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Serious injury due to land transport accidents, Australia, 2003–04

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Flinders UNIVERSITY

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Abbreviations

ABS	Australian Bureau of Statistics
AIHW	Australian Institute of Health and Welfare
ARIA	Accessibility/Remoteness Index of Australia
ARIA	Australian Standard Geographical Classification
ATSB	Australian Transport Safety Bureau
GISCA	National Key Centre for Social Applications of Geographic Information Systems
ICD	International Classification of Diseases
ICD-10-AM	International Classification of Diseases, 10th Revision, Australian Modification
ICISS	ICD-based Injury Severity Score
LOS	Length of Stay
SLA	Statistical Local Area
NHMD	National Hospital Morbidity Database

1 Introduction

Transport accidents are a leading cause of injury, both fatal and non-fatal. The primary purpose of this publication is to provide a broad overview of serious injury due to land transport accidents in Australia in the one-year period 2003–04 (Table 1.1), the latest year for which data are available. The main focus is on accidents involving road vehicles travelling on public roads (called travelling in 'traffic'). Road vehicles include motor vehicles, pedal cycles and other road vehicles such as trams, animals or animal-drawn vehicles (when they travel on the road).

Table 1.1: Land transport injury, Australia, 2003–04

Seriously injured†	Males	Females	Persons
Road traffic crashes	18,846	9,934	28,782[(a)]
Non-traffic crashes	10,453	2,384	12,837
Unspecified as to whether traffic or non-traffic	2,571	2,672	5,243
Total	**31,870**	**14,990**	**46,862[(a)]**

† In this report 'seriously injured' means admitted to hospital due to injury (see Data Issues 'Serious injury', p. 43)
(a) Includes cases where sex is missing or indeterminate.

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 one or more nights stay in a hospital bed (i.e. deaths are excluded).

This report presents estimates of the numbers of persons seriously injured in Australia due to land transport accidents, including road traffic crashes, in the one-year period of 2003–04. Trends in injury rates in road traffic crashes are examined over a five-year period, 1999–00 to 2003–04. 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'.

2 Main findings

Land transport injury

This report looks at serious injury in Australia due to land transport accidents in the one-year period 2003–04. *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 one or more nights stay in a hospital bed (i.e. deaths are excluded). The main findings of the report are that:

- Land transport accidents accounted for 0.8% of all hospital separations in Australia and 11.6% of all injury-related hospital separations.
- There were 214,484 land transport-related patient days in hospital, 0.9% of total patient days in Australia and 11.6% of all injury-related patient days. The mean length of stay for the 46,862 persons hospitalised due to a land transport accident was 4.6 days.
- On a population basis, the age-standardised rate of serious injury was 235 admissions to hospital per 100,000 population. Males had 2.1 times the rate of serious injury in transport accidents of females, 320 per 100,000 population compared with 149 per 100,000 population.
- The Northern Territory had the highest rate of serious injury due to land transport accidents (326 per 100,000 population).
- Over half (53%) 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 a quarter (27%) of all land transport-related serious injury cases.
- Seven types of land transport accidents accounted for over half (52.8%) of all serious injury cases. They were 1) a car occupant injured on a public road in a collision with a car, pick-up truck or van (15.9%), 2) a car occupant injured on a public road in a collision with a fixed or stationary object (7.9%), 3) a motorcyclist injured off-road in a non-collision transport accident (7.0%), 4) a pedal cyclist injured off-road in a non-collision transport accident (6.3%), 5) a car occupant injured on a public road in a non-collision transport accident (5.8%), 6) an animal rider or occupant of an animal-drawn vehicle injured in a non-collision transport accident (unspecified location) (5.2%), and 7) a pedestrian injured on a public road in a collision with a car, pick-up truck or van (4.7%).
- Nearly two-thirds (61%) of serious injury cases due to land transport accidents were road vehicle traffic crashes.

Road vehicle traffic crashes

Focusing on road vehicle traffic crashes, i.e. those involving a motor vehicle, pedal cycle, ridden animal or animal-drawn vehicle on a public road, it was observed that:

- Road vehicle traffic crashes accounted for 0.5% of all hospital separations in Australia and 7.1% of all injury-related hospital separations.
- There were 148,524 patient days in hospital attributable to road vehicle traffic crashes, 0.6% of total patient days in Australia and 8.0% of all injury-related patient days. The mean length of stay for the 28,782 persons hospitalised due to a road vehicle traffic crash was 5.2 days.
- On a population basis, the age-standardised rate of serious injury was 144 admissions to hospital per 100,000 population. Males had 1.9 times the rate of serious injury in road vehicle traffic crashes of females, 190 per 100,000 population compared with 99 per 100,000 population.
- The burden of injury due to road vehicle traffic crashes was mainly among those of 'working age'. Eighty per cent of persons seriously injured were aged 15–64 years.
- For males, the four most frequently injured road user groups were, in order, car drivers, motorcyclists, pedal cyclists and car passengers. For females, the most frequently injured road users were car drivers, car passengers, pedestrians and pedal cyclists. Male rates of serious injury in road vehicle traffic crashes exceeded female rates due to much higher rates involving motorcycles and pedal cycles, and higher rates involving cars.
- Over a quarter (26.6%) of serious injury cases due to road vehicle traffic crashes represented a high threat to life. The proportion of pedestrians with injuries that posed a high threat to life (37.2%) was higher than for all other modes of transport. Pedestrians had the longest episodes of care, with a mean length of stay of 8.8 days in hospital.
- Over three-quarters of the persons seriously injured resided in the three most populous jurisdictions; nearly a third (32.1%) of the cases of persons seriously injured resided in New South Wales, over a quarter resided in Victoria (27.2%) and 18.7% resided in Queensland.
- The rate of serious injury in terms of vehicle kilometres travelled for motorcyclists was thirty-four times that for car occupants (364 motorcyclists compared to 11 car occupants were seriously injured per 100 million vehicle kilometres travelled). The rate of serious injury was lower for bus occupants than for car occupants (8 bus occupants were seriously injured per 100 million vehicle kilometres travelled) though a comparison of rates on a passenger-kilometre basis would show an even lower rate for buses relative to cars. Occupants of heavy transport vehicles had a lower rate of serious injury compared with car occupants (3 seriously injured per 100 million vehicle kilometres travelled).
- On a population basis, age-standardised rates of serious injury in road vehicle traffic crashes increased according to remoteness of usual residence from an urban centre though the majority (82.2%) of persons seriously injured resided in major cities and inner regional areas.

- On a population basis, serious injury rates for car occupants exceeded the national rate in the Northern Territory, South Australia and Victoria. Motorcyclists had serious injury rates above the national rate in the Northern Territory and Queensland. Pedestrians in the Northern Territory and New South Wales, and pedal cyclists in Victoria had serious injury rates that exceeded the national rate.
- Head injuries and lower limb injuries were the most common injuries for seriously injured pedestrians. Head and thorax injuries were the most common injuries for car drivers and car passengers. Lower limb injuries and injuries of the shoulder and upper limb were the most common injuries for motorcyclists. Shoulder and upper limb and head injuries were the most common injuries for pedal cyclists.
- The age-standardised rate of serious injury due to road vehicle traffic crashes fluctuated over the five year period from 1999–00 to 2003–04. Although rates for males (and persons overall) in 2001–02 and 2003–04 were significantly higher than for other years, there did not appear to be any increasing or decreasing trend over time in the rate of total hospitalisation due to road vehicle traffic crashes.
- The age-standardised rate of serious injury due to road vehicle traffic crashes for injuries with a high threat to life declined over the five year period, from 42 per 100,000 in 1999–00 to 38 per 100,000 in 2003–04.

3 Serious injury due to land transport in 2003–04

This section examines non-fatal injury due to road and rail transport. Road and rail transport includes traffic (occurring on a public road), non-traffic and unspecified as to whether traffic or non-traffic. This definition of land transport injury excludes injury recorded as being due to intentional self harm, assault or undetermined intent. A broad overview of non-fatal injury due to all forms of transport, that is, road, railway, water and air transport can be found in another publication in this series entitled 'Serious injury due to transport, Australia, 2003–04'.

In the one-year period 2003–04, there were a total of 6,841,192 hospital separations from public, private and psychiatric hospitals in Australia corresponding to a total of 23,583,213 patient days (AIHW 2005). Land transport accidents accounted for 0.8% of these separations and 11.6% of all injury-related hospital separations (Table 3.1).

During 2003–04, there were 1,845,452 injury-related patient days in hospital, with a mean length of stay of 4.5 days. There were 214,484 land transport–related patient days, with a mean length of stay of 4.6 days, which accounted for 0.9% of all patient days in Australia and 11.6% of all injury-related patient days.

The number of persons seriously injured is shown in Table 3.1 and is estimated by omitting inward transfers from one hospital to another. In 33% of serious injury cases, the injured person was discharged on the same day as they were admitted (33% for traffic and 32% for non-traffic). Nearly two-thirds (61%) of serious injury cases due to land transport accidents occurred in traffic conditions, that is, they were road vehicle traffic crashes (see Section 4).

The age-standardised rate of land transport serious injury was 235 admissions to hospital per 100,000 population. The male: female age-standardised rate ratio was 2.1:1.0, indicating that, after accounting for any difference in age composition, twice as many males as females were hospitalised as a result of land transport injury, 320 per 100,000 population compared with 149 per 100,000 population. Males accounted for over two-thirds (68%) of persons seriously injured in land transport accidents in 2003–04.

Table 3.1: Key indicators for serious land transport injury, Australia, 2003–04

Indicator	Males	Females	Persons*		
			Traffic	Non-traffic	Total§
Seriously injured† [a]					
Persons admitted to hospital [b]	31,870	14,990	28,782	12,837	46,862
Percentage of all hospital separations	1.1	0.5	0.5	0.2	0.8
Percentage of all hospital separations due to injury	14.0	8.5	7.1	3.2	11.6
Same day hospitalisations	10,171	5,099	9,543	4,045	15,271
Mean length of stay in hospital (days)‡	4.6	4.6	5.2	3.6	4.6
Total patient days (including same day and deaths in hospital)	145,021	69,461	148,524	45,812	214,484
Crude rate/100,000 population**	320.9	149.2	144.0	64.2	234.5
Age-standardised rate/100,000 population***	320.1	149.4	144.3	64.8	235.4

† Includes cases where Principal Diagnosis was coded to ICD-10-AM S00–T98.
* Includes cases where sex is missing or indeterminate.
§ This includes 5,243 hospital cases where it is unspecified as to whether the crash occurred in traffic or non-traffic conditions.
** Using population denominators in December 2003.
*** Adjusted by direct standardisation to the Australian population in June 2001.
‡ This is the average number of days a person is likely to stay in hospital when seriously injured.

Nationally, the rates of serious injury due to land transport accidents were high at ages 15–24 years (484 per 100,000 among 15–19 years and 431 per 100,000 among 20–24 years) (Table 3.2). In each jurisdiction, the highest rates of serious injury occurred at ages 15–24 years.

The Northern Territory had the highest age-standardised rate of serious injury due to land transport accidents (326 per 100,000 population) and the Australian Capital Territory had the lowest rate (177 per 100,000 population). Of the 677 persons seriously injured in the Northern Territory, 201 (29.7%) were Aboriginal and Torres Strait Islanders. The rates of fatal and non-fatal injury due to transport accidents are higher for Aboriginal and Torres Strait Islander Australians than for non-Indigenous Australians. For more information on this topic, see another publication in this series entitled 'Injury of Aboriginal and Torres Strait Islander people due to transport, 1999–00 to 2003–04'.

Over half (53%; n=24,955) 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 a quarter (27%) of all land transport-related serious injury cases (Table 3.3).

(a) The term *seriously injured* and *hospitalisation* are used interchangeably and represent a person being admitted to hospital for injury and subsequently discharged alive, either on the same day or after one or more nights stay in a hospital bed (i.e. deaths are excluded). Discharge from hospital can include transfer to home, to another acute care hospital and to another form of care (e.g. rehabilitation). In this report, a method has been used 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.

(b) In total, there were 52,268 admissions to hospital for transport injury for an estimated 47,238 persons, of whom 376 (0.8%) died while in hospital. These deaths are probably included in estimates of fatal transport injuries 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 includes separations in which the person died in hospital.

Table 3.2: Land transport—age-specific rates of serious injury per 100,000 population by state and territory of residence, Australia, 2003–04

State and territory	Age group (years)																	All ages (crude)	Age Std*
	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+	
Seriously injured																			
NSW	68.0	178.1	324.8	467.1	388.1	301.6	252.8	222.8	185.4	174.5	155.5	143.5	128.6	143.6	154.0	174.6	195.5	168.7	224.7	226.3
Vic	55.6	142.9	303.0	455.1	439.1	345.1	281.7	243.1	209.2	204.5	179.5	161.4	151.1	150.5	158.6	169.9	219.0	169.1	238.7	239.0
Qld	84.8	228.3	411.7	529.1	459.2	336.3	272.3	224.3	195.0	189.4	158.0	130.8	124.4	132.5	132.5	155.4	173.3	162.0	249.8	249.2
WA	103.3	161.8	334.4	436.2	346.3	297.2	233.9	170.1	159.9	127.2	113.9	110.0	88.7	105.3	112.4	158.5	179.0	163.1	203.2	202.4
SA	48.0	171.7	309.9	573.0	499.8	320.4	290.0	227.6	189.3	176.5	140.0	133.0	106.2	124.4	115.4	173.2	227.1	182.2	235.2	239.5
Tas	55.6	175.4	271.0	461.2	431.4	334.2	234.7	225.6	186.6	127.4	110.8	105.1	75.4	76.3	274.8	126.6	161.6	196.5	208.4	214.9
ACT	68.7	156.7	176.6	311.1	314.6	278.4	170.3	206.4	163.8	135.1	101.1	94.0	152.9	141.2	195.4	48.7	237.9	69.5	181.6	177.2
NT	109.3	263.5	451.3	672.6	563.2	429.7	309.5	457.5	273.1	255.2	200.8	173.7	132.3	350.0	45.3	271.2	250.9	162.3	340.7	325.7
National	**70.9**	**179.0**	**335.6**	**483.9**	**430.8**	**329.9**	**267.1**	**227.5**	**193.3**	**180.2**	**156.6**	**141.5**	**128.6**	**140.2**	**148.7**	**167.3**	**199.7**	**169.2**	**234.5**	**235.4**

Note: Rates are age-specific rates per 100,000 population, unless otherwise stated. Case numbers and population denominators are grouped by state and territory of usual residence.
* Adjusted by direct standardisation to the Australian population in June 2001.

Table 3.3: Serious injury due to land transport by age group, Australia, 2003–04

Age group	Males		Females		Persons	
	Count	Per cent	Count	Per cent	Count	Per cent
0–4 years	567	1.8%	328	2.2%	896[(a)]	1.9%
5–14 years	4,922	15.4%	2,106	14.0%	7,029[(a)]	15.0%
15–24 years	8,987	28.2%	3,551	23.7%	12,538	26.8%
25–44 years	10,702	33.6%	4,152	27.7%	14,854	31.7%
45–64 years	4,683	14.7%	2,745	18.3%	7,428	15.9%
65+ years	2,009	6.3%	2,108	14.1%	4,117	8.8%
Total	**31,870**	**100.0%**	**14,990**	**100.0%**	**46,862[(a)]**	**100.0%**

Note: (a) Includes cases where sex is missing or indeterminate.

Table 3.4 shows the place of occurrence and mode of transport for young children aged 0–4 years seriously injured in a land transport accident. For about a third of the records, the place of occurrence was not specified. A third (33.3%) of the seriously injured children aged 0–4 years were travelling in a car, 30.2% were pedal cyclists and over a fifth (22.3%) were pedestrians. Nearly a fifth (19.3%) of young children aged 0–4 years were seriously injured in a land transport accident at a home. Of the 65 children injured in the driveway of a home, 46 were pedestrians and 45 of these cases involved a collision with a motor vehicle. Only one of the nine pedal cyclists that were seriously injured in a driveway had been involved in a collision with a motor vehicle.

Of the 108 children injured at another and unspecified place at a home, 23 were pedestrians and 17 of these cases involved a collision with a motor vehicle. Sixty-two children were pedal cyclists but none of these cases involved a collision with a motor vehicle (although there were 17 cases where the accident type was unspecified).

Table 3.4: Place of occurrence and mode of transport for young children aged 0–4 years seriously injured due to a land transport accident, Australia, 2003–04

			Injured person's vehicle			
Place	**Count**	**Per cent**	**Pedestrian**	**Pedal cycle**	**Car**	**Other**
Driveway to home	65	7.3%	46	9	10	0
Other and unspecified place in home	108	12.1%	23	62	*	19
Roadway	331	36.9%	70	22	224	15
Footpath next to road	11	1.2%	*	6	*	*
Other specified public highway, street or road	8	0.9%	*	0	*	*
Unspecified public highway, street or road	14	1.6%	*	*	7	*
Parking place	6	0.7%	6	0	0	0
Farm	10	1.1%	*	0	0	8
School	13	1.5%	*	7	*	*
Other specified place of occurrence	23	2.6%	*	*	*	*
Unspecified place of occurrence	307	34.3%	37	156	44	70
Total	**896**	**100.0%**	**200**	**271**	**298**	**127**

* Small counts are omitted.

Mode of transport

Table 3.5 shows the number of serious injury cases by injured person's mode of transport and state and territory in which the person usually lived. Cars and motorcycles were the modes of transport with the highest number of serious injury cases. Over three-quarters of the cases of car occupants and motorcyclists seriously injured resided in the three most populous jurisdictions; New South Wales, Victoria and Queensland.

Table 3.5: Land transport—serious injury cases by mode of transport and state and territory of usual residence, Australia, 2003–04

	Serious injury case counts														
Injured person's mode of transport	**Cars**	**Motorcycles**	**Pedal cycles**	**Pedestrian**	**Pick-up truck or van**	**Heavy transport vehicle**	**Buses**	**Animal or animal-drawn vehicle**	**Special all-terrain or off-road motor vehicle**	**Three-wheeled motor vehicle**	**Tram**	**Train**	**Special industrial, agricultural or construction vehicle**	**Unknown**	**Total**
State and territory															
NSW	5,784	3,383	2,434	1,389	146	256	155	975	162	23	*	51	125	167	15,054
Vic	4,924	2,430	2,002	976	148	181	72	645	95	14	64	43	82	110	11,786
Qld	3,093	2,553	1,685	593	125	175	73	903	133	20	8	10	114	122	9,607
WA	1,448	957	793	283	67	51	19	202	86	9	*	*	26	45	3,992
SA	1,597	789	540	220	50	63	39	157	56	18	6	*	30	31	3,598
Tas	397	193	162	80	19	13	9	64	36	*	0	0	9	17	1,001
ACT	240	115	141	42	*	6	*	21	6	0	0	*	*	7	587
NT	245	136	118	62	20	*	*	52	19	*	0	0	7	12	677
Other territories†	38	7	5	*	0	*	0	0	0	0	*	*	0	0	55
Missing	247	49	49	69	5	*	24	35	13	*	*	*	*	7	505
National	**18,013**	**10,612**	**7,929**	**3,716**	**584**	**749**	**394**	**3,054**	**606**	**90**	**88**	**112**	**397**	**518**	**46,862**

Notes:
† *Other Territories* include Cocos (Keeling) Islands, Christmas Island and Jervis Bay.
* Small counts are omitted.

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 result in the serious injury of Australians is specified in Tables 3.6 (for traffic conditions), 3.7 (for non-traffic conditions) and 3.8 (for instances where it is unspecified as to whether it is traffic or non-traffic). Note that ICD-10-AM (hospitals) does not allow 'heavy transport vehicle' to be distinguished from 'bus' as a counterpart or 'pedestrian' to be disaggregated from 'animal'.

Seven types of land transport accidents accounted for over half (52.8%) of all serious injury cases (whether traffic, non-traffic or unspecified). They were 1) a car occupant injured on a public road in a collision with a car, pick-up truck or van (15.9%), 2) a car occupant injured on a public road in a collision with a fixed or stationary object (7.9%), 3) a motorcyclist injured off-road in a non-collision transport accident (7.0%), 4) a pedal cyclist injured off-road in a non-collision transport accident (6.3%), 5) a car occupant injured on a public road in a non-collision transport accident (5.8%), 6) an animal rider or occupant of an animal-drawn vehicle injured in a non-collision transport accident (unspecified as to whether it was off-road or on a public road) (5.2%), and 7) a pedestrian injured on a public road in a collision with a car, pick-up truck or van (4.7%).

Table 3.6: Traffic serious injury—mechanism of injury for persons seriously injured in land transport accidents, Australia, 2003–04

	Counterpart in collision										
Injured person	**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†**	**Other and unspecified transport accidents**	**Total**
Car occupant	7,457	35	6	88	570	21	13	3,681	2,711	1,187	15,769
Motorcyclist	1,405	112	7	114	59	*	7	503	1,724	1,452	5,385
Pedal cyclist	916	6	62	16	40	0	*	157	1,067	1,410	3,676
Pedestrian	2,210	34	36	0	99	11	7	0	0	181	2,578
Occupant of pick-up truck or van	103	0	0	*	24	*	*	62	120	35	352
Occupant of heavy transport vehicle	49	0	*	*	40	*	*	52	224	34	406
Bus occupant	31	0	0	*	10	*	0	14	64	29	152
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	74	74
Occupant of three-wheeled motor vehicle	10	*	0	0	0	0	0	*	7	11	32
Occupant of a tram	0	0	0	0	0	0	0	0	0	9	9
Occupant of a train	0	0	0	0	0	0	0	0	0	10	10
Occupant of special agricultural or industrial or construction vehicle	0	0	0	0	0	0	0	0	0	28	28
Unknown	0	0	0	0	0	0	0	0	55	256	311
Total	**12,181**	**188**	**112**	**226**	**842**	**40**	**33**	**4,472**	**5,972**	**4,716**	**28,782**

Note: Shading denotes the 4 highest figures in the table.
* Small counts are omitted.
Includes cases where Principal Diagnosis was coded to ICD-10-AM S00–T98.
† Includes non-collision accidents such as overturning, falling or being thrown from a vehicle. It is possible this category may have been used as a residual (i.e. 'dump') code for cases lacking information on whether the accident involved a collision with a counterpart, despite the provision of the *other and unspecified category* for this purpose.
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'.

Table 3.7: Non-traffic serious injury—mechanism of injury for persons seriously injured in land transport accidents, Australia, 2003–04

	Counterpart in collision										
Injured person	**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†**	**Other and unspecified transport accidents**	**Total**
Car occupant	154	6	*	21	0	0	*	583	866	142	1,775
Motorcyclist	46	*	189	73	*	*	8	627	3,298	626	4,873
Pedal cyclist	60	*	*	27	91	*	*	249	2,974	552	3,964
Pedestrian	337	31	29	0	52	8	34	0	0	206	697
Occupant of pick-up truck or van	0	0	0	*	0	*	0	19	109	35	167
Occupant of heavy transport vehicle	*	5	0	*	0	*	*	7	146	70	233
Bus occupant	0	0	0	0	0	0	0	*	57	27	87
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	526	526
Occupant of three-wheeled motor vehicle	0	0	0	0	0	0	0	*	44	8	56
Occupant of a tram	0	0	0	0	0	0	0	0	0	0	0
Occupant of a train	0	0	0	0	0	0	0	0	0	*	*
Occupant of special agricultural or industrial or construction vehicle	0	0	0	0	0	0	0	0	0	333	333
Unknown	0	0	0	0	0	0	0	0	24	98	122
Total	**598**	**48**	**222**	**124**	**144**	**15**	**49**	**1,492**	**7,518**	**2,627**	**12,837**

Note: Shading denotes the 2 highest figures in the table.
* Small counts are omitted.
Includes cases where Principal Diagnosis was coded to ICD-10-AM S00–T98.
† Includes non-collision accidents such as overturning, falling or being thrown from a vehicle. It is possible this category may have been used as a residual (i.e. 'dump') code for cases lacking information on whether the accident involved a collision with a counterpart, despite the provision of the *other and unspecified category* for this purpose.
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'.

Table 3.8: Unspecified as to whether traffic or non-traffic serious injury—mechanism of injury for persons seriously injured in land transport accidents, Australia, 2003–04

	Counterpart in collision										
Injured person	**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†**	**Other and unspecified transport accidents**	**Total**
Car occupant	12	0	0	0	0	0	0	6	232	219	469
Motorcyclist	*	*	0	0	0	0	0	0	16	335	354
Pedal cyclist	*	0	0	*	0	0	0	0	12	273	289
Pedestrian	259	15	29	0	13	*	12	0	0	110	441
Occupant of pick-up truck or van	0	0	0	0	0	0	0	0	32	33	65
Occupant of heavy transport vehicle	*	0	0	0	0	0	0	0	40	69	110
Bus occupant	0	0	0	0	*	0	0	*	110	42	155
Animal rider or occupant of animal-drawn vehicle	0	0	0	18	0	0	10	39	2,422	565	3,054
Occupant of special all-terrain or off-road vehicle	0	0	0	0	0	0	0	0	0	6	6
Occupant of three-wheeled motor vehicle	0	0	0	0	0	0	0	0	0	*	*
Occupant of a tram	0	0	0	0	0	0	0	0	0	79	79
Occupant of a train	0	0	0	0	0	*	0	0	0	95	98
Occupant of special agricultural or industrial or construction vehicle	0	0	0	0	0	0	0	0	0	36	36
Unknown	0	0	0	0	0	0	0	0	0	85	85
Total	**276**	**17**	**29**	**19**	**14**	**6**	**22**	**47**	**2,864**	**1,949**	**5,243**

Note: Shading denotes the 2 highest figures in the table.
* Small counts are omitted.
Includes cases where Principal Diagnosis was coded to ICD-10-AM S00–T98.
† Includes non-collision accidents such as overturning, falling or being thrown from a vehicle. It is possible this category may have been used as a residual (i.e. 'dump') code for cases lacking information on whether the accident involved a collision with a counterpart, despite the provision of the *other and unspecified category* for this purpose.
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'.

4 Serious injury due to road vehicle traffic crashes, Australia, 2003–04

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 attempts to develop 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).

In the one-year period 2003–04, land transport accidents that involved road vehicles on a public road accounted for 0.5% of all hospital separations in Australia and 7.1% of all injury-related hospital separations (Table 4.1).

During 2003–04, there were 148,524 patient days attributable to road vehicle traffic crashes, with a mean length of stay of 5.2 days, which accounted for 0.6% of all patient days in Australia and 8.0% of all injury-related patient days. In 33% of serious injury cases, the injured person was discharged on the same day as they were admitted.

The age-standardised rate of road vehicle traffic injury was 144 admissions to hospital per 100,000 persons. The male: female age-standardised rate ratio was 1.9:1.0, indicating that, after accounting for any difference in age composition, nearly twice as many males as females were hospitalised as a result of a road traffic crash, 190 per 100,000 population, compared with 99 per 100,000 population.

Table 4.1: Key indicators for serious injury due to road vehicle traffic crashes, Australia, 2003–04

Indicator	Males	Females	Persons*
Seriously injured† (c)			
Persons admitted to hospital (d)	18,846	9,934	28,782
Percentage of all hospital separations	0.7	0.3	0.5
Percentage of all hospital separations due to injury	8.3	5.6	7.1
Same day hospitalisations	6,060	3,482	9,543
Mean length of stay in hospital (days)‡	5.2	5.0	5.2
Total patient days (including same day and deaths in hospital)	98,567	49,955	148,524
Crude rate/100,000 population**	189.7	98.8	144.0
Age-standardised rate/100,000 population***	189.6	98.8	144.3

† Includes cases where Principal Diagnosis was coded to ICD-10-AM S00–T98.
* Includes cases where sex is missing or indeterminate.
** Using population denominators in December 2003.
*** Adjusted by direct standardisation to the Australian population in June 2001.
‡ This is the average number of days a person is likely to stay in hospital when seriously injured.

Age and sex distribution

The burden of injury due to road vehicle traffic crashes was mainly among those of 'working age' (Table 4.2). Eighty per cent of persons seriously injured were aged 15–64 years. Males accounted for nearly two-thirds (65%) of serious injury cases due to road vehicle traffic crashes in 2003–04.

(c) The term *seriously injured* and *hospitalisation* are used interchangeably and represent a person being admitted to hospital for injury and subsequently discharged alive, either on the same day or after one or more nights stay in a hospital bed (i.e. deaths are excluded). Discharge from hospital can include transfer to home, to another acute care hospital and to another form of care (e.g. rehabilitation). In this report, a method has been used 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.

(d) In total, there were 32,013 admissions to hospital for road vehicle traffic crashes for an estimated 29,090 persons, of whom 308 (1.1%) died while in hospital. These deaths are probably included in estimates of fatal transport injuries and are omitted from the seriously injured counts in Table 4.1 and throughout Section 4 in order to avoid double-counting. The estimate of total patient days includes separations in which the person died in hospital.

Table 4.2: Serious injury due to road vehicle traffic crashes by age group, Australia, 2003–04

	Males		Females		Persons	
Age group	**Count**	**Per cent**	**Count**	**Per cent**	**Count**	**Per cent**
0–4 years	240	1.3	159	1.6	400[(a)]	1.4
5–14 years	1,814	9.6	742	7.5	2,557[(a)]	8.9
15–24 years	5,527	29.3	2,579	26.0	8,106	28.2
25–44 years	6,870	36.5	2,967	29.9	9,837	34.2
45–64 years	3,029	16.1	2,048	20.6	5,077	17.6
65+ years	1,366	7.2	1,439	14.5	2,805	9.7
Total	**18,846**	**100.0**	**9,934**	**100.0**	**28,782[(a)]**	**100.0**

(a) Includes cases where sex is missing or indeterminate.

Male rates of serious injury in road vehicle traffic crashes exceeded female rates due to much higher rates while riding motorcycles and pedal cycles, and higher rates while driving cars (except at ages 45–59 years) (Figure 4.1). The rates of serious injury among car drivers were high at ages 15–24 years and peaked at ages 20–24 years (males: 137 per 100,000 population, females: 94 per 100,000). For male motorcyclists, the rate of serious injury peaked at ages 20–24 years (122 per 100,000). For car passengers, the rate of serious injury peaked at ages 15–19 years (males: 80 per 100,000, females: 84 per 100,000). More males than females were seriously injured as pedal cyclists and pedestrians. For pedal cyclists, the serious injury rate peaked at ages 10–14 years (males: 95 per 100,000, females: 21 per 100,000) whereas for pedestrians it was highest in the elderly (males: 44 per 100,000 at ages 85 years and older, females: 33 per 100,000 at ages 80–84 years).

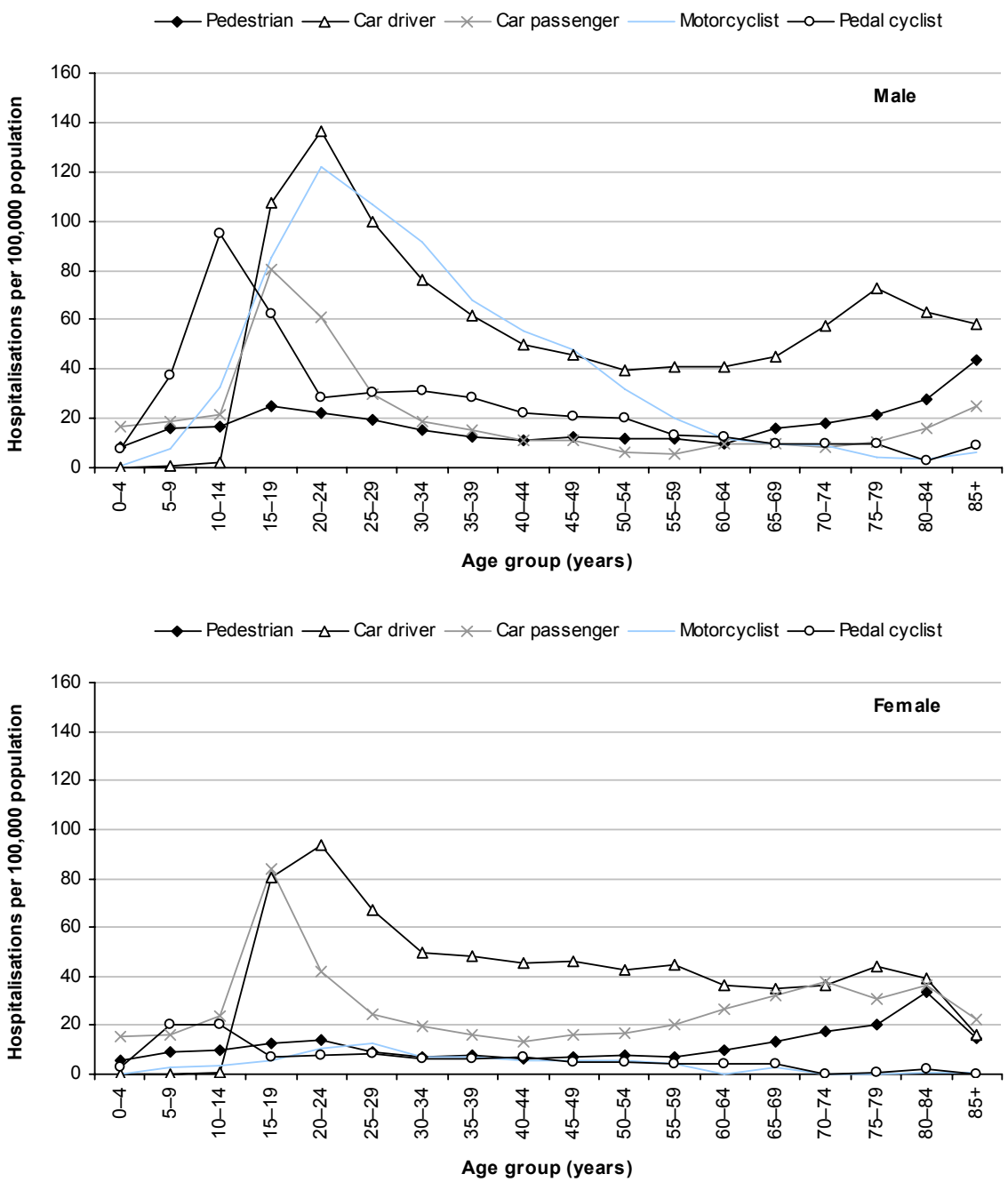


Figure 4.1: Road vehicle traffic crashes—age-specific hospitalisation rates by sex, Australia, 2003–04

In 2003–04, nine circumstances accounted for about 80% of all persons seriously injured in road vehicle traffic crashes (Table 4.3).

Table 4.3: Nine most common mechanisms of serious injury for road vehicle traffic crashes, Australia, 2003–04

	Seriously injured	
Type of collision	**Count**	**Per cent of road vehicle traffic serious injury cases (n=28,782)**
Car in collision with car, pick-up truck or van	7,457	25.9%
Car in collision with fixed or stationary object	3,681	12.8%
Car in non-collision transport accident	2,711	9.4%
Pedestrian in collision with a car, pick-up truck or van	2,210	7.7%
Motorcyclist in non-collision transport accident	1,724	6.0%
Motorcyclist in other and unspecified transport accident	1,452	5.0%
Pedal cyclist in other and unspecified transport accident	1,410	4.9%
Motorcyclist in collision with car, pick-up truck or van	1,405	4.9%
Car in other and unspecified transport accident	1,187	4.1%
Total of the most common mechanisms	**23,237**	**80.7%**

Counts, proportions and age-standardised rates for persons seriously injured according to road user group are shown in Table 4.4. Over half (54.8%) of the persons seriously injured in road vehicle traffic crashes were car occupants. Another 18.7% were motorcyclists, 12.8% were pedal cyclists and 9.0% were pedestrians.

For males, the four most frequently injured road users were, in order, car drivers, motorcyclists, pedal cyclists and car passengers. For females, the most frequently injured road users were car drivers, car passengers, pedestrians and pedal cyclists.

Over a quarter (26.6%) of serious injury cases due to road vehicle traffic crashes presented a high threat to life (Table 4.4). The proportion of pedestrians with injuries that posed a high threat to life (37.2%) was higher than for all other modes of transport. Pedal cyclists had the lowest proportion of high threat to life injuries (17.8%). However, for the subset of pedal cyclists in which the counterpart was a motor vehicle (i.e. car, pick-up truck or van, heavy transport vehicle and two- or three-wheeled motor vehicle) the proportion of pedal cyclists with high threat to life injuries was 27.5% (265/962).

Table 4.4: Serious injury due to road vehicle traffic crashes by road user group, Australia, 2003–04

	Seriously injured†						
	All cases			High threat-to-life cases*			% high threat-to-life
Road user group	Count	Per cent	Rate‡	Count	Per cent	Rate‡	
Males							
Car occupant	8,402	44.6	84.6	2,533	48.8	25.5	30.1%
• Car driver	*5,490*	*29.1*	*55.3*	*1,667*	*32.1*	*16.9*	*30.4%*
• Car passenger	*2,251*	*11.9*	*22.6*	*705*	*13.6*	*7.1*	*31.3%*
Motorcyclist	4,891	26.0	49.0	1,263	24.4	12.7	25.8%
Pedal cyclist	2,951	15.7	29.5	536	10.3	5.4	18.2%
Pedestrian	1,568	8.3	16.0	575	11.1	5.9	36.7%
Heavy vehicle occupant	384	2.0	3.8	110	2.1	1.1	28.6%
Pick up truck or van occupant	278	1.5	2.8	93	1.8	0.9	33.5%
Bus occupant	58	0.3	0.6	9	0.2	0.1	15.5%
Other or unknown	314	1.7	3.2	67	1.3	0.7	21.3%
Total	**18,846**	**100.0**	**189.6**	**5,186**	**100.0**	**52.3**	**27.5%**
Females							
Car occupant	7,366	74.1	73.2	1,786	72.0	17.7	24.2%
• Car driver	*4,248*	*42.8*	*42.2*	*1,039*	*41.9*	*10.3*	*24.5%*
• Car passenger	*2,656*	*26.7*	*26.5*	*656*	*26.4*	*6.5*	*24.7%*
Motorcyclist	494	5.0	5.0	111	4.5	1.1	22.5%
Pedal cyclist	725	7.3	7.4	119	4.8	1.2	16.4%
Pedestrian	1,010	10.2	9.8	385	15.5	3.7	38.1%
Heavy vehicle occupant	22	0.2	0.2	9	0.4	0.1	40.9%
Pick up truck or van occupant	74	0.7	0.7	16	0.6	0.2	21.6%
Bus occupant	93	0.9	0.9	23	0.9	0.2	24.7%
Other or unknown	150	1.5	1.5	33	1.3	0.3	22.0%
Total	**9,934**	**100.0**	**98.8**	**2,482**	**100.0**	**24.5**	**25.0%**
Persons							
Car occupant	15,769[(a)]	54.8	78.9	4,320[(a)]	56.3	21.6	27.4%
• Car driver	9,738	*33.8*	*48.6*	*2,706*	*35.3*	*13.5*	*27.8%*
• Car passenger	4,908[(a)]	*17.1*	*24.6*	*1,362[(a)]*	*17.8*	*6.8*	*27.8%*
Motorcyclist	5,385	18.7	27.1	1,374	17.9	6.9	25.5%
Pedal cyclist	3,676	12.8	18.6	655	8.5	3.3	17.8%
Pedestrian	2,578	9.0	12.9	960	12.5	4.8	37.2%
Heavy vehicle occupant	406	1.4	2.0	119	1.6	0.6	29.3%
Pick up truck or van occupant	352	1.2	1.8	109	1.4	0.5	31.0%
Bus occupant	152[(a)]	0.5	0.8	32	0.4	0.2	21.1%
Other or unknown	464	1.6	2.3	100	1.3	0.5	21.6%
Total	**28,782[(a)]**	**100.0**	**144.3**	**7,669[(a)]**	**100.0**	**38.4**	**26.6%**

Note: (a) Includes cases where sex is missing or indeterminate.
† Includes cases where Principal Diagnosis was coded to ICD-10-AM S00–T98.
* ICD-based Injury Severity Score (ICISS) <0.941 weights from (Stephenson et al. 2004).
‡ Adjusted by direct standardisation to the Australian population in June 2001.

Serious injury rates by vehicle type

This section shows injury rates for the different types of vehicles registered in Australia. Registered vehicles are authorised to travel on public roads and in road-related areas (e.g. shopping centre car parks). The numerator is the number of serious injury cases due to traffic (on public roads) by each vehicle type. Injuries to pedestrians and users of other vehicles are not included. The denominator is the number of each vehicle type registered by state and territory and the kilometres travelled, sourced from the Australian Bureau of Statistics *Motor Vehicle Census* (ABS 2005a) and *Survey of Motor Vehicle Use, Australia* (ABS 2005b).

Serious injury cases that were non-traffic or unspecified as to whether traffic or non-traffic were excluded from case counts. Serious injury rates are restricted to the occupants of the types of registered vehicles within the scope of the ABS publication. Hence, serious injury rates for occupants of special agricultural, industrial or construction vehicles and trams or trains are not presented.

Table 4.5 compares the number of serious injury cases per 100,000 registered vehicles by vehicle type. Motorcycles had the highest serious injury rate; for each 100,000 motorcycles registered in Australia, there were 1,359 riders admitted to hospital with a serious injury. There were 213 persons admitted to hospital per 100,000 buses, a serious injury rate second only to motorcycles and higher than the corresponding rate for cars (148 persons admitted to hospital per 100,000 cars). These rates are influenced by a number of factors, including average distance travelled by each type of vehicle per year and the average number of occupants per vehicle.

Table 4.6 compares risk according to the number of serious injury cases for each 100 million vehicle kilometres travelled by vehicle type. This comparison is important because it accounts for variation in the number of different types of vehicles in use in Australia and their frequency of travel. The serious injury rate for motorcyclists was thirty-four times that for car occupants (364 motorcyclists compared with 11 car occupants were seriously injured per 100 million vehicle kilometres travelled). The rate of serious injury was lower for bus occupants than for car occupants (7 bus occupants were seriously injured per 100 million vehicle kilometres travelled). A comparison of rates on a passenger-kilometre basis would probably show an even lower rate for buses relative to other vehicle types, but the relevant data were not available. Occupants of heavy transport vehicles had a lower rate of serious injury compared with car occupants (3 seriously injured per 100 million vehicle kilometres travelled). Occupants of pick-up trucks or vans had the lowest rate overall (1 seriously injured per 100 million vehicle kilometres travelled). The category 'pick-up trucks or vans' should include serious injury cases of occupants of utilities and panel vans, but such cases may be incorrectly coded as 'occupant of a car', leading to an underestimate of the serious injury rate.

The Northern Territory had the highest rate of serious injury per 100 million vehicle kilometres travelled for cars, motorcycles and pick-up trucks or vans, and the rates were significantly higher than the corresponding national rates. South Australia and New South Wales also had serious injury rates for cars that were above the national rate. In addition to the Northern Territory, serious injury rates for motorcycles were also above the national rate in Tasmania, New South Wales and Victoria. South Australia had the highest rate of serious injury for heavy transport vehicles, but it was not significantly higher than the national rate. Victoria and New South Wales had the highest rates of serious injury for buses, but they were not higher than the national rate.

The ABS estimates of motor vehicle use are based on information collected for a sample of registered motor vehicles, rather than a full enumeration, and are therefore subject to sampling error. Thus, the serious injury rate estimates presented in Tables 4.5 and 4.6 may differ from the estimates that would have been produced if the denominator had included a full enumeration of registered motor vehicles in Australia.

Table 4.5: Road vehicle traffic crashes—serious injury rate per 100,000 registered vehicles by vehicle type and state and territory, Australia, 2003–04

	Crude injury rate per 100,000 vehicles (95% CI)					
State and territory	**Cars‡**	**Motorcycles**	**Pick-up truck or van****	**Heavy transport vehicle† [(a)]**	**Buses**	**Total [(b)]**
Seriously injured						
NSW	155 (151–160)	1,541 (1,467–1,618)	14.5 (11.5–18.1)	99.5 (82.7–119)	264 (198–346)	171 (167–176)
Vic	155 (151–160)	1,253 (1,186–1,324)	22.1 (18.0–26.9)	103 (84.6–124)	198 (134–281)	169 (164–173)
Qld	130 (125–135)	1,493 (1,414–1,576)	15.7 (12.3–19.8)	110 (89.1–134)	192 (129–276)	156 (151–160)
WA	110 (104–116)	966 (881–1,056)	15.4 (10.8–21.4)	40.5 (25.4–61.3)	77.4 (33.4–153)	121 (115–126)
SA	157 (149–165)	1,249 (1,125–1,384)	24.8 (17.2–34.6)	137 (99.4–184)	168 (67.4–346)	169 (161–177)
Tas	124 (111–138)	1,206 (990–1,455)	19.0 (10.1–32.5)	36.4 (9.93–93.3)	245 (79.7–573)	129 (118–142)
ACT	106 (92.1–122)	860 (658–1,105)	10.6 (1.28–38.3)	116 (23.9–338)	109 (2.76–608)	123 (109–139)
NT	324 (283–370)	2,509 (1,992–3,118)	41.8 (20.9–74.7)	24.4 (0.618–136)	33.2 (0.840–185)	301 (269–336)
National	**148 (146–150)**	**1,359 (1,323–1,396)**	**18.0 (16.2–20.0)**	**95.8 (86.7–106)**	**213 (181–250)**	**163 (161–165)**

Note: Case numbers grouped by state and territory of usual residence and vehicle denominators grouped by state and territory of registration of vehicle.
Defined in the Australian Bureau of Statistics *Motor Vehicle Census* and *Survey of Motor Vehicle Use* as ‡ Passenger vehicles ** Light Commercial Vehicle, and † Rigid Truck and Articulated Truck.
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.
(a) For trucks, data is presented for state and territory of operation rather than state and territory of registration.
(b) Does not include cases or denominators for Non-freight Carrying Trucks due to uncertainty about how these are defined according to ICD-10-AM.

Table 4.6: Road vehicle traffic crashes—serious injury rate per 100 million vehicle kilometres travelled by vehicle type and state and territory, Australia, 2003–04

State and territory	Injury rate per 100 million vehicle kilometres travelled (95% CI)					
	Cars‡	Motorcycles	Pick-up truck or van**	Heavy transport vehicle† [(a)]	Buses §	Total [(b)]
Seriously injured						
NSW	11.4 (11.1–11.7)	^460 (438–483)	0.843 (0.669–1.05)	3.16 (2.62–3.77)	8.79 (6.58–11.5)	11.8 (11.6–12.1)
Vic	11.2 (10.8–11.5)	*403 (381–425)	1.22 (0.994–1.49)	3.12 (2.57–3.77)	9.04 (6.14–12.8)	11.4 (11.1–11.7)
Qld	8.92 (8.58–9.28)	^258 (244–272)	0.883 (0.692–1.11)	3.03 (2.46–3.69)	^5.68 (3.80–8.15)	9.92 (9.62–10.2)
WA	7.90 (7.46–8.35)	^337 (307–368)	0.943 (0.660–1.31)	1.52 (0.955–2.31)	3.46 (1.50–6.82)	8.36 (7.98–8.76)
SA	12.3 (11.6–12.9)	^382 (344–423)	1.31 (0.909–1.83)	4.27 (3.10–5.73)	5.26 (2.12–10.8)	12.1 (11.6–12.7)
Tas	9.93 (8.87–11.1)	^727 (597–877)	1.37 (0.732–2.35)	1.25 (0.342–3.21)	11.9 (3.87–27.8)	9.92 (9.03–10.9)
ACT	7.17 (6.20–8.24)	^244 (187–313)	^0.619 (0.075–2.24)	^3.30 (0.680–9.63)	^3.13 (0.079–17.4)	8.20 (7.24–9.25)
NT	22.4 (19.5–25.5)	^900 (715–1,119)	2.81 (1.40–5.03)	0.855 (0.022–4.76)	1.37 (0.035–7.63)	20.0 (17.9–22.3)
National	**10.7 (10.5–10.8)**	**364 (354–374)**	**1.04 (0.930–1.15)**	**2.97 (2.69–3.28)**	**7.72 (6.54–9.05)**	**11.1 (11.0–11.2)**

Note: Case numbers grouped by state and territory of usual residence and million vehicle kilometres travelled denominators grouped by state and territory of registration of vehicle.
Defined in the Australian Bureau of Statistics *Motor Vehicle Census* and *Survey of Motor Vehicle Use* as ‡ Passenger vehicles ** Light Commercial Vehicle, and † Rigid Truck and Articulated Truck.
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.
^ Estimate for the denominator (number of kilometres travelled) has a relative standard error of 10% to less than 25% and should be used with caution.
* Estimate for the denominator (number of kilometres travelled) has a relative standard error of 25% to 50% and should be used with caution.
(a) For trucks, million vehicle kilometres travelled denominators are presented for state and territory of operation rather than state and territory of registration.
(b) Does not include cases or denominators for Non-freight Carrying Trucks due to uncertainty about how these are defined according to ICD-10-AM.

Mode of transport by state and territory of residence

The hospital dataset used for this report does not contain information on the crash location. There are two options for presenting state and territory data: 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 only be the case if a person was treated in the hospital closest to the crash site. However, the practice of airlifting (or driving) patients across borders to major metropolitan hospitals complicates such analyses. Table 4.7 shows that most persons who were seriously injured were hospitalised in the same state in which they resided; the estimate for the jurisdictions ranged from 92.6% to 96.9%, with the exception of the Northern Territory (85.3%) and the Australian Capital Territory (63.2%). A third of residents of the Australian Capital Territory were treated in New South Wales hospitals, and about 10% of Northern Territory residents were treated at a hospital in a bordering state. For these patients, it is unknown whether the crash occurred in the same state that the patient resided in but they were transferred to an interstate hospital or the location of the crash was interstate. Thus, we have chosen to present data according to state and territory of residence, recognising that the crash may have occurred in another jurisdiction.

Table 4.7: Serious injury due to road vehicle traffic crashes—state and territory of hospitalisation versus state and territory of usual residence, Australia, 2003–04

State and territory of residence	State and territory of hospitalisation								
	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	National
NSW	8,828	105	116	12	21	9	142	10	9,243
Vic	154	7,527	51	16	48	19	11	8	7,834
Qld	158	18	5,176	*	6	5	*	9	5,376
WA	8	*	*	2,229	13	*	0	12	2,271
SA	26	29	10	*	2,208	*	0	11	2,293
Tas	*	6	*	*	0	587	0	0	602
ACT	51	6	*	0	*	0	268	0	328
NT	*	*	*	*	9	0	0	411	431
Other territories	13	29	0	*	*	0	0	0	43
Not reported	88	47	125	49	23	6	*	21	361
National	**9,330**	**7,771**	**5,491**	**2,321**	**2,329**	**634**	**424**	**482**	**28,782**

*Small counts are omitted.

The three most populous jurisdictions in Australia are New South Wales (the population number in 2001 was 6,700,312), Victoria (n= 4,936,785) and Queensland (n= 3,846,435). Nearly a third (32.1%) of the cases of persons seriously injured resided in New South Wales, over a quarter resided in Victoria (27.2%) and 18.7% resided in Queensland (Table 4.8).

Table 4.8: Serious injury due to road vehicle traffic crashes by gender and state and territory of residence, Australia, 2003–04

Seriously injured	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	National
Males									
Car occupant	2,638	2,296	1,432	715	767	178	105	128	8,402
• Car driver	*1,792*	*1,587*	*878*	*407*	*513*	*103*	*66*	*67*	5,490
• Car passenger	*672*	*565*	*391*	*231*	*206*	*54*	*31*	*52*	2,251
Motorcyclist	1,502	1,168	1,200	439	327	97	57	73	4,891
Pedal cyclist	930	813	603	226	206	69	33	46	2,951
Pedestrian	606	404	236	107	100	30	14	30	1,568
Heavy transport occupant	113	104	97	21	40	*	*	*	384
Pick-up truck or van occupant	60	81	57	28	28	12	*	*	278
Bus occupant	23	12	10	*	*	*	0	*	58
Other or unknown	96	57	85	*	*	9	0	11	314
Total	**5,968**	**4,935**	**3,720**	**1,564**	**1,497**	**401**	**214**	**298**	**18,846**[(a)]
Females									
Car occupant	2,428	2,180	1,162	522	630	143	93	96	7,366
• Car driver	*1,409*	*1,351*	*650*	*284*	*361*	*66*	*55*	*41*	4,248
• Car passenger	*902*	*722*	*400*	*193*	*242*	*54*	*29*	*43*	2,656
Motorcyclist	136	116	134	39	40	12	*	*	494
Pedal cyclist	221	222	146	55	47	12	8	10	725
Pedestrian	378	308	141	68	53	24	7	13	1,010
Heavy transport occupant	10	6	*	*	*	0	0	0	22
Pick-up truck or van occupant	20	19	16	8	6	*	0	*	74
Bus occupant	30	19	*	*	*	*	*	0	93
Other or unknown	52	28	37	9	12	6	*	*	150
Total	**3,275**	**2,898**	**1,656**	**707**	**796**	**201**	**114**	**133**	**9,934**[(a)]
Persons									
Car occupant	5,066	4,477	2,594	1,237	1,397	321	198	224	15,769
• Car driver	3,201	2,938	1,528	691	874	169	121	108	9,738
• Car passenger	1,574	1,288	791	424	448	108	60	95	4,908
Motorcyclist	1,638	1,284	1,334	478	367	109	61	81	5,385
Pedal cyclist	1,151	1,035	749	281	253	81	41	56	3,676
Pedestrian	984	712	377	175	153	54	21	43	2,578
Heavy transport occupant	123	110	98	22	44	*	*	*	406
Pick-up truck or van occupant	80	100	73	36	34	13	*	*	352
Bus occupant	53	31	29	8	7	*	*	*	152
Other or unknown	148	85	122	34	38	15	*	*	464
Total	**9,243**	**7,834**	**5,376**	**2,271**	**2,293**	**602**	**328**	**431**	**28,782**[(a)]

Note:
(a) There were 361 (male: 221, female: 139, unspecified: 1) cases missing data on state and territory of usual residence and 43 (male: 28, female: 15) cases that were *Other Territories*. *Other Territories* include Cocos (Keeling) Islands, Christmas Island and Jervis Bay.
*Small counts are omitted.

On a population basis, age-standardised rates of serious injury for car occupants in road vehicle traffic crashes were above the national rate for residents in the Northern Territory, South Australia and Victoria (Table 4.9).

Car drivers in Victoria and South Australia had serious injury rates that were above the national rate (Table 4.9 and Figure 4.2). Serious injury rates for car drivers were below the national rate for residents in Queensland, Western Australia, Tasmania and the Australian Capital Territory.

Car passengers who resided in the Northern Territory and South Australia had serious injury rates that were above the national rate. Serious injury rates for car passengers were below the national rate in Queensland, Western Australia and the Australian Capital Territory.

Motorcyclists who resided in the Northern Territory and Queensland had serious injury rates that were above the national rate. Serious injury rates for motorcyclists were below the national rate in New South Wales and the Australian Capital Territory.

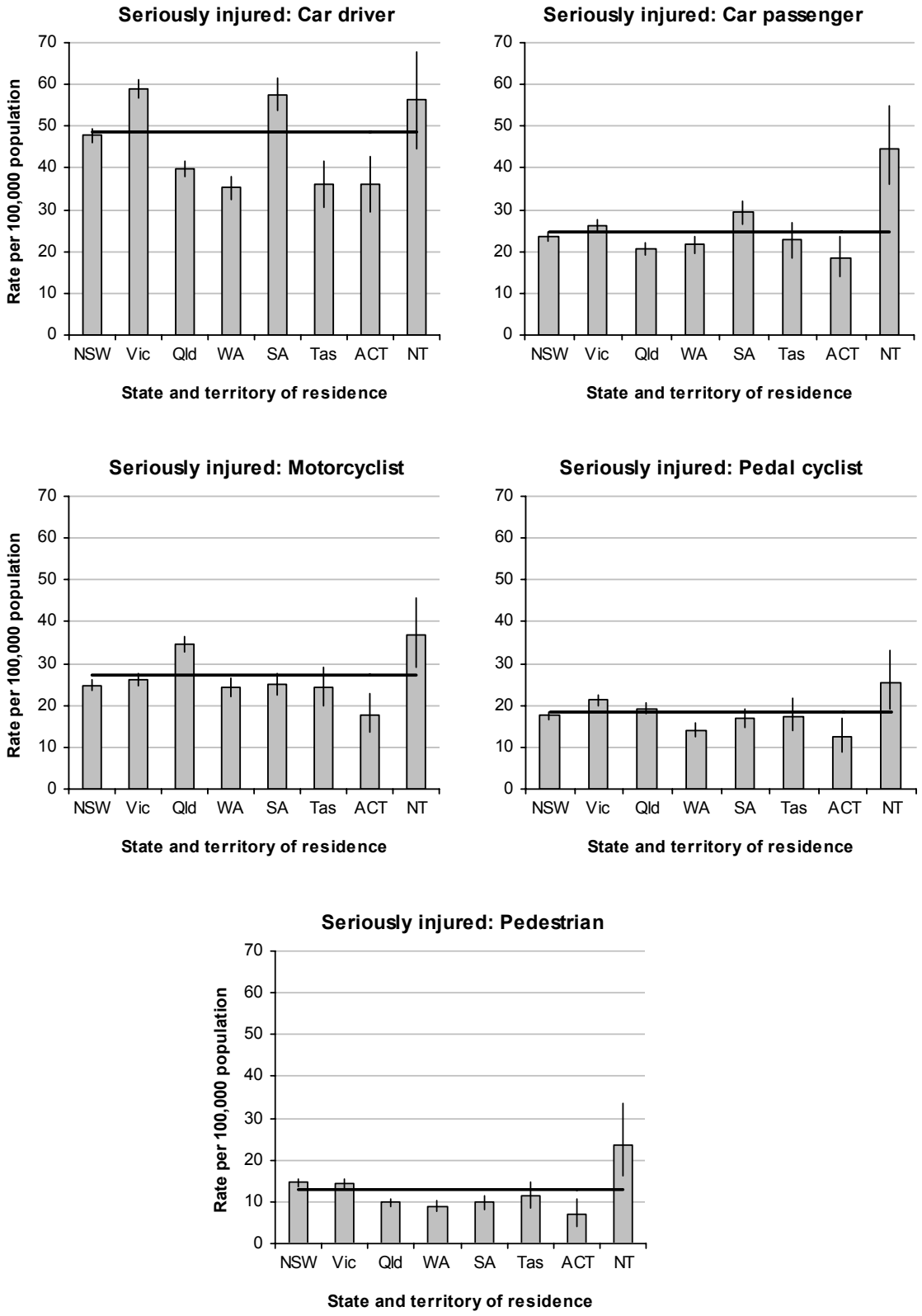
Pedal cyclists in Victoria had serious injury rates that were above the national rate. Serious injury rates for pedal cyclists were below the national rate in Western Australia and the Australian Capital Territory.

Pedestrians who resided in the Northern Territory and New South Wales had serious injury rates that were above the national rate. Serious injury rates for pedestrians were below the national rate in Queensland, Western Australia, South Australia and the Australian Capital Territory.

Table 4.9: Age-standardised serious injury rates for road traffic crashes by mode of transport and state and territory of residence, Australia, 2003–04

Seriously injured person	Age-standardised rate per 100,000 population (95% CI)								
	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	National
Car occupant	76 (74–78)	90 (88–93)	67 (65–70)	63 (60–67)	92 (87–97)	69 (61–76)	60 (51–68)	113 (97–128)	79 (78–80)
• Car driver	48 (46–49)	59 (57–61)	40 (38–42)	35 (33–38)	58 (54–61)	36 (31–42)	36 (30–43)	56 (44–68)	49 (48–50)
• Car passenger	24 (22–25)	26 (25–28)	21 (19–22)	22 (20–24)	29 (27–32)	23 (18–27)	18 (14–24)	45 (36–55)	25 (24–25)
Motorcyclist	25 (24–26)	26 (25–28)	35 (33–37)	24 (22–26)	25 (23–28)	24 (20–29)	18 (14–23)	37 (29–46)	27 (26–28)
Pedal cyclist	18 (16–19)	21 (20–23)	19 (18–21)	14 (12–16)	17 (15–19)	17 (14–22)	12 (9-17)	25 (19–33)	19 (18–19)
Pedestrian	15 (14–16)	14 (13–15)	10 (9–11)	9 (8–10)	10 (8–11)	11 (9–15)	7 (4–11)	24 (16–34)	13 (12–13)

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



Note: The thick horizontal line shows the rate for all people in Australia.

Figure 4.2: Road vehicle traffic crashes—age-standardised rates of serious injury by road user group and state and territory of residence, Australia, 2003–04

Remoteness zones

Remoteness zones in this report refer to the place of usual residence of the person who was admitted to hospital. The remoteness zones reported here are as specified in the ABS Australian Standard Geographical Classification (ASGC) (ABS 2001). Remoteness is defined in a manner based on the Accessibility/Remoteness Index of Australia (ARIA), which was developed for the Commonwealth Department of Heath and Aged Care by the National Key Centre for Social Applications of Geographic Information Systems (GISCA), 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 zones, on the basis of the SLA of usual residence of the person.

Most SLAs lie entirely within one of the five zones. If this was so for all SLAs, then each record could simply be assigned to the zone in which its SLA lies. However, some SLAs include areas in two or more of the zones. Records with these SLAs were assigned to remoteness zones in proportion to the zone-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 zones probabilistically, in proportion to the resident population of that SLA. The resulting values are integers.

The hospital datasets used for this report does not contain information on the crash location and it is therefore not possible to determine with certainty if the crash occurred in the remoteness zone of residence of the person injured. Remoteness zone 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 Australian Transport Safety Bureau estimates that in the period from 2000–03 around 30% of operators (drivers, motorcyclists and cyclists) or persons killed in fatal road crashes were involved in crashes within their postcode of residence and a further 50% or more were 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.

The majority (82.2%) of persons seriously injured in road vehicle traffic crashes resided in major cities or inner regional areas (Table 4.10). Only 3% of serious injury cases occurred to residents in remote or very remote areas. Males comprised about two-thirds of serious injury cases in each remoteness zone (Table 4.10). Age-standardised rates of injury increased according to remoteness of the person's usual residence from an urban centre (Table 4.11 and Figure 4.3). Male rates of serious injury were about twice the rate observed for females in each remoteness zone.

Table 4.10: Serious injury cases by remoteness zone of residence for persons involved in road vehicle traffic crashes, Australia, 2003–04

ASGC remoteness zone of residence	Males	Females	Persons		Per cent male cases per remoteness zone
	Count	Count	Count	Per cent	
Serious injury					
Major cities	11,015	6,221	17,237	60	64
Inner regional	4,327	2,105	6,432	22	67
Outer regional	2,475	1,134	3,609	13	69
Remote	444	176	620	2	72
Very remote	272	120	392	1	69
Total †	**18,846**	**9,934**	**28,782**[(a)]	**100**	**64**

† ASGC remoteness zone of residence not reported for 492 (male=313, female=178) persons.

(a) Includes cases where sex is missing or indeterminate.

Table 4.11: Age-standardised serious injury rates by remoteness zone of residence for persons involved in road vehicle traffic crashes, Australia, 2003–04

ASGC remoteness zone of residence	Age-standardised rate per 100,000 population (95% CI)		
	Males	Females	Persons
Serious injury			
Major cities	170 (167–173)	94 (92–96)	132 (130–134)
Inner regional	225 (219–232)	105 (101–110)	165 (161–169)
Outer regional	252 (242–262)	118 (111–125)	187 (181–193)
Remote	261 (237–286)	120 (102–137)	195 (179–210)
Very remote	272 (239–305)	143 (116–169)	212 (190–234)

Figure 4.4 shows the number of hospitalisation per 100,000 population according to the remoteness of the hospital where the person was treated. In contrast to Figure 4.3 which presents the data according to remoteness of the persons' usual residence, serious injury rates were lower in remote and very remote areas than in major cities and regional areas. This may be due to the practice of airlifting (or driving) patients injured in crashes in remote and very remote areas to major metropolitan hospitals.

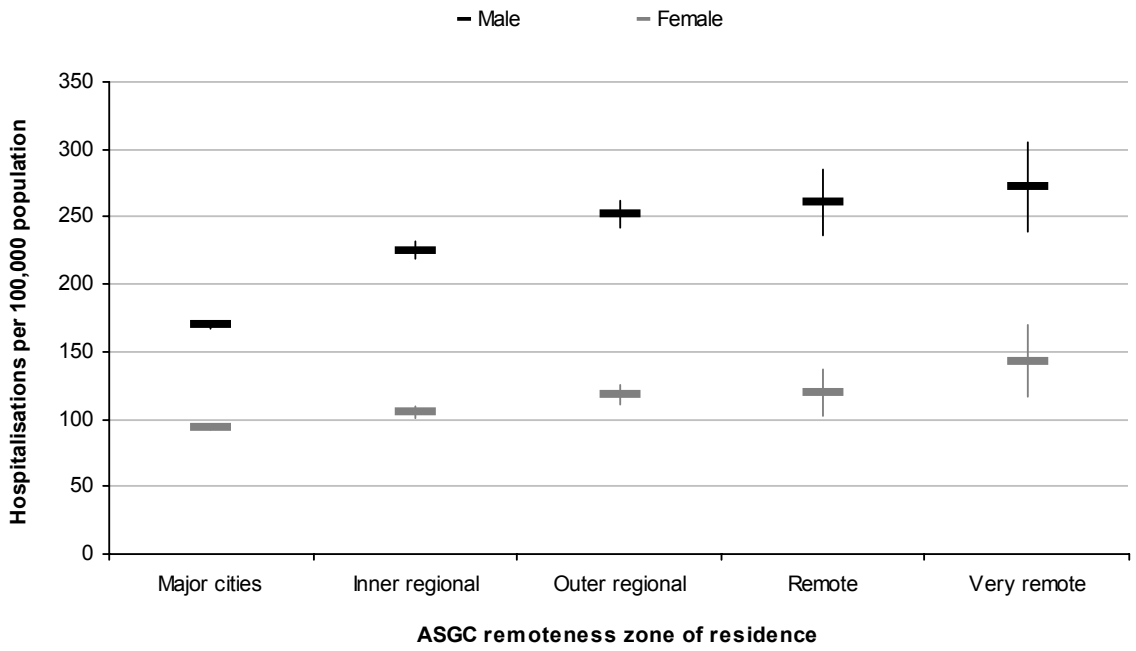


Figure 4.3: Road vehicle traffic crashes—age-standardised rates of serious injury by remoteness of usual residence, Australia, 2003–04

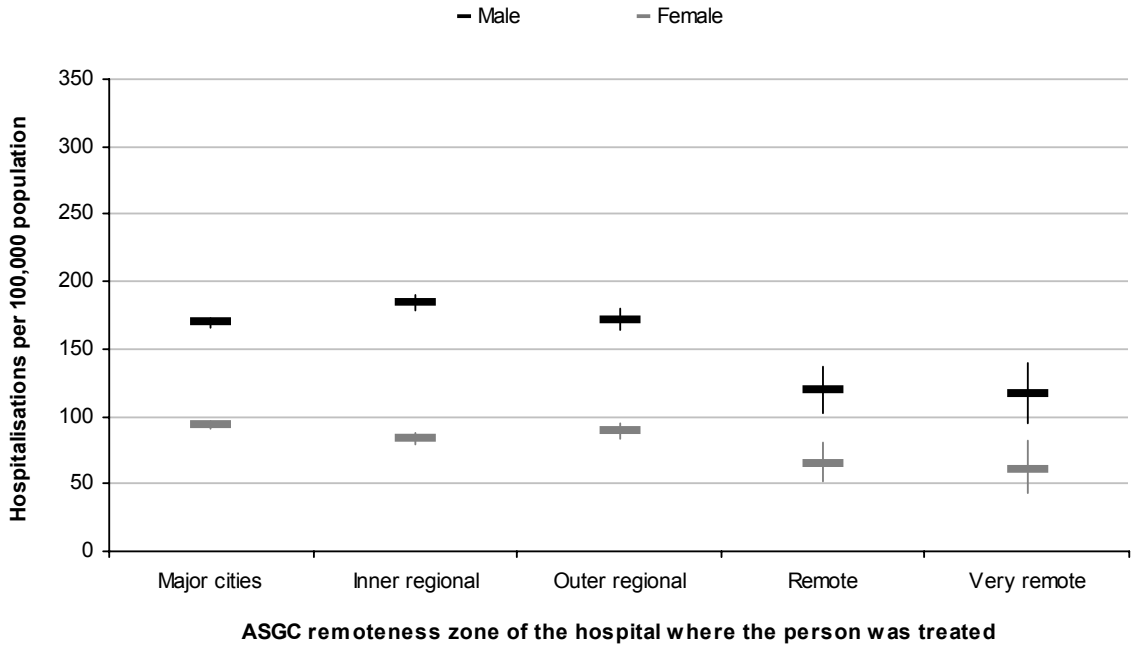


Figure 4.4: Road vehicle traffic crashes—age-standardised rates of serious injury by remoteness of the hospital where the person was treated, Australia, 2003–04

Length of stay

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 for persons seriously injured in road vehicle traffic crashes was 5.2 days. Mean length of stay for persons seriously injured in road vehicle traffic crashes rose with age (Figure 4.5). For the 7,669 persons with serious injuries that posed a high threat to life, the mean length of stay was 12.3 days and the mean length of stay was greater across all age groups (Figure 4.6).

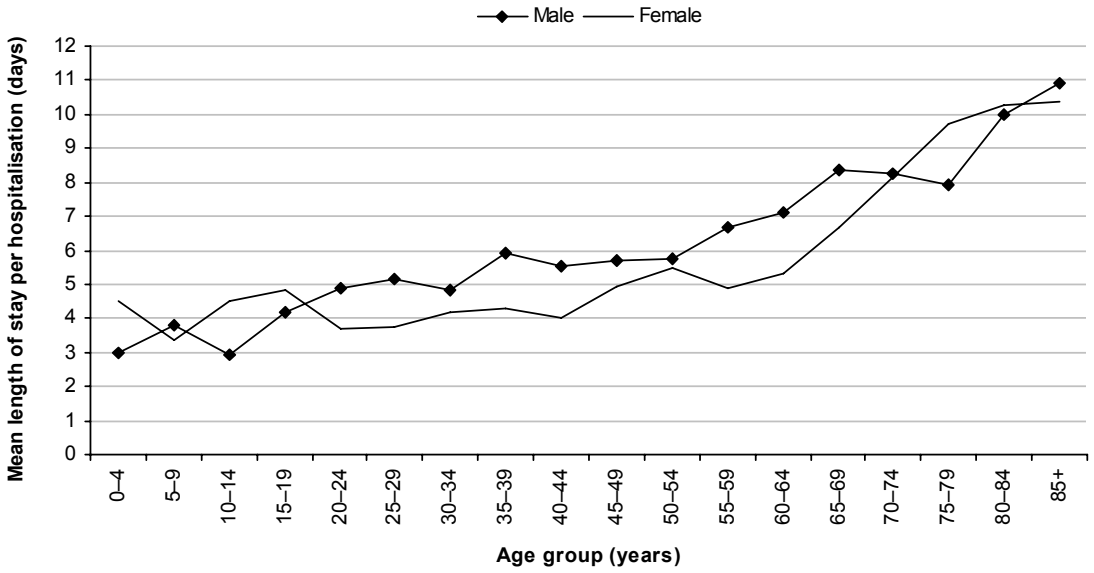


Figure 4.5: Road vehicle traffic crashes—mean length of stay for serious injury by age and sex, Australia, 2003–04

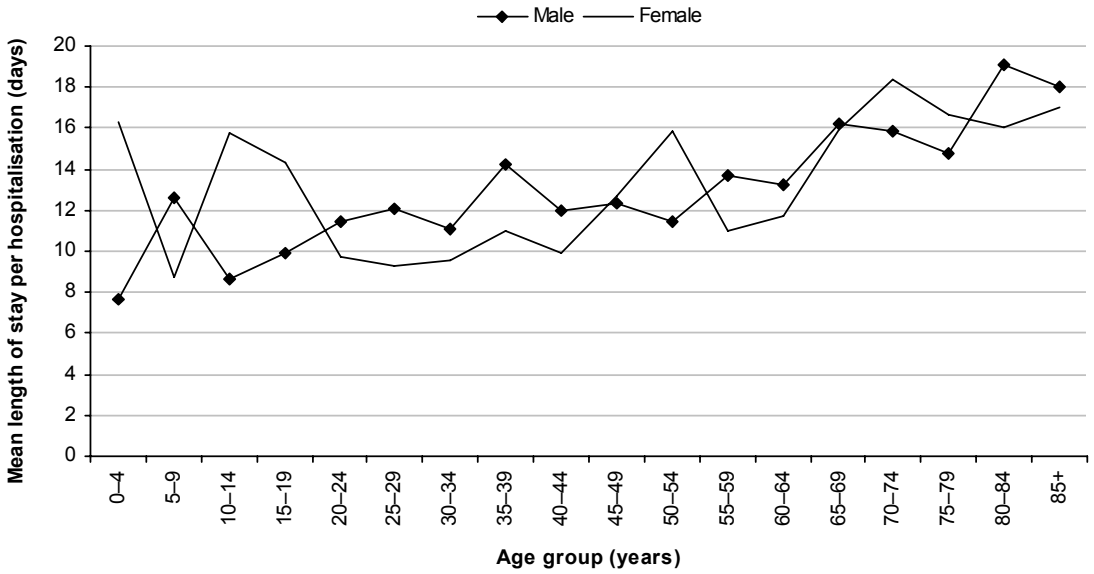


Figure 4.6: Road vehicle traffic crashes—mean length of stay for serious injury with a high threat to life by age and sex, Australia, 2003–04

Length of stay 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 8.8 days in hospital (Figure 4.7). The mean length of stay in hospital was 5.4 days for motorcyclists, 5.2 days for car passengers, 4.9 days for car drivers and 3.0 days for pedal cyclists. The peaks at ages 10–14 years for car drivers and 80–84 years for motorcyclists reflect two cases with a length of stay in hospital that was greater than 60 days.

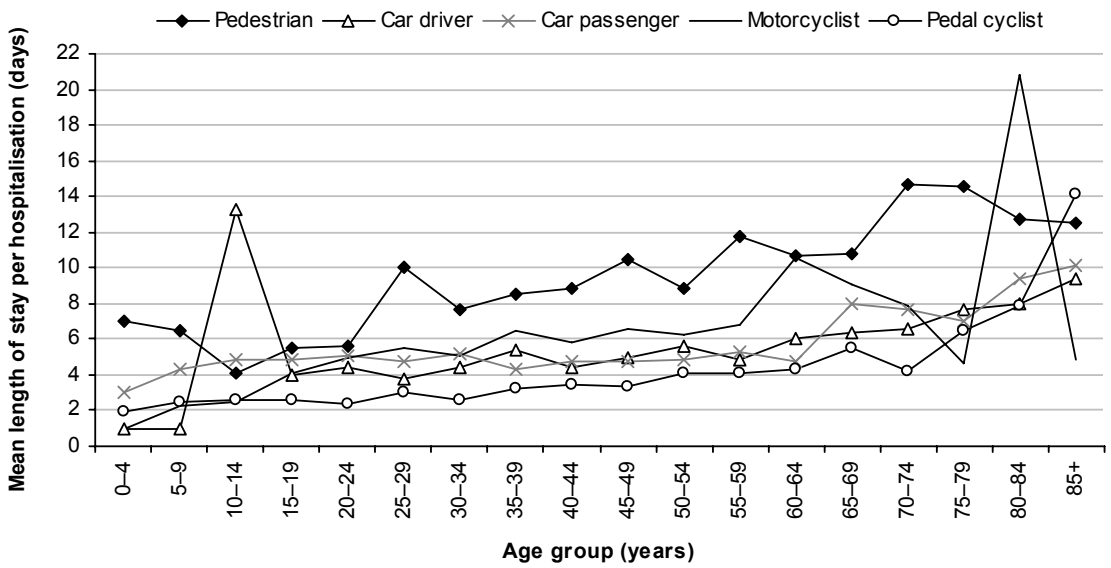


Figure 4.7: Road vehicle traffic crashes—mean length of stay for serious injury by age and sex, Australia, 2003–04

Body part

The body region injured in road vehicle traffic crashes differed according to mode of transport (Table 4.12). A third of pedestrians sustained head injuries and over a quarter had lower limb injuries. The injuries sustained by car drivers and car occupants were similar; over a quarter sustained head injuries and nearly a fifth had injuries involving the thorax (chest). Shoulder and upper limb injuries were the most common among motorcyclists (36%) and lower limb injuries were the second most frequent (28%). Shoulder and upper limb injuries were the most the common among pedal cyclists (42%) and head injuries were the second most frequent (27%).

Table 4.12: Case counts and proportions by body region for serious injury due to road vehicle traffic crashes, Australia, 2003–04

	Pedestrian		Car driver		Car passenger		Other car occupant †		Motorcyclist		Pedal cyclist	
Body region injured	**Count**	**Per cent**	**Count**	**Per cent**	**Count**	**Per cent**	**Count**	**Per cent**	**Count**	**Per cent**	**Count**	**Per cent**
Head	859	33.3	2,527	26.0	1,242	25.3	332	29.6	569	10.6	1,008	27.4
Neck	65	2.5	1,704	17.5	772	15.7	140	12.5	152	2.8	76	2.1
Thorax	111	4.3	1,863	19.1	911	18.6	132	11.8	360	6.7	132	3.6
Abdomen, lower back, lumbar spine and pelvis	223	8.7	1,008	10.4	793	16.2	82	7.3	431	8.0	222	6.0
Shoulder and upper limb	398	15.4	1,213	12.5	632	12.9	228	20.3	1,918	35.6	1,533	41.7
Hip and thigh	185	7.2	308	3.2	154	3.1	30	2.7	305	5.7	163	4.4
Lower limb	673	26.1	966	9.9	307	6.3	131	11.7	1,518	28.2	509	13.9
Other injuries not specified by body region	64	2.5	149	1.5	97	2.0	48	4.3	132	2.5	33	0.9
Road user totals	**2,578**	**100.0**	**9,738**	**100.0**	**4,908**	**100.0**	**1,123**	**100.0**	**5,385**	**100.0**	**3,676**	**100.0**

Note: Shading denotes the 2 highest figures for a column.
† The position of the person in the car is unspecified.
The 'body region injured' is the principal diagnosis recorded by the hospital as mainly responsible for occasioning the patient's treatment in hospital, 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 by body part injured

Persons with hip and thigh injuries had the longest episodes of care, with a mean length of stay of 10.5 days (Figure 4.8). There were age differences in the mean length of stay for each body part injured. For example, among children aged 0–4 years, neck injuries resulted in a mean length of stay of 13.9 days, but the length of stay was much lower in older ages, except among those aged 75 years and older.

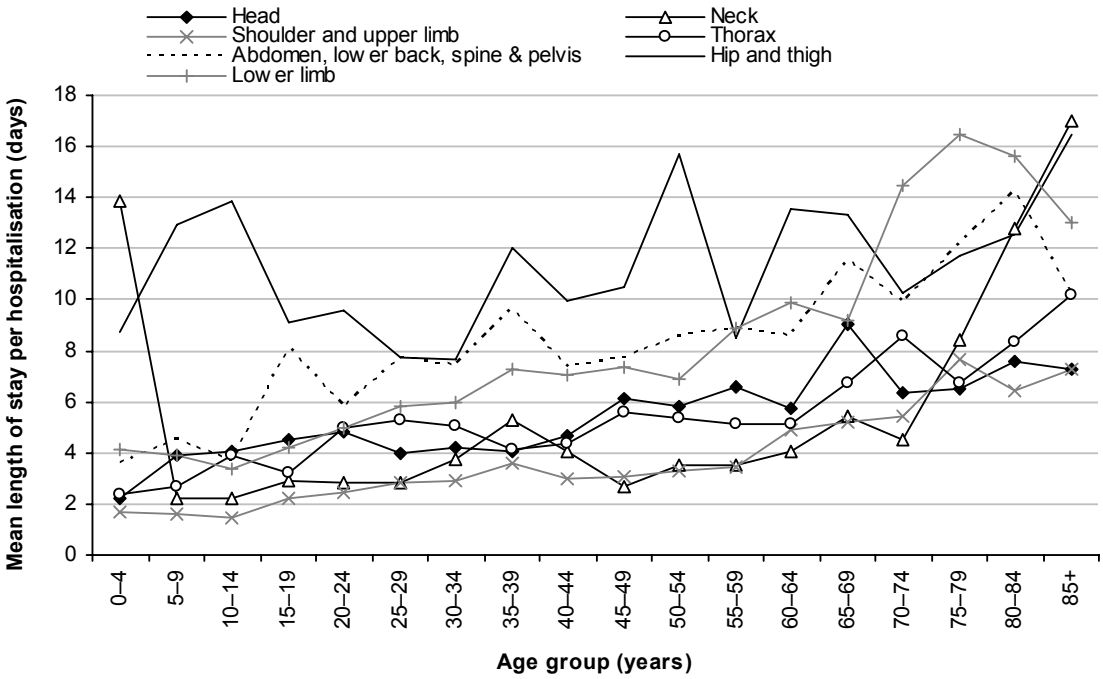


Figure 4.8: Mean length of stay for serious injury by body part injured, Australia, 2003–04

Table 4.13 shows the number of patient days by road user group and body part injured. Head injuries (30.0%) and lower limb injuries (27.3%) resulted in the highest number of patient days for pedestrians. For car drivers and car passengers, it was head injuries (21.7% and 27.5%, respectively), followed by thorax injuries (18.4% and 18.6%, respectively). For motorcyclists, it was lower limb injuries (31.3%) and injuries of the shoulder and upper limb (17.8%). For pedal cyclists, it was shoulder/upper limb injuries (24.3%) and head injuries (23.7%).

Table 4.14 shows the number of patient days for road vehicle traffic crashes by the seriously injured persons' vehicle and the counterpart in the collision. Nearly two thirds (65%) of patient days in hospital were due to five types of road vehicle traffic crashes; 1) a car occupant injured on a public road in a collision with a car, pick-up truck or van (21.1%), 2) a car occupant injured on a public road in a collision with a fixed or stationary object (15.4%), 3) a pedestrian injured on a public road in a collision with a car, pick-up truck or van (12.8%); 4) a car occupant injured on a public road in a non-collision transport accident (8.8%); and 5) a motorcyclist injured on a public road in a collision with a car, pick-up truck or van (7.0%).

Table 4.13: Road vehicle traffic crashes—patient days in hospital for serious injury by body region, Australia, 2003–04

	Pedestrian		Car driver		Car passenger		Other car occupant †		Motor cyclist		Pedal cyclist	
Body part injured	**LOS**	**%**	**LOS**	**%**	**LOS**	**%**	**LOS**	**%**	**LOS**	**%**	**LOS**	**%**
Head	6,791	30.0	10,350	21.7	6,982	27.5	1,158	21.7	3,264	11.3	2,597	23.7
Neck	763	3.4	5,473	11.5	3,035	12.0	558	10.5	944	3.3	314	2.9
Thorax	1,178	5.2	8,794	18.4	4,721	18.6	985	18.5	2,824	9.8	510	4.7
Abdomen, lower back, lumbar spine and pelvis	2,411	10.7	6,921	14.5	4,645	18.3	619	11.6	4,310	14.9	1,310	12.0
Shoulder and upper limb	2,158	9.5	4,515	9.5	2,078	8.2	685	12.9	5,145	17.8	2,664	24.3
Hip and thigh	1,935	8.6	3,803	8.0	1,759	6.9	245	4.6	2,750	9.5	1,528	14.0
Lower limb	6,180	27.3	7,080	14.8	1,921	7.6	876	16.4	9,051	31.3	1,955	17.9
Other injuries not specified by body region	1,214	5.4	845	1.8	253	1.0	206	3.9	645	2.2	66	0.6
Length of stay totals	**22,630**	**100.0**	**47,781**	**100.0**	**25,394**	**100.0**	**5,332**	**100.0**	**28,933**	**100.0**	**10,944**	**100.0**

Note: Shading denotes the 2 highest figures for a road user group.
† The position of the person in the car is unspecified.
The 'body region injured' is the principal diagnosis recorded by the hospital as mainly responsible for occasioning the patient's treatment in hospital, 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 4.14: Road vehicle traffic crashes—patient days in hospital by seriously injured persons' vehicle and the counterpart in the collision; Australia, 2003–04

	Counterpart in collision										
Seriously injured person	**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†**	**Other and unspecified transport accidents**	**Total**
Car occupant	31,275	171	26	379	4,583	94	88	22,844	13,016	6,031	78,507
Motorcyclist	10,369	643	20	431	913	33	25	3,646	7,643	5,210	28,933
Pedal cyclist	4,146	44	220	63	250	0	*	468	2,783	2,966	10,944
Pedestrian	18,964	289	114	0	1,711	408	41	0	0	1,103	22,630
Occupant of pick-up truck or van	408	0	0	6	151	35	6	368	546	189	1,709
Occupant of heavy transport vehicle	159	0	*	12	147	10	*	370	947	155	1,802
Bus occupant	125	0	0	14	19	*	0	64	330	1,096	1,650
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	431	431
Occupant of three-wheeled motor vehicle	38	6	0	0	0	0	0	17	51	32	144
Occupant of a tram	0	0	0	0	0	0	0	0	0	31	31
Occupant of a train	0	0	0	0	0	0	0	0	0	50	50
Occupant of special agricultural or industrial or construction vehicle	0	0	0	0	0	0	0	0	0	165	165
Unknown	0	0	0	0	0	0	0	0	195	1,333	1,528
Total	**65,484**	**1,153**	**381**	**905**	**7,774**	**582**	**165**	**27,777**	**25,511**	**18,792**	**148,524**

Note: Shading denotes the 5 highest figures in the table.
* Small counts are omitted.
Includes cases where Principal Diagnosis was coded to ICD-10-AM S00–T98.
† Includes non-collision accidents such as overturning, falling or being thrown from a vehicle. It is possible this category may have been used as a residual (i.e. 'dump') code for cases lacking information on whether the accident involved a collision with a counterpart, despite the provision of the *other and unspecified category* for this purpose.
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'.

Trends in serious injury rates from 1999–00 to 2003–04

Case counts and trends in the rates of serious injury over five years by sex and by mode of transport are shown in Tables 4.15, 4.16, 4.17 and Figure 4.9. Results must be interpreted with caution as there is potential for variation over time in admission practice, especially for lower severity cases and changes over time in the coding of external causes (Harrison & Steenkamp 2002). Injuries with a high threat to life have been found elsewhere to be less susceptible to changes over time in admission practice (Langley et al. 2003; Cryer & Langley 2006) and are considered in Tables 4.18, 4.19, 4.20 and Figure 4.10.

The age-standardised rate of serious injury due to road vehicle traffic crashes fluctuated over the five year period (Table 4.15). Although rates for males (and persons overall) in 2001–02 and 2003–04 were significantly higher than for other years, there did not appear to be any increasing or decreasing trend over time in the rate of hospitalisation due to road vehicle traffic crashes.

The age-standardised rate of serious injury due to road vehicle crashes declined among pedestrians from 15.4 per 100,000 in 1999–00 to 12.9 per 100,000 in 2003–04 (Table 4.16). Male pedestrian rates declined from 18.9 per 100,000 in 1999–00 to 16.0 per 100,000 in 2003–04. Female pedestrian rates declined from 12.0 per 100,000 in 1999–00 to 9.8 per 100,000 in 2003–04.

Rates of serious injury among car drivers and car passengers fluctuated over the five year period, both for males and persons overall. However, the serious injury rate for female car drivers increased from 37.4 per 100,000 in 1999–00 to 42.2 per 100,000 in 2003–04, whereas the rate for female car passengers declined from 29.3 per 100,000 in 1999–00 to 26.5 per 100,000 in 2003–04.

The age-standardised rate of serious injury among motorcyclists increased over the five year period from 23.5 per 100,000 in 1999–00 to 27.1 per 100,000 in 2003–04. The increase was mainly attributable to male motorcyclists; the male rate of serious injury increased from 43.1 per 100,000 in 1999–00 to 49.0 per 100,000 in 2003–04, whereas the rate among female motorcyclists was low over the five year period.

Rates of serious injury among pedal cyclists fluctuated over the five year period, for males and females and persons overall.

Table 4.15: Road vehicle traffic crashes—trends in the age-standardised rates of serious injury by sex; Australia, 1999–00 to 2003–04

Seriously injured	Age-standardised rate per 100,000 population (95% CI)				
	1999–00	2000–01	2001–02	2002–03	2003–04
Males	181 (178–184)	180 (177–183)	191 (188–193)	183 (180–186)	190 (187–192)
Females	99 (97–101)	97 (95–99)	101 (99–103)	96 (94–98)	99 (97–101)
Persons	140 (138–142)	138 (137–140)	146 (144–147)	139 (138–141)	144 (143–146)
Seriously injured	**Case numbers**				
	1999–00	2000–01	2001–02	2002–03	2003–04
Males	17,240	17,292	18,530	17,980	18,846
Females	9,458	9,402	9,910	9,546	9,934
Persons	26,698	26,694	28,440	27,526	28,782[(a)]

(a) Includes cases where sex is missing or indeterminate.

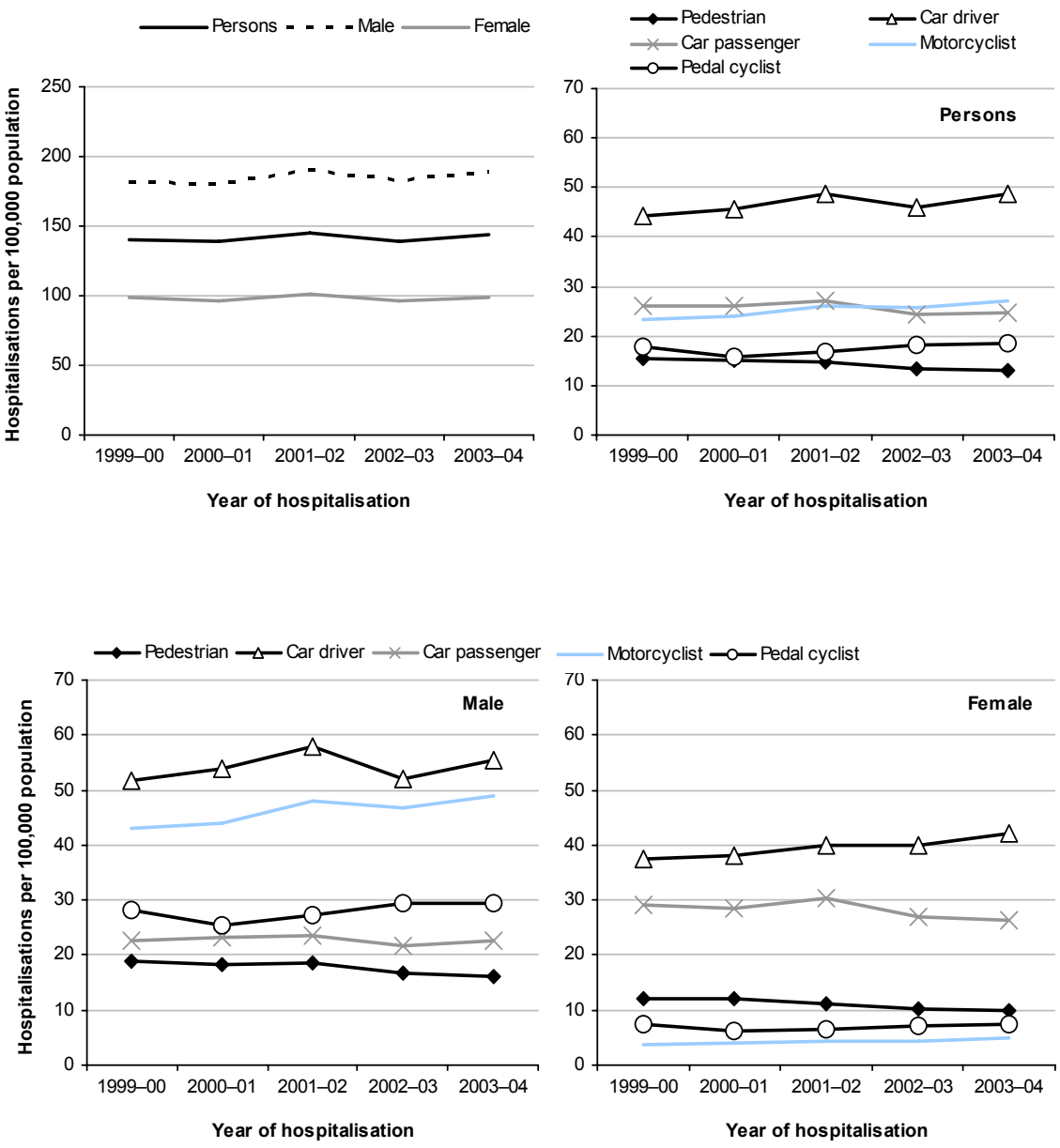


Figure 4.9: Road vehicle traffic crashes—trends in the age-standardised rates of serious injury by sex and mode of transport, Australia, 1999–00 to 2003–04

Table 4.16: Road vehicle traffic crashes—trends in the age-standardised rates of serious injury by sex and mode of transport, Australia, 1999–00 to 2003–04

Mode of transport	Age-standardised rate per 100,000 population (95% CI)				
	1999–00	2000–01	2001–02	2002–03	2003–04
Males					
Pedestrian	18.9 (18.0–19.8)	18.3 (17.4–19.1)	18.6 (17.7–19.4)	16.9 (16.0–17.7)	16.0 (15.2–16.8)
Car driver	51.9 (50.4–53.3)	53.9 (52.4–55.4)	57.9 (56.4–59.5)	52.0 (50.6–53.4)	55.3 (53.9–56.8)
Car passenger	22.5 (21.5–23.4)	23.3 (22.3–24.2)	23.6 (22.7–24.6)	21.6 (20.7–22.5)	22.6 (21.7–23.5)
Motorcyclist	43.1 (41.7–44.4)	43.9 (42.6–45.2)	47.9 (46.5–49.3)	46.9 (45.6–48.3)	49.0 (47.7–50.4)
Pedal cyclist	28.2 (27.1–29.3)	25.3 (24.3–26.3)	27.2 (26.2–28.2)	29.3 (28.3–30.4)	29.5 (28.5–30.6)
Females					
Pedestrian	12.0 (11.3–12.6)	12.0 (11.3–12.7)	11.3 (10.6–11.9)	10.2 (9.5–10.8)	9.8 (9.2–10.5)
Car driver	37.4 (36.2–38.7)	38.0 (36.8–39.2)	40.0 (38.8–41.3)	40.1 (38.8–41.3)	42.2 (40.9–43.5)
Car passenger	29.3 (28.2–30.3)	28.6 (27.5–29.7)	30.2 (29.1–31.3)	27.0 (26.0–28.0)	26.5 (25.4–27.5)
Motorcyclist	3.8 (3.4–4.2)	4.0 (3.6–4.4)	4.3 (3.8–4.7)	4.2 (3.8–4.6)	5.0 (4.6–5.4)
Pedal cyclist	7.5 (6.9–8.0)	6.3 (5.8–6.8)	6.4 (5.9–6.9)	7.1 (6.5–7.6)	7.4 (6.9–8.0)
Persons					
Pedestrian	15.4 (14.8–16.0)	15.1 (14.6–15.7)	14.8 (14.3–15.4)	13.5 (13.0–14.0)	12.9 (12.4–13.4)
Car driver	44.4 (43.5–45.4)	45.7 (44.8–46.7)	48.8 (47.8–49.8)	45.9 (44.9–46.8)	48.6 (47.7–49.6)
Car passenger	26.0 (25.3–26.7)	26.1 (25.4–26.8)	27.0 (26.3–27.7)	24.4 (23.7–25.1)	24.6 (23.9–25.3)
Motorcyclist	23.5 (22.8–24.2)	24.0 (23.3–24.7)	26.1 (25.4–26.9)	25.6 (24.9–26.3)	27.1 (26.4–27.9)
Pedal cyclist	17.9 (17.3–18.5)	15.8 (15.3–16.4)	16.9 (16.3–17.5)	18.3 (17.7–18.9)	18.6 (18.0–19.2)

Table 4.17: Road vehicle traffic crashes—serious injury cases by sex and mode of transport, Australia, 1999–00 to 2003–04

Mode of transport	Serious injury case numbers				
	1999–00	2000–01	2001–02	2002–03	2003–04
Males					
Pedestrian	1,769	1,731	1,777	1,633	1,568
Car driver	4,874	5,122	5,588	5,085	5,490
Car passenger	2,151	2,255	2,306	2,132	2,251
Motorcyclist	4,151	4,252	4,683	4,630	4,891
Pedal cyclist	2,719	2,455	2,672	2,905	2,951
Females					
Pedestrian	1,161	1,185	1,124	1,037	1,010
Car driver	3,596	3,691	3,944	3,992	4,248
Car passenger	2,804	2,772	2,966	2,683	2,656
Motorcyclist	363	390	413	410	494
Pedal cyclist	705	601	620	686	725
Persons					
Pedestrian	2,930	2,916	2,901	2,670	2,578
Car driver	8,470	8,813	9,532	9,077	9,738
Car passenger	4,955	5,027	5,272	4,815	4,908[(a)]
Motorcyclist	4,514	4,642	5,096	5,040	5,385
Pedal cyclist	3,424	3,056	3,292	3,591	3,676

(a) Includes cases where sex is missing or indeterminate.

Trends in serious injury with a high threat to life from 1999–00 to 2003–04

The age-standardised rate of serious injury due to road vehicle traffic crashes for injuries with a high threat to life declined over the five year period from 42 per 100,000 in 1999–00 to 38 per 100,000 in 2003–04 (Tables 4.18 and Figure 4.10). There was a decline in the rate of serious injury with a high threat to life among females; from 28 per 100,000 in 1999–00 to 24 per 100,000 in 2003–04. There did not appear to be any trend in the male rate of serious injury with a high threat to life.

The age-standardised rate of serious injury due to road vehicle traffic crashes with a high threat to life declined among pedestrians from 6.2 per 100,000 in 1999–00 to 4.8 per 100,000 in 2003–04 (Table 4.19). Male pedestrian rates declined from 7.8 per 100,000 in 1999–00 to 5.9 per 100,000 in 2003–04. Female pedestrian rates declined from 4.7 per 100,000 in 1999–00 to 3.7 per 100,000 in 2003–04.

Rates of serious injury with a high threat to life among car drivers fluctuated over the five year period, both for males and females and persons overall. However, the rate of serious injury with a high threat to life among car passengers declined over the five year period from 8.3 per 100,000 in 1999–00 to 6.8 per 100,000 in 2003–04. The decline was mainly attributable to a decline among female car passengers in the rate of serious injury with a high threat to life; from 8.7 per 100,000 in 1999–00 to 6.5 per 100,000 in 2003–04, whereas the male rate fluctuated over the five year period.

Motorcyclist and pedal cyclist rates of serious injury due to road vehicle traffic crashes for injuries with a high threat to life fluctuated over the five year period, for males and females and persons overall.

Table 4.18: Road vehicle traffic crashes—trends in the age-standardised rates of serious injury with a high threat to life by sex, Australia, 1999–00 to 2003–04

High threat to life seriously injured	Age-standardised rate per 100,000 population (95% CI)				
	1999–00	2000–01	2001–02	2002–03	2003–04
Males	55 (54–57)	51 (49–52)	53 (52–55)	51 (49–52)	52 (51–54)
Females	28 (27–29)	25 (24–26)	25 (24–26)	24 (23–25)	24 (24–25)
Persons	42 (41–43)	38 (37–39)	39 (38–40)	37 (36–38)	38 (37–39)
High threat to life seriously injured	**Case numbers**				
	1999–00	**2000–01**	**2001–02**	**2002–03**	**2003–04**
Males	5,227	4,848	5,153	4,975	5,186
Females	2,703	2,482	2,488	2,379	2,482
Persons	7,930	7,330	7,641	7,354	7,669[(a)]

(a) Includes cases where sex is missing or indeterminate.

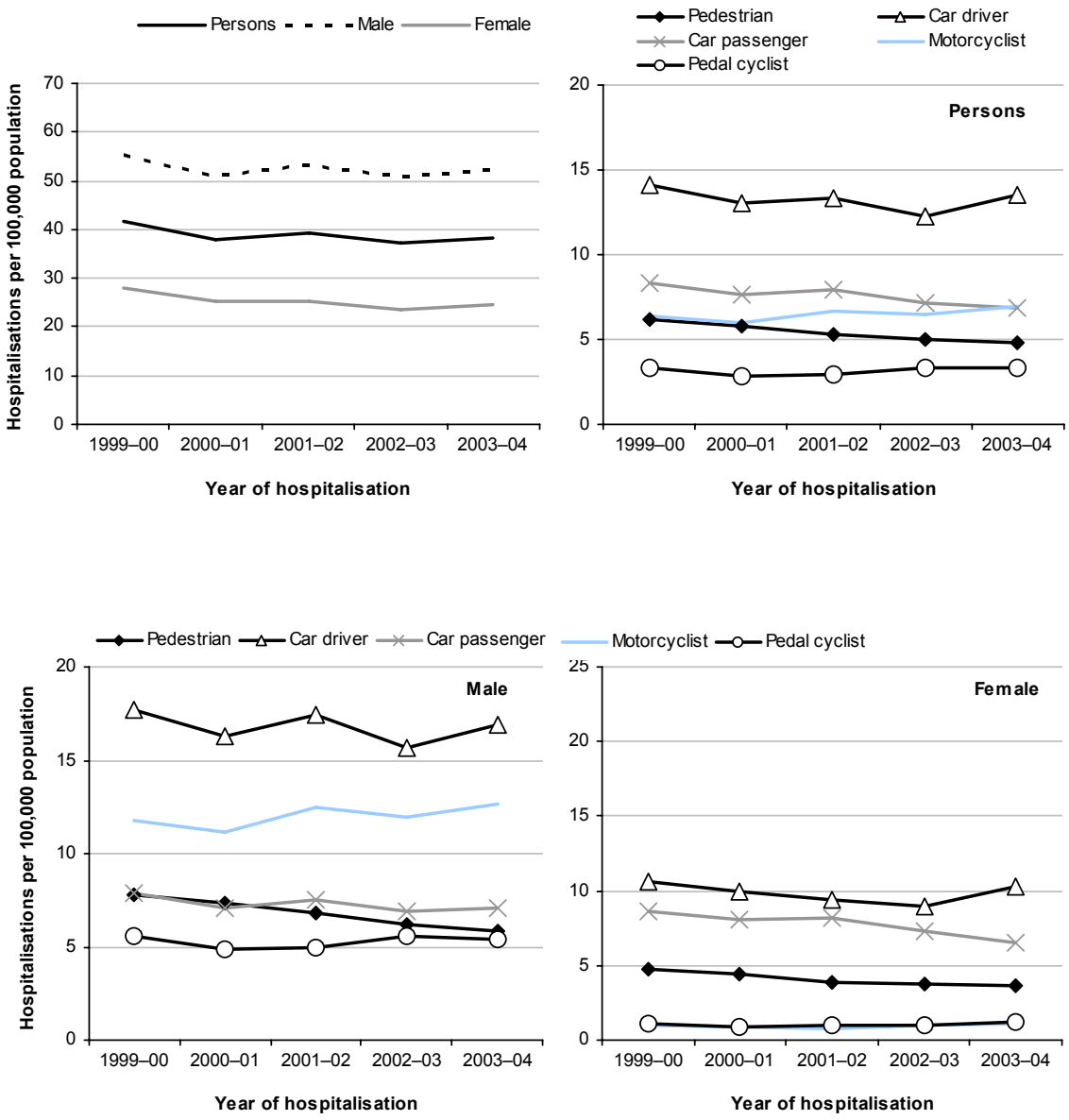


Figure 4.10: Road vehicle traffic crashes—trends in the age-standardised rates of serious injury with high threat to life by sex and mode of transport, Australia, 1999–00 to 2003–04

Table 4.19: Road vehicle traffic crashes—trends in the age-standardised rates of serious injury with a high threat to life by sex and mode of transport, Australia, 1999–00 to 2003–04

Mode of transport	Age-standardised rate per 100,000 population (95% CI)				
	1999–00	2000–01	2001–02	2002–03	2003–04
Males					
Pedestrian	7.8 (7.2–8.4)	7.3 (6.8–7.9)	6.8 (6.3–7.3)	6.2 (5.7–6.7)	5.9 (5.4–6.3)
Car driver	17.7 (16.9–18.6)	16.3 (15.5–17.1)	17.4 (16.6–18.2)	15.7 (14.9–16.4)	16.9 (16.1–17.7)
Car passenger	7.9 (7.3–8.5)	7.1 (6.6–7.7)	7.6 (7.0–8.1)	6.9 (6.4–7.4)	7.1 (6.5–7.6)
Motorcyclist	11.8 (11.1–12.4)	11.1 (10.5–11.8)	12.5 (11.8–13.2)	11.9 (11.2–12.6)	12.7 (12.0–13.4)
Pedal cyclist	5.6 (5.1–6.1)	4.8 (4.4–5.3)	4.9 (4.5–5.4)	5.6 (5.1–6.1)	5.4 (4.9–5.8)
Females					
Pedestrian	4.7 (4.3–5.1)	4.4 (4.0–4.8)	3.9 (3.5–4.3)	3.8 (3.4–4.2)	3.7 (3.3–4.1)
Car driver	10.6 (9.9–11.2)	9.9 (9.3–10.6)	9.4 (8.8–10.0)	8.9 (8.4–9.5)	10.3 (9.6–10.9)
Car passenger	8.7 (8.1–9.3)	8.1 (7.5–8.6)	8.2 (7.6–8.7)	7.3 (6.8–7.8)	6.5 (6.0–7.0)
Motorcyclist	1.0 (0.8–1.2)	0.8 (0.7–1.1)	0.8 (0.6–1.0)	1.0 (0.8–1.2)	1.1 (0.9–1.3)
Pedal cyclist	1.1 (0.9–1.3)	0.9 (0.7–1.1)	1.0 (0.8–1.2)	1.0 (0.8–1.2)	1.2 (1.0–1.4)
Persons					
Pedestrian	6.2 (5.9–6.6)	5.8 (5.5–6.2)	5.3 (5.0–5.6)	5.0 (4.7–5.3)	4.8 (4.5–5.1)
Car driver	14.1 (13.5–14.6)	13.0 (12.5–13.5)	13.3 (12.8–13.8)	12.2 (11.7–12.7)	13.5 (13.0–14.0)
Car passenger	8.3 (7.9–8.7)	7.7 (7.3–8.0)	7.9 (7.5–8.3)	7.1 (6.8–7.5)	6.8 (6.5–7.2)
Motorcyclist	6.4 (6.1–6.8)	6.0 (5.7–6.3)	6.6 (6.3–7.0)	6.5 (6.1–6.8)	6.9 (6.5–7.3)
Pedal cyclist	3.3 (3.1–3.6)	2.8 (2.6–3.1)	2.9 (2.7–3.2)	3.3 (3.0–3.5)	3.3 (3.0–3.5)

Table 4.20: Road vehicle traffic crashes—serious injury cases for injuries with a high threat to life by sex and mode of transport, Australia, 1999–00 to 2003–04

Mode of transport	High threat to life serious injury case numbers				
	1999–00	2000–01	2001–02	2002–03	2003–04
Males					
Pedestrian	721	688	645	597	575
Car driver	1,663	1,543	1,675	1,529	1,667
Car passenger	755	690	737	682	705
Motorcyclist	1,133	1,077	1,218	1,175	1,263
Pedal cyclist	532	465	481	550	536
Females					
Pedestrian	458	435	394	390	385
Car driver	1,017	966	928	894	1,039
Car passenger	831	785	806	729	656
Motorcyclist	98	82	77	102	111
Pedal cyclist	103	83	93	98	119
Persons					
Pedestrian	1,179	1,123	1,039	987	960
Car driver	2,680	2,509	2,603	2,423	2,706
Car passenger	1,586	1,475	1,543	1,411	1,362[(a)]
Motorcyclist	1,231	1,159	1,295	1,277	1,374
Pedal cyclist	635	548	574	648	655

(a) Includes cases where sex is missing or indeterminate.

Appendix 1: Data issues

Serious injury

National hospital separations data were provided by 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, 2001). 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.

Hospital cases were defined as being due to land transportation if they contained a first reported Chapter 20 external cause code in the ICD-10-AM range V01–V89. Cases with a Principal Diagnosis other than injury and cases in which an external cause code for land transportation only appears as an Additional Diagnosis 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 52,268 records.

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

Record occurring from 1 July 2003 to 30 June 2004	Persons
Records with an ICD-10-AM 'Land Transport Accident' code (V01–V89) as external cause anywhere in the record.*	58,644
Records with a 'Land Transport Accident' as first reported external cause†, and	58,180
• Injury as a Principal Diagnosis (S00–T98)	52,268

Notes:
There were 464 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 of land transportation.
† There were 5,912 cases with a first reported external cause code of land transportation but a Principal Diagnosis outside of the injury range (S00–T98). The most common Principal Diagnoses were *care involving use of rehabilitation procedure, unspecified* (n=1,620), *examination and observation following transport accident* (n=622), *cervicalgia* (n=293), *other specified diseases and conditions complicating pregnancy, childbirth and the puerperium* (n=264) and *other specified surgical follow-up care* (n=202).

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: V0(1–6).1, V09.2(3), V1(0–8).4(5,9), V19.4(5,6,9), V2(0–8).4(5,9), V29.4(5,6,9), V3(0–8).5(6,7,9), V39.4(5,6,9), V4(0–8).5(6,7,9), V49.4(5,6,9), V5(0–8).5(6,7,9), V59.4(5,6,9), V6(0–8).5(6,7,9), V69.4(5,6,9), V7(0–8).5(6,7,9), V79.4(5,6,9), V81(2).1, V82.9, V8(3–6).0(1,2,3), V87, V89.2(3).

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 one or more nights stay in a hospital bed (i.e. deaths are excluded). The terms *seriously injured* and *hospitalisation*s are used interchangeably in the report. 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 2003 to 30 June 2004, coded according to the third edition of ICD-10-AM (NCCH 2002);
- Principal Diagnosis in the ICD-10-AM range S00–T98 using Chapter XIX *Injury, poisoning and certain other consequences of external causes* codes;
- First (left-most) external cause of morbidity in ICD-10-AM range V01–V99 (i.e. the 'Transport Accidents' section of Chapter XX *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; and
- Mode of separation has any value except the one indicating that the person died while in hospital.

High threat to life hospitalisations are cases with injury diagnoses that have been found to be associated with a probability of death before discharge from hospital of 5.9% or higher according to the ICD-based Injury Severity Score (ICISS) method, as implemented by Stephenson et al. (2004), using Australian hospital separations data.

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) requires the inclusion of 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).

Population and other denominators

With the exception of Tables 4.5 and 4.6, all rates in this report were calculated using, as the denominator, the final estimate of the estimated resident population as at 31 December 2003, obtained from the AIHW. The rates in Tables 4.5 and 4.6 were calculated using, as the denominator, the number of each vehicle type registered by state and territory and the kilometres travelled, sourced from the Australian Bureau of Statistics Motor Vehicle Census (ABS 2005a) and Survey of Motor Vehicle Use, Australia (ABS 2005b).

Direct standardisation was used to age-standardise rates, using the Australian population in 2001 as the standard (ABS 2003). Confidence intervals (95%; based on a Poisson distribution) were calculated using a method elsewhere described (Anderson & Rosenburg 1998).

For further information on how jurisdiction is defined, see page 24. Remoteness zones in this report refer to the place of usual residence of the person who died or was admitted to hospital (see p. 28). The remoteness zones were specified according to the ABS Australian Standard Geographical Classification (ASGC) (ABS 2001).

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.

Comparability with other ATSB reports

Australian hospitals use an international standard classification called the International Statistical Classification of Diseases (ICD) when compiling 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 Australian Transport Safety Bureau (ATSB) or others in looking at safety in each transport mode individually. For example, road safety statistics compiled by the ATSB are focused on crashes on public roads, whereas ICD covers road crashes both on and off public roads. Aviation statistics compiled by the ATSB do not cover hang-gliders, gliders and other forms of non-powered aircraft, whereas ICD does.

The serious injury data series published previously by the ATSB for the period 1999–00 to 2002–03 excluded same-day separations from the definition of serious injury, resulting in figures that are substantially lower than those provided in this report. In 2003–04, for example, same-day separations accounted for one-third of separations due to land 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 on the same day. In 2003–04, for example, there were over 2,000 such land transport injury cases. Consequently, same-day separations are now included in the figures. This effectively means the threshold for serious injury is now 'admitted to hospital', regardless of the length of stay.

For national road deaths, readers should refer to the 'road safety/statistics' part of the ATSB website at <www.atsb.gov.au>, where road death statistics are published on a monthly basis. Similarly, for details on marine, rail and air safety (aviation death statistics are published monthly), the relevant part of the ATSB website should be consulted.

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AIHW

This report presents national statistics on serious injury due to land transport accidents that resulted in admission to hospital in Australia during the one-year period 2003–04. It focuses on road vehicle traffic crashes in particular, and examines variables such as mode of transport, gender, age group and remoteness from an urban centre.

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