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# Mobility scooter-related injuries and deaths

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A person's mobility is closely linked to health status and quality of life (Webber et al. 2010). Mobility scooters are increasingly seen as a lifeline toward independence and emotional wellbeing, particularly for older Australians (ACCC et al. 2012).

Despite media attention and community discussion about the risks and benefits of mobility scooter use, there are few substantial evidence-based reviews of these largely unregulated consumer products.

Recent publications from Australia and elsewhere have generally focused on mobility scooter uptake, safety, training, design issues, and health benefits (Jancey et al. 2013; Johnson et al. 2013; Nitz 2008; Zagol & Krasuski 2010), with limited focus on mobility scooter-related injuries and deaths (Edwards & McCluskey 2010; Kitching et al. 2015; Mortensen & Kim 2016).

This report aims to help fill this data gap. It provides an overview of mobility scooter-related injuries, including pedestrians injured in a collision with a mobility scooter, and falls that were most likely from a mobility scooter and ended in a hospital admission. These data are for the 5 years from 1 July 2011 to 30 June 2016. It also provides information on mobility scooter-related deaths in Australians aged 60 and over for 10 years from 1 July 2006 to 30 June 2016, using data from the National Coronial Information System (NCIS).



Over the **5 years** from 2011–12 to 2015–2016, **4,613** people were admitted to hospital for a possible mobility scooter-related injury

Most injuries were **fall-related** (97%); the rest were pedestrians injured in a collision with a mobility scooter (3%)

Over the 10 years from 2006–07 to 2015–16, **69** people aged 60 and over died from a mobility scooter-related incident

Mobility scooter-related deaths were most likely to occur when the person was **crossing the road** (45%)

Compared with a decade earlier, fall injuries most likely from a mobility scooter rose for older Australians, from about 200 to about **500** per year

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## What are mobility scooters?

Several terms are used to describe mobility scooters; such as 'motorised mobility scooter', 'motorised wheelchairs', 'powered scooter', 'buggy', or 'gopher'.

As a consumer product, mobility scooters fall under the product regulation of the Australian Competition and Consumer Commission (ACCC). The ACCC defines mobility scooters as 'three or four wheels attached to a frame supporting a chair and steering wheel' (ACCC 2019). Mobility scooters offer individuals a transport alternative when faced with limited mobility due to ageing or chronic illness, or while recovering from injury or surgery.

Under the Australian Road Rules legislation or regulations in all states and territories, a person using a mobility scooter is considered to be a pedestrian if the mobility scooter has a maximum speed of 10 kilometres per hour on flat ground, and users are subject to the general road rules for pedestrians (Parliamentary Counsel's Committee, Australian Road Rules, as at 19 March 2018, Part 14, Rule 18, cited in Senate Standing Committee on Rural and Regional Affairs and Transport 2018). Mobility scooters do not need to be registered, except in Queensland (Queensland Government 2018), and can be operated without training or a licence.

### Where can mobility scooters be used?

All states and territories have guidelines for where mobility scooters can be used, and under what conditions. For example, the Queensland Government's (2017) *Wheelchairs and mobility scooters—a guide to safe travel in Queensland* provides the following summary of road rules that apply to mobility scooter users:

- Mobility scooters can go anywhere a pedestrian can go, such as footpaths, shopping centres, and nature strips.
- Mobility scooters cannot be used on the road in the same way as a car. A mobility scooter can only be taken on the road if there is no footpath, pathway, or nature strip available, and only where a pedestrian is allowed to walk.
- Mobility scooter users who need to use the road must stay as close as possible to the side of the road, and travel in the opposite direction to traffic for good visibility.
- Mobility scooter users should always cross a road at the safest possible point, using pedestrian crossings, traffic lights, or refuge islands if available.
- Users must obey all traffic signals intended for pedestrians.

New South Wales guidelines further require the user to have a reasonable need to use a mobility scooter because of physical disability or limited mobility, and to not be affected by alcohol or drugs when travelling on a road or road-related area such as a footpath (New South Wales Government 2018).

## Why report on mobility scooters?

In 2010, the ACCC responded to media-generated concern about the safety of mobility scooter use among vulnerable older Australians by commissioning the Monash University Accident Research Centre to conduct a targeted study of injury data involving mobility scooter devices for people aged 60 and over (Gibson et al. 2011).

Researchers used a mixed-methods study to review admitted patient care data from the National Hospital Morbidity Database and mortality data from the NCIS. The study identified 442 hospital admissions due to a fall-related injury likely to have involved a mobility scooter in 2006–07 and 2007–08, and 62 deaths involving mobility scooters over a 10-year period (1 July 2000 to 16 August 2010) (Gibson et al. 2011).

Further to this study, an Australian-wide telephone survey was done in 2012 to estimate the incidence of mobility scooter use in the adult population (age 18 and over) (ACCC et al. 2012). This estimated that about 13 per 1,000 Australians aged 18 and over used a mobility scooter, equating to about 231,000 users.

Despite the stereotype of mobility users being older Australians aged 60 and over, this survey found that half (51%) of mobility scooter users were aged 18–59. Without more current data on mobility scooter usage available, the best estimate of the number of older Australians aged 60 and over using a mobility scooter was about 115,000 people in 2012.

This report aims to provide an updated analysis of mobility scooter-related reported injuries and deaths. A significant difference between the ACCC commissioned study and this study is the inclusion of analysis of pedestrians injured in a collision with a mobility scooter.

### What data did we use?

This report uses admitted patient care data from the National Hospital Morbidity Database for the 5 years from 1 July 2011 to 30 June 2016 to provide information on mobility scooter-related injury. Diagnosis, procedure and external cause data for 2011–12 to 2015–16 were reported to the National Hospital Morbidity Database by all states and territories using the *International Statistical Classification of Diseases and Related Health Problems, 10th revision, Australian modification* (ICD 10-AM) (ACCD 2014; NCCC 2013).

In this report, mobility scooter injury cases are estimated as the number of injury separations, minus records with a mode of admission of 'Admitted patient transferred from another hospital'.

This report also uses mortality data from the NCIS for the 10 years from 1 July 2006 and 30 June 2016. The NCIS stores coronial information on all deaths reported to Australian coroners.

### What do we mean by pedestrian?

The term 'pedestrians' or 'cases of pedestrians' is used instead of 'estimated cases' throughout this report for ease of reading. Pedestrian is the descriptive term used by the ICD-10-AM external cause code categories that are the subject of this report, such as V00.04 *Pedestrian injured in collision with pedestrian conveyance, non-traffic accident (scooter, powered gopher)*.

For more details about the data, selection criteria, data terms and definitions, see <https://www.aihw.gov.au/reports/injury/mobility-scooter-injuries-deaths-2011-12-2015-16/data>.

## How many pedestrians were admitted to hospital?

Table 1 shows the 3 ICD-10-AM categories that are relevant to identifying any hospital admissions for a pedestrian injured in a collision with a mobility scooter.

Over the 5 years from 2011–12 to 2015–16, 121 pedestrians were admitted to hospital for injuries from collisions with mobility scooters. The majority (68%) of these were injured while in a non traffic environment (for example, in a shopping centre, restaurant, or other public space), while only 19% were injured in a collision with a mobility scooter in a traffic setting (for example, while crossing a road, or walking on a footpath).

The numbers of cases of pedestrians injured in a collision with a mobility scooter were roughly similar across the 5-year period, with an average of 24 cases per year (Table 2).

## Female pedestrians were twice as likely to be injured as male pedestrians

**Table 1: Pedestrians injured in collisions with mobility scooters, by place of traffic collision and sex, 2011–12 to 2015–16**

Key indicators	Males	Females	Persons
Pedestrian injured in collision with pedestrian conveyance, non-traffic accident (scooter, powered gopher) cases	19	63	82
Pedestrian injured in collision with pedestrian conveyance, traffic accident (scooter, powered gopher) cases	12	11	23
Pedestrian injured in collision with pedestrian conveyance, unspecified whether traffic or non-traffic (scooter, powered gopher) cases	6	10	16
<b>Total pedestrian injury cases</b>	<b>37</b>	<b>84</b>	<b>121</b>
Age-standardised rate of cases per 100,000 population	0.06	0.11	0.09

Note: Direct age-standardisation was employed, using the Australian population in 2001 as the reference (ABS 2003).

Source: AIHW National Hospital Morbidity Database.

**Table 2: Case numbers for pedestrians injured in collisions with mobility scooters, by year and sex, 2011–12 to 2015–16**

Year	Males		Females		Persons	
	Number	%	Number	%	Number	%
2011–12	6	16.2	20	23.8	26	21.5
2012–13	8	21.6	17	20.2	25	20.7
2013–14	9	24.3	16	19.0	25	20.7
2014–15	5	13.5	10	11.9	15	12.4
2015–16	9	24.3	21	25.0	30	24.8
<b>Total</b>	<b>37</b>	<b>100</b>	<b>84</b>	<b>100</b>	<b>121</b>	<b>100</b>

Source: AIHW National Hospital Morbidity Database.

## Most pedestrians injured were aged 65 and over

Three-quarters (76%) of pedestrians injured in a collision with a mobility scooter were aged 65 and over (Table 3). Of these, 3 out of 4 were women (77%, or 71 of the 92 cases).

**Table 3: Case numbers for pedestrians injured in collisions with mobility scooters, by age group and sex, 2011–12 to 2015–16**

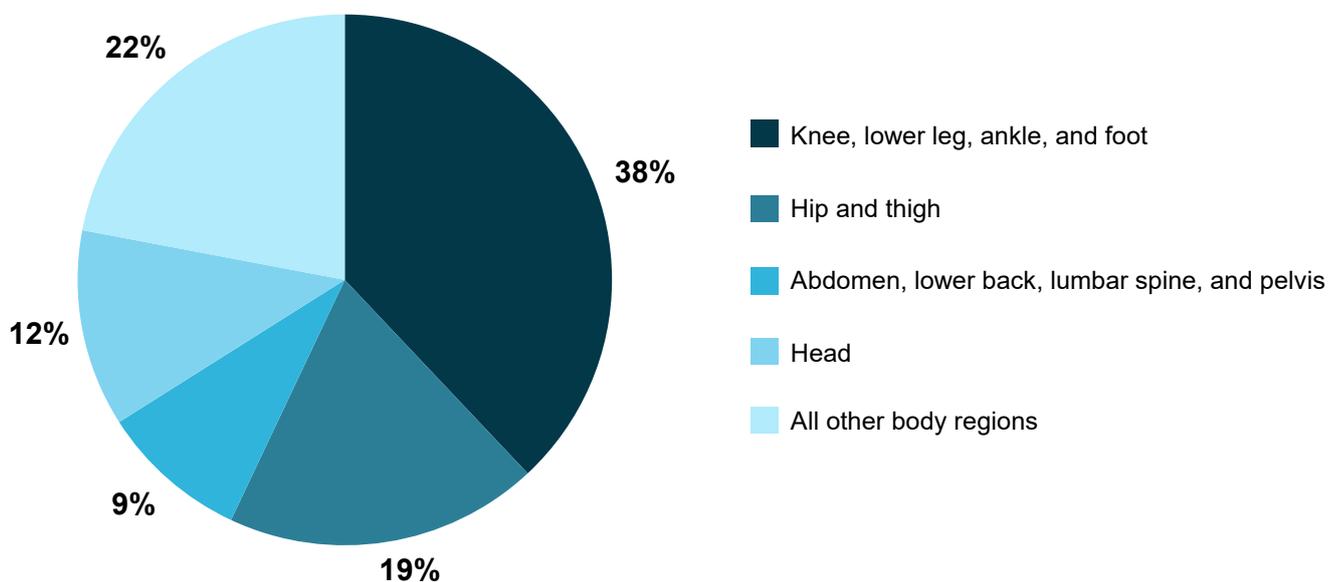
Age group	Males		Females		Persons	
	Number	%	Number	%	Number	%
0–14	7	18.9	0	0.0	7	5.8
15–19	1	2.7	1	1.2	2	1.7
20–34	0	0.0	2	2.4	2	1.7
35–64	8	21.6	10	11.9	18	14.9
65+	21	56.8	71	84.5	92	76.0
<b>Total</b>	<b>37</b>	<b>100</b>	<b>84</b>	<b>100</b>	<b>121</b>	<b>100</b>

Source: AIHW National Hospital Morbidity Database.

## What type of injuries did pedestrians sustain?

Pedestrians were most likely to sustain an injury to their lower limbs (such as the knee, lower leg, ankle, and foot regions) (38%, or 46 cases), or hips and thighs (19%, or 23 cases) (Figure 1).

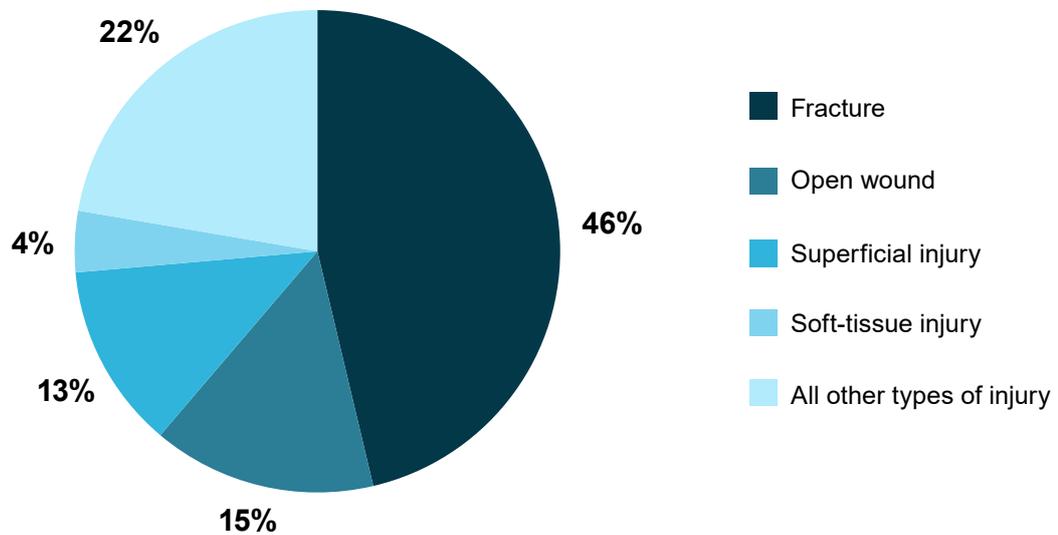
**Figure 1: Proportion of pedestrians injured in collisions with mobility scooters, by body region injured, 2011–12 to 2015–16**



Source: AIHW National Hospital Morbidity Database.

Fractures were the most common type of injury (46%, or 56 cases), followed by an open wound (15%, or 18 cases) (Figure 2).

**Figure 2: Proportion of pedestrians injured in collisions with mobility scooters, by type of injury, 2011–12 to 2015–16**



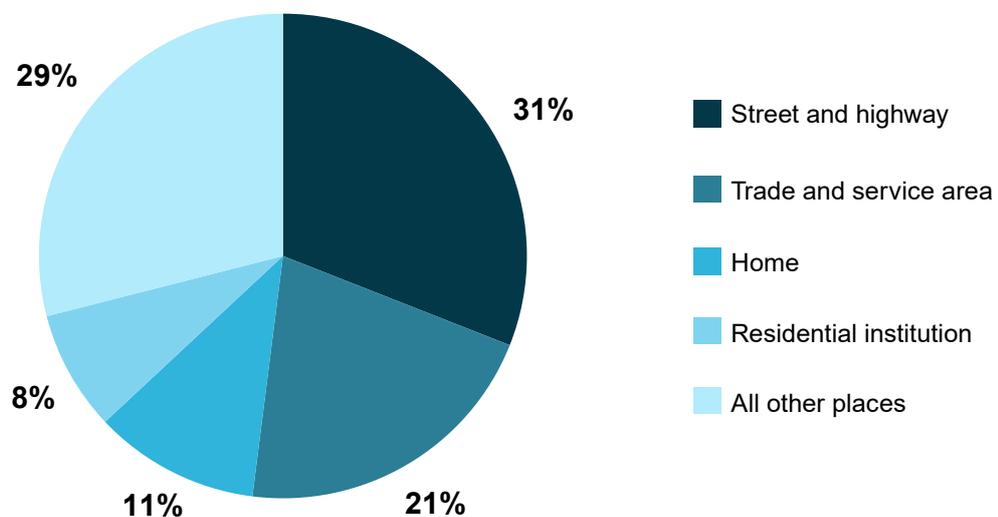
Source: AIHW National Hospital Morbidity Database.

## Where did the collision occur?

The place of the collision was not specified in almost one-quarter (23%, or 28 cases) of the incidents between pedestrians and mobility scooters.

Public spaces such as streets and highways (37 cases), and trade and service areas (26 cases) accounted for just over half of the locations where pedestrians were injured in a collision with a mobility scooter (Figure 3). In and around the home (13 cases), or a residential institution (10 cases) were the other most common types of locations reported.

**Figure 3: Proportion of pedestrians injured in collisions with mobility scooters, by place of occurrence, 2011–12 to 2015–16**



Note: 'All other places' includes both other specified and unspecified places.

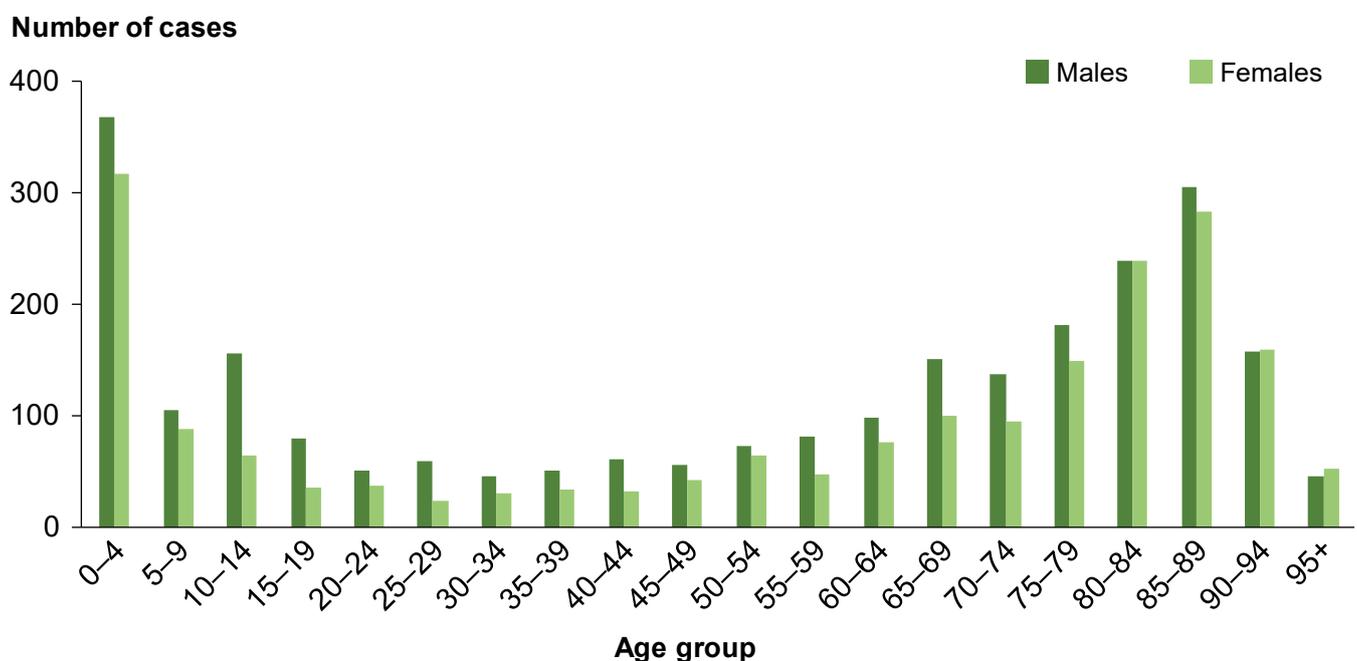
Source: AIHW National Hospital Morbidity Database.

## How many people were injured in a possible mobility scooter-related fall?

The ICD-10-AM code W02.9 *Fall involving other and unspecified pedestrian conveyance* does not distinguish between a fall that 'involved a powered [mobility] scooter' or a fall that occurred 'while seated in or climbing into or out of a shopping trolley'. While it is highly unlikely that older Australians are falling from shopping trolleys, it is not possible to say definitively that all incidents in older Australians coded as W02.9 are due to falling from a powered mobility scooter.

During 2011–12 and 2015–16, close to 4,500 people were hospitalised due to a *Fall involving other and unspecified pedestrian conveyances*. Figure 4 shows the age and sex distribution of these cases. Older Australians aged 60 and over accounted for more than half (55%) of these injury cases, with similar numbers for males (1,320 cases) and females (1,157 cases).

Figure 4: All falls involving other and unspecified pedestrian conveyances, by age and sex, 2011–12 to 2015–16



Source: AIHW National Hospital Morbidity Database.

## What does the data tell us if we restrict falls most likely from a mobility scooter to cases aged 60 and over?

Previous studies have limited analysis of *Falls involving other and unspecified pedestrian conveyances* to people aged 60 and over to increase the likelihood of capturing falls from mobility scooters. The following analyses have been restricted to those aged 60 and over, but not all cases described are necessarily mobility scooter-related.

Over the 5 years, the number of hospitalisations of older Australians aged 60 and over for a *Fall involving other and unspecified pedestrian conveyance* rose from 426 in 2011–12 to an average of 536 per year since 2013–14 (Table 4). These last 3 years show a rise of more than twice the annual admissions identified by Gibson and colleagues (2011) in the 2-year timeframe nearly a decade earlier (197 in 2006–07 and 245 in 2007–08).

**Table 4: Falls involving other and unspecified pedestrian conveyances among Australians aged 60 and over, by year and sex, 2011–12 to 2015–16**

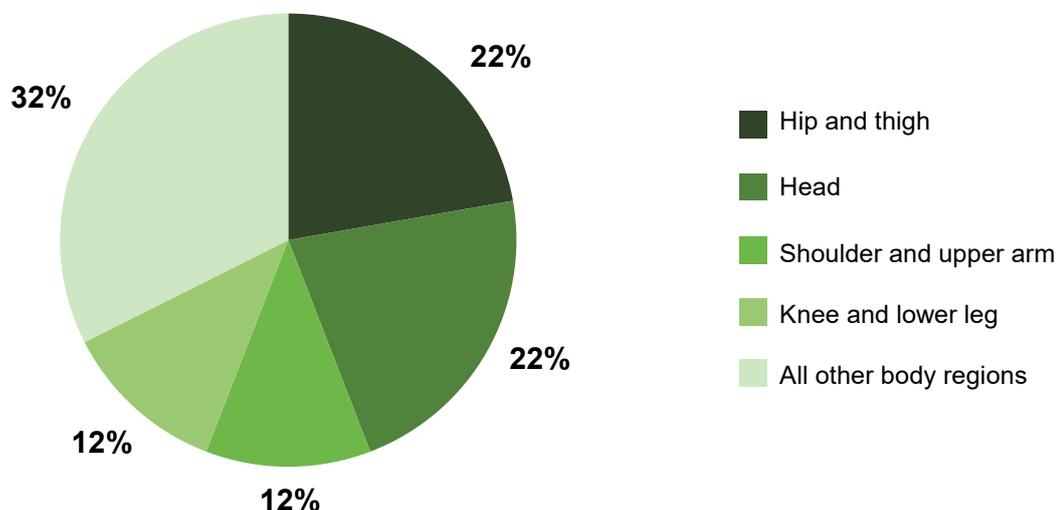
Year	Men		Women		Persons	
	Number	%	Number	%	Number	%
2011–12	218	16.5	208	18.0	426	17.2
2012–13	217	16.4	226	19.5	443	17.9
2013–14	300	22.7	225	19.4	525	21.2
2014–15	295	22.3	250	21.6	545	22.0
2015–16	290	22.0	248	21.4	538	21.7
<b>Total</b>	<b>1,320</b>	<b>100</b>	<b>1,157</b>	<b>100</b>	<b>2,477</b>	<b>100</b>

Source: AIHW National Hospital Morbidity Database.

## What type of injuries did older Australians sustain?

People aged 60 and over who sustained a *Fall from another and unspecified pedestrian conveyance* most commonly injured their hip and thigh (22%, or 551 cases), or head (22%, or 545 cases) (Figure 5).

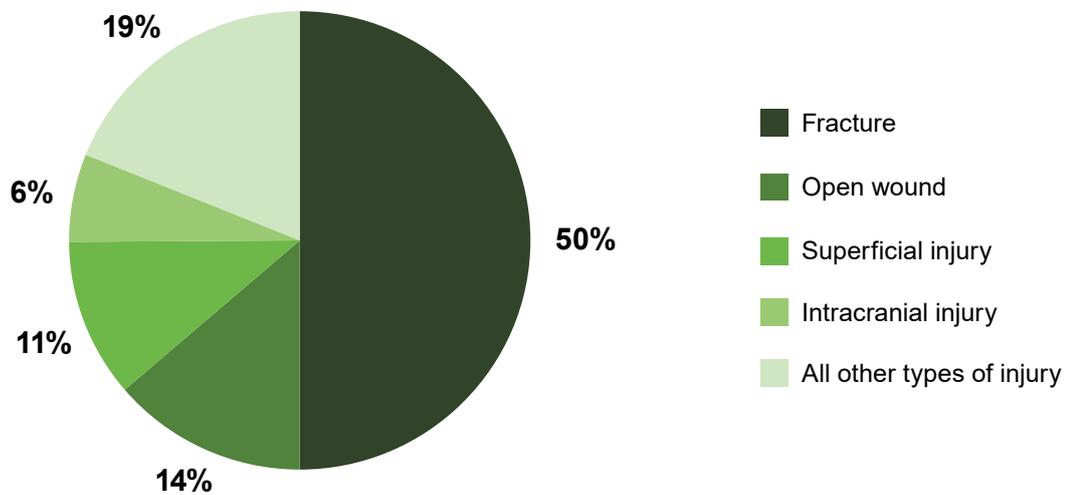
**Figure 5: Proportion of falls involving other and unspecified pedestrian conveyances among Australians aged 60 and over, by body region injured, 2011–12 to 2015–16**



Source: AIHW National Hospital Morbidity Database.

Fractures were the most common type of injury, accounting for half (50%; 1,238 cases) of all injuries (Figure 6).

**Figure 6: Proportion of falls involving other and unspecified pedestrian conveyances among Australians aged 60 and over, by type of injury, 2011–12 to 2015–16**



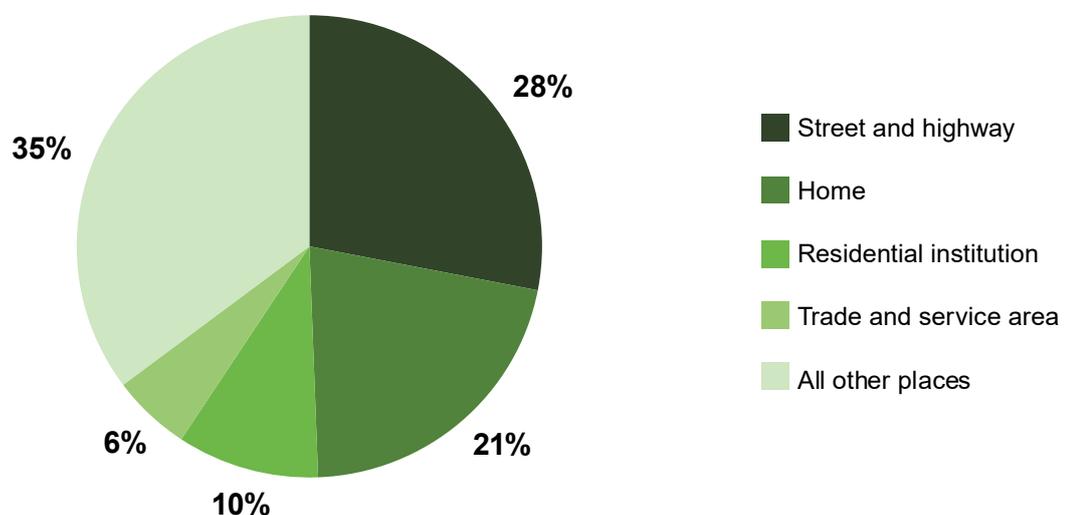
Source: AIHW National Hospital Morbidity Database.

## Where did possible mobility scooter-related falls among older Australians occur?

Almost one-third (30%), or 742, of the 2,477 Falls involving other and unspecified pedestrian conveyances hospitalisations recorded for older Australians had no specified place where the fall injury occurred.

Just over one-quarter (28%) of falls most likely to be due to a mobility scooter occurred on a street or highway (695 cases), and a further 21% occurred in and around the home (529 cases) (Figure 7). About 250 injury cases occurred in a residential institution, while 135 occurred in a trade and service area.

**Figure 7: Proportion of falls involving other and unspecified pedestrian conveyances among Australians aged 60 and over, by place of occurrence, 2011–12 to 2015–16**



Source: AIHW National Hospital Morbidity Database.

## How many mobility scooter incidents resulted in deaths?

A detailed search of the NCIS found 69 people aged 60 and over died from a mobility scooter-related incident between 1 July 2006 and 30 June 2016. Fewer than 10 records were found for deaths in people aged under 60 that might have involved a mobility scooter. Due to this small number, and to enable comparability with similar studies by Gibson et al. (2011) and Kitching et al. (2016), the remaining analysis of mobility scooter deaths is limited to Australians aged 60 and over.

When compared with the 62 and 77 closed coroner cases identified in the previous studies with a similar duration of about 10 years (Gibson et al. 2011; Kitching et al. 2016), this study's finding of 69 deaths between 2006–07 and 2015–16 suggests the incidence of mobility scooter-related deaths among older Australians remains steady.

From 2006–07 to 2015–16, one-quarter (25%, or 17 cases) of older Australians who died following a mobility scooter-related incident were living in residential care at the time of death.

### Most deaths were among those aged 80–89

Mobility scooter-related death was more common in males (79%) than females (21%) (Table 5). About 6 in 10 deaths were among those aged 80–89 (55% of males; 71% of females). These proportions are consistent with the earlier studies (Gibson et al. 2011; Kitching et al. 2016).

**Table 5: Mobility scooter-related deaths among Australians aged 60 and over, by age and sex, 2006–07 to 2015–16**

Age group	Men		Women		Persons	
	Number	%	Number	%	Number	%
60–69	2	3.6	1	7.1	3	4.3
70–79	9	16.4	0	0.0	9	13.0
80–89	30	54.5	10	71.4	41	59.4
90–99	12	21.8	3	21.4	15	21.7
100+	2	3.6	0	0.0	2	2.9
<b>Total</b>	<b>55</b>	<b>100</b>	<b>14</b>	<b>100</b>	<b>69</b>	<b>100</b>

Source: National Coronial Information System.

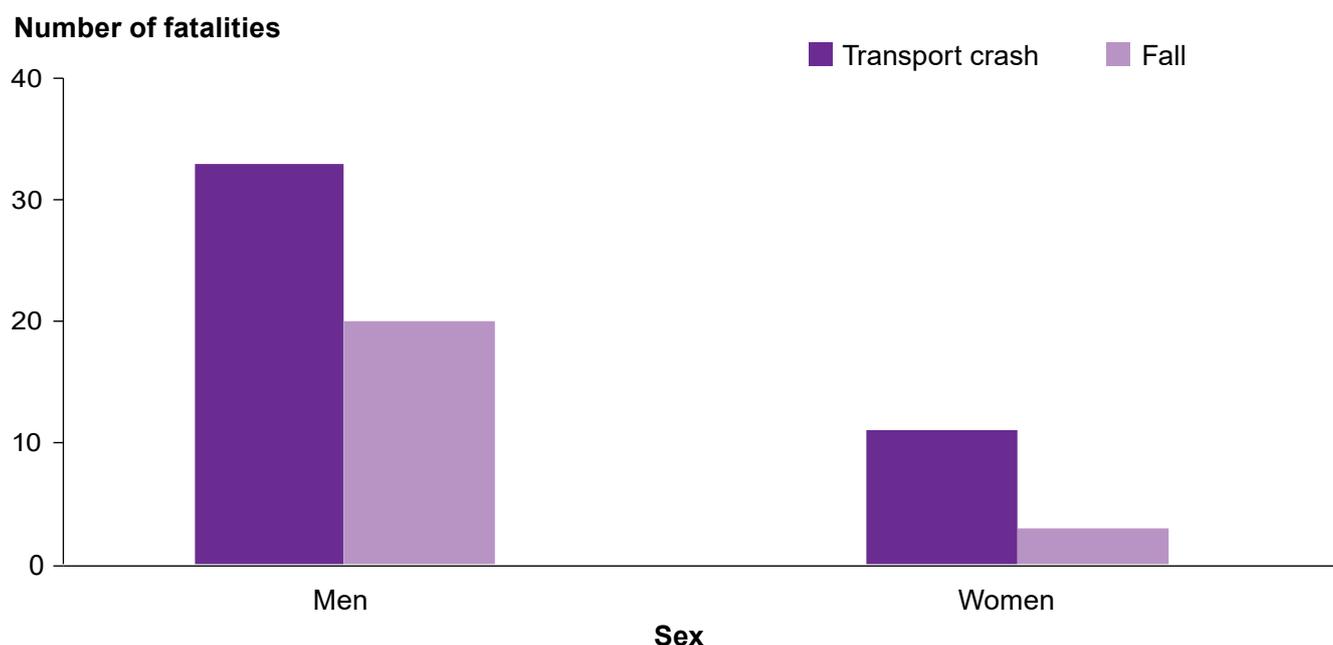
### Nearly 2 in 3 people were killed in a crash with another vehicle

In the 10-year period, 2006–07 to 2015–16, 33 men and 11 women aged 60 and over, died following a collision incident between their mobility scooter and another transport vehicle, such as a car, truck, or train. This accounted for 64% of fatal incidents overall (Figure 8).

A further 20 male and 3 female deaths were due to a fall-related incident involving a mobility scooter (33% of fatal incidents).

While most of these fall-related deaths involved the person operating the mobility scooter, 1 pedestrian died after falling when they were hit by a mobility scooter. Two men also died after their mobility scooter crashed into a fixed/stationary or unspecified object (3% of fatal incidents).

**Figure 8: The 2 main causes of fatal mobility scooter-related incidents among Australians aged 60 and over, by sex, 2006–07 to 2015–16**



Source: National Coronial Information System.

A total of 15 older Australians in their 90s died from mobility scooter-related crashes and falls (22%) (Table 6). Both fatal incidents involving people aged 100 and over were due to falling from a mobility scooter.

**Table 6: Mobility scooter-related deaths among Australians aged 60 and over, by age and 2 main causal groups, 2006–07 to 2015–16**

Age group	Transport crashes		Falls		Total	
	Number	%	Number	%	Number	%
60–69	1	2.3	2	8.7	3	4.5
70–79	5	11.4	3	13.0	8	11.9
80–89	27	61.4	12	52.2	39	58.2
90–99	11	25.0	4	17.4	15	22.4
100+	0	0.0	2	8.7	2	3.0
<b>Total</b>	<b>44</b>	<b>100</b>	<b>23</b>	<b>100</b>	<b>67</b>	<b>100</b>

Note: Table excludes the 2 mobility scooter-related deaths due to a collision with a stationary or unspecified object.

Source: National Coronial Information System.

## What were mobility scooter users doing at the time of their fatal incident?

What the user was doing at the time of the fatal mobility scooter incident was recorded in 54 (78%) of the 69 deaths (Table 7).

The most common activity was crossing a road (45%), followed by travelling on a footpath (10%). Crossing a road includes crossing at marked and unmarked pedestrian crossings, traffic light intersections, pedestrian refuge islands, roundabouts, and unspecified road crossings.

More than one-third (36%) of fatal mobility scooter-related incidents that occurred when the user was crossing a road took place at a pedestrian crossing (11 fatalities).

**Table 7: Mobility scooter-related deaths among Australians aged 60 and over, by sex and type of activity at time of fatal incident, 2006–07 to 2015–16**

Activity type	Men		Women		Persons	
	Number	%	Number	%	Number	%
Crossing road	25	46.3	6	40.0	31	44.9
Alighting/boarding scooter	2	3.7	1	6.7	3	4.3
Travelling on footpath	6	11.1	1	6.7	7	10.1
Travelling on road	5	9.3	0	0.0	5	7.2
Crossing driveway	1	1.9	2	13.3	3	4.3
At home/driveway	1	1.9	1	6.7	2	2.9
Struck by a train	0	0.0	1	6.7	1	1.4
Other specified	1	1.9	1	6.7	2	2.9
Unspecified	13	24.1	2	13.3	15	21.7
<b>Total</b>	<b>54</b>	<b>100</b>	<b>15</b>	<b>100</b>	<b>69</b>	<b>100</b>

Source: National Coronial Information System.

## Circumstances of deaths—NCIS case studies

### Transport crashes

The most commonly specified activity resulting in a transport-related death was crossing a road (80% of the 44 transport crash cases), as shown by these 3 case examples from the NCIS:

**Woman in her 80s:** The woman was struck by a van at low speed while crossing a T intersection. She suffered multiple injuries, including bone fractures, head injuries, and contusions, and died due to complications from these injuries.

**Man in his 70s:** The man was riding his mobility scooter across a pedestrian crossing when he was struck by a vehicle. He later died in hospital.

**Man in his 90s:** The man was struck by a car while crossing a 4-laned highway.

### Falls

The circumstances for fall-related mobility scooter deaths varied considerably, and, for nearly half of the cases (44% of fall cases), were unspecified. The most commonly specified activity was travelling along a footpath (31% of falls cases), as shown by these 3 case examples from the NCIS:

**Woman in her 80s:** The woman had been travelling along a footpath, when she stopped and tried to get off the scooter, using the handle to steady herself. In doing so, she inadvertently activated the acceleration by twisting the handle, and the scooter moved forward causing her to fall to the ground. She developed post-operative complications after a fracture repair, and later died.

**Man in his 80s:** The man was driving his mobility scooter on the footpath alongside a highway. He toppled over on to the highway, and sustained a fatal blow to the head.

**Man in his 90s:** The man was taking the family dog for a ride around the park on his mobility scooter when he fell from his scooter, and fractured his leg. His health deteriorated after surgery on his leg, and he later died.

*Source:* National Coronial Information System.

## How many mobility scooter-related deaths involved alcohol?

The presence of alcohol was identified in 5 of the 69 (or 7%) of the NCIS records of mobility scooter-related deaths among people aged 60 and over.

On examination of the supporting coroner reports and toxicology reports, only 2 of these records had alcohol intoxication noted as a contributing factor to death, and both involved falls. Notably, alcohol was either not specified or not detected in toxicology reports in any transport crash mobility scooter deaths.

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## Glossary

For definitions of terms used in this report, see <<https://www.aihw.gov.au/reports/injury/mobility-scooter-injuries-deaths-2011-12-2015-16/>>.



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