 (4–6)	4 (2–6)	7 (4–10)	6 (3–10)	4 (4–4)
Pedestrian	4 (4–5)	5 (4–5)	4 (4–5)	4 (3–5)	4 (3–5)	4 (2–5)	2 (0–3)	9 (5–13)	4 (4–5)
Total for road traffic crashes	33 (32–35)	40 (39–42)	41 (39–43)	38 (35–40)	44 (41–47)	41 (36–47)	45 (38–52)	86 (72–100)	39 (38–40)
Total case numbers	2,322	2,157	1,742	811	699	200	157	182	8,392^(c)

(a) Confidence intervals are provided to show by about how much rates might be expected to vary (between years, for example) in view of the number of cases. See the Data issues section of this report for further information.

(b) 'Car occupants' includes cases for which the position of the injured person within the car is unspecified.

(c) There were 119 cases missing data on state and territory of usual residence and 3 cases that were 'other territories'. 'Other territories' include Cocos (Keeling) Islands, Christmas Island and Jervis Bay.

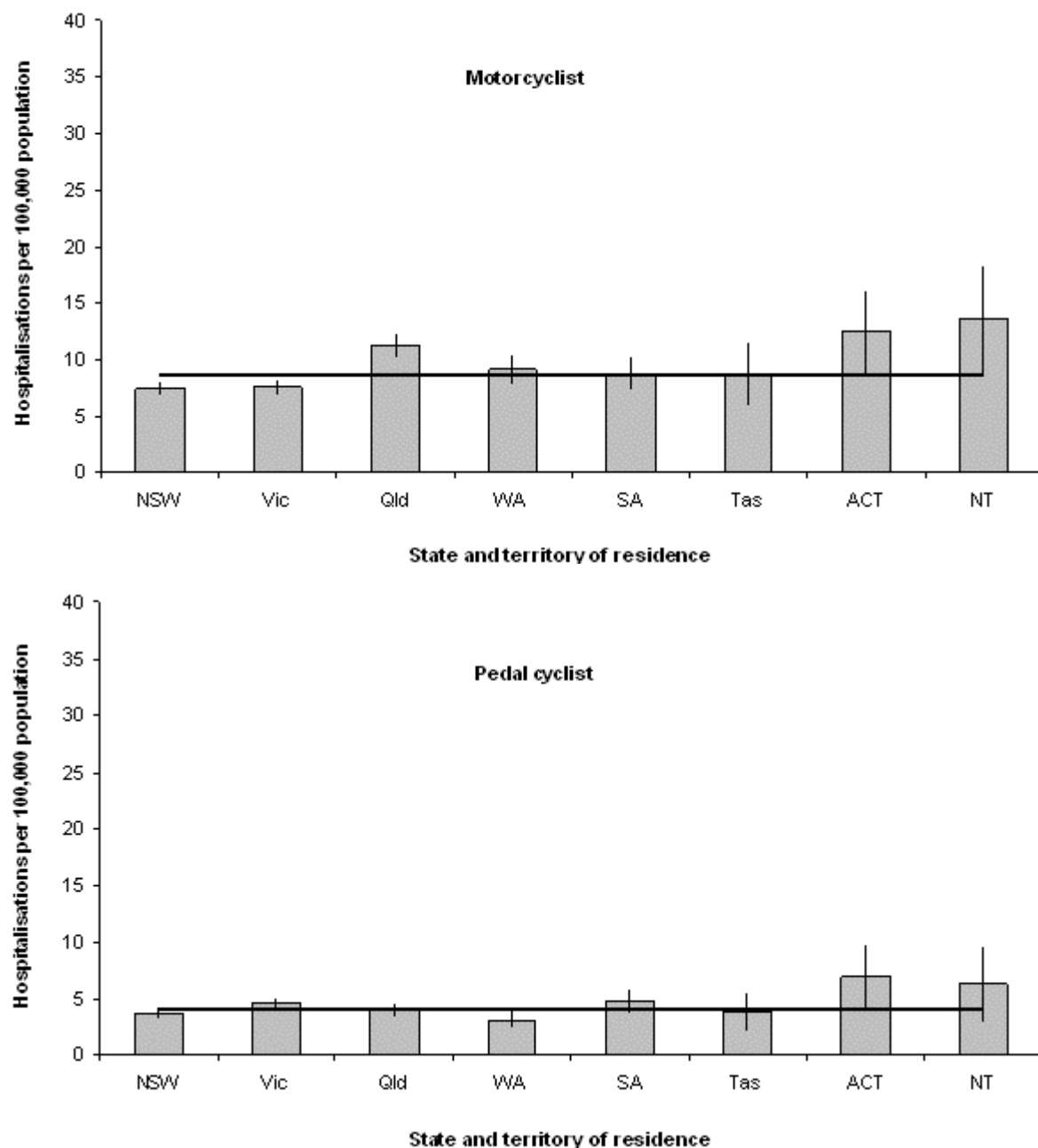
Note: Shaded areas indicate jurisdictions with rates markedly above the national rate.



Notes

1. The thick horizontal line shows the rate for all people in Australia.
2. Confidence intervals are provided to show by about how much rates might be expected to vary (between years, for example) in view of the number of cases. See the Data issues section of this report for further information.

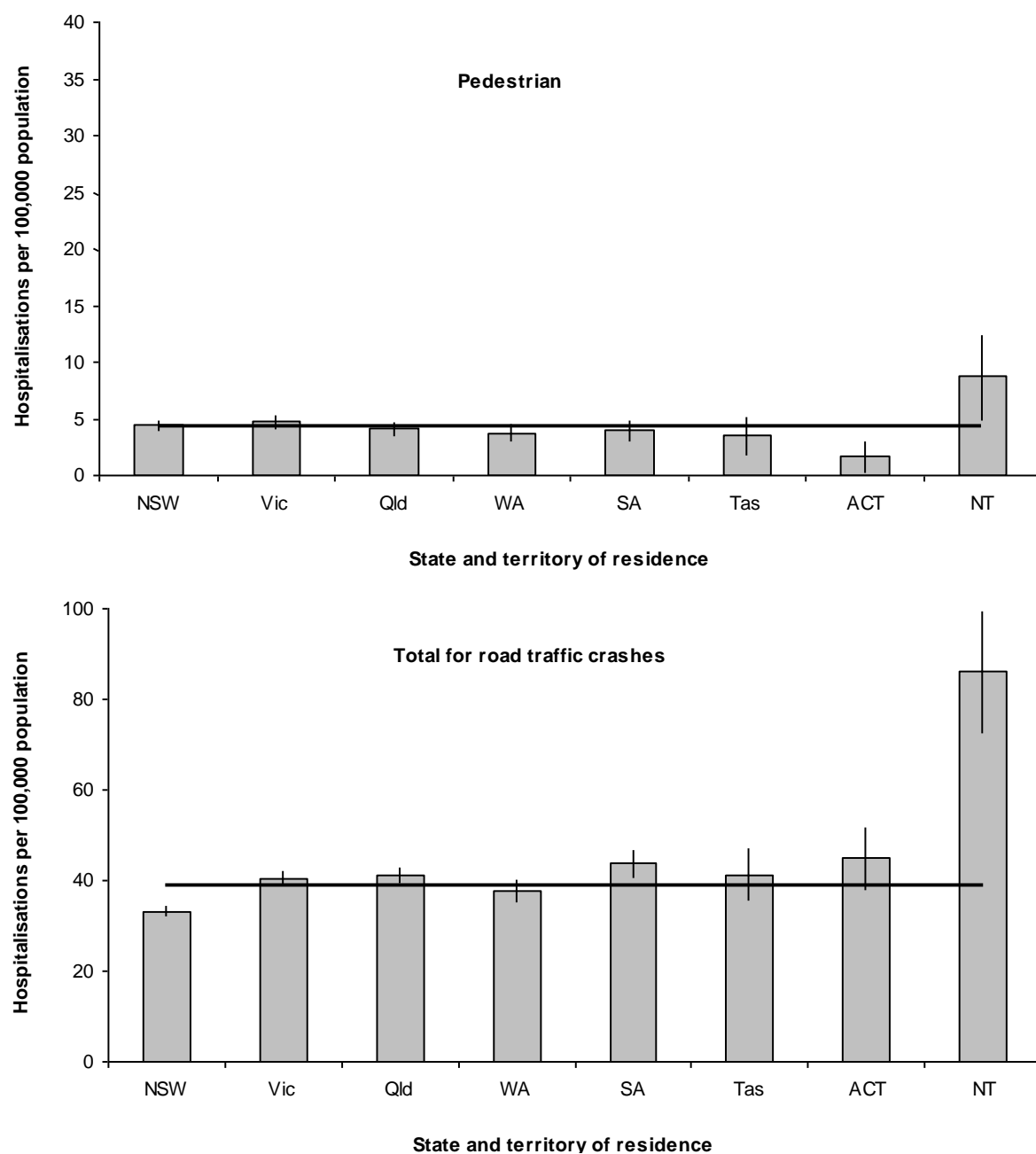
Figure 3.5: Serious injury with high threat to life – age-standardised rates of road vehicle traffic crashes for car drivers and car passengers by state/territory of residence, Australia, 2007–08



Notes

1. The thick horizontal line shows the rate for all people in Australia.
2. Confidence intervals are provided to show by about how much rates might be expected to vary (between years, for example) in view of the number of cases. See the Data issues section of this report for further information.

Figure 3.6: Serious injury with high threat to life – age-standardised rates of road vehicle traffic crashes for motorcyclists and pedal cyclists by state/territory of residence, Australia, 2007–08



Notes

1. The thick horizontal line shows the rate for all people in Australia.
2. Confidence intervals are provided to show by about how much rates might be expected to vary (between years, for example) in view of the number of cases. See the Data issues section of this report for further information.

Figure 3.7: Serious injury with high threat to life – age-standardised rates of road vehicle traffic crashes for pedestrians and road traffic crashes by state/territory of residence, Australia, 2007–08

Remoteness area of residence

The majority (83%) of persons seriously injured in road vehicle traffic crashes resided in *Major cities* or *Inner regional* areas (Table 3.10). A further 4% of serious injury cases were residents of *Remote* or *Very remote* areas. Male rates of serious injury were about 2 to 2.5 times the rate observed for females in each remoteness area, except for the very remote zone where the male rate was 1.5 times the female rate. Age-standardised rates of injury increased according to remoteness of the person's usual residence from an urban centre (Table 3.11 and Figure 3.8).

Table 3.10: Serious injury cases by remoteness area of residence for road vehicle traffic crashes, Australia, 2007–08

ASGC remoteness area of residence	Males	Females	Persons		
	Count	Count	Count	Per cent	Per cent male cases
Major cities	13,076	6,741	19,817	61	66
Inner regional	4,796	2,261	7,057	22	68
Outer regional	2,804	1,074	3,878	12	72
Remote	569	235	804	2	71
Very remote	328	195	523	2	63
Total^(a)	21,855	10,688	32,543		67

(a) Total includes cases for which ASGC remoteness area of residence was not reported (males = 282, females = 182).

Table 3.11: Age-standardised serious injury rates by remoteness area of residence for road vehicle traffic crashes, Australia, 2007–08

ASGC remoteness area of residence	Age-standardised rate per 100,000 population (95% CI ^(a))		
	Males	Females	Persons
Major cities	179 (176–182)	90 (88–92)	134 (132–136)
Inner regional	240 (234–247)	110 (105–115)	176 (171–180)
Outer regional	288 (277–299)	113 (106–120)	203 (197–210)
Remote	349 (320–378)	160 (140–181)	259 (241–277)
Very remote	368 (327–409)	244 (208–279)	307 (280–335)

(a) Confidence intervals are provided to show by about how much rates might be expected to vary (between years, for example) in view of the number of cases. See the Data issues section of this report for further information.



Length of stay in hospital

Length of stay provides an approximate indication of case severity, that is, severe injuries are more likely to result in longer episodes of care than minor injuries. The mean length of stay in hospital for persons seriously injured in road vehicle traffic crashes was 4.8 days. Mean length of stay rose with age (Figure 3.9). For the 8,392 persons with serious injuries that posed a high threat to life, the mean length of stay in hospital (11.4 days) was more than double that of seriously injured persons who did not meet the criteria for high threat to life and was greater across all age groups (Figure 3.10). A small number of cases with exceptionally long lengths of stay were excluded when calculating mean lengths of stay in order to prevent misleading values. Refer to the Data issues section of the report for details on how mean length of stay is calculated.

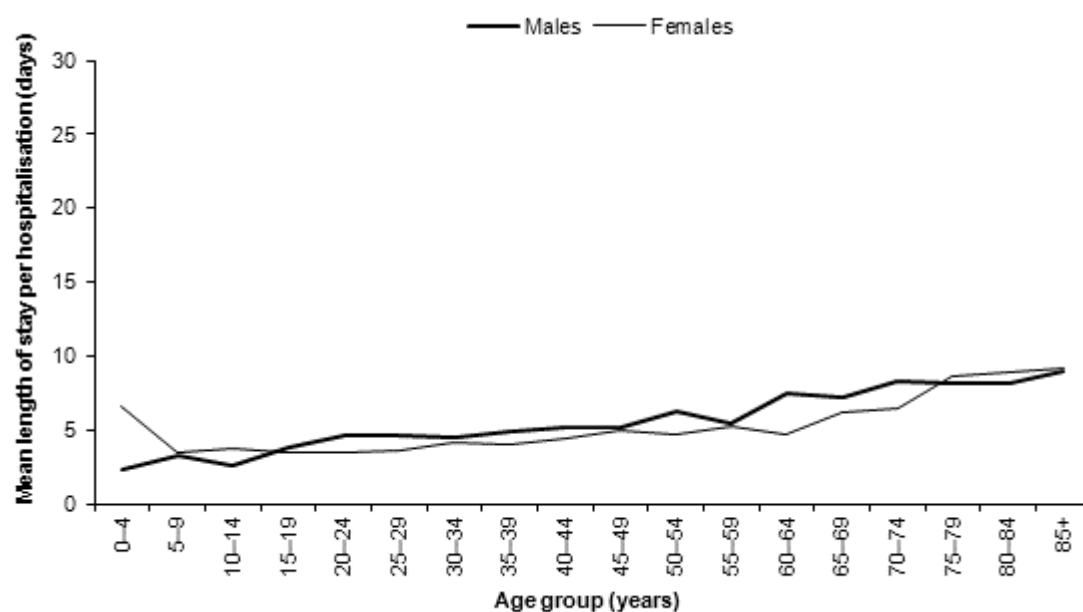


Figure 3.9: Road vehicle traffic crashes – mean length of stay in hospital for serious injury by age and sex, Australia, 2007-08

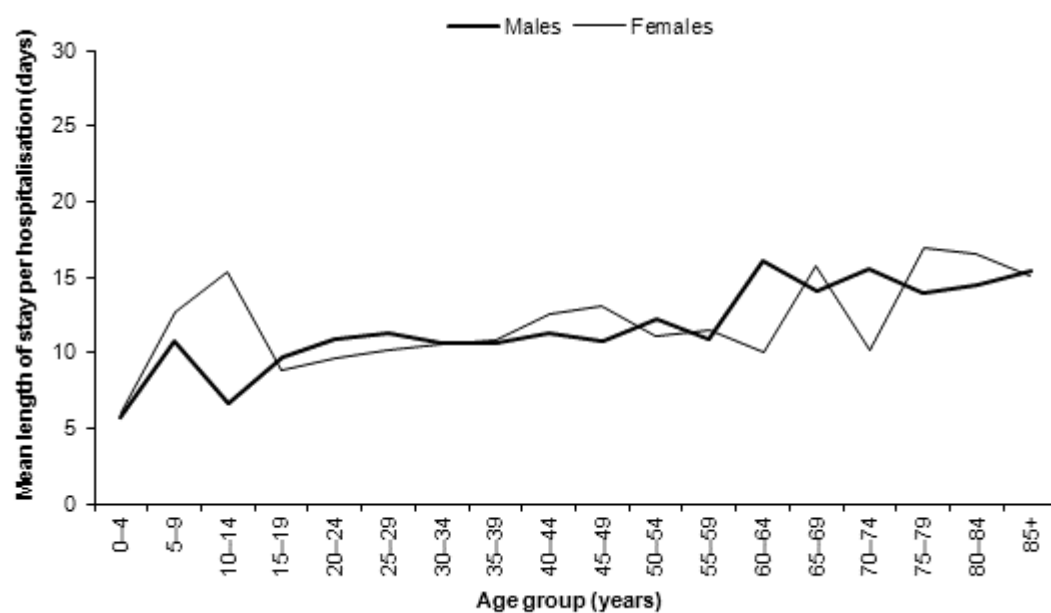


Figure 3.10: Serious injury with a high threat to life – mean length of stay in hospital for road vehicle traffic crashes by age and sex, Australia, 2007-08

Length of stay in hospital by road user group

Among persons seriously injured due to road vehicle traffic crashes, pedestrians had the longest episodes of care, with a mean length of stay of 7.6 days in hospital. The mean length of stay in hospital was 5.1 days for motorcyclists, 5.0 days for car passengers, 4.7 days for car drivers and 2.9 days for pedal cyclists. Mean length of stay generally increased with age in most age groups (Figure 3.11).

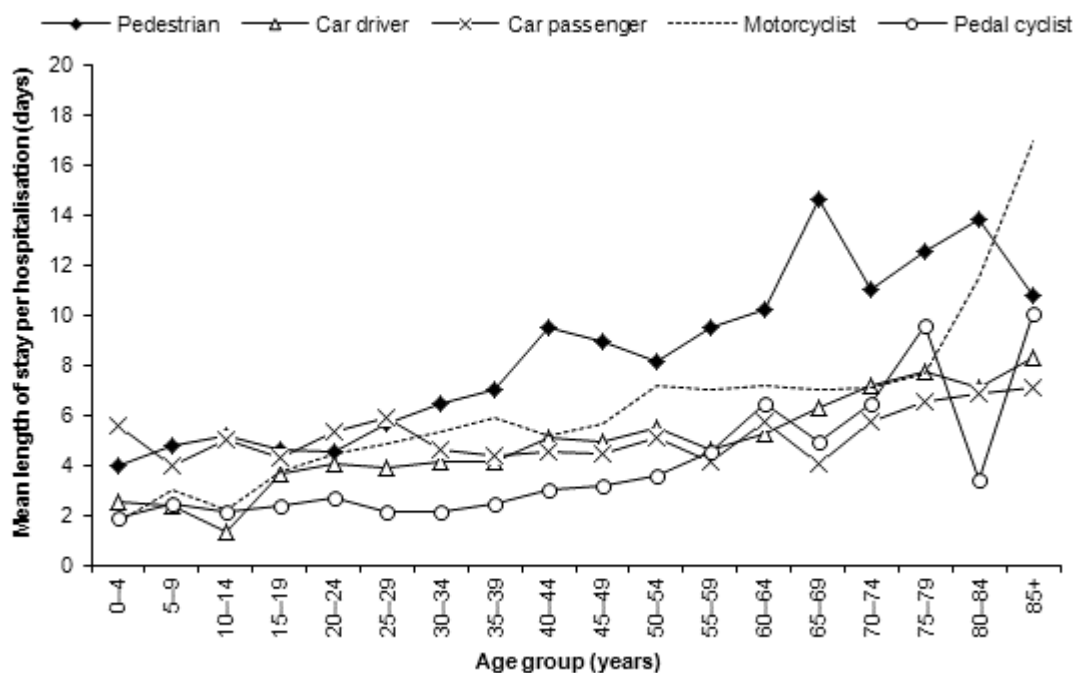


Figure 3.11: Road vehicle traffic crashes – mean length of stay in hospital for serious injury by road user group, Australia, 2007–08

Body part injured

The body region injured in road vehicle traffic crashes where those injured were hospitalised and classified as seriously injured differed according to road user group (Table 3.12). The head was the most commonly injured body region among car occupants and pedestrians while injuries to the shoulder and upper limb were most commonly observed among motorcyclists and pedal cyclists. Injuries to the thorax were also prominent among car occupants while injuries to the lower limbs were also prominent among pedestrians and motorcyclists. The head was the second most commonly injured body region among pedal cyclists.

Table 3.12: Case counts and proportions by body region for serious injury due to road vehicle traffic crashes, Australia, 2007–08

Body region injured	Pedestrian		Car occupant ^(a)		Car driver		Car passenger		Motorcyclist		Pedal cyclist	
	Count	Per cent	Count	Per cent	Count	Per cent	Count	Per cent	Count	Per cent	Count	Per cent
Head	857	31.4	3,889	24.6	2,448	24.7	1,181	24.5	751	10.0	1,124	23.3
Neck	88	3.2	2,622	16.6	1,800	18.2	689	14.3	214	2.8	135	2.8
Thorax	130	4.8	2,898	18.3	1,873	18.9	910	18.9	576	7.7	215	4.5
Abdomen, lower back, lumbar spine and pelvis	272	10.0	2,126	13.5	1,193	12.0	829	17.2	569	7.6	287	6.0
Shoulder and upper limb	387	14.2	2,222	14.1	1,304	13.2	669	13.9	2,654	35.3	2,154	44.7
Hip and thigh	183	6.7	429	2.7	246	2.5	149	3.1	389	5.2	229	4.8
Lower limb	776	28.4	1,308	8.3	868	8.8	315	6.5	2,171	28.9	631	13.1
Other injuries not specified by body region	37	1.4	301	1.9	174	1.8	78	1.6	200	2.7	39	0.8
Total	2,730	100.0	15,795	100.0	9,906	100.0	4,820	100.0	7,524	100.0	4,814	100.0

(a) Includes 1,069 cases where the position of the person in the car is unspecified.

Notes

1. Shading denotes the 2 highest figures for a column.
2. The 'body region injured' is the principal diagnosis recorded by the hospital as chiefly responsible for occasioning an episode of admitted patient care, i.e. a person might have suffered other injuries as well. Information on precisely how injuries were sustained, e.g. the role of vehicle features, is not available from the data sources used for this report.

Length of stay in hospital by body part injured

Persons with hip and thigh injuries had the longest episodes of care, with a mean length of stay in hospital of 8.8 days (Figure 3.12). A small number of cases with exceptionally long lengths of stay were excluded when calculating mean lengths of stay in order to prevent misleading outcomes. Length of stay in hospital tended to be higher for older age groups.

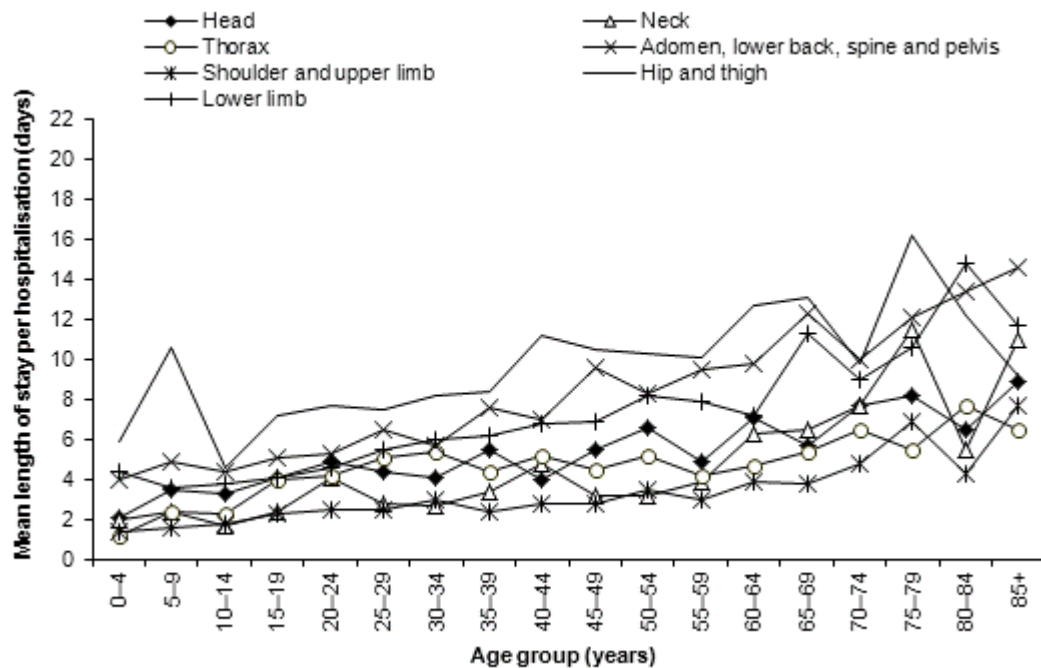


Figure 3.12: Mean length of stay in hospital for serious injury by body part injured, Australia, 2007-08

Injuries to the head accounted for almost one-quarter of all patient days for car occupants who were seriously injured (Table 3.13). For motorcyclists, injuries to the lower limbs accounted for over 30% of all patient days, while for pedal cyclists, injuries to the shoulder and upper limbs accounted for over one-quarter (27%) of all patient days. In terms of patient days, head injuries were prominent among pedestrians and pedal cyclists, while injuries in the abdominal region were also prominent among car occupants. Injuries to the shoulder and upper limbs were notable among motorcyclists.

Nearly two-thirds (62%) of patient days in hospital were due to five types of road vehicle traffic crashes (Table 3.14). Three of these five types of crashes involved car occupants injured in collisions with a:

- car, pick-up truck or van
- fixed or stationary object
- non-collision transport accident.

Table 3.13: Road vehicle traffic crashes – patient days in hospital for serious injury by body region, Australia, 2007–08

Body part injured	Pedestrian		Car occupant ^(a)		Car driver		Car passenger		Motor cyclist		Pedal cyclist	
	Patient days	Per cent	Patient days	Per cent	Patient days	Per cent	Patient days	Per cent	Patient days	Per cent	Patient days	Per cent
Head	5,489	26.4	18,857	25.1	11,914	25.5	5,935	24.8	4,550	11.9	3,014	21.6
Neck	504	2.4	9,672	12.9	6,044	13.0	3,189	13.3	1,291	3.4	817	5.9
Thorax	913	4.4	12,823	17.1	8,294	17.8	3,780	15.8	3,975	10.4	972	7.0
Abdomen, lower back, lumbar spine and pelvis	3,012	14.5	12,960	17.2	7,157	15.3	5,054	21.1	5,174	13.5	1,667	11.9
Shoulder and upper limb	1,976	9.5	7,771	10.3	4,443	9.5	2,580	10.8	6,573	17.2	3,792	27.2
Hip and thigh	2,201	10.6	3,936	5.2	2,417	5.2	1,289	5.4	3,448	9.0	1,058	7.6
Lower limb	6,530	31.4	8,286	11.0	5,892	12.6	1,824	7.6	12,149	31.8	2,512	18.0
Other injuries not specified by body region	158	0.8	851	1.1	491	1.1	296	1.2	1,098	2.9	132	0.9
Total	20,783	100.0	75,156	100.0	46,652	100.0	23,947	100.0	38,258	100.0	13,964	100.0

(a) Includes 4,557 patient days for which the position of the person in the car is unspecified, in addition to cases specified as car driver or car passenger.

Notes

1. Shading denotes the 2 highest figures for a road user group.
2. The 'body region injured' is the principal diagnosis recorded by the hospital as *chiefly* responsible for occasioning an episode of admitted patient care, i.e. a person might have suffered other injuries as well. Information on precisely how injuries were sustained, e.g. the role of vehicle features, is not available from the data sources used for this report.

Table 3.14: Road vehicle traffic crashes – patient days in hospital by seriously injured person’s vehicle and the counterpart in the collision, Australia, 2007–08

Seriously injured person	Counterpart in collision										Total
	Car, pick-up truck or van	2- or 3-wheeled motor vehicle	Pedal cycle	Pedestrian or animal	Heavy transport vehicle or bus	Train	Other non-motor vehicle	Fixed or stationary object	Non-collision transport accident ^(a)	Other and unspecified transport accidents	
Car occupant	29,518	144	n.p.	713	4,111	63	n.p.	22,212	14,335	4,007	75,156
Motorcyclist	12,935	711	10	565	842	0	89	5,089	11,454	6,563	38,258
Pedal cyclist	4,314	21	470	123	202	27	7	856	4,561	3,383	13,964
Pedestrian	17,860	505	186	41	1,101	147	44	0	0	899	20,783
Pick-up truck or van occupant	317	n.p.	0	n.p.	106	n.p.	n.p.	422	364	74	1,290
Heavy transport vehicle occupant	371	n.p.	n.p.	46	267	31	n.p.	361	890	308	2,276
Bus occupant	165	0	0	19	46	15	0	90	452	256	1,043
Occupant of special all-terrain or off-road vehicle	0	0	0	0	0	0	0	0	0	388	388
Occupant of three-wheeled motor vehicle	144	n.p.	0	n.p.	0	n.p.	n.p.	0	30	42	220
Occupant of a tram	0	0	0	0	0	0	0	0	0	17	17
Occupant of a train	0	0	0	0	0	0	0	0	0	43	43
Occupant of special agricultural or industrial or construction vehicle	0	0	0	0	0	0	0	0	0	331	331
Unknown	0	0	0	0	0	0	0	0	190	1,831	2,021
Total	65,624	1,386	670	1,511	6,675	284	192	29,030	32,276	18,142	155,790

(a) Includes non-collision accidents such as overturning, falling or being thrown from a vehicle.

Notes

1. Shading denotes the 5 highest figures in the table.
2. A 'special all-terrain or off-road motor vehicle' refers only to such vehicles that are not registrable for on-road use and does not include registrable 4WD passenger vehicles, which are included under 'car occupants'.

Appendix 1: Data issues

Source of case data

National hospital separations data were sourced from the Australian Institute of Health and Welfare (AIHW) National Hospital Morbidity Database (NHMD). A 'separation' is a term used in Australian hospitals to refer to a formal, or statistical process, by which an episode of care for an admitted patient ceases (AIHW 2010). An 'episode of care' is a period of health care characterised by only one care type. For the lay person, this is perhaps best understood as a stay in a particular ward in a hospital. For example, a person who is in an acute care ward and is then transferred to a rehabilitation ward will have undergone two episodes of care and hence two separations within the hospital.

Land transport accidents

Hospital cases were defined as being due to a land transport accident if they contained a first reported ICD-10-AM Chapter 20 external cause code in the range V01–V89. Cases with a Principal diagnosis other than injury and cases in which land transportation only appears as an additional external cause code were excluded on the grounds that injury due to a land transport accident was not recorded as being the main reason for admission to hospital (Table A1), resulting in a starting file of 57,132 records.

Table A1: Selection criteria for hospital records of land transport injury

Records occurring from 1 July 2007 to 30 June 2008	Persons
Records with an ICD-10-AM 'Land Transport Accident' code (V01–V89) as external cause anywhere in the record ^(a)	66,484
Records with a 'Land Transport Accident' as first reported external cause ^(b)	65,920
Injury as a Principal diagnosis (S00–T98)	57,132

- (a) There were 564 records with a first reported external cause code of another type of injury (e.g. complications of surgical and medical care, other unintentional injuries, falls, intentional self-harm etc.) but a 2nd or subsequent external cause code indicating a land transport accident.
- (b) There were 8,191 cases with a first reported external cause code indicating a land transport accident but a Principal diagnosis outside of the injury range (S00–T98). The most common Principal diagnoses were care involving use of rehabilitation procedure, unspecified (Z50.9, $n = 4,321$), examination and observation following transport accident (Z04.1, $n = 864$), cellulitis of lower limb (L03.11, $n = 193$), other specified orthopaedic follow-up care (Z47.8, $n = 183$), other specified surgical follow-up care (Z48.8, $n = 181$), and examination and observation following other accident (Z04.3, $n = 150$).

Road Vehicle Traffic Crashes

Hospital cases were defined as being due to road vehicle traffic crashes if they contained a Principal diagnosis in the range S00–T98 and a first reported external cause code of: V00–V06.[1], V09.2, V09.3, V10–V18.[4,5,9], V19.[4,5,6,9], V20–V28.[4,5,9], V29.[4,5,6,9], V30–V38.[5,6,7,9], V39.[4,5,6,9], V40–V48.[5,6,7,9], V49.[4,5,6,9], V50–V58.[5,6,7,9], V59.[4,5,6,9], V60–V68.[5,6,7,9], V69.[4,5,6,9], V70–V78.[5,6,7,9], V79.[4,5,6,9], V81.1, V82.1, V82.9, V83–V86.[0,1,2,3], V87, V89.2, V89.3.

Key: In the list shown above, V00–V06.[1] includes all cases where the first reported external cause code is in the range V00 to V06 and having a fourth character of 1.

Serious injury

'Seriously injured' is defined for this report as an injury which results in the person being admitted to hospital, and subsequently discharged alive either on the same day or after staying for one or more nights in a hospital bed (i.e. deaths in hospital are excluded). As discharge from hospital can include transfer to home, to another acute care hospital and to another form of care (e.g. rehabilitation), a method has been used in this report to reduce over-counting of injury cases by omitting separations in which the mode of admission is recorded as being by transfer from another acute-care hospital, on the grounds that such cases are likely to result in two or more separation records for the same injury.

Records that met the following criteria are included in this report:

- Australian hospital separations occurring 1 July 2007 to 30 June 2008, coded according to the fifth edition of ICD-10-AM (NCCH 2006)
- Principal diagnosis in the ICD-10-AM range S00-T98 using Chapter 19 Injury, poisoning and certain other consequences of external causes codes
- first (left-most) external cause of injury or poisoning in ICD-10-AM range V01-V89 (i.e. the 'Land transport accidents' section of Chapter 20 External causes of morbidity and mortality)
- mode of admission has any value except the one indicating that transfer from another acute-care hospital has occurred
- mode of separation has any value except the one indicating that the person died while in hospital.

The calculation of land transport accidents as a percentage of all hospital separations and the calculation of total patient days (including same day, which are assigned a stay of one day) included all separations (i.e. not omitting separations in which the mode of admission is recorded as being by transfer from another acute-care hospital or separations in which the person died in hospital).

Serious injury with a high threat to life

'High threat to life' serious injury cases are selected on the basis of having an ICISS of less than 0.941. ICISS is a measure of injury severity based upon a patient's injury diagnoses. The ICISS measure for this report is based upon ICD-10-AM coding and was derived using Australian hospital separations data (Stephenson et al. 2004). ICISS involves calculating a Survival Risk Ratio (SRR), i.e. the probability of survival, for each individual injury diagnosis code as the ratio of the number of patients with that injury code who have not died to the total number of patients diagnosed with that code. Thus, a given SRR approximates the likelihood that a patient will survive a particular injury. Each patient's ICISS score (survival probability) is then the product of the probabilities of surviving each of their injuries individually. This may be a single SRR, as in the case of a patient with a single injury, or it may be multiple SRRs, as in the case of a patient with multiple injuries. Hence a patient's ICISS score can vary from 0 (most severe) to 1 (least severe). Methods used to calculate ICISS scores for this report were similar to those discussed in the previous report in this series (Henley & Harrison 2009).

Population and other denominators

With the exception of Table 3.5, all rates in this report were calculated using, as the denominator, the final estimate of the estimated resident population as at 31 December in the relevant year (e.g. 31 December 2007 for 2007–08 data). The rates in Table 3.5 were calculated using, as the denominator, the number of each vehicle type registered by state and territory sourced from the Australian Bureau of Statistics Motor Vehicle Census (ABS 2009). Direct standardisation was used to age-standardise rates, using the Australian population in 2001 as the standard (ABS 2003). Note that it is a convention of the ABS and AIHW to change the standard reference population only once a decade.

Age-standardised rates and 95% confidence intervals were calculated in Stata version 12.0 statistical software (StataCorp 2011) using the `-dstdize-` command. For further information on how jurisdiction is defined, see page 24.

Quantifying variability in the counts presented in this report

The data presented in this report are subject to two types of statistical error, non-random and random. (A third type of statistical error, sampling error, does not apply here because none of the data sources used involved probability sampling.)

Non-random error: Some amount of non-random error is to be expected in administrative data collections such as the hospital inpatient data on which this report relies. For example, non-random error could occur if the approach to assigning cause codes to cases were to differ systematically between jurisdictions or over time. Systems are in place to encourage uniform data collection and coding and scrutiny of data during analysis includes checking for patterns that might reflect non-random error. Nevertheless, some non-random error is likely to remain. Identified or suspected non-random errors large enough to materially affect findings are mentioned in reports.

Random error: The values presented in the report are subject to random error, or variation. Variation is relatively large when the case count is small (especially if less than about 10) and small enough to be unimportant in most circumstances when the case count is larger (i.e. more than a few tens of cases).

Some of the topics for which results are reported compare groups that vary widely in case count, largely due to differences in population size (e.g. the population of NSW is more than 30 times as large as the NT population and the *Major cities* zone population is nearly 90 times as large as that of the *Very remote* zone). In this situation, year-to-year changes in counts or rates for the smaller-population groups may be subject to large random variation. There is potential to misinterpret such fluctuations as meaningful rises or falls in occurrence.

In this situation, and similar ones, guidance is provided to readers concerning how much variation of values can be expected due to random variation of small counts. Confidence intervals (CIs) are calculated for this purpose. In this report CIs were calculated using the Stata `-dstdize-` command (CIs around single estimates) (StataCorp 2011).

Confidence intervals

The AIHW is currently undertaking a review to assess the provision of confidence intervals and statistical tests when data arise from sources that provide information on all subjects, rather than from a sample survey. This review will include analysis of the methods used to calculate confidence intervals, as well as the appropriateness of reporting confidence

intervals and undertaking statistical testing for such data. This review aims to ensure that statistical methods used in AIHW reports remain robust and appropriately inform understanding and decision making. As a consequence, the type of information reported in future editions of this publication may change.

Calculation of mean length of stay in hospital

Mean length of stay in hospital was calculated by dividing the total number of patient days for all hospital separations in 2007–08 where admission was as a result of a land transport accident by the estimated number serious injury cases resulting from a land transport accident. The estimated number of serious injury cases is calculated by excluding cases transferred from another acute hospital and cases where death occurred in hospital. These exclusions are done in order to prevent double counting of cases (i.e. where a patient may have two or more hospital separations relating to the same injury).

Classification of remoteness area

Remoteness area in this report refers to the place of usual residence of the person who was admitted to hospital. The remoteness areas were specified according to the ABS Australian Standard Geographical Classification (ASGC) (ABS 2010). Remoteness is defined in a manner based on the Accessibility/Remoteness Index of Australia (ARIA), which was developed for the Australian Government Department of Health and Ageing by the National Centre for Social Applications of Geographic Information Systems, Adelaide University. According to this method, remoteness is an index applicable to any point in Australia, based on road distance from urban centres of five sizes. The ABS has provided tables that specify the proportion of the population of each Statistical Local Area (SLA) in Australia whose place of residence is in each of five segments of the remoteness index. These segments are:

- *Major cities*, with ARIA index value of 0 to 0.2
- *Inner regional*, with ARIA index value of >0.2 and ≤2.4
- *Outer regional*, with ARIA index value of >2.4 and ≤5.92
- *Remote*, with ARIA index value of >5.92 and ≤10.53
- *Very remote*, with average ARIA index value of >10.53.

These tables were used to assign records to the five areas, on the basis of the SLA of usual residence of the person.

Most SLAs lie entirely within one of the five areas. If this was so for all SLAs, then each record could simply be assigned to the area in which its SLA lies. However, some SLAs overlap two or more of the areas. Records with these SLAs were assigned to remoteness areas in proportion to the area-specific distribution of the resident population of the SLA according to the 2001 census. For hospitalisations, each record in the set having a particular SLA code was assigned to one or other of the areas probabilistically, in proportion to the resident population of that SLA. The resulting values are integers.

The hospital datasets used for this report do not contain information on the crash location and it is therefore not possible to determine with certainty if the crash occurred in the remoteness area of residence of the person injured. Remoteness area of residence is nonetheless a useful classification in itself and an indicator of crash location if it can be assumed that most crashes in which people are seriously injured occur in the vicinity of where they live. The DIT estimates, based on 2000 to 2003 data, that around 30% of operators (drivers, motorcyclists and cyclists) or persons killed in fatal road crashes are involved in

crashes within their postcode of residence and a further 50% or more are involved in a fatal road crash within 100 kilometres of the centroid of their postcode of residence (but not within their postcode of residence). It is likely that non-fatal crashes in which people are seriously injured follow a similar pattern.

Suppression of small cell counts in tables

Cell counts in tables that are four cases or fewer have been suppressed as have rates derived from them, to protect confidentiality and because values based on very small numbers are sometimes difficult to interpret. In the instances where only one cell in a row or column has a count of four or less, counts of one or more other cells in the same row or column have generally also been suppressed. The abbreviation 'n.p.' has been used in these tables to denote these suppressions. For these tables, the totals include the suppressed information.

Comparability with other reports

Australian hospitals use an Australian clinical modification of the international standard classification called the International Statistical Classification of Diseases (ICD) when reporting data on persons injured and subsequently admitted to hospital (morbidity data). ICD provides a nationally consistent basis for looking at morbidity due to transport accidents of all kinds (road, rail, water and air). However, it is not necessarily consistent with the approach taken by the DIT or others in looking at safety in each transport mode individually. For example, road safety statistics compiled by the DIT are focused on crashes on public roads, whereas ICD covers road crashes both on and off public roads.

Serious injury data series published previously by the DIT for the period 1999–00 to 2002–03 excluded same-day separations from the definition of serious injury. The previously published reports for the periods 2003–04 (Berry & Harrison 2007), 2005–06 (Berry & Harrison 2008) and 2006–07 (Henley & Harrison 2009) and the current report include same-day separations in the figures. This effectively means the threshold for serious injury is now 'admitted to hospital', regardless of the length of stay. In 2007–08, same-day separations accounted for almost one-third of non-fatal transport injury. It has been found that persons with injuries that pose a high threat to life can still be admitted to and discharged from hospital to a place of usual residence on the same day. In 2007–08, for example, there were over 750 such transport injury cases.

The 1999–00 to 2002–03 data series also focused only on serious injury in traffic or accidents on public roads whereas the reports for the periods 2003–04 (Berry & Harrison 2007), 2005–06 (Berry & Harrison 2008) and 2006–07 (Henley & Harrison 2009) and the current report have broadened the scope to include non-traffic or off-road accidents in part of the report (Chapter 2), further increasing the overall figures above those previously reported.

For national road deaths, readers should refer to the 'road statistics' part of the Bureau of Infrastructure and Regional Economics website at <www.bitre.gov.au>, where road death statistics are published on a monthly basis. For details on marine, rail and air safety (aviation death statistics are published monthly), the Australian Transport Safety Bureau website should be consulted at <www.atsb.gov.au>.

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