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# Trends in hospitalisations due to falls by older people, Australia

1999–00 to 2010–11

*Clare Bradley*



**Flinders**  
UNIVERSITY

INJURY RESEARCH AND STATISTICS SERIES NO. 84



**Australian Government**

**Australian Institute of  
Health and Welfare**

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

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Canberra

Cat. no. INJCAT 160

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# Abbreviations

ABS	Australian Bureau of Statistics
AIHW	Australian Institute of Health and Welfare
ASGC	Australian Standard Geographical Classification
CI	confidence interval
ICD-10-AM	International Statistical Classification of Diseases, 10th revision, Australia Modification
ICISS	International Statistical Classification of Diseases-based Injury Severity Score
LOS	length of stay
METeOR	Metadata Online Registry
MLOS	Mean length of stay
NCCH	National Centre for Classification in Health
NHMD	National Hospital Morbidity Database
NISU	National Injury Surveillance Unit
NPHP	National Public Health Partnership
RACF	Residential Aged Care Facilities

# Symbols

..	not applicable
n.e.c.	not elsewhere classified
n.p.	not publishable because of small numbers, confidentiality or other concerns about the quality of the data
std.	standardised

# Summary

This report focuses on trends in fall-related hospital care for people aged 65 and older that occurred over the period 1999–00 to 2010–11. Information is also presented on the incidence and burden of hospitalised fall injury in the financial year 2010–11.

## Falls in 2010–11

The estimated number of serious injuries due to falls in people aged 65 and older in 2010–11 was 92,150. Females accounted for most of these fall injury cases, and rates of cases were higher for females than for males for all age groups.

About 70% of fall injury cases in 2010–11 were recorded as having occurred in either the home or an aged care facility. The age-standardised rate of falls in the home for older people living in the community was 1,647 per 100,000 population while the rate of falls for older people living in aged care facilities was 9,226 per 100,000 population.

In addition to the separations representing these fall injury cases, there were more than 100,000 other fall-related hospital separations for people aged 65 and older in 2010–11.

One in every 10 days spent in hospital by a person aged 65 and older in 2010–11 was directly attributable to an injurious fall. These episodes of care accounted for 1.4 million patient days over the year and the average total length of stay per fall injury case was estimated to be 14.7 days.

## Trends in hospitalised fall-related injury 1999–00 to 2010–11

The patient days for hospital care directly attributable to fall-related injury doubled, from 0.7 million patient days in 1999–00 to 1.4 million patient days in 2010–11.

Age-standardised rates of fall injury cases increased over the 12 years to June 2011 (2% per year), however there was a decrease in the rate of hip fractures due to falls (–1% per year). There were nearly 25,000 extra fall injury cases for people aged 65 and older in 2010–11 than there would have been if the rate of falls had remained stable since 1999–00.

The decrease in the rate of hip fracture was confined to the period 1999–00 to 2005–06. No change in trend was observed from 2006–07. Most other types of fall-related fracture increased over the study period.

Falls resulting in head injuries increased at a particularly high rate (7% per year). Increases in the rate of fall injury cases and fall-related head injury were most apparent for residents of *Major cities* (3% and 8% per year, respectively).

Rates of fall injury for Aboriginal and Torres Strait Islander people were generally lower than those for Other Australians although both sets of rates showed similar trends. Continuing weakness in the identification of Indigenous status limited analysis.

Rates of fall-related hospital care episodes additional to the initial episode for each fall injury case (such as follow-up care) increased significantly over the study period. However, the average total length of stay per case was relatively stable over the study period (around 15 days). Hence this increase may have been due to changes in hospital practices (for example, the division of care into multiple episodes) rather than because fall injuries required more care.



# 1 Introduction

The main topics addressed in this report are:

- An overview of hospitalised injury due to falls by people aged 65 and older in 2010–11
- Trends in hospitalised injury due to falls by people aged 65 and older over the period 1999–00 to 2010–11.

## Structure of this report

**Chapter 2** presents an overview of fall injury cases by people aged 65 and older in Australia in 2010–11, including the circumstances of the fall.

**Chapter 3** presents a summary of fall-related hospitalisations additional to those representing falls cases for the older population in 2010–11, including hospital care following transfers after initial fall injury episodes, fall-related follow-up care separations and episodes of care attributed to a ‘tendency to fall’.

**Chapter 4** presents a time series analysis of fall injury cases and other fall-related episodes of hospital care from 1 July 1999. It includes data for 1999–00 to 2010–11.

**Appendix A** provides summary information on the hospital data source and includes notes on the presentation of data, the population estimates used to calculate population rates and methods of analysis. Relevant terms regarding the data used in this report are summarised in Box 1.1.

**Appendix B** consists of data tables underpinning results presented in the chapters.

Chapters are structured to address a common set of questions concerning the source data for each chapter, with section titles that include:

- What is reported? – which describes the analyses presented in the chapter
- What data were used? – which outlines chapter-specific inclusion criteria and rate calculation methods, with references to more detailed information in the Appendix A.

Generally, summary tables and figures are placed immediately below the discussion in related text.

## Methods

The Australian Institute of Health and Welfare (AIHW) provided the national hospital separations data from the National Hospital Morbidity Database (NHMD). A separation is defined as:

The process by which an episode of care for an admitted patient ceases. A separation may be formal or statistical. (METeOR identifier: 270407, see also AIHW 2010a).

The hospital separations analysed in this report were coded according to seven editions of the *International statistical classification of diseases, 10th revision, Australia modification* (ICD-10-AM). This classification has been used to code diagnoses and external causes for all Australian hospital separations from 1 July 1999, which was taken as the starting point for the trends reported here.



The report examines all NHMD records for people aged 65 and older that included both an ICD-10-AM injury diagnosis in the range S00–T75 or T79 and an external cause code signifying an unintentional fall (W00–W19). These codes could appear anywhere within the record (that is, analysis was not restricted to records that had a principal diagnosis indicating that the injury was the chief reason for the episode of hospital care). However, our definition of fall injury *cases* is restricted to records where the principal diagnosis is an injury. This report also includes an analysis of NHMD records for people aged 65 and older that included the diagnosis code R29.6 *Tendency to fall, not elsewhere classified*.

Chapters 2 and 4 focus on cases of fall injury. Some injuries result in more than one episode in hospital and, accordingly, generate more than one NHMD record. As the NHMD does not include information that enables a set of records belonging to a particular injury case to be recognised as such, case numbers need to be estimated. The approach used for this report excludes from estimates of case numbers separations which meet our injury criteria but which have a *Mode of admission* of a transfer from another acute hospital. Inclusion of such separations would be likely to result in the multiple counting of some cases. This approach corrects for overestimation of cases that is due to transfers, but cannot correct for overestimation that is due to readmissions.

Rates are generally Age-standardised because risk of fall injury varies greatly with age and the age distribution of the Australian population aged 65 and older changed during the study period.

For tables and charts in this report:

- The patient's age is as at the date of admission.
- In tables by age group and sex, cases for which age and/or sex were not reported are included in totals.
- Charts depicting trends generally present both modelled rates (as lines) and Age-standardised rates (as symbols).

### **Box 1.1: Summary of terms and classifications relating to hospitalised injury**

Statistics on admitted patients are compiled when an **admitted patient** (a patient who undergoes a hospital's formal admission process) completes an episode of admitted patient care and 'separates' from the hospital. This is because most of the data on the use of hospitals by admitted patients are based on information provided at the end of the patients' episodes of care, rather than at the beginning. The length of stay and the procedures carried out are then known and the diagnostic information is more accurate.

**Separation** is the term used to refer to the episode of admitted patient care, which can be a total hospital stay (from admission to discharge, transfer or death) or a portion of a hospital stay beginning or ending in a change of type of care (for example, from acute care to rehabilitation). 'Separation' also means the process by which an admitted patient completes an episode of care by being discharged, dying, transferring to another hospital or changing type of care.

The **principal diagnosis** is the diagnosis established after study to be chiefly responsible for occasioning the patient's episode of admitted patient care. An additional diagnosis is a condition or complaint that either coexists with the principal diagnosis or arises during the episode of care. Additional diagnoses are reported if the conditions affect patient management.

(continued)

### **Box 1.1 (continued): Summary of terms and classifications relating to hospitalised injury**

In 2010–11, diagnoses and external causes of injury were recorded using the 7th edition of the *International statistical classification of diseases and related health problems, 10th revision, Australian modification* (ICD-10-AM, NCCH 2010). It comprises classifications of diseases and external causes of injuries and poisoning, based on the World Health Organization's version of ICD-10.

Data covering the period 1999 to 2011 were coded according to seven editions of the ICD-10-AM. Changes across the ICD-10-AM over the revisions have not impacted on the analysis overall. Where analyses have been limited to specific editions of the ICD-10-AM, due to changes to the coding, this has been noted within the text (e.g. Figure 4.9).

The ICD-10-AM classification is hierarchical, with 19 disease chapters which are divided into a large number of more specific disease groups (represented by 3-character codes). Chapter 19 provides codes for injury conditions, such as *Fracture of neck of femur*. *External causes of morbidity and mortality* comprise the twentieth chapter of the ICD-10-AM and are used in conjunction with injury diagnoses to describe the mechanism of injury (for example, injury due to a transport crash or, as in this report, injury due to a fall) and the role of human intent (for example, unintentional injuries or intentional self-harm). Most of the 3-character categories in ICD-10-AM are divided into more specific categories represented by 4- and 5-character codes. In this publication, most diagnosis and external cause information is presented at the 3-character level.

The data presented on area of usual residence were provided as state or territory and Statistical Local Area (SLA) and/or postcode, and have been aggregated to remoteness areas according to the Australian Standard Geographical Classification (ABS 2006, see Appendix A).

### **Box 1.2: National injury prevention plans**

Injury prevention and control is a National Health Priority Area. Injury is also the subject of three national prevention plans: the National Injury Prevention and Safety Promotion Plan: 2004–2014 (NPHP 2005a), the National Aboriginal and Torres Strait Islander Safety Promotion Strategy (NPHP 2005b) and – of particular relevance to this report – the National Falls Prevention for Older People Plan: 2004 Onwards (NPHP 2005c).

The aim of the National Falls Prevention Plan is to work strategically and collectively to reduce the burden and impact of falls and fall-related injury among older people in three key settings: residential aged care, acute care and the community.

The goals of the plan include:

- Generating a low risk population and promoting independence.
- Improving outcomes through local partnerships.
- Creating safer environments and products.
- Enhancing the capacity of workers in the health and related sectors in the prevention of falls and fall-related injury in older people.
- Developing and managing knowledge through research, information dissemination, and training.

(continued)

**Box 1.2 (continued): National injury prevention plans**

The plan also advocates that prevention of fall-related injury should be a responsibility of all who promote products, services or information to older people.

Analyses such as this report and those in the National Injury Surveillance Unit series *Hospitalisations due to falls by older people, Australia* (see Bradley 2012a, 2013) contribute to the goal of developing knowledge through research and information dissemination.

## 2 Fall injury incidence, Australia 2010–11

This chapter draws on data from the National Hospital Morbidity Database (NHMD) covering the financial year 1 July 2010 to 30 June 2011 to present an overview of hospitalised injury due to falls by people aged 65 and older in Australia in that period.

The focus is on estimated cases of hospitalised fall injury and population-based rates of this condition that occurred in this 1-year period.

### What is reported?

The analyses presented in this chapter report on:

- age (in 5-year groups up to 95+)
- sex
- type of injury, based on principal diagnosis
- type of fall, based on external cause
- place of occurrence of the fall event
- remoteness of usual residence of the injured person
- Indigenous status.

### What data were used?

This chapter includes the cases of hospitalised fall injury where separation occurred in the year to 30 June 2011. Fall injury cases were estimated from the NHMD according to the method stated in Appendix A.

### What was the profile of hospitalised fall injuries in 2010–11?

There were an estimated 92,150 hospitalised fall injury cases for Australians aged 65 years or older in 2010–11 (Table 2.1). These cases represented 2.7% of the total number of hospitalisations for this population.

**Table 2.1: Key indicators for hospitalised fall injury, people aged 65+, Australia 2010–11**

Key indicators	Men	Women	People
All hospital separations 2010–11, people aged 65+(a)	1,759,839	1,628,003	3,387,842
Estimated fall injury cases(b)	28,992	63,158	92,150
As percentage of all hospital separations, people aged 65+	1.6%	3.9%	2.7%
Mean length of stay for fall injury cases: days	6.7	6.8	6.7
Total patient days, fall injury cases	194,304	426,325	620,629
As percentage of all hospital patient days, people aged 65+	3.2%	6.3%	4.8%

(a) Data source: *Australian hospital statistics 2010–11* (AIHW 2012a).

(b) Selection criteria are stated in Appendix A.

## Age and sex

Unlike most other types of injury, women aged 65 and older sustained a greater number of hospitalised fall injuries than men, constituting 69% of the cases in 2010–11 (63,158). The age-standardised rate of hospitalised falls for older women was 3,346 per 100,000 population. This compares with 2,238 per 100,000 population for fall cases involving men aged 65 and older – a male:female rate ratio of 0.7 hospitalised falls for males for every case for females.

Age-specific rates of fall injury cases increased markedly with age for both men and women (Figure 2.1). The rate of fall injury cases was higher for women than men in all age groups. For all older people in 2010–11, the highest rate observed was for people aged 95 and older: 160 cases per 1,000 population.

Figure 2.1 demonstrates that the rate of fall injury cases was substantially higher for men and women aged 75 and older. Convention maintains that fall injury indicators include all people aged 65 and older. However, following Pointer et al. (2003), we also report age-standardised rates of fall injury cases specifically for the population aged 75 and older. In this older aged population, the rate of fall injury cases was almost double that for the population aged 65 and older – 4,884 per 100,000 population (women: 5,638 per 100,000; men: 3,790 per 100,000).

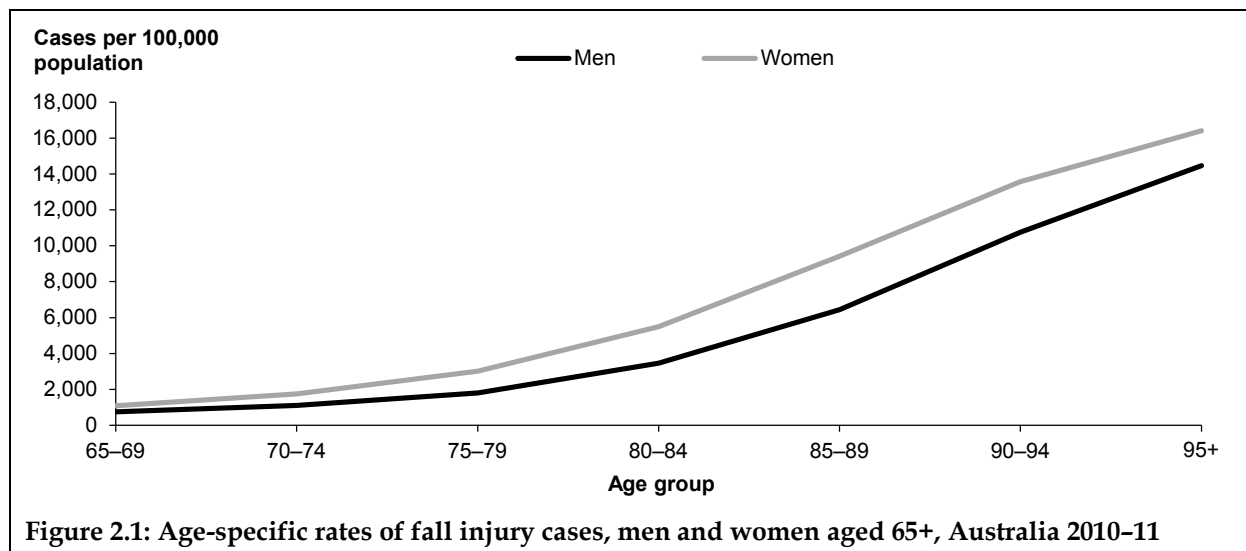


Figure 2.1: Age-specific rates of fall injury cases, men and women aged 65+, Australia 2010–11

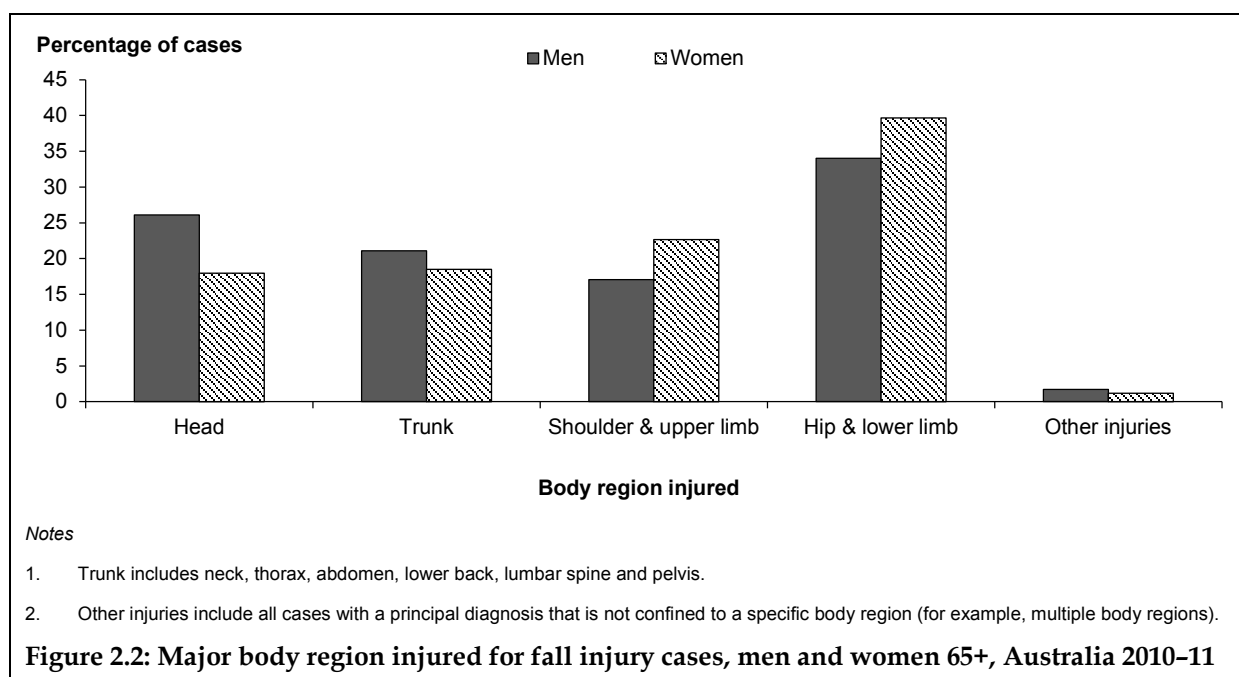
## Injury type

The largest proportion of fall injury cases for people aged 65 and older in 2010–11 resulted in *Injuries to the hip and thigh* (Table 2.2). Fractures of the neck of the femur (also commonly called hip fractures; cases with a principal diagnosis of S72.0–S72.2) accounted for the majority of *Injuries to the hip and thigh* (74%). *Injuries to the hip and thigh*, and fractures of the neck of the femur, were proportionately more common for women than men. *Injuries to the head* were the most common type of principal diagnosis for men, and were the second most common injury for older people overall – constituting 21% of all fall cases.

Summarising the information in Table 2.2, Figure 2.2 highlights the differences in the types of injury that were sustained by men and women aged 65 and older in 2010–11. Men sustained proportionately more injuries to the head and trunk regions (according to the principal diagnosis for the case) while women sustained proportionately more injuries to the shoulder and upper limbs and to the hip and lower limbs.

**Table 2.2: Injury type for fall injury cases, men, women and people aged 65+, Australia 2010-11**

Injury type	Men		Women		People	
	Count	Per cent	Count	Per cent	Count	Per cent
Injuries to the head	7,562	26.1	11,345	18.0	18,907	20.5
Injuries to the neck	638	2.2	722	1.1	1,360	1.5
Injuries to the thorax	2,689	9.3	3,517	5.6	6,206	6.7
Injuries to the abdomen, lower back, lumbar spine and pelvis	2,793	9.6	7,447	11.8	10,240	11.1
Injuries to the shoulder and upper arm	2,349	8.1	6,313	10.0	8,662	9.4
Injuries to the elbow and forearm	1,763	6.1	6,921	11.0	8,684	9.4
Injuries to the wrist and hand	831	2.9	1,078	1.7	1,909	2.1
Hip fractures	5,232	18.0	13,415	21.2	18,647	20.2
Other injuries to the hip and thigh	1,949	6.7	4,489	7.1	6,438	7.0
<i>Total injuries to the hip and thigh</i>	<i>7,181</i>	<i>24.8</i>	<i>17,904</i>	<i>28.3</i>	<i>25,085</i>	<i>27.2</i>
Injuries to the knee and lower leg	2,356	8.1	6,263	9.9	8,619	9.4
Injuries to the ankle and foot	328	1.1	890	1.4	1,218	1.3
Injuries involving multiple body regions	33	0.1	48	0.1	81	0.1
Injuries to unspecified parts of trunk, limb or body region	253	0.9	447	0.7	700	0.8
Burns	n.p.	0.0	n.p.	0.0	5	0.0
Other and unspecified effects of external causes	30	0.1	65	0.1	95	0.1
Certain early complications of trauma	179	0.6	195	0.3	374	0.4
Other injury principal diagnoses	n.p.	0.0	n.p.	0.0	5	0.0
<b>Total</b>	<b>28,992</b>	<b>100.0</b>	<b>63,158</b>	<b>100.0</b>	<b>92,150</b>	<b>100.0</b>



## Fractures

About three in every five people aged 65 and older who were hospitalised due to an injurious fall in 2010–11 sustained at least one fracture (59%, 54,713). A higher proportion of women than men sustained fractures (63% and 51%, respectively).

Table 2.3 describes the injury type for fall injury cases with at least one fracture, as well as the proportion of the specific type of injury that these cases represent (for example, 55% of all cases with a principal diagnosis of *Injuries to the knee and lower leg* involved a fracture). Fall cases with a principal diagnosis denoting *Injuries to the hip and thigh* and *Injuries to the elbow and forearm* had the largest proportion of fractures present in the patients' records: 82% (20,483) and 81% (7,050), respectively. *Injuries to the hip and thigh* accounted for the greatest proportion of all fracture-related fall injury cases, about one in every three such injuries (34%). The vast majority of these hip and thigh fracture cases had a principal diagnosis of fractured neck of femur (91%).

Fall injury cases that had a principal diagnosis of hip fracture (fractured neck of femur) occurred at an age-standardised rate of 570 per 100,000 population in 2010–11. Women aged 65 and older in 2010–11 had a higher rate of fall-related hip fracture (682 cases per 100,000) than men (412 per 100,000). Age-specific rates of fall-related fractured neck of femur injuries were highest for people aged 95 and older: 42 per 1,000 population, compared with 1 per 1,000 for people aged 65–69.

**Table 2.3: Injury type for fall injury cases involving fractures, men, women and people aged 65+, Australia 2010–11**

Injury type	Men		Women		People		Per cent of type
	Count	Per cent	Count	Per cent	Count	Per cent	
Injuries to the head	1,067	7.2	1,656	4.2	2,723	5.0	14.4
Injuries to the neck	421	2.8	433	1.1	854	1.6	62.8
Injuries to the thorax	2,003	13.5	2,474	6.2	4,477	8.2	72.1
Injuries to the abdomen, lower back, lumbar spine and pelvis	1,703	11.5	5,287	13.3	6,990	12.8	68.3
Injuries to the shoulder and upper arm	1,313	8.9	4,623	11.6	5,936	10.8	68.5
Injuries to the elbow and forearm	992	6.7	6,058	15.2	7,050	12.9	81.2
Injuries to the wrist and hand	314	2.1	531	1.3	845	1.5	44.3
Hip fractures	5,232	35.3	13,415	33.6	18,647	34.1	100.0
Other injuries to the hip and thigh	454	3.1	1,382	3.5	1,836	3.4	28.5
<i>Total injuries to the hip and thigh</i>	<i>5,686</i>	<i>38.3</i>	<i>14,797</i>	<i>37.1</i>	<i>20,483</i>	<i>37.4</i>	<i>81.7</i>
Injuries to the knee and lower leg	1,162	7.8	3,579	9.0	4,741	8.7	55.0
Injuries to the ankle and foot	153	1.0	414	1.0	567	1.0	46.6
Other diagnoses	18	0.1	29	0.1	47	0.1	3.7
<b>Total</b>	<b>14,832</b>	<b>100.0</b>	<b>39,881</b>	<b>100.0</b>	<b>54,713</b>	<b>100.0</b>	<b>59.4</b>

## External causes

Records of hospital separations can contain multiple external causes just as they can contain multiple diagnoses codes. Table 2.4 describes the first-recorded external cause code for fall injury cases.

The most common cause of fall injury cases at ages 65 and older in 2010–11 was falling on the same level from slipping, tripping and stumbling (33%). Slips, trips and stumbles were proportionately more common for women than for men and, for both sexes, most of these types of fall (61%) were attributed to tripping.

*Unspecified fall* (accounting for 26% of cases) and *Other fall on same level* (23%) were the second- and third-most common types of external cause of hospitalised fall injury in 2010–11. Relatively few cases were coded as falls due to colliding with people, off scaffolding, trees or ladders, or involving furniture (data not shown).

**Table 2.4: Causes of fall injury cases, men, women and people aged 65+, Australia 2010–11**

External cause	Men		Women		People	
	Count	Per cent	Count	Per cent	Count	Per cent
Fall on same level from slipping	2,437	8.4	6,213	9.8	8,650	9.4
Fall on same level from tripping	5,016	17.3	13,284	21.0	18,300	19.9
Fall on same level from stumbling	1,048	3.6	2,200	3.5	3,248	3.5
<i>Total fall on same level from slipping, tripping and stumbling</i>	<i>8,501</i>	<i>29.3</i>	<i>21,697</i>	<i>34.4</i>	<i>30,198</i>	<i>32.8</i>
Other fall on same level	6,542	22.6	14,286	22.6	20,828	22.6
Unspecified fall	7,469	25.8	16,930	26.8	24,399	26.5
All other fall external causes	6,480	22.4	10,245	16.2	16,725	18.1
<b>Total</b>	<b>28,992</b>	<b>100.0</b>	<b>63,158</b>	<b>100.0</b>	<b>92,150</b>	<b>100.0</b>

## Place of occurrence

Detailed information about ICD-10-AM *Place of occurrence* coding is provided in Box 3.1.

A specific place of occurrence was not identified in 16% of records for fall injury cases in 2010–11 (Y92.9 *Unspecified place of occurrence* 15,004, or not reported 5).

Almost half of all hospitalised fall injury cases involving people aged 65 and older in 2010–11 occurred in the home, including the driveway to the home (49%, see Table 2.5). The bulk of these cases were recorded as occurring in ‘other and unspecified’ places in the home (45%, 20,370). A further 16% of falls in the home were recorded as occurring in the outdoor areas of the home (7,364), with falls occurring in the bathroom and bedroom also relatively common (11% and 10% of falls in the home, respectively).

Aged care facilities were the reported place of occurrence for a further 23% of hospitalised fall injury cases in 2010–11 (20,768). In all, about six in every seven fall injury cases with a *specified* place of occurrence (86%) were reported to have happened in either the home or an aged care facility (59% and 27% of specified places, respectively).



**Table 2.5: Place of occurrence for fall injury cases, men, women and people aged 65+, Australia 2010–11**

Place of occurrence	Men		Women		People		Per cent specified
	Count	Per cent	Count	Per cent	Count	Per cent	
Driveway to home	382	1.3	597	0.9	979	1.1	1.3
Outdoor areas	2,668	9.2	4,696	7.4	7,364	8.0	9.5
Garage	228	0.8	240	0.4	468	0.5	0.6
Bathroom	1,574	5.4	3,515	5.6	5,089	5.5	6.6
Kitchen	747	2.6	2,241	3.5	2,988	3.2	3.9
Bedroom	1,276	4.4	3,103	4.9	4,379	4.8	5.7
Laundry	42	0.1	220	0.3	262	0.3	0.3
Indoor living areas, n.e.c.	988	3.4	2,318	3.7	3,306	3.6	4.3
Other and unspecified place in home	6,299	21.7	14,071	22.3	20,370	22.1	26.4
<i>Total home</i>	<i>14,204</i>	<i>49.0</i>	<i>31,001</i>	<i>49.1</i>	<i>45,205</i>	<i>49.1</i>	<i>58.6</i>
Aged care facilities	5,419	18.7	15,349	24.3	20,768	22.5	26.9
Other specified residential institution	90	0.3	173	0.3	263	0.3	0.3
<i>Total residential institution</i>	<i>5,509</i>	<i>19.0</i>	<i>15,522</i>	<i>24.6</i>	<i>21,031</i>	<i>22.8</i>	<i>27.3</i>
Health service area	443	1.5	853	1.4	1,296	1.4	1.7
Other school, institution and public administrative area	161	0.6	352	0.6	513	0.6	0.7
<i>Total school, institution and public administrative area</i>	<i>604</i>	<i>2.1</i>	<i>1,205</i>	<i>1.9</i>	<i>1,809</i>	<i>2.0</i>	<i>2.3</i>
Sports and athletics area	178	0.6	234	0.4	412	0.4	0.5
Footpath (sidewalk)	864	3.0	1,616	2.6	2,480	2.7	3.2
Other and unspecified public highway, street or road	486	1.7	752	1.2	1,238	1.3	1.6
<i>Total street and highway</i>	<i>1,350</i>	<i>4.7</i>	<i>2,368</i>	<i>3.7</i>	<i>3,718</i>	<i>4.0</i>	<i>4.8</i>
Trade and service area	997	3.4	2,161	3.4	3,158	3.4	4.1
Industrial and construction area	43	0.1	11	0.0	54	0.1	0.1
Farm	91	0.3	59	0.1	150	0.2	0.2
Other specified place of occurrence	644	2.2	960	1.5	1,604	1.7	2.1
Unspecified place of occurrence or place not reported	5,372	18.5	9,637	15.3	15,009	16.3	..
<b>Total</b>	<b>28,992</b>	<b>100.0</b>	<b>63,158</b>	<b>100.0</b>	<b>92,150</b>	<b>100.0</b>	

## Aged care facilities

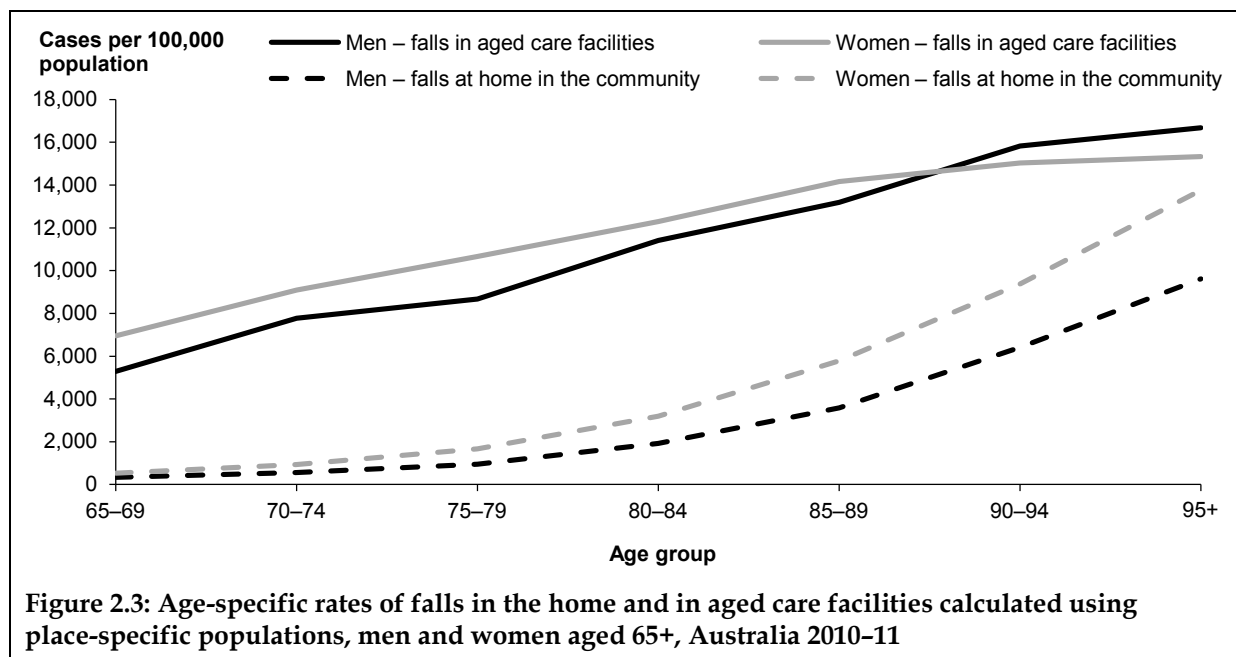
### Box 2.1: Calculation of place-specific rates

About six in every seven fall injury cases with a specified place of occurrence in 2010–11 were reported to have happened in either the home or an aged care facility. We have calculated the age-standardised rate of falls reported to have occurred in aged care facilities involving people aged 65 and older resident in such facilities using population estimates derived from the AIHW's *Residential aged care in Australia* report series (AIHW 2011; 2012b, see also Appendix A). We have similarly calculated the rate of falls reported to have occurred in the home for people aged 65 and older and resident in the community (that is, the population who were not residents of aged care facilities in 2010–11). Of course, some of the 16% of fall injury cases that had either an unspecified place of occurrence code or no place code recorded may have occurred in either of these locations and, hence, were not included in this analysis.

The estimated incidence of fall injury cases occurring in aged care facilities for people aged 65 and older living in residential facilities in 2010–11 was 9,226 per 100,000 population, nearly 6 times as high as the rate of falls in the home involving people aged 65 and older resident in the community. The age-standardised rate of falls in the home for older people living in the community was 1,647 per 100,000 population.

The age-standardised rate of falls by female residents of aged care facilities (9,846 per 100,000 population) was somewhat higher than that for male residents (8,450 per 100,000); however, this difference is not of the same magnitude as that observed for all falls (a male:female rate ratio of 0.9, compared with 0.7 for all falls).

The age-specific rates of fall injury cases that occurred in the home and in aged care facilities in 2010–11 are presented in Figure 2.3. As in previous years, the rate of hospitalised falls for the oldest men resident in aged care facilities was higher than the equivalent rate for women – a very different pattern to that for falls reported to have occurred in the home. The highest age-specific fall injury rate observed for residents of aged care facilities was 167 per 1,000 population for men aged 95 and older (compared with 96 per 1,000 for men of that age resident in the community and falling in the home). For women resident in aged care facilities, the highest rate observed was also for those aged 95 and older: 153 per 1,000 population (compared with 138 per 1,000 for women of that age resident in the community and falling in the home).



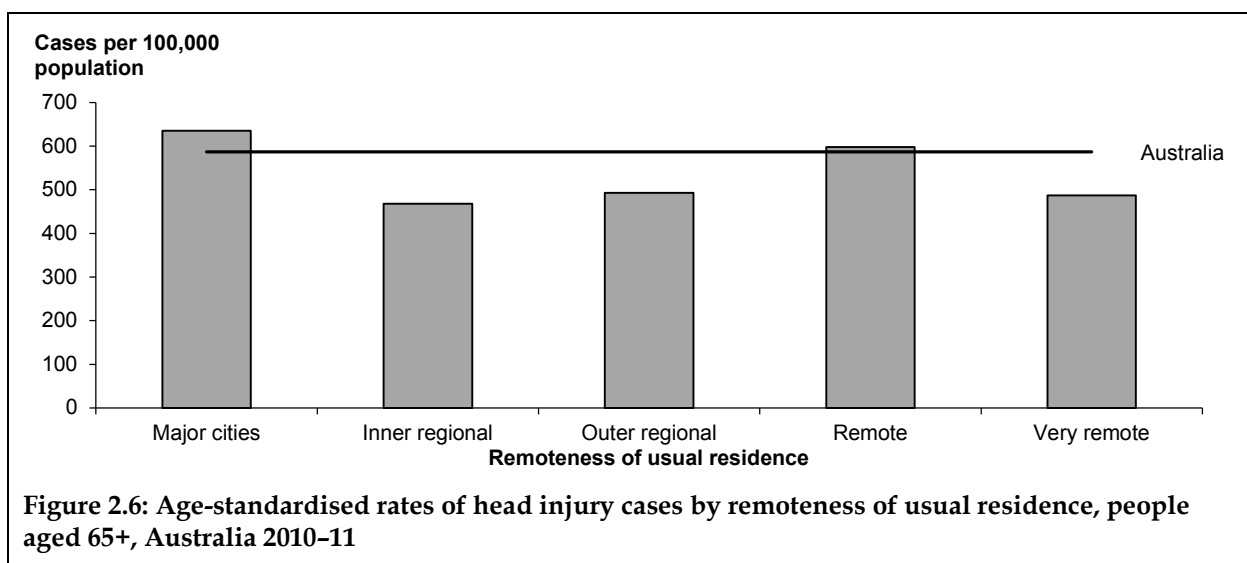
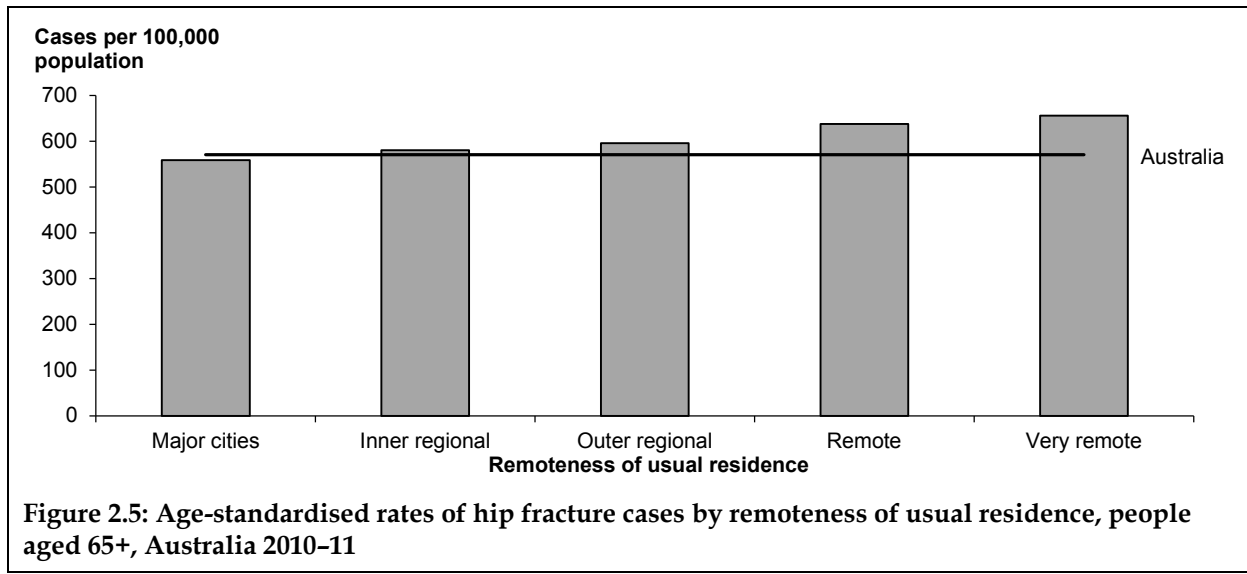
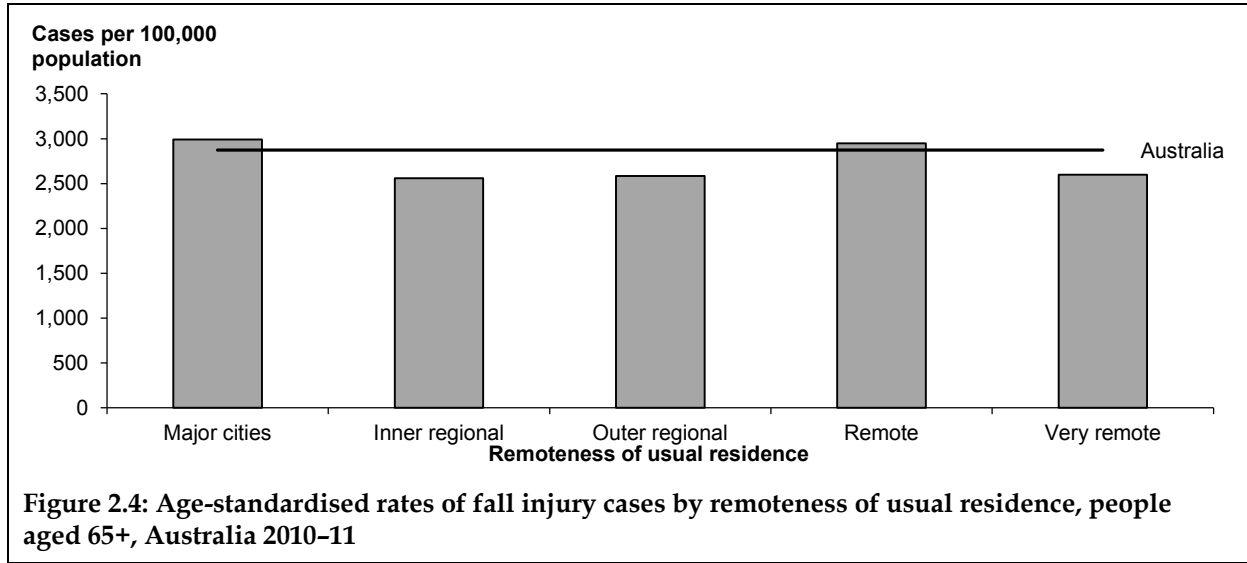
## Remoteness of usual residence

The number and rate of hospitalised fall injury cases varied with remoteness of usual residence, though not greatly (Figure 2.4). The rate for residents of *Major cities* was higher than for residents of most other regions (2,992 per 100,000 population), an unusual pattern compared to other types of injury hospitalisations or even fall injury hospitalisations for people of all ages (see Tovell et al. 2012).

Figure 2.5 presents rates of hip fracture due to falls in older people by remoteness of residence. The pattern of hip fractures in 2010-11 differs from that seen for previous years (see Bradley 2012a, 2013). The lowest rate of hip fracture was observed for residents of *Major cities* (558 per 100,000 population) and the highest for residents of *Very remote* regions (656 per 100,000). This is akin to the pattern generally seen for injury hospitalisations (for example, Tovell et al. 2012).

Figure 2.6 shows that the pattern for head injuries due to falls in 2010-11 is very similar to that for all types of fall-related cases (that is, Figure 2.4) and to that presented in 2009-10. Relatively high rates observed for residents of *Major cities* (635 per 100,000 population) and *Remote* regions (598 per 100,000) and lower for residents in the other regions of Australia.

These data should be interpreted with some caution, however, because of low numbers of cases in *Remote* and *Very remote* Australia (see supplementary tables B.4 and B.5 for case numbers).



## Aboriginal and Torres Strait Islander people

### Box 2.2: Aboriginal and Torres Strait Islander reporting

The Indigenous status data are of sufficient quality for statistical reporting purposes for the following jurisdictions: New South Wales, Victoria, Queensland, South Australia, Western Australia and the Northern Territory (public hospitals only), from the data year 2007–08 onwards. Prior to this time data were of sufficient quality for statistical reporting purposes for the following jurisdictions: Queensland, South Australia, Western Australia and the Northern Territory (public hospitals only). Further information is available in 'Appendix A: Data issues'.

There were 478 hospitalised fall injury cases for Aboriginal and Torres Strait Islander people aged 65 and older during the financial year 2010–11 (Table 2.6). As for the non-Indigenous population, more Aboriginal and Torres Strait Islander women than men survived to be in the population at this age and more women than men were hospitalised due to a fall.

For Aboriginal and Torres Strait Islander people aged 65 and older, the age-standardised rate of hospitalised fall injury in 2010–11 was a little higher than that for Other Australians, while the age-standardised rate for men was more markedly above that for Other Australian males and the rate for Aboriginal and Torres Strait Islander women was almost the same as that for Other Australian women (Table 2.6). It should be noted that the rates for Aboriginal and Torres Strait Islander people have fluctuated considerably from year to year (see Chapter 4), and the rates in the single year 2010–11 do not necessarily provide a reliable guide to the relative risk of hospitalised fall injury in the two segments of the Australian population aged 65+.

**Table 2.6: Key indicators for hospitalised fall injury, Aboriginal and Torres Strait Islander people and Other Australians aged 65+, Australia<sup>(a)</sup> 2010–11**

Indicator	Aboriginal and Torres Strait Islander people			Other Australians <sup>(b)</sup>		
	Males	Females	Persons	Males	Females	Persons <sup>(c)</sup>
Estimated fall injury cases	187	291	478	27,989	60,802	88,791
Age-standardised rate/100,000 population	2,785	3,375	3,166	2,225	3,378	2,890

(a) Excludes data for Tasmania and the Australian Capital Territory and private hospitals in the Northern Territory; see Box 2.2.

(b) Other Australians includes separations for which Indigenous status was not reported.

(c) Includes separations where sex was not reported.

## 3 The burden of hospitalised fall injury

The previous chapter described numbers and rates of cases of hospitalised injury due to falls. Many cases involve transfers between hospitals and follow-up care. Also, hospital care is provided to investigate people at high risk of sustaining an injurious fall. All of these types of episode contribute to the burden that fall-related injury places on hospitals and they are the subject of this chapter.

### What is reported?

Where relevant, the analyses presented in this chapter provide summary statistical information on the four types of fall-related separation records identifiable in the NHMD and additional to the case data reported in Chapter 2. Like Chapter 2, this chapter is restricted to separations in 2010–11.

In addition to providing summary information on numbers and age-standardised rates of each of the four additional types of separations, analyses in the chapter compare the types in relation to:

- place of occurrence for the fall event
- length of stay.

The fall injury cases described in Chapter 2 have been included in the Place and Length of stay comparisons in this chapter in order to present a complete picture of the burden of hospitalised injury.

### What data were used?

This chapter includes the NHMD records that meet the criteria (given in Appendix A) for the four types of fall-related separation that are outside the scope of Chapter 2. They are: fall injury inward transfers, fall-related follow-up care and ‘other fall-related’ separations, and separations having the diagnosis of R29.6 *Tendency to fall, not elsewhere classified*.

For purposes of comparison, data on fall injury cases are also included in Tables 3.1 and 3.2.

## What was the burden of hospitalised fall injury in 2010–11?

### Fall injury inward transfer separations

These records were omitted from data presented in the previous Chapter because, as inward transfers from one acute hospital to another, they probably represented a second episode of care following an initial episode of care for a particular fall injury event. The inclusion of these records in case counts would be likely to lead to over-counting.

A total of 10,110 fall injury inward transfer separations were identified for the 2010–11 study period and inward transfers represented 0.3% of the total number of hospitalisations for people aged 65 and older. Women accounted for 68% (6,848) of all fall injury inward transfer separations.

Inward transfers occurred at an age-standardised rate of 315 per 100,000 population, about the same as that for 2009–10. These separations occurred at a higher rate for women (361 per 100,000) than for men (253 per 100,000).

## **Fall-related follow-up care separations**

Many fall injury cases require rehabilitation and related care. This aspect of hospital care is typically recorded in a different separation record to the acute care phase.

Nearly 38,000 fall-related follow-up care separations were identified for people aged 65 and older in 2010–11 (37,567). These 37,567 fall-related follow-up care separations represented 1.1% of all hospital separations for the older population in 2010–11 and nearly three-quarters involved women (70%, 26,140).

The age-standardised rate of fall-related follow-up care separations was 1,175 separations per 100,000 population. The age-standardised rate for women (1,395 per 100,000) was much higher than that for men (883 per 100,000). As with most other types of fall-related hospital care, age-specific rates of fall-related follow-up care separations in 2010–11 increased considerably with age for both men and women until very old age.

Most fall-related follow-up care separations (89%, 33,429) had a principal diagnosis of Z50 *Care involving use of rehabilitation procedures*.

## **‘Other fall-related’ separations**

An additional 27,581 episodes of hospital care involving people aged 65 and older were identified as ‘other fall-related’ separations in 2010–11. These records contained an injury diagnosis and a falls external cause but were not fall cases, inward transfers or follow-up care separations. As in previous years, ‘other fall-related’ separations represented 0.8% of the total number of hospital separations for people aged 65 and older in 2010–11 and a relatively low proportion of ‘other fall-related’ separations involved women (53%, 14,577).

The age-standardised rate of ‘other fall-related’ separations was 868 per 100,000 population in 2010–11. Unlike the separations directly attributable to falls in this report (that is, fall injury cases, inward transfers and follow-up care separations), the age-standardised rate of ‘other fall-related’ separations was higher for men than for women: 1,002 per 100,000 compared with 778 per 100,000, respectively. The rate-ratio was 1.3 ‘other fall-related’ separations for men for every such separation for women. Further, the age-specific rates for men were higher than those for women for every age group.

One in five ‘other fall-related’ separations (21%, 5,784) had a principal diagnosis from Chapter 19 of the ICD-10-AM (*Diseases of the circulatory system*) and a similar number had a principal diagnosis from Chapter 18 (*Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified*: 17%, 4,749).

## **‘Tendency to fall’ separations**

A total of 33,075 hospital separations for people aged 65 and older in 2010–11 included the diagnosis code R29.6 *Tendency to fall, not elsewhere classified*. Small numbers of these records are included in this report as fall injury cases, inward transfers, follow-up care or ‘other fall-related’ separations. There were 24,947 other separations containing a ‘tendency to fall’ diagnosis – a 15% increase on the number in 2009–10.

Of the 24,947 'tendency to fall' separations for people aged 65 and older in 2010–11, slightly more than half (55%, 13,693) involved women. The age-standardised rate of 'tendency to fall' separations for all people aged 65 and older was 777 per 100,000 population and the rate of was higher for men (875 per 100,000 population) than for women (717 per 100,000).

One in every three 'tendency to fall' separations (33%, 9,371) had a principal diagnosis from Chapter 21 of the ICD-10-AM (*Factors influencing health status and contact with health services*) and principal diagnoses from Chapter 18 (*Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified*) were also relatively common (23%, 5,412).

## Place of occurrence

### Box 3.1: Place of occurrence for fall-related separations

Hospital records containing ICD-10-AM Chapter 20 *External causes of morbidity and mortality* codes in the range V00–Y89 must also have at least one Y92 *Place of occurrence* code recorded (NCCCH 2010). These codes may be quite general in nature (for example, Y92.7 *Farm*) or extremely specific (for example, Y92.64 *Industrial and construction area: Oil and gas extraction [Oil rig and other offshore installations]*). Category expansions in recent editions of the ICD-10-AM have included subcategories under the Y92.0 *Home* grouping to describe particular areas in the home such as the bathroom or the garage (as is presented in Table 2.5).

This section looks at the first-recorded *Place of occurrence* code for all of the types of fall-related separation discussed in this report. This is to help reveal the nature of the falls recorded in the separations other than cases and inward transfer separations – records where the link between the fall injury and the principal diagnosis is either presumed (fall-related follow-up care) or obscure ('other fall-related separations').

In some cases, the falls described in these additional fall-related records might be new incidents, which occurred while the patient was hospitalised for another condition (that is, in-hospital falls). Such falls should, more correctly, be counted in the annual estimate of case numbers. It would, in principle, be possible to identify in-hospital falls through analysis of the *Episode of admitted patient care – condition onset flag* variables mandated for national collection from 2008–09. However, these data are yet to be assessed as being of sufficient quality for analysis (see AIHW 2012a). Access to separation data in which all records for a particular person have been linked would also provide a basis for estimating such cases. In the absence of data sufficient to allow either of these methods, analysis of place of occurrence remains the only option.

Table 3.1 presents the place of occurrence coding for all types of fall-related separations involving people aged 65 and older in 2010–11. In order to provide an overview of all five types of fall-related records, place of occurrence values for the fall injury cases presented in Chapter 2 have also been included in Table 3.1. This repeats some of the information in Table 2.5.

The home was the most commonly specified place of occurrence for all types of directly fall-related separations (cases, transfers and follow-up care separations) with falls in aged care facilities also contributing a relatively large proportion of cases. This similarity is not surprising given that transfers and follow-up care separations are considered to be subsequent episodes of care for the fall injury events counted as cases.



*Health service area* was the specified place of occurrence for many 'other fall-related' and 'tendency to fall' separations. Nearly half of all 'other fall-related' separations with a specified place of occurrence had *Health service area* as the place of occurrence (44%, 10,462). It appears likely that these are injurious falls that occurred while the patient was hospitalised for another condition. If so, they may be considered as new fall events, additional to those counted as fall injury cases. Similarly, four in five 'tendency to fall' separations with a specified place of occurrence had *Health service area* as the place of occurrence (79%, 2,171), although due to the nature of this type of fall-related separation (few of which have injury diagnoses) most 'tendency to fall' separations did not have a specific place of occurrence code in the record (89%, 22,214). These observations underscore the need for robust national condition onset data (see AIHW 2012a) in order to better understand these types of falls and better count the incidence of injurious falls affecting the older Australian population.

**Table 3.1: Place of occurrence for fall-related separations by type, people aged 65+, Australia 2010–11**

Place of occurrence	Cases		Transfers <sup>(a)</sup>		Follow-up care <sup>(a)</sup>		'Other fall-related'		'Tendency to fall' <sup>(b)</sup>		Total	
	Count	Per cent specified	Count	Per cent specified	Count	Per cent specified	Count	Per cent specified	Count	Per cent specified	Count	Per cent specified
Total home	45,205	58.6	4,994	64.1	17,388	66.9	9,258	39.3	406	14.9	77,251	56.3
Aged care facilities	20,768	26.9	1,508	19.4	2,423	9.3	2,541	10.8	90	3.3	27,330	19.9
Various other residential institutions	263	0.3	n.p.	0.3	52	0.2	56	0.2	n.p.	0.1	400	0.3
<i>Total residential institution</i>	<i>21,031</i>	<i>27.3</i>	<i>1,535</i>	<i>19.7</i>	<i>2,475</i>	<i>9.5</i>	<i>2,597</i>	<i>11.0</i>	<i>92</i>	<i>3.4</i>	<i>27,730</i>	<i>20.2</i>
Health service area	1,296	1.7	436	5.6	3,211	12.3	10,462	44.4	2,171	79.4	17,576	12.8
Various other specified institution and public administrative area	513	0.7	48	0.6	220	0.8	n.p.	0.3	n.p.	0.0	845	0.6
<i>Total school, other institution and public administrative area</i>	<i>1,809</i>	<i>2.3</i>	<i>484</i>	<i>6.2</i>	<i>3,431</i>	<i>13.2</i>	<i>10,525</i>	<i>44.7</i>	<i>2,172</i>	<i>79.5</i>	<i>18,421</i>	<i>13.4</i>
Sport and athletics area	412	0.5	40	0.5	126	0.5	40	0.2	0	0.0	618	0.5
Public highway, street or road	3,718	4.8	287	3.7	987	3.8	460	2.0	49	1.8	5,501	4.0
Trade and service area	3,158	4.1	258	3.3	1,071	4.1	498	2.1	5	0.2	4,990	3.6
Industrial and construction area	54	0.1	n.p.	0.0	11	0.0	7	0.0	n.p.	0.0	76	0.1
Farm	150	0.2	20	0.3	36	0.1	n.p.	0.1	n.p.	0.0	222	0.2
Other specified place of occurrence	1,604	2.1	168	2.2	485	1.9	169	0.7	7	0.3	2,433	1.8
<b>Total specified</b>	<b>77,141</b>	<b>100.0</b>	<b>7,789</b>	<b>100.0</b>	<b>26,010</b>	<b>100.0</b>	<b>23,569</b>	<b>100.0</b>	<b>2,733</b>	<b>100.0</b>	<b>137,242</b>	<b>100.0</b>
Unspecified place of occurrence or place not reported	15,009		2,321		11,557		4,012		22,214		55,113	
<b>Total</b>	<b>92,150</b>		<b>10,110</b>		<b>37,567</b>		<b>27,581</b>		<b>24,947</b>		<b>192,355</b>	

(a) Transfers and follow-up care separations are likely to be additional episodes of care for people included as cases.

(b) Note that 'tendency to fall' separations were defined by a non-injury disease code and a large proportion of these separations (87%) did not have any place of occurrence code recorded.

Note: Shading denotes most commonly specified places of occurrence for fall-related separations overall.

## Length of stay

There were 1,353,710 patient days for hospital care directly attributable to injurious falls (that is, fall injury cases, inward transfers and fall-related follow-up care separations) by people aged 65 and older in 2010–11 (Table 3.2). This figure represents 11% of all patient days for this population in this period and nearly 59,000 more patient days than reported for 2009–10 (a 5% increase).

The additional 661,244 patient days attributable to ‘other fall-related’ and ‘tendency to fall’ separations brings the total number of patient days for fall-related separations for people aged 65 and older in 2010–11 to more than 2.0 million. However, as the relationship between the injurious fall and the principal reason for hospitalisation for the ‘other fall-related’ category and the use of the ‘tendency to fall’ code are not fully understood, the patient days for such separations have been omitted from the following analyses.

**Table 3.2: Total patient days for all types of fall-related hospitalisations, men, women and people aged 65+, Australia 2010–11**

Separation type	Men	Women	People	Per cent of directly fall-related	Per cent of all patient days 65+(a)
Fall injury cases <sup>(b)</sup>	194,304	426,325	620,629	45.8	4.8
Fall injury inward transfer separations	44,222	93,822	138,044	10.2	1.1
Fall-related follow-up care separations	178,596	416,441	595,037	44.0	4.6
<i>Total directly fall-related</i>	<i>417,122</i>	<i>936,588</i>	<i>1,353,710</i>	<i>100.0</i>	<i>10.5</i>
‘Other fall-related’ separations	181,149	192,953	374,102		2.9
R29.6 (‘tendency to fall’) separations	131,990	155,152	287,142		2.2
<b>Total</b>	<b>730,261</b>	<b>1,284,693</b>	<b>2,014,954</b>		<b>15.7</b>

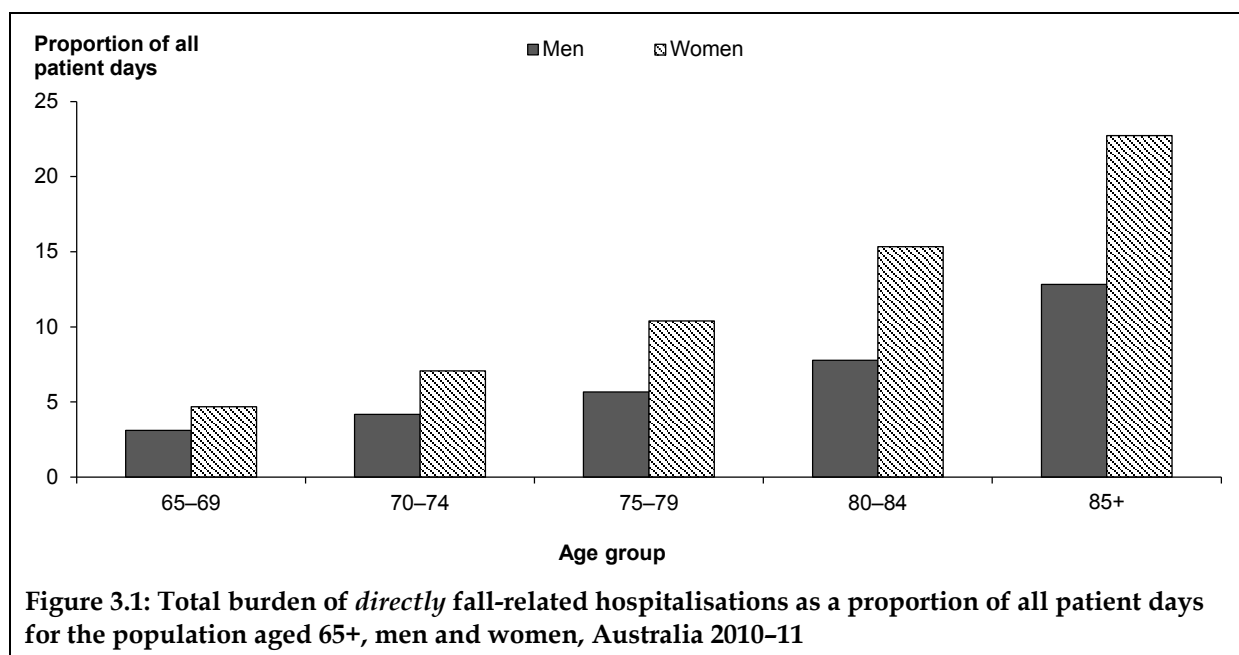
(a) Patient days for total episodes due to all causes at ages 65+.

(b) Fall injury cases, described in Chapter 2, are included here to provide an overview of all five types of fall-related record.

The 1,353,710 patient days of hospital care *directly* attributable to injurious falls by people aged 65 and older in 2010–11 accounted for 7% of all patient days for men and 14% of patient days for women aged over 65. The patient days for fall-related separations in 2010–11, as a proportion of all patient days for any cause, increased with age for both men and women (Figure 3.1). For people aged 85 and older, directly fall-related separations accounted for nearly one-fifth of the total number of patient days for this age group (19%).

## Total mean length of stay

As described above, this report considers three groups of hospital separations to be ‘directly attributable to falls’: fall injury inward transfers and fall-related follow-up care episodes are typically preceded by an initial episode for acute care of a fall injury case. Accordingly, a valid estimate of the average total duration of hospital care for admitted incidents of fall-related injury should include the patient days for all three of these types of record. That is, a mean total length of stay may be calculated by dividing the sum number of patient days reported for directly fall-related separations by the number of cases for the period. On this basis, the estimated total mean length of stay for fall injury cases in 2010–11 (92,150) was 14.7 days. This total mean length of stay is nearly a day shorter than that estimated in 2009–10 (15.5 days).



## 4 How have hospitalisations for fall-related injury changed over time?

In this chapter we present trend analyses for fall-related hospital data from July 1999 to June 2011. Time-series analyses are presented for all of the types of fall-related hospital separation discussed in this report: fall injury cases, inward transfers, fall-related follow-up care, 'other-fall-related' and 'tendency to fall' separations, although there is a focus on fall injury case characteristics.

### What is reported?

The analyses presented in this chapter report on:

- age (in three age groups; 65–74, 75–84 and 85 and older)
- sex
- type of injury, based on principal diagnosis
- type of fall, based on external cause
- place of occurrence of the fall event
- remoteness of usual residence of the injured person
- indigenous status
- type of fall-related separation
- length of stay.

### What data were used?

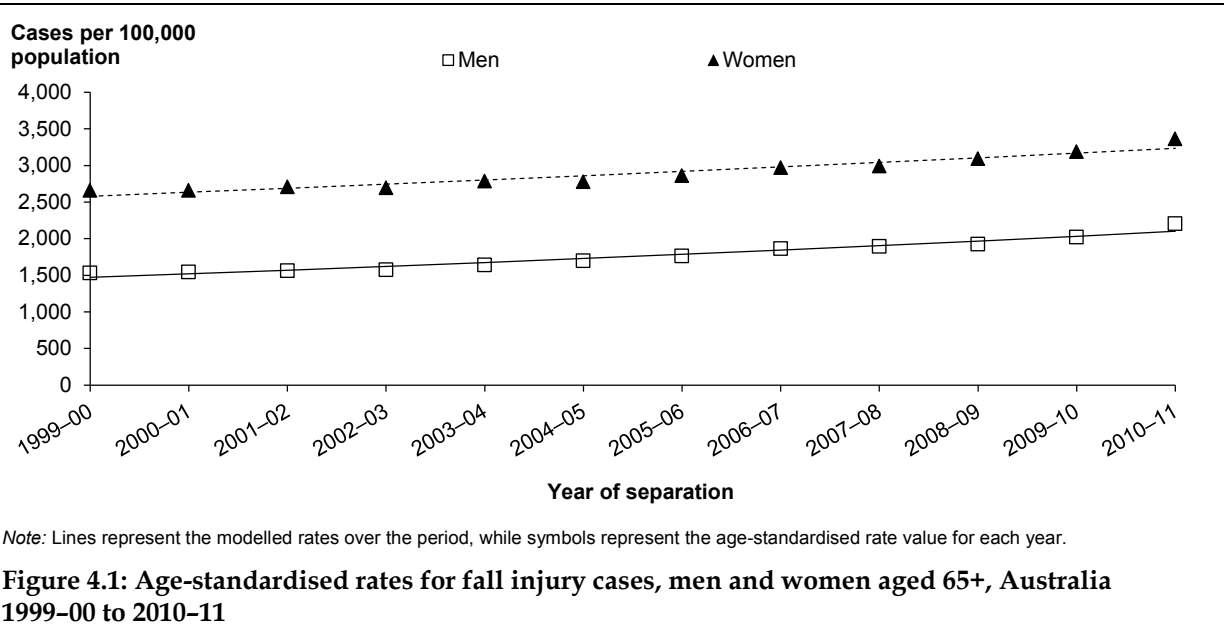
The same types of fall-related NHMD separations as analysed in Chapters 2 and 3 are analysed here in Chapter 4, except the period was widened to include records with a date of separation from 1 July 1999 to 30 June 2011 and which met the selection criteria (see Appendix A). The first section of the chapter focuses on fall injury cases. The second and third sections include all the types of fall-related NHMD records.

Trends were analysed using the negative binomial distribution regression technique, as described in Berry and Harrison (2006, see also Appendix A). Generally, the lines in the figures represent the modelled rates per 100,000 population while the symbols represent the annual age-standardised rates per 100,000 population.

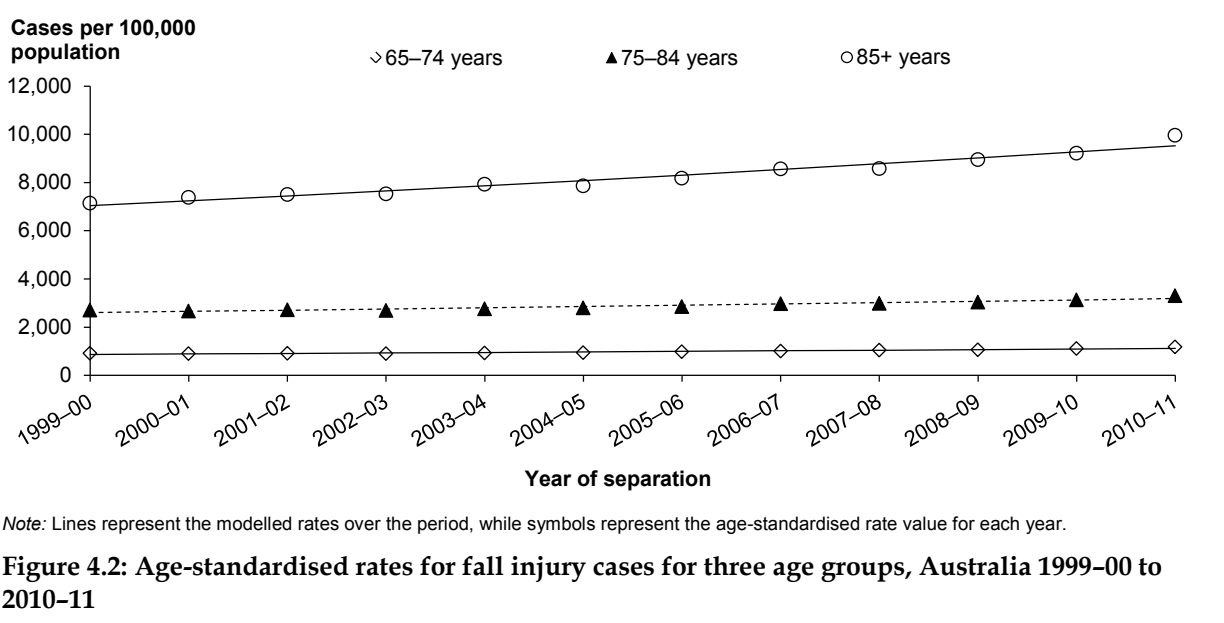
### How have fall injury cases changed over 1999–00 to 2010–11?

The age-standardised rates of hospitalised fall injury cases for both men and women aged 65 and older rose over the period to 1999–00 to 2010–11 (Figure 4.1). The increase for men and women combined was estimated to be 2.3% per year (95% CI: 2.0–2.6). While contributing fewer case numbers, the rate for men increased by a greater magnitude (3.3% per year, 95% CI: 2.9–3.7) than for women (2.1%, 95% CI: 1.8–2.4).

Based on these observations, we estimate that there were nearly 25,000 extra fall injury cases for people aged 65 and older in 2010–11 than there would have been if the age-standardised rate had remained stable since 1999–00.



Increases in the rate of hospitalised falls were not consistent across all age groups in the older population (Figure 4.2). For those aged 85 and older, the increase was 2.8% per year between 1999–00 and 2010–11 (95% CI: 2.4–3.1), compared with 2.4% per year for people aged 65–74 (95% CI: 1.9–2.8) and 1.8% per year for people aged 75–84 (95% CI: 1.5–2.2). Again, all of these increases were statistically significant ( $p < 0.001$ ).

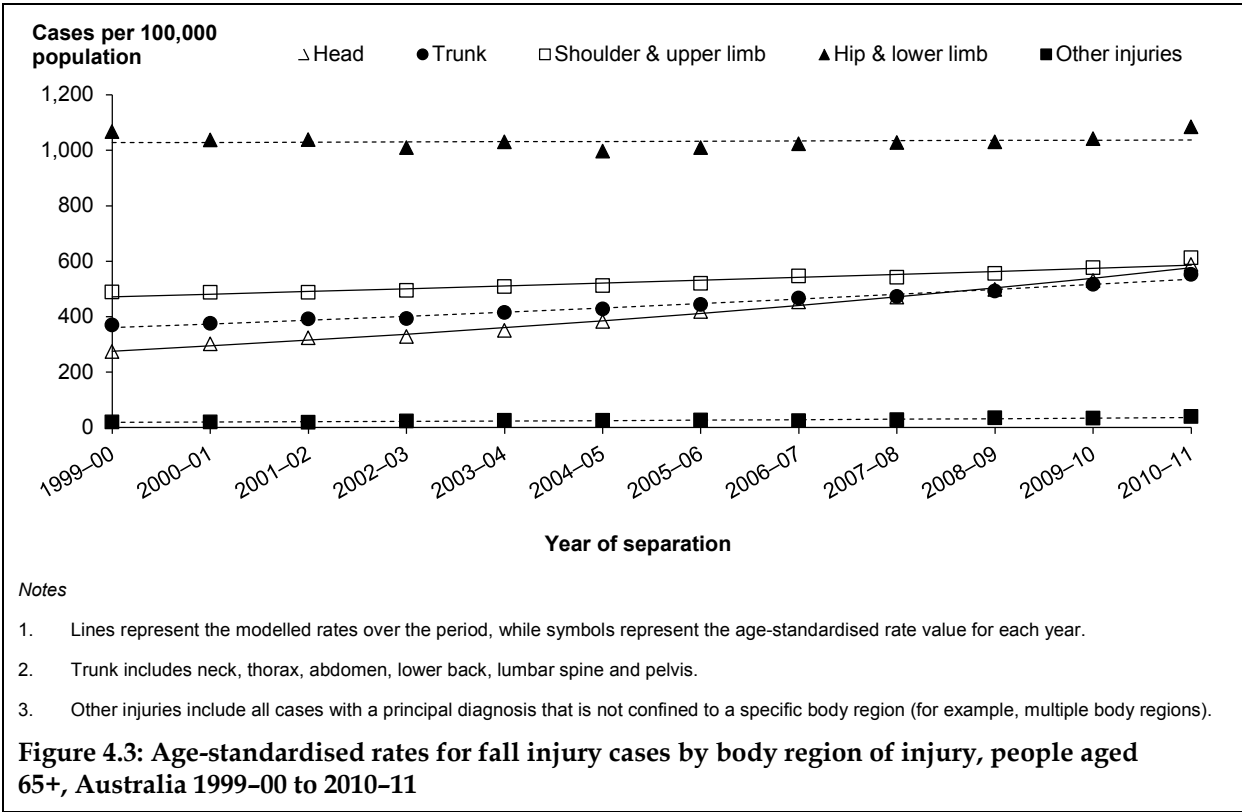


### How have types of injury changed over time?

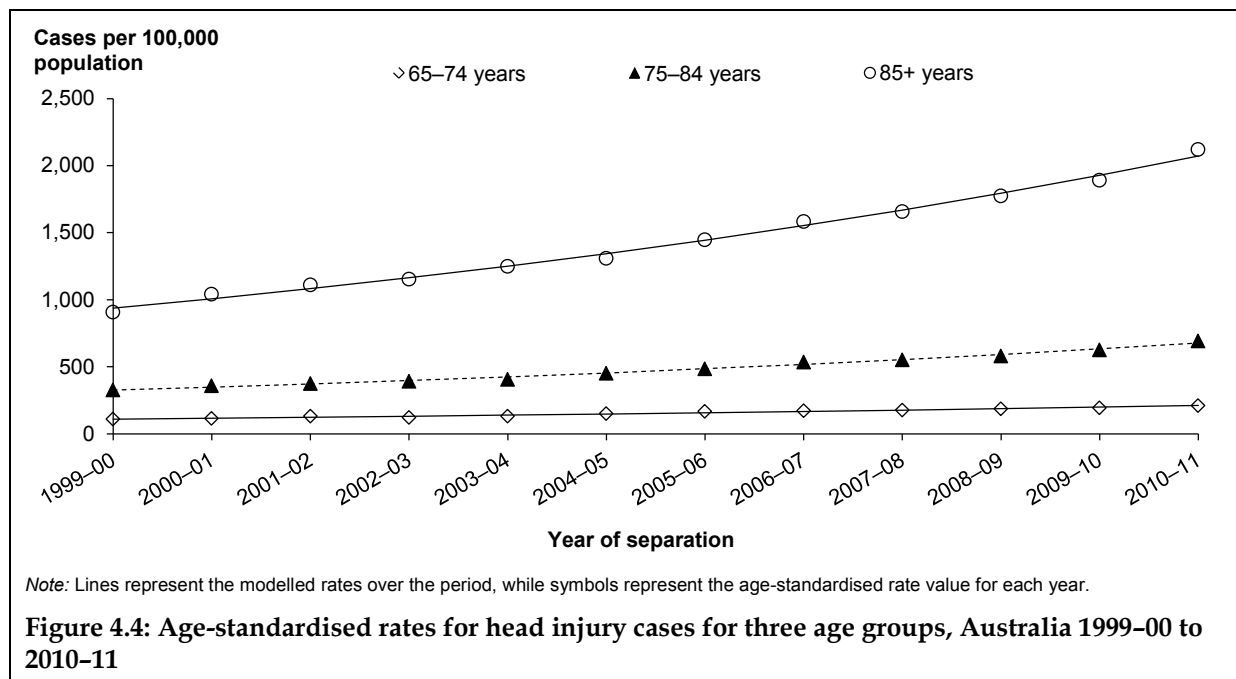
Analyses of fall injury cases over the 1999–00 to 2010–11 study period according to the type of injury (described by the principal diagnosis) demonstrate that rates increased for all body regions other than the hip and lower limbs (Figure 4.3). Rates of injuries to the head increased most substantially: 6.9% per year (95% CI: 6.6–7.3,  $p < 0.001$ ). Rates of injuries to the trunk region and to the shoulders and upper limbs also increased significantly over the 12 years to June 2011 (by 3.7% [95% CI: 3.4–3.9] and 2.0% [95% CI: 1.6–2.3] per year, respectively).

While less than 2% of fall injury cases were classed as ‘other injuries’ (that is, injuries of a type not specified by body region), it is of interest that rates of cases of this type increased by 6.4% per year during the study period (95% CI: 5.2–7.6,  $p < 0.001$ ). These ‘other injury’ cases (commonly having a principal diagnosis indicating *Injuries to unspecified part of trunk, limb or body region* or *Certain early complications of trauma, n.e.c.*) increased from 444 in 1999–00 to 1,260 in 2010–11.

Conversely, injuries to the hip and lower limb region remained stable over the study period (0.1% per year, 95% CI: -0.3 to 0.5,  $p = 0.64$ ). Despite a decrease in the rate of hospitalised hip fractures (-1.4% per year, presented in greater detail below), increased rates of hip and lower limb injuries other than hip fractures (2.2% per year) negated any gains.



The large increase in head injuries due to falls affected all age groups and the magnitude of these increases was higher for older age groups: for those aged 65–74 the rate of head injury increased by 6.1% per year (95% CI: 5.4–6.7) while for those aged 75–84 the rate increased by 6.9% per year (95% CI: 6.5–7.3). The increase in the rate of head injury was most substantial for those aged 85+ and was estimated at 7.5% per year (95% CI: 7.1–7.8).



## How have fractures due to falls changed over time?

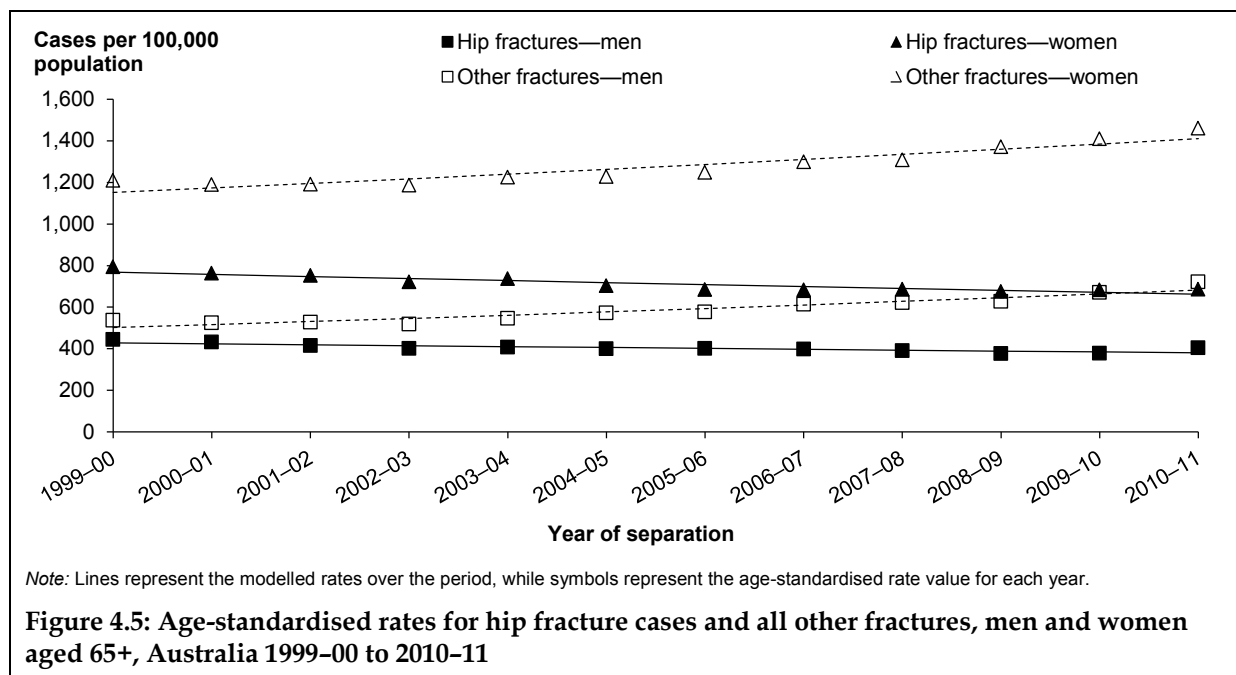
In contrast to fall injury cases generally, and head injuries specifically, the rates of hospitalised cases of hip fracture (principal diagnoses S72.0–S72.2) due to falls in people aged 65 and older decreased over the period 1999–00 to 2010–11 (Figure 4.5). While changes in admission practices over time may affect the rate of all falls injury cases, it is thought that hip fractures are serious enough to be admitted to hospital in nearly every instance.

The decrease in the age-standardised rate of hip fracture over the 12 years to June 2011 was estimated to be  $-1.4\%$  per year for Australians aged 65 and older (95% CI:  $-1.8$  to  $-1.1$ ). The rate of hip fracture for women decreased a little more rapidly ( $-1.3\%$  per year, 95% CI:  $-1.7$  to  $-1.0$ ) than for men ( $-1.1\%$ , 95% CI:  $-1.5$  to  $-0.6$ ). Using these figures, we estimate that some 2,800 fewer hip fracture cases involving people aged 65 and older occurred in 2010–11 than there would have been if the age-standardised rate had remained stable since 1999–00.

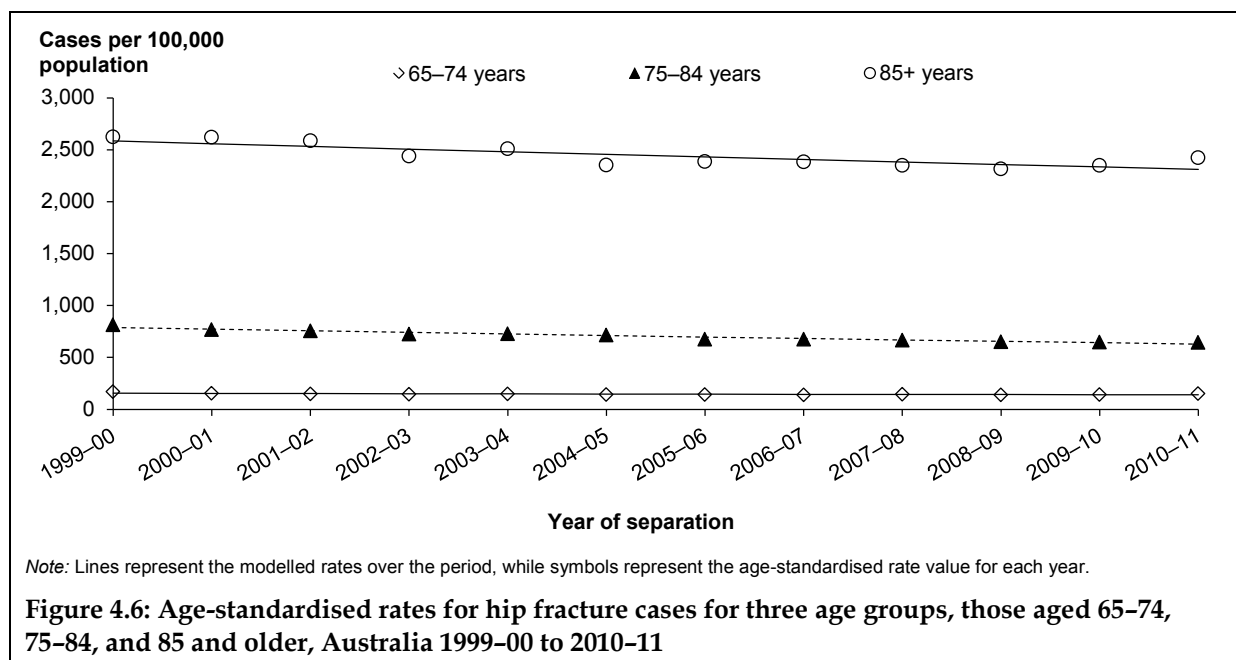
The decline in age-adjusted hip fracture rates was confined to the first half of the study period. Between 1999–00 and 2005–06, hip fracture cases declined by  $-1.7\%$  per year for men (95% CI:  $-2.3$  to  $-1.1$ ) and  $-2.2\%$  for women (95% CI:  $-2.7$  to  $-1.8$ ). From 2006–07, however, there was no significant change in rates for either men or women:  $-0.03\%$  per year (95% CI:  $-1.7$  to  $1.7$ ) and  $0.05\%$  (95% CI:  $-0.6$  to  $0.6$ ), respectively.

Rates of other types of fracture (that is, any other fractures other than hip fractures) were estimated to have increased over the study period (also plotted on Figure 4.5). The magnitude of this increase was estimated to be  $1.9\%$  per year for all people aged 65 and older (95% CI:  $1.5$ – $2.4$ ) and the rate for men increased by a greater magnitude ( $2.8\%$  per year, 95% CI:  $2.3$ – $3.4$ ) than for women ( $1.9\%$  per year, 95% CI:  $1.5$ – $2.3$ ).





As for all hospitalised fall injuries and head injuries, decreases in the rate of hip fractures were not consistent across all age groups in the older population (Figure 4.6). The decrease in the rate of hospitalised hip fracture due to falls was estimated to be  $-1.0\%$  per year for people aged 65-74 (95% CI:  $-1.7$  to  $-0.3$ ) and  $-2.0\%$  per year for people aged 75-84 (95% CI:  $-2.3$  to  $-1.8$ ). The rate of decrease for the oldest age group, those aged 85 and older, was estimated at  $-1.0\%$  per year (95% CI:  $-1.4$  to  $-0.6$ ).



### Other types of fracture

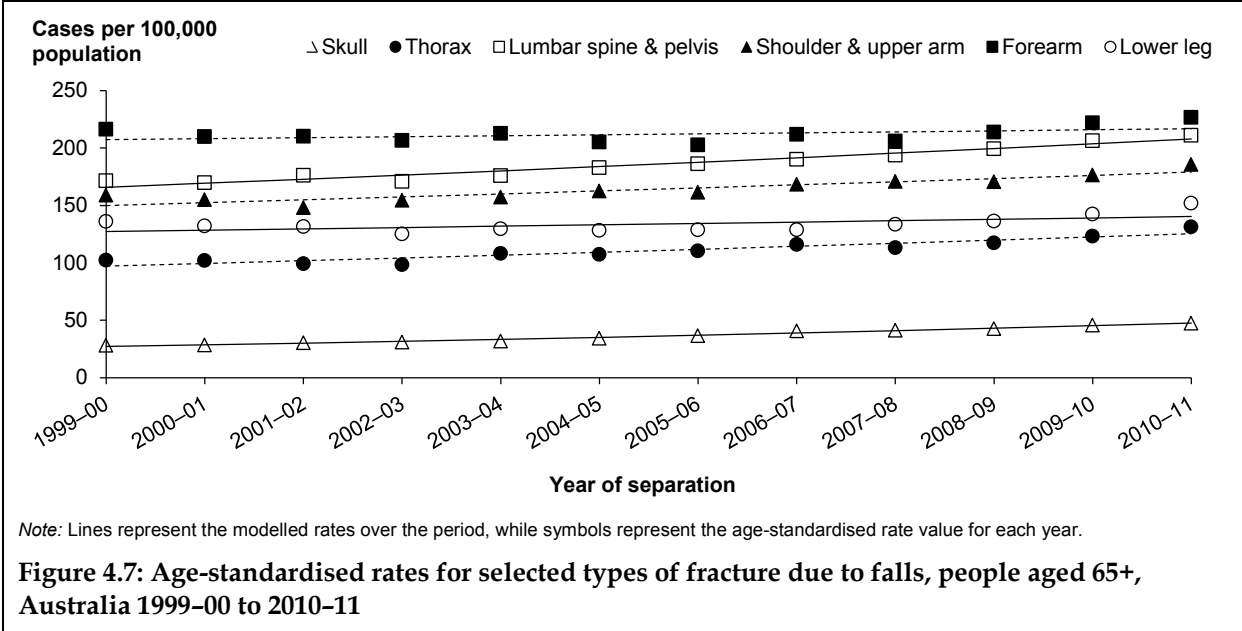
The decrease in hip fractures – which account for about a third of all hospitalised fall injury cases (38%) and more than this proportion of costs (see Bradley 2012b) – but an apparent increase in the rate of all fall injury cases raises interesting questions. What is the explanation

for these divergent trends? Is there an increasing propensity to admit minor fractures to hospital? Have falls prevention interventions over the last decade or so focused on hip fractures specifically? Many of these questions cannot be answered with the data available. We can, however, examine the rates of other hospitalised fall-related fractures to see if they increased or decreased over the study period.

Fractures of the skull (ICD-10-AM diagnosis code S02), the thorax (S22), the lumbar spine and pelvis (S32), the shoulder and upper arm (S42), the forearm (S52), and the lower leg (S82) account for over half of all fall-related fracture cases (53%). Some of these are particularly numerous (for example, forearm fractures: 68,572, 13% of all fractures over the 12-year study period) and some are less common but likely to be of high severity (for example, skull fractures: 12,124).

The results of negative binominal modelling for these specific types of fracture were mixed (Figure 4.7). In line with the observation of large increases in the rate of fall-related head injury, a large increase in the rate of skull fractures (5.3%, 95% CI: 4.7–5.8,  $p < 0.001$ ) was not a surprise. Rates for fractures of the thorax (2.3%, 95% CI: 1.8–2.9), the lumbar spine and pelvis (2.1%, 95% CI: 1.8–2.4) and the shoulder and upper arm (1.6%, 95% CI: 1.2–2.1) also significantly increased ( $p < 0.001$ ). An increase, though less strongly significant, was also observed for fractures of the lower leg (0.9%, 95% CI: 0.2–1.6,  $p = 0.01$ ). The rates of fractures of the forearm (0.4%, 95% CI: -0.1–0.9,  $p = 0.10$ ) were essentially stable over time however.

Of interest, the rate of femur fractures other than hip fractures (that is, excluding cases with a principal diagnosis S72.0–S72.2) was estimated to have increased at a rate of 1.1% per year between 1999–00 and 2010–11 (95% CI: 0.4–1.8). This increase was statistically significant ( $p < 0.01$ ). The difference in trends between fractures of the neck of femur (that is, hip fractures) and fractures of other parts of the femur remains to be explained.



### How have the causes of fall injury cases changed over time?

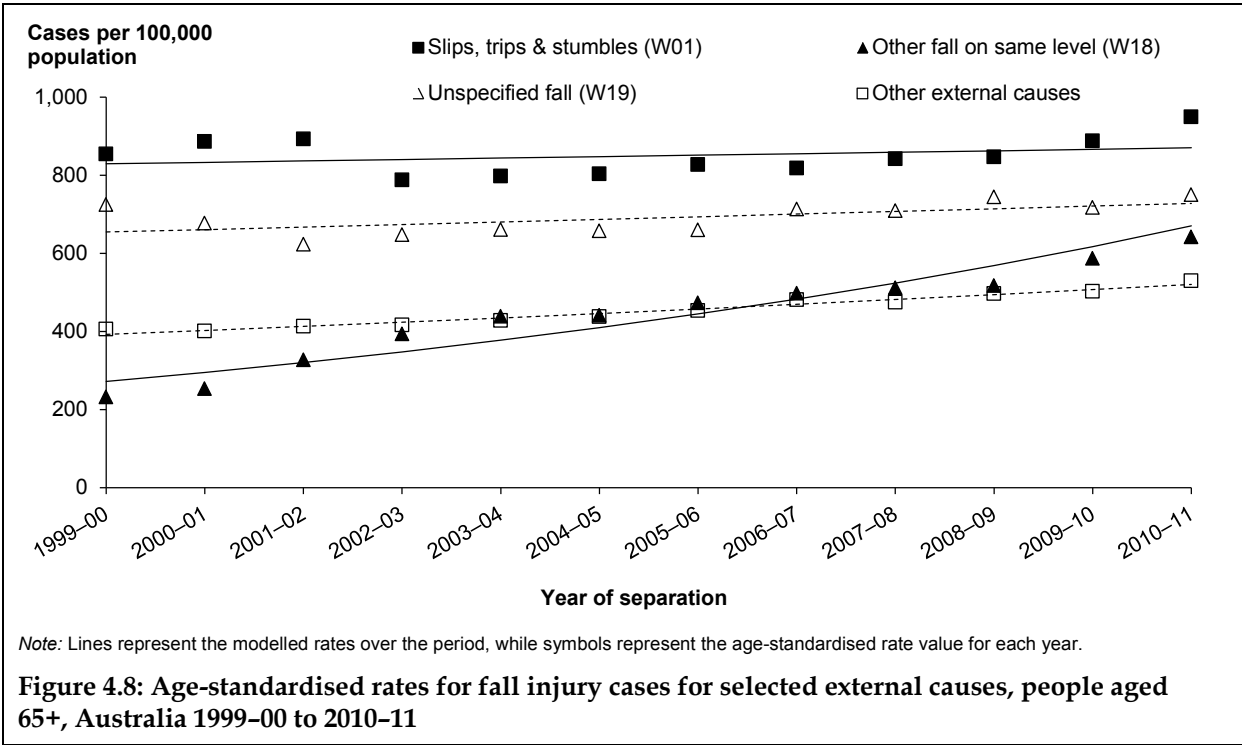
Three external cause codes accounted for four in five (82%) fall injury cases for the 12-year study period 1999–00 to 2010–11 (W01 *Fall due to slipping, tripping and stumbling*, 35%; W18

Other fall on same level, 19%; and W19 Unspecified fall, 28%). Rates for these three external causes, and all other fall external causes combined, are shown in Figure 4.8.

The age-standardised rate of falls coded as due to slipping, tripping and stumbling remained stable over the 12 years to 2010–11 (0.4% per year, 95% CI: -0.4–1.3,  $p = 0.30$ ). This is a notable change in results from a previous analysis, when the rate of falls due to slipping, tripping and stumbling was estimated to have significantly decreased by -1.2% per year (see Bradley and Pointer 2012). The rate of *Other fall on the same level* over the 12-year study period was also found to have increased less rapidly than previously reported; 8.5% (95% CI: 6.8–10.3) per year (compared with 11.8% per year over the 8 years to 2007 and 9.2% per year over the 10 years to 2009).

A different pattern than observed previously was also seen for the rate of *Unspecified fall*. Cases with this fall external cause were found to have increased by 1.0% per year (95% CI: 0.2–1.7), a result that is statistically significant ( $p = 0.01$ ). This is contrary to the observation of a stable rate over time noted in past analyses (see Bradley 2012a; Bradley and Pointer 2012). These observations raise the question of whether the specificity of external cause coding for falls has decreased.

Falls due to all other external causes combined (18% of cases over 1999–00 to 2010–11) increased over the study period by an estimated 2.6% per year (95% CI: 2.3–2.9), an increase that was statistically significant ( $p < 0.001$ ). This group includes falls from beds, or from chairs, or involving stairs and steps, but in relatively low numbers compared to slipping, tripping and stumbling, *Other fall on same level* and *Unspecified fall*.

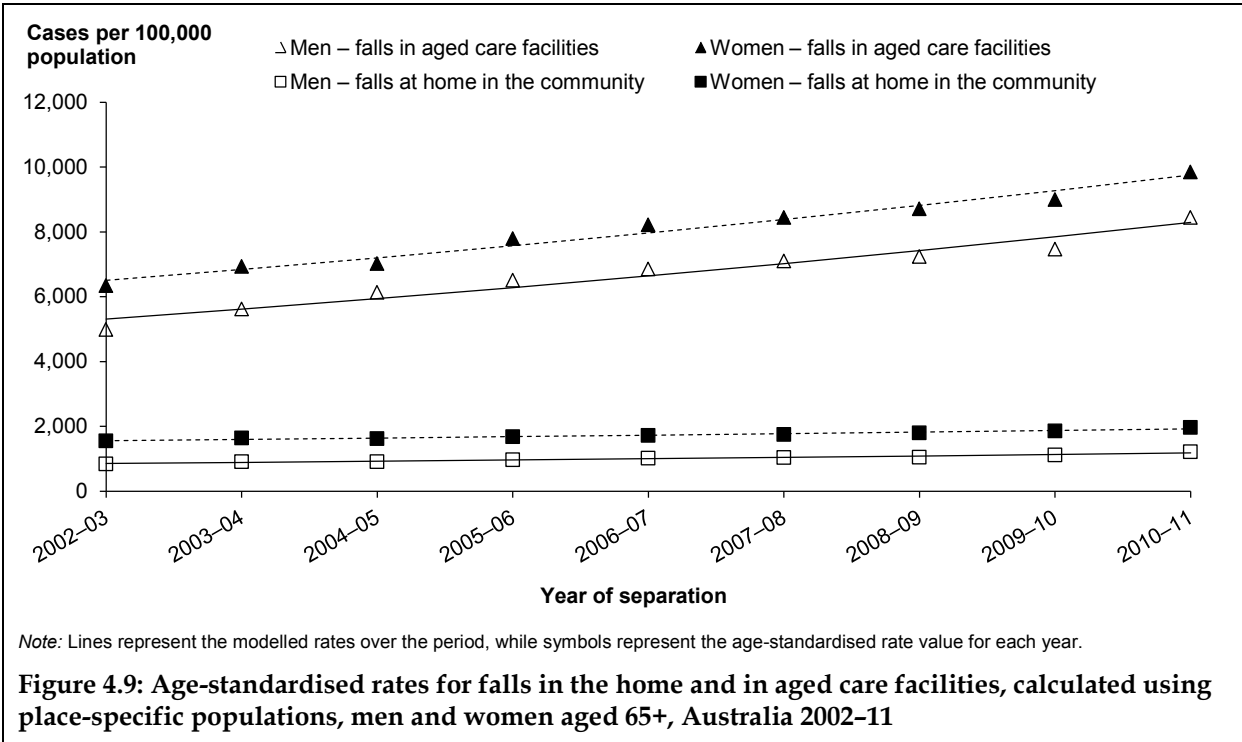


### How have the places where fall injuries occurred changed over time?

The two most common places of occurrence recorded for hospitalised fall injury cases for people aged 65 and older are the home and aged care facilities (see Chapter 2). Over the

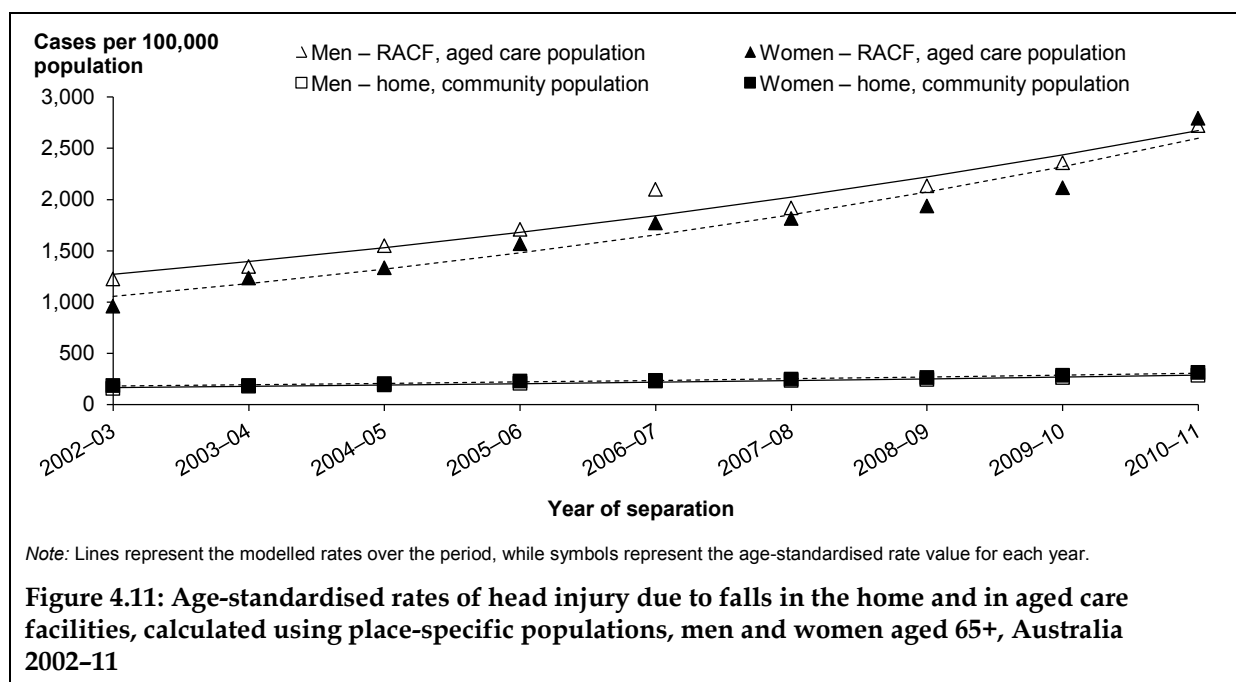
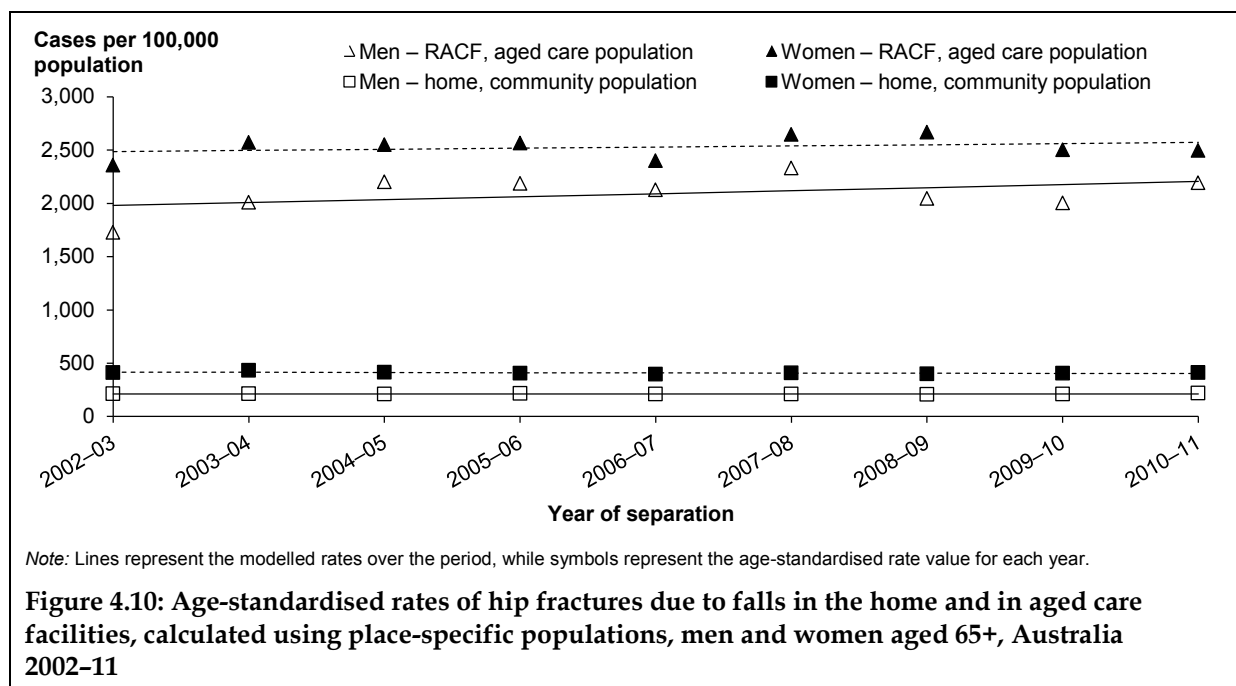
nine-year period 2002–11 (when the ICD-10-AM included an ‘aged care facility’ place of occurrence code), 71% of falls were reported to have occurred in the home or in aged care facilities. Using the same method as that underlying Figure 2.3 (see also Appendix A), Figure 4.9 presents the rates over time for fall injury cases resulting in hospitalisation that had been recorded as occurring in the home or in aged care facilities.

Residents of aged care facilities had considerably higher rates of fall-related injury than community residents falling in the home in each year of the analysis, and both sets of rates increased significantly over the study period. Further, while age-standardised rates of falls occurring in the home that involved people aged 65 and older resident in the community increased significantly between 2002–03 and 2010–11 (men: 4.1% per year, 95% CI: 3.6–4.6; women: 2.7% per year, 95% CI: 2.3–3.0), rates of falls that occurred in an aged care facility increased faster (men: 5.7% per year, 95% CI: 4.8–6.6; women: 5.2% per year, 95% CI: 4.6–5.8).



Rates of hip fractures and head injuries due to falls were also much higher for residents of aged care facilities than for residents of the community falling at home (Figures 4.10 and 4.11). Nevertheless, statistically significant trends were not observed for hip fracture rates for either sex in either setting in the period from 2002–03. In contrast, strong upward trends in rates were observed for head injuries due to falls. Head injury rates were estimated to have increased by 6.9% per year (95% CI: 6.4–7.3) for residents of the community falling at home and 10.8% per year (95% CI: 9.2–12.3) for residents of aged care facilities. This rate of increase was a little more rapid for female than male residents of aged care facilities: 11.9% per year (95% CI: 10.1–13.8) compared to 9.7% (95% CI: 8.2–11.3).

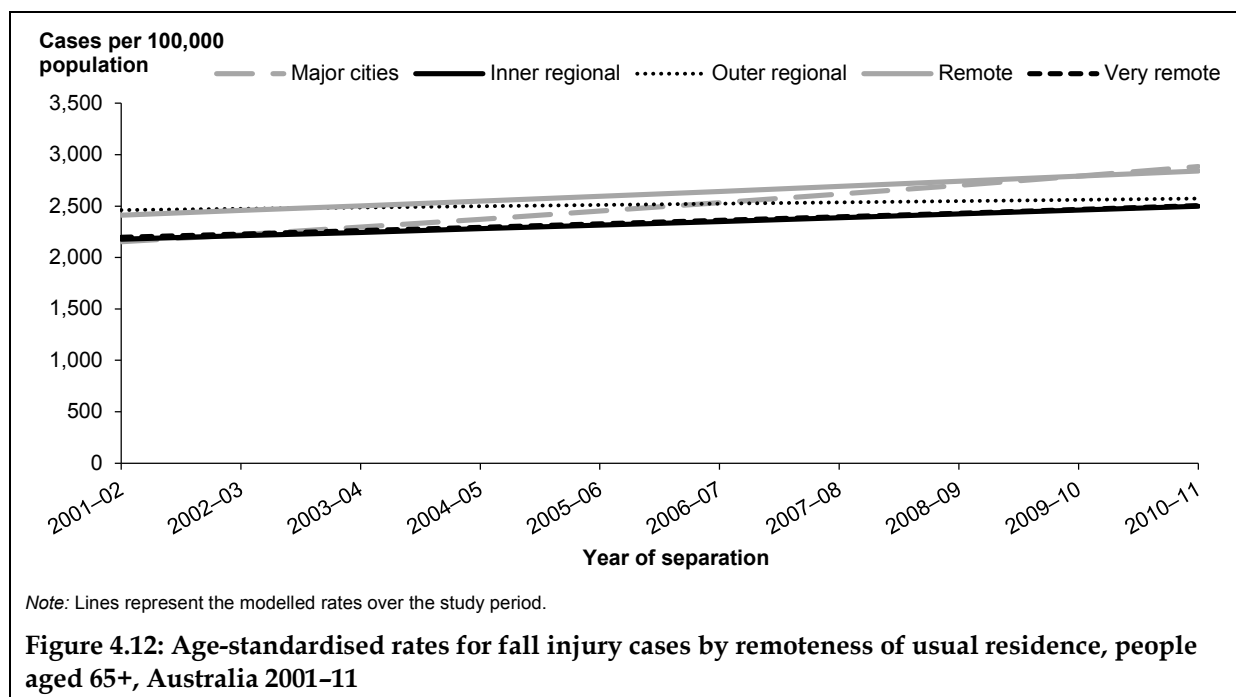
Higher rates of fall-related injuries in residents of aged care facilities are not surprising given the higher levels of frailty in this population relative to people of the same age who remain resident in the community. The faster annual increase in rates of falls for residents of aged care facilities and the widening difference in injury risk suggest a continuing need for interventions designed for the aged care setting.



## How have fall injuries varied by remoteness of usual residence over time?

Trend analyses for falls by remoteness of usual residence were limited to the period 2001–11 due to changes in the Remoteness Structure at the time of the 2006 Census (see Appendix A). Only modelled results are presented in the figures in this section as the numerous rate values are difficult to distinguish. Underlying rate values and case counts are provided in Appendix B.

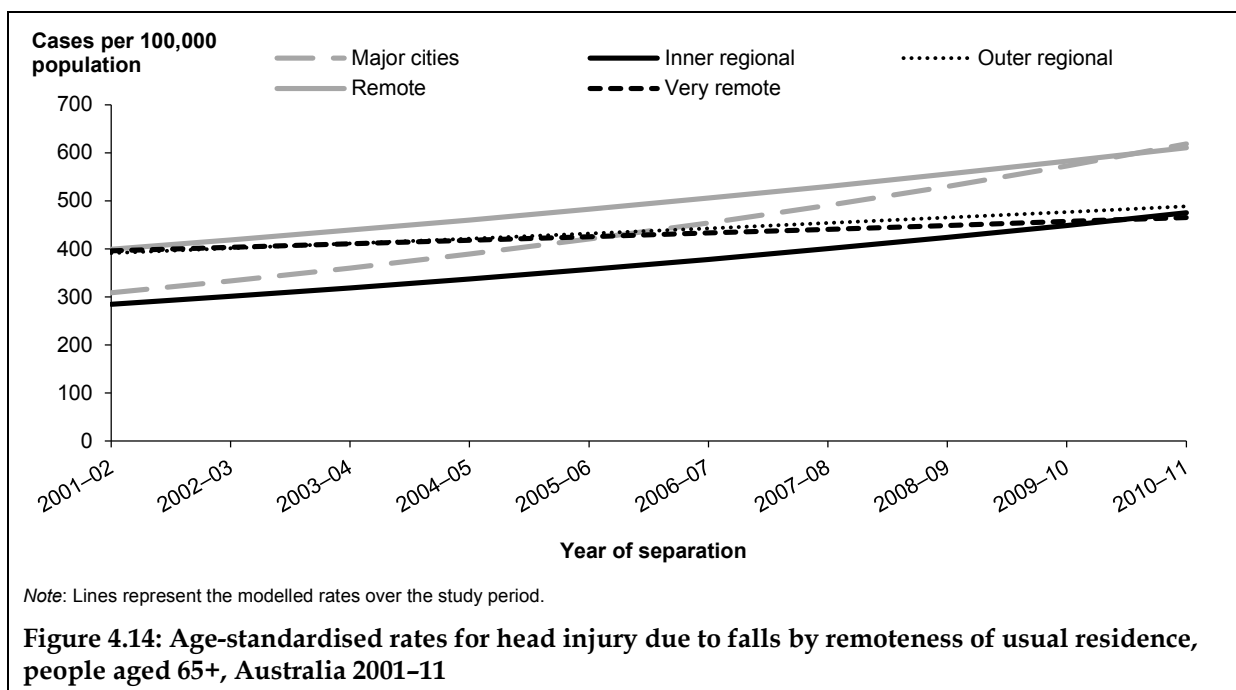
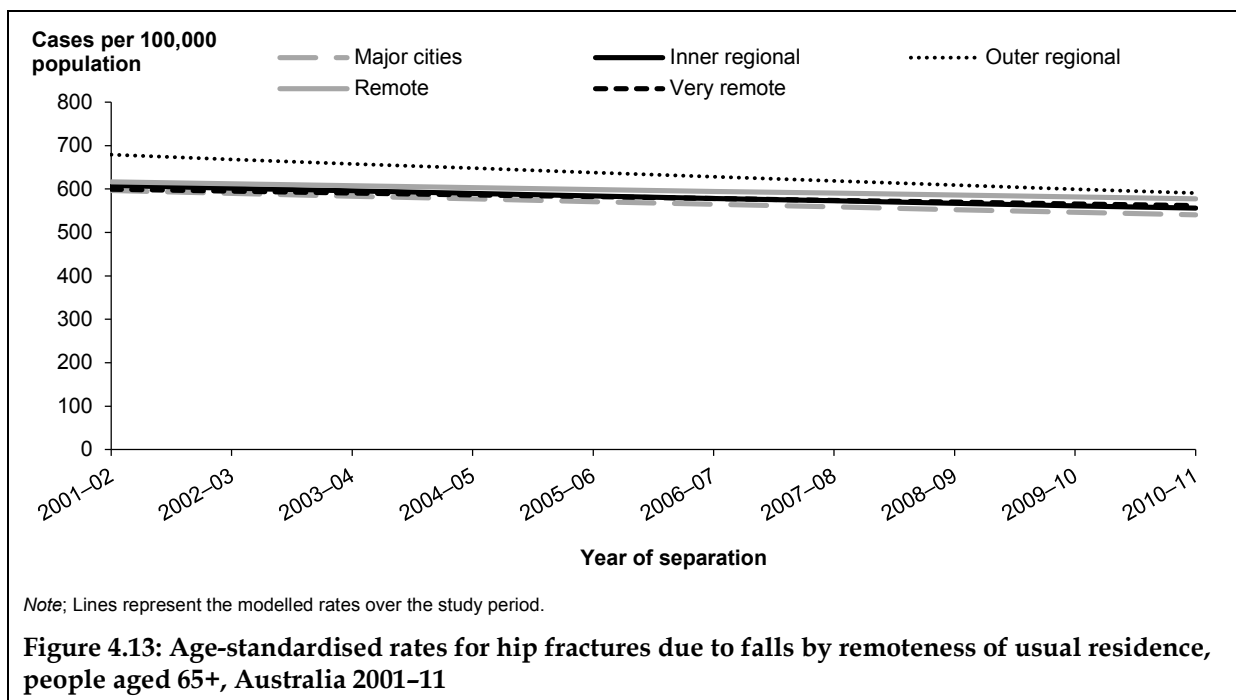
Rates of fall injury overall did not differ greatly between residents of the five remoteness areas. This differs from most other external causes of injury, rates of which increase with remoteness of usual residence (see Tovell et al. 2012). Rates of fall injuries tended to rise over the study period in most of the regions. The trends were significant except for *Very remote* areas where the small population and case count resulted in wide uncertainty around the estimated trend. Average annual increases in rate fell with remoteness from *Major cities* (3.3% per year, 95% CI: 2.8–3.8) to *Outer regional* areas (0.5% per year, 95% CI: 0.2–0.8).



Decreases in the rate of fall-related hip fractures were observed in most remoteness areas (Figure 4.13). The largest decrease in the age-standardised rate of hospitalised hip fractures involved residents of Australia's *Outer regional* areas, falling -1.5% per year over the 2001-11 study period (95% CI: -2.3 to -0.8,  $p < 0.001$ ). Trends for residents of *Remote* and *Very remote* areas were not statistically significant (-0.7% per year each,  $p > 0.40$ ).

The rate of head injury due to falls tended to increase over the study period in most remoteness areas (Figure 4.14). Rates of head injury increased by the greatest magnitude for residents of *Major cities* (8.0% per year, 95% CI: 7.5–8.5,  $p < 0.001$ ) and did not increase for residents of *Very remote* regions (1.5% per year, 95% CI: -1.5–5.2,  $p = 0.28$ ).

It is important to note that the case numbers underpinning the analyses presented in figures 4.13 and 4.14 are much smaller than those for the analysis of all fall injury cases by remoteness of usual residence, contributing to greater uncertainty around the results.



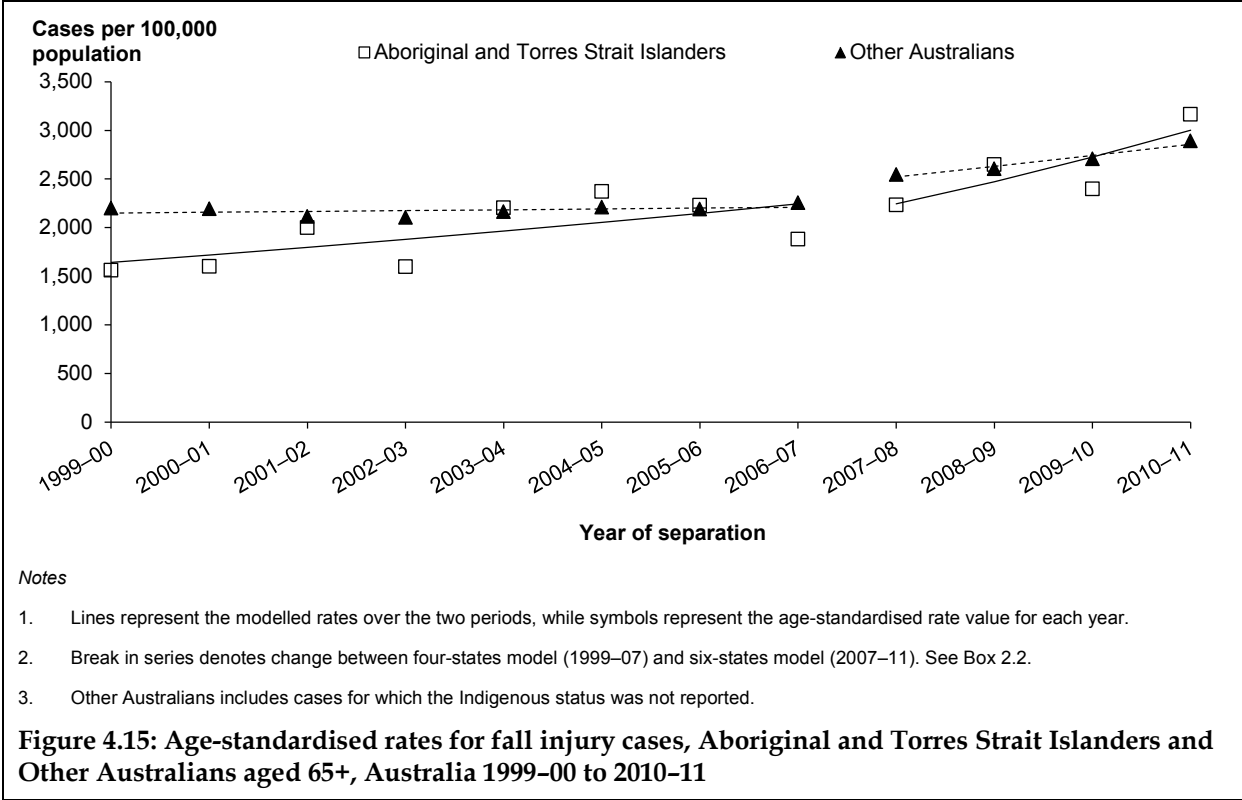
## How have fall injuries for Aboriginal and Torres Strait Islander people changed over time?

Examining the trends in fall injuries for Aboriginal and Torres Strait Islander people over time is complicated by the change in the states and territories for which Indigenous estimates were assessed to be adequate for statistical reporting and by high year-to-year variation due, at least in part, to the relatively small annual numbers of cases (see Box 2.2). The following figures present data for four states (Queensland, Western Australia, South Australia and the

Northern Territory) for the period 1999–00 to 2006–07 and for six states (also including New South Wales and Victoria) for the shorter period 2007–08 to 2010–11. The change of scope is shown as a break in the series. Rates for Other Australians were calculated in the same way as those for Aboriginal and Torres Strait Islander people.

Aboriginal and Torres Strait Islander case numbers rose considerably in the study period. In the six-state region, the numbers of fall-related hospitalisations in the four years from 2007–08 were 312, 357, 355 and 478. This reflects the size of the Indigenous population aged 65 and older, which grew even more rapidly than the non-Indigenous population of the same age (ABS 2010; 2012. See also ABS, 2009).

The focus of this report is risk of fall-related injury, and so the results in this section are presented as population-based rates. The rates are age-standardised to allow for rise in injury risk with age and for the different age distribution of Aboriginal and Torres Strait Islander people aged 65 and older and the remainder of the population of this age. Figure 4.15 presents age-standardised rates of hospitalised fall injury from 1999–00 to 2010–11 for Aboriginal and Torres Strait Islander people and Other Australians aged 65 and older.

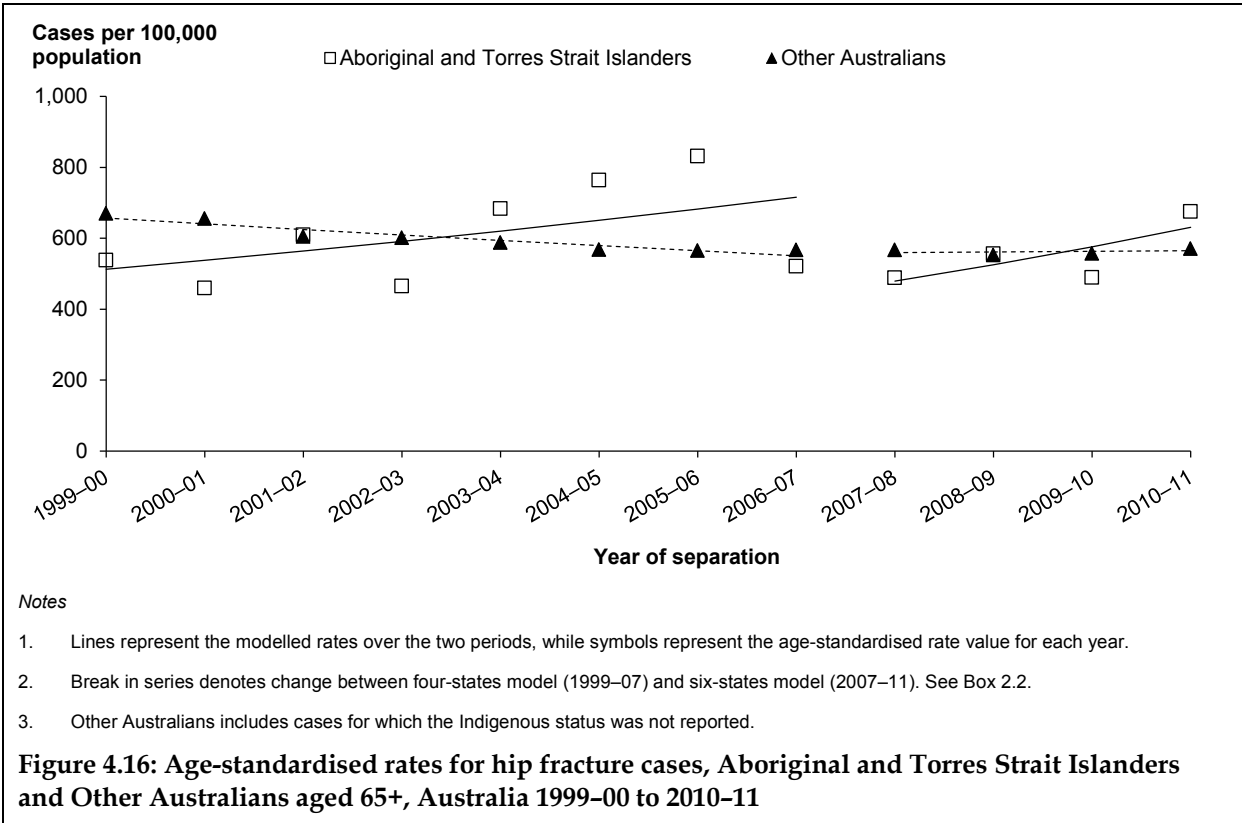


Age-standardised rates for Aboriginal and Torres Straits Islander people fluctuated from year to year but tended to be a little lower than those for Other Australians across the 12 years studied. For the period 1999–00 to 2006–07, the age-standardised rate of fall injury cases for Aboriginal and Torres Strait Islander people rose by an average of 4.6% per year (95% CI: 0.7–8.5,  $p < 0.05$ ) while for Other Australians there was no statistically significant trend (95% CI: -0.2% to 1.0% per year,  $p = 0.19$ ). For the period 2007–08 to 2010–11, the average increase in the rate for Aboriginal and Torres Strait Islander people was 10.2% per year (95% CI: 3.0–17.0,  $p < 0.01$ ) while for Other Australians the average annual increase was 4.3% (95% CI: 3.3–5.3,  $p < 0.001$ ).



Age-standardised rates and estimates of trend are also presented for two subtypes of hospitalised fall injury: hip fracture and fall-related head injury. Analysis of these conditions for Aboriginal and Torres Strait Islanders was subject to the same constraints as analysis of total fall injury, exacerbated by the even smaller case numbers.

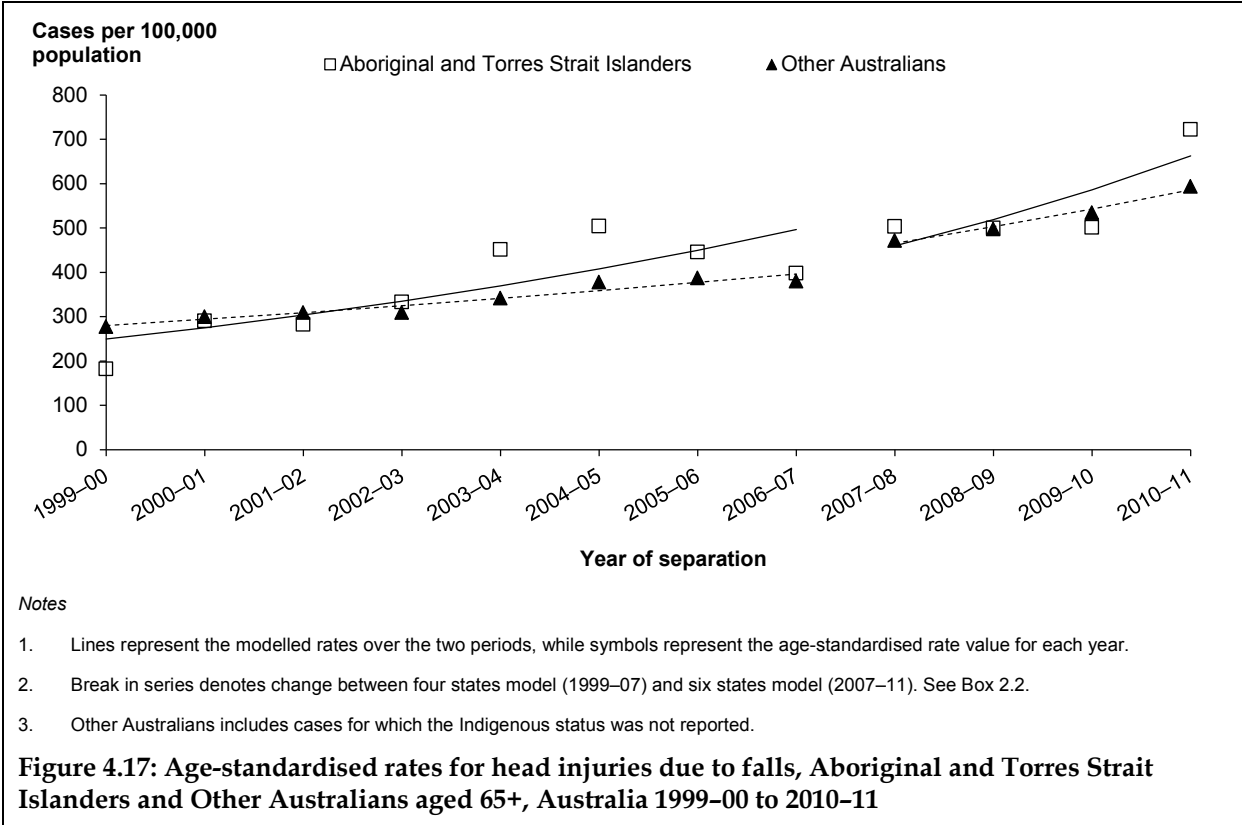
For people not identified as Aboriginal and Torres Strait Islanders, age-standardised hip fracture rates declined by an average of 2.5% per year (95% CI: -3.1 to -1.9,  $p < 0.001$ ) during the period 1999-00 to 2006-07 (Figure 4.16). This is in keeping with the findings for the whole population reported earlier in this chapter. Age-standardised hip fracture rates for Aboriginal and Torres Strait Islander people fluctuated widely during this period, and a significant trend was not found (95% CI: -1.0 to 11.1,  $p = 0.11$ ).



In the second period, for which data from six jurisdictions were used, age-standardised hip fracture rates for people not identified as Aboriginal and Torres Strait Islanders showed no significant trend (95% CI: -0.8 to 1.4,  $p = 0.60$ ) again in accord with findings for the whole population (Figure 4.16). Hip fracture rates for Aboriginal and Torres Strait Islander people continued to fluctuate in this period, with a marginally significant upward trend over the 4-year period (95% CI: 0.1-19.9,  $p = 0.05$ ).

Age-standardised rates of hospitalised head injury due to falls were similar for Aboriginal and Torres Strait Islander people and Other Australians throughout both periods (Figure 4.17). As expected, rates for the Indigenous population showed more year-to-year variation than those for Other Australians. The upward trends evident in Figure 4.17 were statistically significant for both populations in both periods. For the period 1999-00 to 2006-07, the annual increase in the rate of fall-related head injury for Aboriginal and Torres Strait Islander people was 10.3% per year (95% CI: 4.2-16.8,  $p < 0.01$ ) while for Other Australians the average rise was 5.1% per year (95% CI: 4.1-6.2,  $p < 0.001$ ). For the period 2007-08 to

2010–11, the average annual increase in the rate of head injury cases for Aboriginal and Torres Strait Islander people was 12.9% per year (95% CI: 2.8–24.0,  $p < 0.05$ ) while for Other Australians this was 8.0% per year (95% CI: 6.8–9.2,  $p < 0.001$ ). As for hip fractures and falls overall, the results presented here do not provide a basis for claiming that trends differ significantly between the two population groups.



The interpretation of the results in this section requires care, for reasons outlined above. Uncertainty related to the relatively small annual numbers of Aboriginal and Torres Strait Islander cases is exacerbated by the possibility that the completeness of Indigenous identification has changed over time.

The most noteworthy aspect of these findings, and the one on which most weight can be put, is the similarity of age-standardised rates of fall-related injuries for both population groups, particularly in the second period, when Indigenous identification may have been better than in earlier years and which is based on data for a larger part of Australia.

There is some evidence of rising rates of hospitalised fall injury for Aboriginal and Torres Strait Islander people. However, increasing completeness of Indigenous identification could also produce, or steepen, upward trends. Efforts have been made during the period covered by this report to improve the completeness of identification. Hospital records for NSW and Victoria were only regarded as adequate for years from 2007–08, implying that ascertainment was lower before that and not ruling out the possibility of further improvement more recently or in other jurisdictions. It is also important to note that the estimates of trend for Aboriginal and Torres Strait Islander people have wide 95% confidence intervals, mainly due to the relatively small case numbers.

For these reasons, it is important to be cautious in the interpretation of trends. In particular, we do not consider that there is a sound basis to conclude that trends for Aboriginal and Torres Strait Islander people differ from those for Other Australians.

Note also that the change from the four states model to the six states model may have influenced the patterns observed (this is explored in the forthcoming AIHW report *Impact of improvements to Indigenous identification in hospital data on patterns of hospitalised injury*).

## How have types of fall-related separations changed over time?

Trends in rates of fall cases were analysed in the first part of this chapter. This section extends the analysis of trends to the other types of fall-related separation records distinguished in this report.

Age-standardised rates of both fall injury inward transfer separations and fall-related follow-up care separations were observed to have significantly increased over the 12 years to June 2011 (Figure 4.18). Fall injury inward transfers were estimated to have increased by 4.4% per year over the study period (95% CI: 3.4–5.5,  $p < 0.001$ ) while fall-related follow-up care separations were estimated to have increased by an even more substantial 9.8% per year (95% CI: 8.3–11.3,  $p < 0.001$ ). These increases are of a greater magnitude than observed for fall injury cases and, as these separations are considered to be additional episodes of care for cases, this suggests changes in patterns of care provision over the study period.

We caution against interpreting the rises in rates shown in Figures 4.18 and 4.19 as necessarily having implications for the overall burden of fall-related injuries on hospitals. They could be due to changes in administrative practices over time. They could also be due to more complete recording of when episodes of follow-up care are related to falls. That is, what may be increasing is the number of separations per fall event (more transfers and more, or more identifiable, episodes of follow-up care) whereas overall length of stay for fall-related injuries may remain similar over time. Without person-linked data it is difficult to investigate patterns of admitted patient episodes per case; however, information on trends in length of stay is provided in the next section.

Although we are not certain of the role of fall injury in the episodes of care we identify as 'other fall-related' separations, or what leads to a diagnosis of R29.6 *Tendency to fall, not elsewhere classified*, Figure 4.18 also presents the age-standardised rates of these separations over the 1999–00 to 2010–11 study period. (Please note that the ICD-10-AM code R29.6 *Tendency to fall, not elsewhere classified* was introduced for the 2006–07 data year. Consequently data were only available from this time.) Rates of 'other fall-related' separations significantly increased over the study period by an estimated 3.1% (95% CI: 2.8–3.4,  $p < 0.001$ ) while 'tendency to fall' separations increased by an even more substantial 7.2% per year (95% CI: 5.7–8.8,  $p < 0.001$ ).

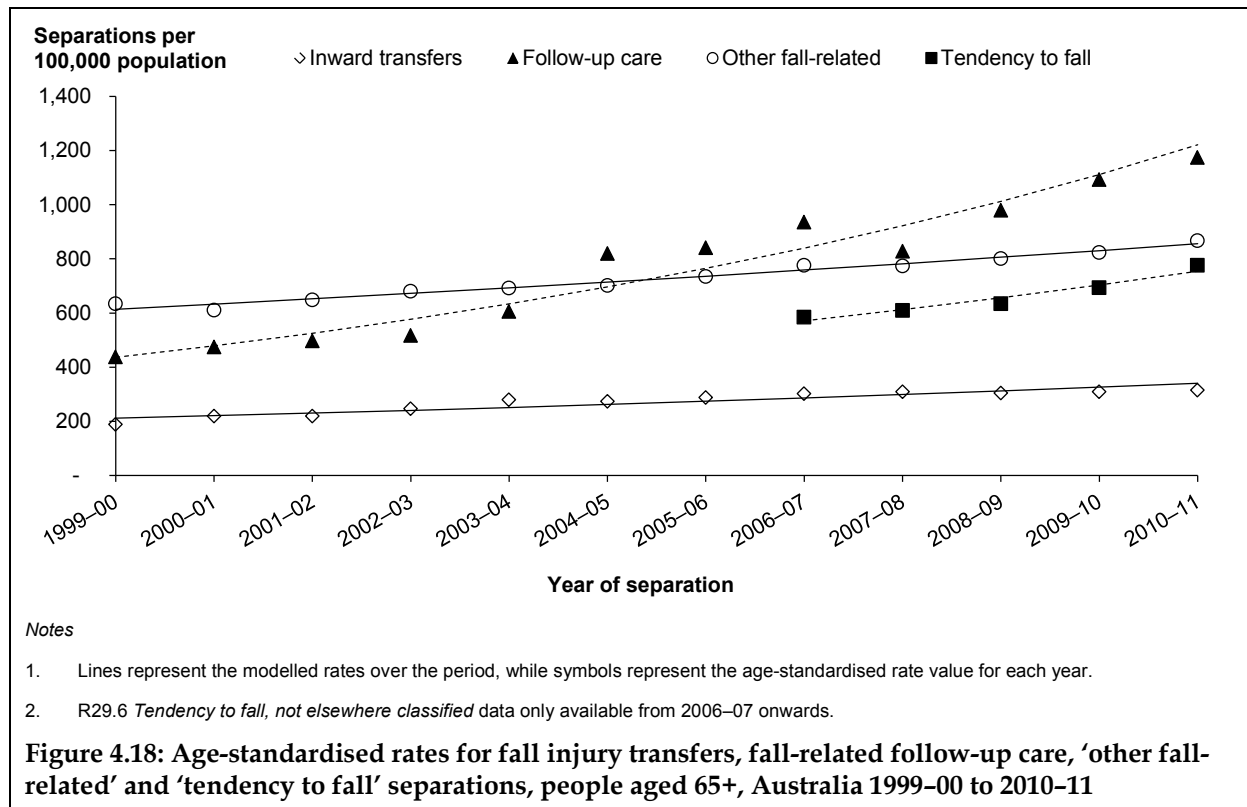
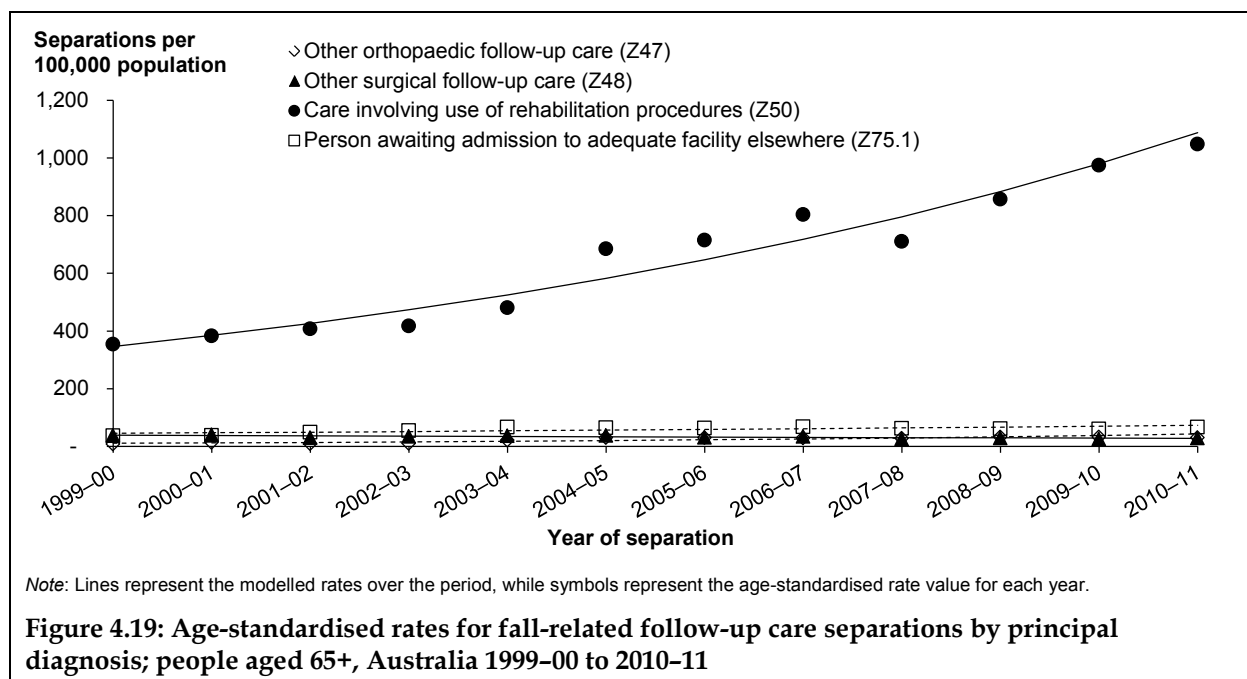


Figure 4.19 shows that a substantial increase for fall-related follow-up care separations was observed for those records with a principal diagnosis of Z50 *Care involving use of rehabilitation procedures*: 11.0% per year (95% CI: 9.4-12.6  $p < 0.001$ ). While separations with principal diagnoses of Z47 *Other orthopaedic follow-up care* had a greater magnitude of increase (13.5% per year, 95% CI: 8.4-18.7,  $p < 0.001$ ), the much smaller case numbers for this class of separation mean that this result has far less of an impact on the increasing burden of fall-related hospital care.

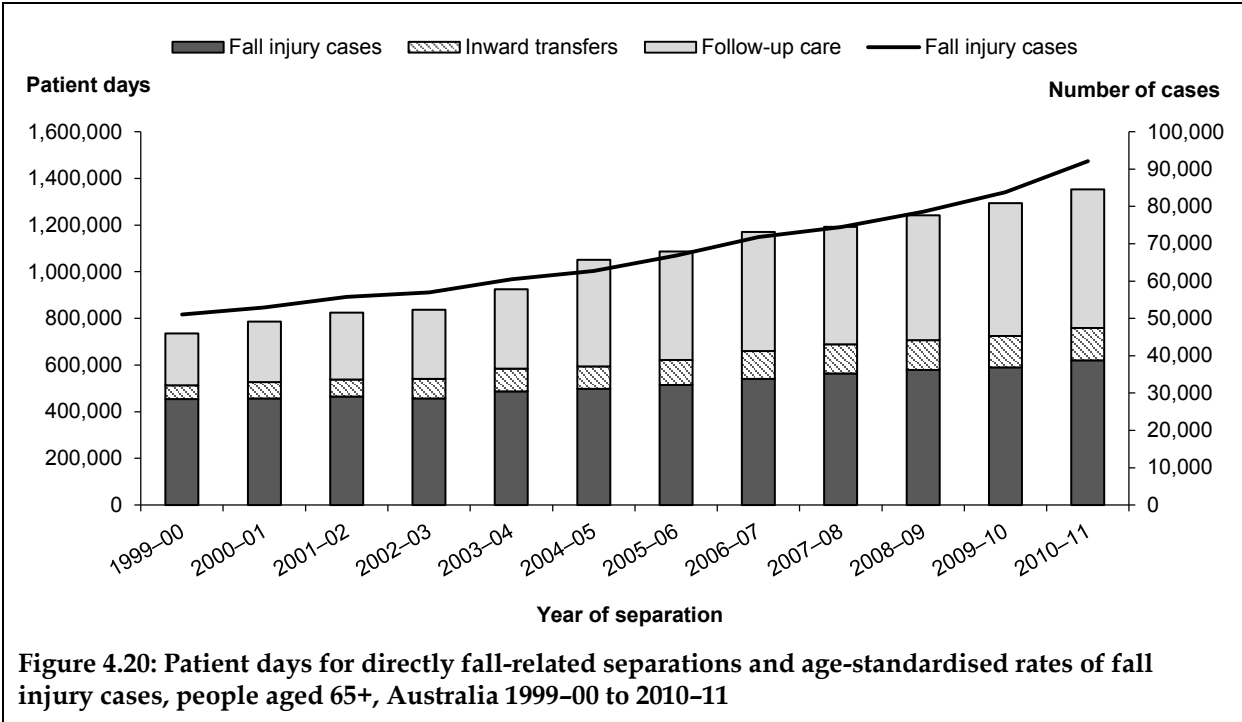


# How has length of stay for fall injury changed over time?

The number of patient days for all hospital care directly attributable to fall-related injury (that is, fall-related cases, transfers and follow-up care) increased substantially over the 12 years 1999-00 to 2010-11 (Figure 4.20). Commensurate with the increasing numbers of cases, the burden of fall-related hospital care increased from 736,128 patient days in 1999-00 to 1,353,710 patient days in 2010-11 (see tables B.26-B.28).

The initial episode of care for each fall injury case accounted for 62% of directly fall-related patient days in 1999-00. This proportion fell during the study period to 44% in 2010-11 because of marked increases in the number of patient days due to fall injury inward transfers and fall-related follow-up care.

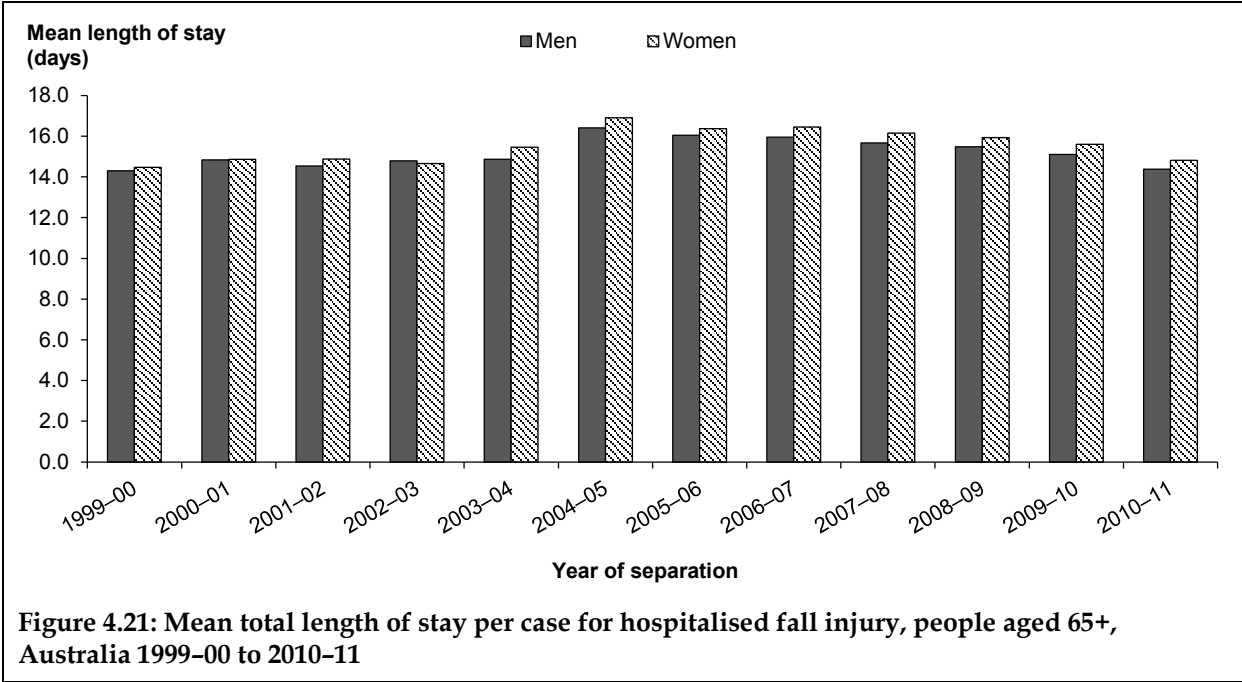
The annual number of patient days for fall injury cases was 453,995 patient days in 1999-00, rising to 620,629 patient days in 2010-11, an increase of about one third. The annual number of patient days for fall injury inward transfer and fall-related follow-up care separations more than doubled over the 12-year study period, however. Fall injury inward transfers accounted for 59,386 patient days in 1999-00 compared to 138,044 patient days in 2010-11, while follow-up care separations accounted for 222,747 patient days in 1999-00 compared to 595,037 patient days in 2010-11.



More fall cases were hospitalised annually over the 12 years 1999-00 to 2010-11 and many more patient days were provided, in aggregate, for the care for these injuries. However, this is not to say that each fall injury case required an increasing level of hospital care (that is, a longer stay in hospital) over the study period.

Figure 4.21 shows that the estimated mean total length of stay per case (all patient days directly attributable to falls divided by the number of cases for the year) was very similar, for both men and women, at the beginning of the study period as at the end. For men and

women together this was a mean of 14.4 days per case in 1999–00 and 14.7 days per case in 2010–11. There was a rise in length of stay in the first half of the study period, to a maximum of 16.8 days per case for people in 2004–05 (coincident with the noticeable jump in the rate of fall-related follow-up care separations and associated patient days). A sustained decrease in mean total length of stay was observed to 2010–11. The change in the mix of types of fall injuries observed over the study period may have been a factor alleviating the burden of hospital care for an increasing rate of hospitalised fall injury. That is, a decreasing rate of hip fractures, which have a longer mean length of stay than most other types of hospitalised fall injury, may have off-set the additional care required by increasing rates of fall injury cases that have typically shorter lengths of stay.



# Appendix A: Data issues

## Data sources

The data on hospital separations were from the Australian Institute of Health and Welfare's (AIHW) National Hospital Morbidity Database (NHMD). Comprehensive information on the quality of the data for 2010–11 is available in *Australian hospital statistics 2010–11* (AIHW 2012a) and the data quality statement below. Nearly all fall injury cases admitted to hospitals in Australia are thought to be included in the NHMD data reported.

In 2010–11, diagnoses and external cause injury and poisoning were recorded using the seventh edition of the *International statistical classification of diseases and related health problems, 10th revision, Australia modification* (ICD-10-AM). Data from 1999–00 were coded to earlier editions of the ICD-10-AM.

Denominators for most age-specific and age-standardised rates are estimated resident population (ERP) values as at 31 December of the relevant year. Australian ERPs for 30 June 2001 (persons, by 5-year age groups to the same oldest group present in the population denominator data) were used as the standardising population throughout the report. Data from other sources, mostly based on ERPs, were used as denominators for rates by remoteness of usual residence, Indigenous status and residence in aged care facilities (see Rates, below).

## Definitions

The principal diagnosis is the diagnosis established after study to be chiefly responsible for occasioning the patient's episode of admitted patient care (AIHW 2012a).

An external cause is defined as the environmental event, circumstance or condition that was the cause of injury or poisoning. Whenever a patient has a principal or additional diagnosis of an injury or poisoning, an external cause code should be recorded. In this report the focus was on external causes W00–W19 *Falls*.

## Selection criteria

This report describes the incidence of fall-related injuries newly occurring in the older Australia population and which resulted in admission to a hospital (fall injury cases). For some purposes, particularly concerning length of stay and total patient days, several other types of fall-related separation record warrant attention. This section describes the criteria that were used to select NHMD records to achieve these purposes.

## Period

This report is restricted to admitted patient episodes that ended in the period 1 July 2010 to 30 June 2011 for the single-year analyses (Chapters 2 and 3), and admitted patient episodes that ended in the period 1 July 1999 to 30 June 2011 for the multi-year trend analyses (Chapter 4).

## Fall cases

Fall injury cases were defined as all NHMD records that met all of the following four criteria:

- The patient was aged 65 or older when admitted.
- The principal diagnosis was in the range S00–T75 or T79.
- The first-reported external cause code was in the range W00–W19 *Falls*.
- The mode of admission was not a transfer from another hospital.

Selection has been based on principal diagnosis because this refers to the condition ‘chiefly responsible for occasioning [the] episode of admitted patient care’. The first-reported external cause code was chosen as a selection criterion as this is most likely to be related to the principal diagnosis.

Separation records that met the first three criteria but were inward transfers from another acute care hospital (and thus excluded by the fourth criterion) were omitted from case counts to reduce over-counting (see *Estimating incident cases*, below).

## Inward transfer separations

Fall injury inward transfers were defined as all NHMD records that met all of the following four criteria:

- The patient was aged 65 or older when admitted.
- The principal diagnosis was in the range S00–T75 or T79.
- The first-reported external cause code was in the range W00–W19 *Falls*.
- The mode of admission was a transfer from another hospital.

Inward transfers were analysed separately from cases but included in measures of patient days and length of stay due to fall-related injuries.

## Follow-up care separations

It is likely that many separations following an episode of care for an injury, particularly for older people with falls injuries, are coded with a principal diagnosis from Chapter 21 of the ICD-10-AM (*Factors influencing health status and contact with health services*). Most such separations are coded as Z50 *Care involving use of rehabilitation procedures*. These separations contribute a non-trivial proportion of the burden of hospital care due to falls by older people.

In this report, fall-related follow-up care separations were defined as all NHMD records that met all of the following four criteria:

- The patient was aged 65 or older when admitted.
- The principal diagnosis was Z47, Z48, Z50 or Z75.1.
- At least one other diagnosis field contained a code in the range S00–T75 or T79.
- At least one external cause code field contained a code in the range W00–W19 *Falls*.



## **‘Other fall-related’ separations**

The NHMD contains other records, not meeting the criteria for fall-related cases, transfers or follow-up care, which include one or more external cause codes in the range W00–W19 *Falls* as well as one or more injury diagnosis in the range S00–T75 or T79. The role of the injurious fall in bringing about the episode in hospital is less clear for this type of record than for the types defined above. As the type including the residue of records with fall injury codes, the title given to it is ‘other fall-related’ separations. This type is defined as all NHMD records that met all of the following four criteria:

- The patient was aged 65 years or older when admitted.
- Any diagnosis variable contained a code in the range S00–T75 or T79.
- Any external cause code variable contained a code in the range W00–W19.
- The record did not satisfy the criteria for fall injury case, inward transfer or fall-related follow-up care separations.

Most of these ‘other fall-related’ separations had a principal diagnosis for a non-injury condition; however, the type also included separations with an injury principal diagnosis and a fall external cause, but not as the first-reported external cause.

## **‘Tendency to fall’ separations**

From 1 July 2006 the ICD-10-AM has included the diagnosis code R29.6 *Tendency to fall, not elsewhere classified* (NCCH 2010). The code R29.6 replaced the R29.81 *Other and unspecified symptoms and signs involving the nervous and musculoskeletal systems – falls* code used in earlier editions of the classification. The coding standard for R29.6 describes the “tendency to fall because of old age or other unclear health problems” (*Australian Coding Standards*, NCCH 2010). Falls due to difficulty walking, dizziness and giddiness, syncope and collapse or causing injury are explicitly excluded. Further, the coding standards specify that R29.6 should not be applied in cases of known injury or when a medical condition is found to be the cause of the falls. Nevertheless, some records containing fall injury codes (for example, fall injury case separations, fall-related follow-up care separations) also contain code R29.6 as an additional diagnosis. The number of records meeting the criteria for the types of fall separations defined above but also containing an R29.6 code is relatively small (8,128 in 2010–11). However, to avoid double-counting we have omitted records already included elsewhere in the report from our analysis of ‘tendency to fall’ separations.

In this report, ‘tendency to fall’ separations were defined as all NHMD records that met all of the following three criteria:

- The patient was aged 65 years or older when admitted.
- Any diagnosis variable contained an R29.6 code.
- The separation was not classed as a fall injury case, inward transfer, fall-related follow-up care or ‘other fall-related’ separation.

## **Estimating incident cases**

Each record in the NHMD refers to a single episode of care in a hospital. Some fall injuries result in more than one episode in hospital and, hence, more than one NHMD record. This can occur in two main ways:

- a person is admitted to one hospital, then transferred to another
- a person has an episode of care in hospital, is discharged home (or to another place of residence) and is then admitted for further treatment for the same injury, to the same hospital or another one.

The NHMD does not include information designed to enable the set of records belonging to the same fall injury case to be recognised as such. Hence, there is potential for some cases to be counted more than once when two or more NHMD records are generated, all of which satisfy the selection criteria being used.

Information in the NHMD enables this problem to be reduced, though not eliminated. The approach used to estimate fall injury cases in this report makes use of the *Mode of admission* variable, which indicates whether the episode of care commenced with inward transfer from another acute care hospital. Episodes of this type (inward transfers) are likely to have been preceded by another episode that also meets the selection criteria for fall injury cases, so are omitted from our estimates of case counts.

This procedure should correct largely for overestimation of cases that is due to transfers, but will not correct for overestimation that is due to readmissions.

## Length of stay

The patient days in hospital directly attributable to a fall injury include those associated with three of the types of record defined above: fall injury cases, fall injury inward transfers and fall-related follow-up care. Length of stay values reported here are sums of these three types (except where specified as being limited to one of these types).

Mean length of stay values were calculated as the sum of patient days for these three types of record divided by the number of fall injury cases.

Note that this method does not include the patient days, potentially attributable to fall-related injury, associated with the remaining two types of record distinguished in this report: 'other fall-related' and 'tendency to fall' separations.

## Rates

### Age standardisation

Rates of falls were generally age-standardised. This adjustment allows for comparison without distortion due to population group differences such as those that may occur due to the ageing of the Australian population over time. Direct standardisation was used, taking the Australian population in 2001 as the standard (ABS 2003) and using 5-year age groups extending to the oldest age permitted by the case data and the population denominator data. Age-standardising national rates for the period commencing 1999–2000 were based on 5-year age groups to 85+ rather than 95+ because records of separations in Queensland in 1999–2000 combined all ages 85 and older.

## Population denominators

### General population

Where possible, rates were calculated using the final estimate of the resident population (ERP) as at 31 December in the relevant year as the denominator (for example, 31 December 2006 for 2006–07 data). Where tables of 31 December ERPs were not available but tables of 30 June ERPs were available population denominators were calculated as the average of 30 June estimates for adjacent years. This method was used to produce denominators for rates by remoteness of usual residence.

Where possible, rates were calculated using denominator data in 5-year age groups from 65–69 to an oldest group of 95 years and older. This was done because rates of the conditions analysed vary over this age range and over time and the age-composition of the Australian population aged 65+ has changed. Some population denominator data were not available with these age groups: populations by remoteness of usual residence and Indigenous status were available in 5-year groups to 85+.

### Community and residential aged care population

Rates of falls occurring in the home or in aged care facilities were calculated using denominator data reflecting the estimated place of residence for the population. Population estimates of residents of aged care facilities were obtained from the AIHW report series *Residential aged care in Australia* (for example, AIHW 2011). The populations resident in aged care facilities as at 30 June in adjacent years were averaged to estimate this population as at 31 December, the mid-point of the financial year. The number of people aged 65 and older who were resident in the community was then estimated by subtracting the number of residents of aged care facilities from the general population (as at 31 December).

### Indigenous population

Rates of falls for Aboriginal and Torres Strait Islander people were calculated using two sources of population denominators: experimental estimates (for the period 1999 to 2006) and projected populations Series B (for the period 2006 to 2011, see ABS 2009). In the first period (1999–00 to 2006–07), the states and territories eligible for inclusion were limited to South Australia, Northern Territory, Western Australia and Queensland. In the second period (2007–08 to 2010–11), the states and territories eligible for inclusion also comprised New South Wales and Victoria (in addition to South Australia, Northern Territory, Western Australia and Queensland).

For Other Australians, population denominators were derived by subtracting the Aboriginal and Torres Strait Islander population from the total Australian estimated resident population (of the states and territories eligible for inclusion) as at 31 December of the relevant year.

### Estimated change in rates over time

Estimated trends in rates of fall-related separations were reported as annual per cent change obtained using negative binomial regression modelling using Stata 12.1 (StataCorp, College Station, Texas).

The use of the terms ‘significant’ or ‘significantly’ throughout this report indicates an outcome which was *statistically* significant ( $p < 0.05$  or less).

## Classification of remoteness area

Remoteness area in this report refers to the place of usual residence of the person who was admitted to hospital. The remoteness areas were specified according to the ABS Australian Standard Geographical Classification (ASGC). Remoteness categories were defined in a manner based on the Accessibility/Remoteness Index of Australia (ARIA). According to this method, remoteness was an index applicable to any point in Australia, based on road distance from urban centres of five sizes. The categories 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.

The period examined in this report is limited to 2001–11 due to changes in the Remoteness Structure at the time of the 2006 Census (see ABS 2006).

## Quality of Indigenous status data

The AIHW report *Indigenous identification in hospital separations data–quality report* (AIHW 2010b) presented the latest findings on the quality of Indigenous identification in hospital separations data in Australia, based on studies of Indigenous identification in public hospitals conducted during 2007 and 2008.

The results of the studies indicated that, overall, the quality of Indigenous identification in hospital separations data had improved since last assessed. However, the quality of Indigenous identification still varied substantially between jurisdictions. The results supported expanding national reporting to include data for New South Wales, Victoria, Queensland, South Australia, Western Australia, and the Northern Territory (public hospitals only) from 2007–08. Levels of Indigenous identification were estimated to be 80% or higher for those jurisdictions.

An estimated 89% of Indigenous patients were correctly identified in Australian public hospital admission records in 2007–08. In other words, 11% of Indigenous patients were not identified, and the ‘true’ number of hospital admissions for Indigenous persons was about 12% higher than reported.

The data presented on Indigenous status in this report should therefore be interpreted with caution. Patterns of Indigenous hospitalisations in jurisdictions not included may not be the same as in those that are included.

Further information on quality of Indigenous status data is provided the AIHW publications *Indigenous identification in hospital separations data–quality report* (AIHW 2010b) and *Australian hospital statistics 2010–11* (AIHW 2012a).

## Missing data on Indigenous status

Records not coded as Aboriginal and Torres Strait Islander or as non-Indigenous were included with the latter type as the category Other Australians.

## Suppression of small cell counts in data tables

Cell counts in tables that have fewer than 5 cases have been suppressed as have proportions and 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 5 or less, counts of one or more other cells in the same row or column have generally also been suppressed.

## Data quality statement: National Hospital Morbidity Database

This section provides a summary of key issues relevant to interpretation of the National Hospital Morbidity Database (NHMD). Further information on the quality of the data for earlier years is available in relevant editions of the AIHW's *Australian hospital statistics*.

The full AIHW Data Quality Statement for the NHMD is accessible at:

<<http://meteor.aihw.gov.au/content/index.phtml/itemId/511338>>.

### Summary of key issues

- The National Hospital Morbidity Database (NHMD) is a comprehensive data set that has records for all separations of admitted patients from essentially all public and private hospitals in Australia.
- For 2010–11, almost all public hospitals provided data for the NHMD. The exception was a mothercraft hospital in the ACT. The great majority of private hospitals also provided data, the exceptions being the private day hospital facilities in the ACT, the single private free-standing day hospital facility in the NT, and a small private hospital in Victoria. Coverage was similar for earlier years, with some more variation in the private sector, which is not expected to impact substantially on the statistics in this report.
- A record is included for each separation, not for each patient, so patients who separated more than once in the year have more than one record in the NHMD.
- The NHMD contains records from 1993–94 to 2010–11. For each reference year, the NHMD includes records for admitted patient separations between 1 July and 30 June.
- The data reported for 2010–11 are broadly consistent with data reported for the NHMD for previous years.
- Although there are national standards for data on admitted patient care, and while the NHMD is a valuable source of information on admitted patient care, the data have limitations. For example, variations in admission practices and policies lead to variation among providers in the number of admissions for some conditions and there is apparent variation between states and territories in the use of statistical discharges and associated assignment of care types.
- States and territories are primarily responsible for the quality of the data they provide. However, the AIHW undertakes extensive validations on receipt of data. Data are checked for valid values, logical consistency and historical consistency. Where possible, data in individual data sets are checked with data from other data sets. Potential errors are queried with jurisdictions, and corrections and resubmissions may be made in

response to these edit queries. The AIHW does not adjust data to account for possible data errors or missing or incorrect values, except as stated.

- For 2010–11, principal diagnosis information was not provided for 882 public hospital separations and 3,306 private hospital separations.
- Caution should be used in comparing diagnosis, procedure and external cause data over time, as the ICD-10-AM and ACHI classifications and coding standards used for those data can change over time.
- Not all states provided information on the area of usual residence of the patient in the form of a Statistical Local Area (SLA) code for all presentations. In addition, not all states and territories provided the version of SLA specified in the NMDS. Where necessary, the AIHW mapped the supplied area of residence data for each presentation to the same SLA and to remoteness area categories based on the ABS ASGC Remoteness Structure for 2006. This mapping was done on a probabilistic basis. Because of the probabilistic nature of the mapping, the SLA and remoteness areas data for individual records may not be accurate; however, the overall distribution of records by geographical area is considered useful.
- The NHMD does not include episodes of non-admitted patient care provided in outpatient clinics or emergency departments. Patients in these settings may be admitted subsequently, in which case the care provided to them as admitted patients will be included in the NHMD.

## Appendix B: Supplementary tables

Table B.1: Case counts, estimated resident population and rates per 100,000, fall injury cases for people aged 65+, Australia 2010–11

<b>Case counts</b>	<b>65–69</b>	<b>70–74</b>	<b>75–79</b>	<b>80–84</b>	<b>85–89</b>	<b>90–94</b>	<b>95+</b>	<b>Total</b>
Men	3,480	3,840	4,622	6,542	6,330	3,268	910	28,992
Women	5,103	6,412	9,005	13,863	15,893	9,410	3,472	63,158
People	8,583	10,252	13,627	20,405	22,223	12,678	4,382	92,150
<b>Estimated resident population 31 Dec 2010</b>	<b>65–69</b>	<b>70–74</b>	<b>75–79</b>	<b>80–84</b>	<b>85–89</b>	<b>90–94</b>	<b>95+</b>	<b>Total</b>
Men	461,960	344,369	256,211	188,528	98,374	30,370	6,290	1,386,102
Women	467,879	365,728	298,246	252,045	168,899	69,335	21,166	1,643,298
People	929,839	710,097	554,457	440,573	267,273	99,705	27,456	3,029,400
<b>Age-specific rates per 100,000 population</b>	<b>65–69</b>	<b>70–74</b>	<b>75–79</b>	<b>80–84</b>	<b>85–89</b>	<b>90–94</b>	<b>95+</b>	<b>Age-standardised rate<sup>(a)</sup></b>
Men	753	1,115	1,804	3,470	6,435	10,761	14,467	2,238
Women	1,091	1,753	3,019	5,500	9,410	13,572	16,404	3,346
People	923	1,444	2,458	4,631	8,315	12,716	15,960	2,872

(a) Age-standardised to the 30 June 2001 Australian population.

**Table B.2: Case counts, estimated resident population and rates per 100,000, fall injury cases for residents of aged care facilities aged 65+, Australia 2010–11**

<b>Case counts</b>	<b>65–69</b>	<b>70–74</b>	<b>75–79</b>	<b>80–84</b>	<b>85–89</b>	<b>90–94</b>	<b>95+</b>	<b>Total</b>
Men	151	344	601	1,236	1,593	1,121	373	5,419
Women	185	465	1,125	2,852	4,989	3,918	1,815	15,349
People	336	809	1,726	4,088	6,582	5,039	2,188	20,768
<b>Estimated resident population 31 Dec 2010</b>	<b>65–69</b>	<b>70–74</b>	<b>75–79</b>	<b>80–84</b>	<b>85–89</b>	<b>90–94</b>	<b>95+</b>	<b>Total</b>
Men	2,853	4,426	6,936	10,830	12,072	7,083	2,237	46,435
Women	2,663	5,111	10,551	23,202	35,231	26,067	11,843	114,667
People	5,516	9,536	17,487	34,032	47,303	33,149	14,080	161,101
<b>Age-specific rates per 100,000 population</b>	<b>65–69</b>	<b>70–74</b>	<b>75–79</b>	<b>80–84</b>	<b>85–89</b>	<b>90–94</b>	<b>95+</b>	<b>Age-standardised rate<sup>(a)</sup></b>
Men	5,293	7,773	8,666	11,413	13,196	15,828	16,678	8,450
Women	6,948	9,099	10,662	12,292	14,161	15,031	15,326	9,846
People	6,092	8,484	9,870	12,012	13,915	15,201	15,540	9,226

(a) Age-standardised to the 30 June 2001 Australian population.



**Table B.3: Case counts, estimated resident population and rates per 100,000, fall injury cases for the community population aged 65+, Australia 2010–11**

<b>Case counts</b>	<b>65–69</b>	<b>70–74</b>	<b>75–79</b>	<b>80–84</b>	<b>85–89</b>	<b>90–94</b>	<b>95+</b>	<b>Total</b>
Men	1,556	1,910	2,355	3,408	3,092	1,493	390	14,204
Women	2,435	3,374	4,815	7,307	7,727	4,060	1,283	31,001
People	3,991	5,284	7,170	10,715	10,819	5,553	1,673	45,205
<b>Estimated resident population 31 Dec 2010</b>	<b>65–69</b>	<b>70–74</b>	<b>75–79</b>	<b>80–84</b>	<b>85–89</b>	<b>90–94</b>	<b>95+</b>	<b>Total</b>
Men	459,107	339,944	249,276	177,698	86,303	23,288	4,054	1,339,668
Women	465,217	360,618	287,695	228,843	133,668	43,269	9,323	1,528,632
People	924,324	700,561	536,971	406,541	219,971	66,556	13,377	2,868,299
<b>Age-specific rates per 100,000 population</b>	<b>65–69</b>	<b>70–74</b>	<b>75–79</b>	<b>80–84</b>	<b>85–89</b>	<b>90–94</b>	<b>95+</b>	<b>Age-standardised rate<sup>(a)</sup></b>
Men	339	562	945	1,918	3,583	6,411	9,621	1,217
Women	523	936	1,674	3,193	5,781	9,383	13,762	1,970
People	432	754	1,335	2,636	4,918	8,343	12,507	1,647

(a) Age-standardised to the 30 June 2001 Australian population.

**Table B.4: Case counts, estimated resident population and rates per 100,000, fall injury cases by remoteness of usual residence, people aged 65+ 2010–11**

<b>Case counts</b>	<b>65–69</b>	<b>70–74</b>	<b>75–79</b>	<b>80–84</b>	<b>85+</b>	<b>Total</b>
Major cities	5,482	6,815	9,372	14,299	28,609	64,577
Inner regional	1,918	2,183	2,841	4,103	7,358	18,403
Outer regional	919	969	1,137	1,684	2,876	7,585
Remote	132	149	156	n.p.	n.p.	894
Very remote	49	55	45	n.p.	n.p.	256
<b>Estimated resident population 31 Dec 2010</b>	<b>65–69</b>	<b>70–74</b>	<b>75–79</b>	<b>80–84</b>	<b>85+</b>	<b>Total<sup>(a)</sup></b>
Major cities	593,866	456,564	364,973	297,340	272,639	1,985,382
Inner regional	220,311	168,128	128,562	98,742	85,134	700,875
Outer regional	98,574	74,091	53,946	39,822	32,745	299,177
Remote	12,300	8,304	5,684	4,143	3,005	33,435
Very remote	4,687	2,917	1,831	1,157	886	11,477
<b>Age-specific rates per 100,000 population</b>	<b>65–69</b>	<b>70–74</b>	<b>75–79</b>	<b>80–84</b>	<b>85+</b>	<b>Age-standardised rate<sup>(b)</sup></b>
Major cities	923	1,493	2,568	4,809	10,493	2,992
Inner regional	871	1,298	2,210	4,155	8,643	2,560
Outer regional	932	1,308	2,108	4,229	8,783	2,583
Remote	1,073	1,794	2,745	n.p.	n.p.	2,948
Very remote	1,045	1,885	2,458	n.p.	n.p.	2,599

(a) Discrepancies with totals are due to rounding in component figures.

(b) Age-standardised to the 30 June 2001 Australian population.

**Table B.5: Case counts and rates per 100,000 for hip fracture and head injury cases by remoteness of usual residence, people aged 65+ 2010–11**

<b>Hip fractures</b>						
<b>Case counts</b>	<b>65–69</b>	<b>70–74</b>	<b>75–79</b>	<b>80–84</b>	<b>85+</b>	<b>Total</b>
Major cities	537	934	1,564	2,822	6,497	12,354
Inner regional	199	341	569	1,007	2,103	4,219
Outer regional	90	167	229	400	854	1,740
Remote	20	28	32	n.p.	n.p.	190
Very remote	9	15	10	n.p.	n.p.	63
<b>Age-specific rates per 100,000 population</b>	<b>65–69</b>	<b>70–74</b>	<b>75–79</b>	<b>80–84</b>	<b>85+</b>	<b>Age-standardised rate<sup>(a)</sup></b>
Major cities	90	205	429	949	2,383	558
Inner regional	90	203	443	1,020	2,470	580
Outer regional	91	225	425	1,004	2,608	595
Remote	163	337	563	n.p.	n.p.	638
Very remote	192	514	546	n.p.	n.p.	656
<b>Head injuries</b>						
<b>Case counts</b>	<b>65–69</b>	<b>70–74</b>	<b>75–79</b>	<b>80–84</b>	<b>85+</b>	<b>Total</b>
Major cities	972	1,301	1,968	3,185	6,367	13,793
Inner regional	315	365	524	805	1,355	3,364
Outer regional	156	182	213	334	559	1,444
Remote	27	24	32	n.p.	n.p.	181
Very remote	12	8	11	n.p.	n.p.	49
<b>Age-specific rates per 100,000 population</b>	<b>65–69</b>	<b>70–74</b>	<b>75–79</b>	<b>80–84</b>	<b>85+</b>	<b>Age-standardised rate<sup>(a)</sup></b>
Major cities	164	285	539	1,071	2,335	635
Inner regional	143	217	408	815	1,592	468
Outer regional	158	246	395	839	1,707	493
Remote	220	289	563	n.p.	n.p.	598
Very remote	256	274	601	n.p.	n.p.	487

(a) Age-standardised to the 30 June 2001 Australian population.

**Table B.6: Patient days for directly fall-related hospitalisations, all patient days, and fall-related care as percentage of all patient days for the population aged 65+, men and women, Australia 2010–11**

<b>Patient days for fall-related care<sup>(a)</sup></b>	<b>65–69</b>	<b>70–74</b>	<b>75–79</b>	<b>80–84</b>	<b>85+</b>	<b>Total</b>
Men	35,000	50,239	71,142	96,782	163,959	417,122
Women	45,254	76,484	126,432	220,394	468,024	936,588
People	80,254	126,723	197,574	317,176	631,983	1,353,710
<b>All patient days<sup>(b)</sup></b>	<b>65–69</b>	<b>70–74</b>	<b>75–79</b>	<b>80–84</b>	<b>85+ years</b>	<b>Total</b>
Men	1,128,372	1,205,467	1,256,237	1,244,132	1,278,590	6,112,798
Women	967,464	1,082,245	1,214,992	1,435,949	2,058,219	6,758,869
People	2,095,836	2,287,712	2,471,229	2,680,081	3,336,809	12,871,667
<b>Fall-related care as percentage of all patient days (%)</b>	<b>65–69</b>	<b>70–74</b>	<b>75–79</b>	<b>80–84</b>	<b>85+</b>	<b>Total</b>
Men	3.1	4.2	5.7	7.8	12.8	6.8
Women	4.7	7.1	10.4	15.3	22.7	13.9
People	3.8	5.5	8.0	11.8	18.9	10.5

(a) Sum of patient days for three types of record: fall injury cases, fall injury inward transfers and fall-related follow-up care.

(b) Data source: AIHW 2012a.

**Table B.7: Case counts, estimated resident population, age-standardised rates and modelled rates per 100,000 population for fall injury cases, Australia 1999-00 to 2010-11**

	Men				Women				People			
	Cases	Population	Age-std. rate	Modelled rate	Cases	Population	Age-std. rate	Modelled rate	Cases	Population	Age-std. rate	Modelled rate
1999-00	13,743	1,035,905	1,538	1,479	37,265	1,319,270	2,661	2,575	51,008	2,355,175	2,218	2,144
2000-01	14,329	1,061,095	1,557	1,529	38,611	1,343,593	2,657	2,628	52,940	2,404,688	2,221	2,193
2001-02	15,165	1,088,919	1,577	1,581	40,596	1,368,923	2,702	2,681	55,761	2,457,842	2,257	2,243
2002-03	15,652	1,113,597	1,588	1,634	41,306	1,391,105	2,686	2,736	56,958	2,504,702	2,245	2,295
2003-04	16,784	1,140,361	1,652	1,690	43,726	1,414,734	2,777	2,792	60,510	2,555,095	2,322	2,347
2004-05	18,038	1,167,918	1,715	1,747	44,670	1,439,762	2,764	2,849	62,709	2,607,680	2,336	2,401
2005-06	19,500	1,198,105	1,780	1,806	47,322	1,466,248	2,842	2,907	66,822	2,664,353	2,408	2,456
2006-07	21,362	1,229,755	1,888	1,867	50,426	1,495,113	2,951	2,966	71,790	2,724,868	2,508	2,512
2007-08	22,481	1,261,570	1,920	1,930	51,990	1,525,163	2,979	3,027	74,471	2,786,733	2,536	2,570
2008-09	23,570	1,297,593	1,953	1,995	55,040	1,559,156	3,078	3,088	78,610	2,856,749	2,608	2,629
2009-10	25,597	1,339,535	2,048	2,062	58,171	1,599,968	3,175	3,151	83,768	2,939,503	2,698	2,689
2010-11	28,992	1,386,102	2,238	2,132	63,158	1,643,298	3,346	3,216	92,150	3,029,400	2,872	2,751

**Table B.8: Case counts, estimated resident population, age-standardised rates and modelled rates per 100,000 population for fall injury cases by age, Australia 1999–00 to 2010–11**

	65–74 years				75–84 years				85+ years			
	Cases	Population	Age-std. rate	Modelled rate	Cases	Population	Age-std. rate	Modelled rate	Cases	Population	Age-std. rate	Modelled rate
1999–00	2,228	1,308,634	170	155	6,464	801,326	814	788	6,432	245,215	2,625	2,578
2000–01	2,021	1,314,722	154	154	6,374	831,841	770	772	6,764	258,125	2,624	2,552
2001–02	1,957	1,327,055	148	152	6,522	861,075	755	756	6,975	269,712	2,583	2,526
2002–03	1,921	1,340,446	144	151	6,497	887,064	725	741	6,763	277,192	2,433	2,500
2003–04	1,985	1,356,426	149	149	6,759	914,163	728	726	7,139	284,506	2,495	2,475
2004–05	1,936	1,376,557	144	148	6,854	934,816	716	711	6,968	296,307	2,332	2,449
2005–06	1,947	1,399,778	143	146	6,605	950,772	676	697	7,488	313,803	2,366	2,424
2006–07	1,924	1,431,875	138	145	6,692	962,044	674	682	7,892	330,949	2,371	2,400
2007–08	2,090	1,470,377	146	144	6,658	969,771	665	669	8,147	346,585	2,343	2,375
2008–09	2,051	1,518,884	139	142	6,604	977,241	651	655	8,348	360,624	2,317	2,351
2009–10	2,151	1,577,036	141	141	6,660	985,492	648	642	8,855	376,975	2,351	2,327
2010–11	2,366	1,639,936	150	139	6,716	995,030	646	629	9,565	394,434	2,422	2,304

**Table B.9: Case counts, age-standardised rates and modelled rates per 100,000 population for fall injury cases by body region, Australia 1999–00 to 2010–11**

	Head			Trunk			Shoulder and upper limb			Hip and lower limb			Other injuries		
	Cases	Age-std. rate	Modelled rate	Cases	Age-std. rate	Modelled rate	Cases	Age-std. rate	Modelled rate	Cases	Age-std. rate	Modelled rate	Cases	Age-std. rate	Modelled rate
1999–00	6,280	273	275	8,486	370	360	11,307	488	472	24,491	1,068	1,027	3,184	136	127
2000–01	7,185	302	294	8,932	375	373	11,652	487	481	24,702	1,037	1,028	3,168	132	128
2001–02	7,987	323	315	9,680	392	387	12,001	487	491	25,627	1,037	1,028	3,238	132	130
2002–03	8,323	328	337	9,948	392	401	12,477	494	500	25,615	1,008	1,029	3,145	125	131
2003–04	9,098	349	360	10,785	413	416	13,143	508	510	26,827	1,027	1,030	3,333	130	132
2004–05	10,214	381	385	11,468	426	431	13,585	511	520	26,758	993	1,031	3,373	128	133
2005–06	11,563	417	412	12,322	442	447	14,190	518	531	28,030	1,005	1,032	3,485	129	134
2006–07	12,943	451	440	13,407	466	463	15,363	545	541	29,366	1,020	1,033	3,568	129	135
2007–08	13,816	469	471	13,946	472	480	15,618	541	552	30,264	1,026	1,034	3,776	134	137
2008–09	15,015	497	503	14,916	492	498	16,457	555	563	31,183	1,030	1,035	3,951	136	138
2009–10	16,529	530	538	16,120	516	516	17,531	576	574	32,530	1,042	1,035	4,254	142	139
2010–11	18,907	587	576	17,806	552	535	19,255	611	586	34,922	1,083	1,036	4,672	152	140

**Table B.10: Case counts, estimated resident population, age-standardised rates and modelled rates per 100,000 population for head injury cases due to falls by age, Australia 1999–00 to 2010–11**

	65–74 years				75–84 years				85+ years			
	Cases	Population	Age-std. rate	Modelled rate	Cases	Population	Age-std. rate	Modelled rate	Cases	Population	Age-std. rate	Modelled rate
1999–00	1,445	1,308,634	110	110	2,606	801,326	328	326	2,229	245,215	910	935
2000–01	1,532	1,314,722	117	117	2,967	831,841	358	348	2,686	258,125	1,042	1,005
2001–02	1,747	1,327,055	132	124	3,242	861,075	375	372	2,998	269,712	1,110	1,080
2002–03	1,619	1,340,446	121	132	3,508	887,064	392	398	3,196	277,192	1,151	1,161
2003–04	1,781	1,356,426	133	140	3,762	914,163	406	425	3,555	284,506	1,242	1,248
2004–05	2,045	1,376,557	151	148	4,291	934,816	451	454	3,878	296,307	1,300	1,341
2005–06	2,299	1,399,778	167	157	4,724	950,772	486	485	4,540	313,803	1,437	1,441
2006–07	2,419	1,431,875	172	167	5,283	962,044	535	519	5,241	330,949	1,575	1,549
2007–08	2,559	1,470,377	178	177	5,509	969,771	552	554	5,748	346,585	1,654	1,665
2008–09	2,761	1,518,884	186	188	5,852	977,241	582	593	6,402	360,624	1,777	1,790
2009–10	3,004	1,577,036	195	199	6,399	985,492	626	633	7,126	376,975	1,892	1,924
2010–11	3,386	1,639,936	212	212	7,159	995,030	692	677	8,362	394,434	2,117	2,068



**Table B.11: Case counts, estimated resident population, age-standardised rates and modelled rates per 100,000 population for hip fracture cases due to falls, Australia 1999–00 to 2010–11**

	Men				Women				People			
	Cases	Population	Age-std. rate	Modelled rate	Cases	Population	Age-std. rate	Modelled rate	Cases	Population	Age-std. rate	Modelled rate
1999–00	3,797	1,035,905	447	432	11,327	1,319,270	794	766	15,124	2,355,175	662	639
2000–01	3,821	1,061,095	436	428	11,338	1,343,593	761	755	15,159	2,404,688	637	630
2001–02	3,865	1,088,919	420	424	11,589	1,368,923	749	745	15,454	2,457,842	625	621
2002–03	3,825	1,113,597	406	420	11,356	1,391,105	718	734	15,181	2,504,702	596	612
2003–04	4,022	1,140,361	412	416	11,861	1,414,734	732	724	15,883	2,555,095	606	604
2004–05	4,110	1,167,918	406	412	11,647	1,439,762	697	714	15,758	2,607,680	581	595
2005–06	4,310	1,198,105	407	408	11,730	1,466,248	679	704	16,040	2,664,353	571	586
2006–07	4,466	1,229,755	407	404	12,042	1,495,113	678	695	16,508	2,724,868	568	578
2007–08	4,539	1,261,570	399	401	12,356	1,525,163	682	685	16,895	2,786,733	566	570
2008–09	4,527	1,297,593	384	397	12,476	1,559,156	671	676	17,003	2,856,749	555	562
2009–10	4,717	1,339,535	387	393	12,949	1,599,968	679	666	17,666	2,939,503	558	554
2010–11	5,232	1,386,102	412	390	13,415	1,643,298	682	657	18,647	3,029,400	570	546

**Table B.12: Case counts, estimated resident population, age-standardised rates and modelled rates per 100,000 population for all other fracture cases due to falls, Australia 1999–00 to 2010–11**

	Men				Women				People			
	Cases	Population	Age-std. rate	Modelled rate	Cases	Population	Age-std. rate	Modelled rate	Cases	Population	Age-std. rate	Modelled rate
1999–00	4,986	1,035,905	537	503	16,649	1,319,270	1,210	1,151	21,635	2,355,175	936	888
2000–01	5,030	1,061,095	527	518	16,890	1,343,593	1,189	1,172	21,920	2,404,688	918	905
2001–02	5,266	1,088,919	530	533	17,429	1,368,923	1,190	1,193	22,695	2,457,842	920	922
2002–03	5,310	1,113,597	521	549	17,738	1,391,105	1,184	1,215	23,048	2,504,702	911	940
2003–04	5,744	1,140,361	549	564	18,738	1,414,734	1,222	1,238	24,482	2,555,095	944	958
2004–05	6,194	1,167,918	575	581	19,236	1,439,762	1,225	1,261	25,430	2,607,680	953	977
2005–06	6,515	1,198,105	581	598	20,052	1,466,248	1,245	1,284	26,567	2,664,353	966	995
2006–07	7,147	1,229,755	618	615	21,332	1,495,113	1,295	1,307	28,480	2,724,868	1,007	1,015
2007–08	7,482	1,261,570	626	633	21,948	1,525,163	1,304	1,331	29,430	2,786,733	1,015	1,034
2008–09	7,777	1,297,593	633	651	23,595	1,559,156	1,368	1,356	31,372	2,856,749	1,054	1,054
2009–10	8,604	1,339,535	677	670	24,850	1,599,968	1,407	1,381	33,454	2,939,503	1,093	1,074
2010–11	9,600	1,386,102	729	689	26,466	1,643,298	1,457	1,406	36,066	3,029,400	1,141	1,095

**Table B.13: Case counts, estimated resident population, age-standardised rates and modelled rates per 100,000 population for hip fracture cases due to falls by age, Australia 1999–00 to 2010–11**

	65–74 years				75–84 years				85+ years			
	Cases	Population	Age-std. rate	Modelled rate	Cases	Population	Age-std. rate	Modelled rate	Cases	Population	Age-std. rate	Modelled rate
1999–00	2,228	1,308,634	170	155	6,464	801,326	814	788	6,432	245,215	2,625	2,578
2000–01	2,021	1,314,722	154	154	6,374	831,841	770	772	6,764	258,125	2,624	2,552
2001–02	1,957	1,327,055	148	152	6,522	861,075	755	756	6,975	269,712	2,583	2,526
2002–03	1,921	1,340,446	144	151	6,497	887,064	725	741	6,763	277,192	2,433	2,500
2003–04	1,985	1,356,426	149	149	6,759	914,163	728	726	7,139	284,506	2,495	2,475
2004–05	1,936	1,376,557	144	148	6,854	934,816	716	711	6,968	296,307	2,332	2,449
2005–06	1,947	1,399,778	143	146	6,605	950,772	676	697	7,488	313,803	2,366	2,424
2006–07	1,924	1,431,875	138	145	6,692	962,044	674	682	7,892	330,949	2,371	2,400
2007–08	2,090	1,470,377	146	144	6,658	969,771	665	669	8,147	346,585	2,343	2,375
2008–09	2,051	1,518,884	139	142	6,604	977,241	651	655	8,348	360,624	2,317	2,351
2009–10	2,151	1,577,036	141	141	6,660	985,492	648	642	8,855	376,975	2,351	2,327
2010–11	2,366	1,639,936	150	139	6,716	995,030	646	629	9,565	394,434	2,422	2,304

**Table B.14: Case counts, age-standardised rates and modelled rates per 100,000 population for skull, lumbar spine and pelvis and forearm fractures due to falls, people aged 65+, Australia 1999–00 to 2010–11**

	Skull fractures			Lumbar spine and pelvis fractures			Forearm fractures		
	Cases	Age-std. rate	Modelled rate	Cases	Age-std. rate	Modelled rate	Cases	Age-std. rate	Modelled rate
1999–00	651	28	27	3,920	172	166	5,038	216	207
2000–01	678	28	29	4,044	170	169	5,029	210	208
2001–02	751	30	30	4,360	176	173	5,180	210	209
2002–03	783	31	32	4,343	171	176	5,205	207	210
2003–04	829	32	33	4,597	175	180	5,481	213	211
2004–05	915	34	35	4,926	182	184	5,440	205	212
2005–06	999	36	37	5,211	186	187	5,496	203	212
2006–07	1,150	41	39	5,493	190	191	5,901	212	213
2007–08	1,197	41	41	5,775	194	195	5,879	206	214
2008–09	1,273	43	43	6,109	199	199	6,253	214	215
2009–10	1,399	46	45	6,513	207	204	6,652	222	216
2010–11	1,499	47	48	6,900	211	208	7,018	227	217

**Table B.15: Case counts, age-standardised rates and modelled rates per 100,000 population for wrist, femur (excluding hip fracture) and lower leg fractures due to falls, people aged 65+, Australia 1999-00 to 2010-11**

	Wrist fractures			Femur fractures (excluding hip fracture)			Lower leg fractures		
	Cases	Age-std. rate	Modelled rate	Cases	Age-std. rate	Modelled rate	Cases	Age-std. rate	Modelled rate
1999-00	374	16	17	1,228	53	49	3,184	136	127
2000-01	417	17	17	1,193	50	50	3,168	132	128
2001-02	448	18	18	1,226	50	50	3,238	132	130
2002-03	481	19	18	1,262	50	51	3,145	125	131
2003-04	463	18	19	1,338	51	51	3,333	130	132
2004-05	534	20	20	1,268	47	52	3,373	128	133
2005-06	529	19	20	1,438	52	53	3,485	129	134
2006-07	612	22	21	1,485	52	53	3,568	129	135
2007-08	603	21	22	1,535	52	54	3,776	134	137
2008-09	642	22	22	1,765	59	54	3,951	136	138
2009-10	658	22	23	1,763	57	55	4,254	142	139
2010-11	808	26	24	1,759	55	55	4,672	152	140

**Table B.16: Case counts, age-standardised rates and modelled rates per 100,000 population for fall injury cases occurring in residential aged care facilities, men and women aged 65+, Australia 2002–11**

Men	Estimated aged care population	Total			Hip fractures			Head injuries		
		Cases	Age-std. rate	Modelled rate	Cases	Age-std. rate	Modelled rate	Cases	Age-std. rate	Modelled rate
2002–03	35,907	2,323	4,992	5,315	897	1,727	1,981	513	1,227	1,272
2003–04	37,266	2,744	5,621	5,619	1,066	2,011	2,008	624	1,347	1,396
2004–05	38,692	3,123	6,137	5,941	1,189	2,202	2,035	742	1,551	1,531
2005–06	39,977	3,406	6,508	6,281	1,220	2,186	2,063	842	1,711	1,680
2006–07	41,055	3,906	6,853	6,641	1,339	2,127	2,091	1,025	2,099	1,844
2007–08	42,278	4,021	7,101	7,021	1,336	2,331	2,119	1,101	1,920	2,023
2008–09	43,562	4,231	7,243	7,423	1,269	2,047	2,148	1,182	2,133	2,220
2009–10	44,934	4,535	7,470	7,848	1,329	2,004	2,177	1,370	2,360	2,435
2010–11	46,435	5,419	8,450	8,297	1,501	2,192	2,206	1,695	2,721	2,672

Women	Estimated aged care population	Total			Hip fractures			Head injuries		
		Cases	Age-std. rate	Modelled rate	Cases	Age-std. rate	Modelled rate	Cases	Age-std. rate	Modelled rate
2002–03	98,819	8,464	6,347	6,508	3,301	2,360	2,487	1,313	961	1,056
2003–04	101,685	9,727	6,936	6,846	3,707	2,571	2,497	1,602	1,237	1,181
2004–05	104,580	10,218	7,028	7,201	3,737	2,552	2,508	1,785	1,336	1,322
2005–06	106,733	11,175	7,793	7,575	3,865	2,566	2,518	2,052	1,568	1,480
2006–07	107,982	12,244	8,220	7,969	4,031	2,401	2,529	2,426	1,774	1,656
2007–08	109,439	12,459	8,444	8,383	4,108	2,646	2,540	2,565	1,815	1,853
2008–09	111,016	13,189	8,717	8,818	4,147	2,668	2,550	2,845	1,937	2,074
2009–10	112,759	13,820	8,998	9,276	4,167	2,502	2,561	3,154	2,115	2,321
2010–11	114,667	15,349	9,846	9,758	4,430	2,495	2,572	3,721	2,794	2,598

**Table B.17: Case counts, age-standardised rates and modelled rates per 100,000 population for fall injury cases occurring in the home, men and women aged 65+, Australia 2002–11**

Men	Estimated community population	Total			Hip fractures			Head injuries		
		Cases	Age-std. rate	Modelled rate	Cases	Age-std. rate	Modelled rate	Cases	Age-std. rate	Modelled rate
2002–03	1,077,690	7,602	845	854	1,820	212	211	1,427	158	167
2003–04	1,103,096	8,382	909	889	1,896	213	212	1,665	181	179
2004–05	1,129,226	8,738	916	926	1,918	210	212	1,864	192	192
2005–06	1,158,128	9,594	966	964	2,068	217	212	2,091	210	205
2006–07	1,188,701	10,489	1,022	1,004	2,072	210	212	2,388	231	219
2007–08	1,219,292	11,041	1,040	1,045	2,136	209	212	2,540	236	235
2008–09	1,254,031	11,468	1,052	1,088	2,190	206	212	2,694	246	251
2009–10	1,294,601	12,611	1,114	1,133	2,287	209	212	3,021	265	269
2010–11	1,339,668	14,204	1,217	1,180	2,493	220	212	3,376	286	288
Women	Estimated community population	Total			Hip fractures			Head injuries		
		Cases	Age-std. rate	Modelled rate	Cases	Age-std. rate	Modelled rate	Cases	Age-std. rate	Modelled rate
2002–03	1,292,287	20,032	1,557	1,556	5,299	412	416	2,382	186	182
2003–04	1,313,050	21,517	1,638	1,598	5,677	432	414	2,440	187	194
2004–05	1,335,182	21,809	1,621	1,640	5,580	413	413	2,767	206	207
2005–06	1,359,516	23,193	1,678	1,684	5,605	404	411	3,155	229	222
2006–07	1,387,131	24,471	1,717	1,729	5,697	397	409	3,394	238	237
2007–08	1,415,724	25,543	1,754	1,775	5,986	408	407	3,636	250	253
2008–09	1,448,141	26,837	1,802	1,823	6,003	400	406	3,958	266	270
2009–10	1,487,210	28,469	1,860	1,871	6,260	406	404	4,380	285	289
2010–11	1,528,632	31,001	1,970	1,921	6,493	410	402	4,957	314	308

**Table B.18: Case counts, age-standardised rates and modelled rates per 100,000 population for fall injury cases for residents of *Major cities*, people aged 65+, Australia 2002–11**

	<i>Major cities</i> population	Total			Hip fractures			Head injuries		
		Cases	Age-std. rate	Modelled rate	Cases	Age-std. rate	Modelled rate	Cases	Age-std. rate	Modelled rate
2001–02	1,641,894	37,293	2,225	2,152	10,380	616	596	5,361	320	309
2002–03	1,671,182	37,919	2,203	2,223	10,100	582	590	5,612	326	334
2003–04	1,701,083	40,622	2,301	2,297	10,543	591	584	6,224	352	360
2004–05	1,731,165	42,484	2,340	2,373	10,525	572	577	7,029	387	389
2005–06	1,759,816	44,637	2,389	2,451	10,458	551	571	7,908	423	421
2006–07	1,794,129	49,259	2,559	2,532	11,009	560	565	9,042	469	454
2007–08	1,833,832	51,349	2,598	2,616	11,418	566	559	9,749	491	491
2008–09	1,877,196	53,413	2,627	2,702	11,186	538	553	10,534	516	530
2009–10	1,928,726	58,290	2,788	2,792	11,736	547	547	11,844	562	573
2010–11	1,985,382	64,577	2,992	2,884	12,354	558	541	13,793	635	619



**Table B.19: Case counts, age-standardised rates and modelled rates per 100,000 population for fall injury cases for residents of *Inner regional* areas, people aged 65+, Australia 2002–11**

	<i>Inner regional</i> population	Total			Hip fractures			Head injuries		
		Cases	Age-std. rate	Modelled rate	Cases	Age-std. rate	Modelled rate	Cases	Age-std. rate	Modelled rate
2001–02	544,126	11,921	2,222	2,177	3,322	622	608	1,586	296	285
2002–03	557,164	12,106	2,188	2,211	3,200	579	602	1,637	296	301
2003–04	571,723	13,006	2,280	2,245	3,569	626	596	1,699	298	319
2004–05	588,434	12,962	2,190	2,279	3,389	571	590	1,945	329	338
2005–06	605,654	14,630	2,380	2,314	3,731	604	584	2,314	377	357
2006–07	622,445	14,831	2,330	2,350	3,639	568	578	2,512	394	378
2007–08	638,879	15,174	2,315	2,386	3,671	555	573	2,569	391	401
2008–09	656,938	16,533	2,450	2,423	3,820	559	567	2,924	433	424
2009–10	677,969	16,875	2,427	2,460	3,887	553	561	3,092	446	449
2010–11	700,875	18,403	2,560	2,498	4,219	580	556	3,364	468	475

**Table B.20: Case counts, age-standardised rates and modelled rates per 100,000 population for fall injury cases for residents of *Outer regional* areas, people aged 65+, Australia 2002–11**

	<i>Outer regional</i> population	Total			Hip fractures			Head injuries		
		Cases	Age-std. rate	Modelled rate	Cases	Age-std. rate	Modelled rate	Cases	Age-std. rate	Modelled rate
2001–02	237,522	5,502	2,422	2,461	1,485	661	679	878	386	391
2002–03	242,619	5,860	2,516	2,474	1,640	712	668	894	384	401
2003–04	246,721	5,899	2,502	2,486	1,526	655	658	1,001	425	411
2004–05	252,442	6,044	2,498	2,498	1,548	648	648	1,028	425	421
2005–06	260,884	6,423	2,549	2,511	1,591	637	638	1,132	449	432
2006–07	269,153	6,502	2,481	2,523	1,612	617	628	1,145	437	443
2007–08	275,727	6,648	2,466	2,536	1,532	572	619	1,241	460	454
2008–09	282,357	7,189	2,603	2,549	1,692	615	609	1,277	464	465
2009–10	290,522	7,270	2,556	2,561	1,773	627	600	1,315	463	477
2010–11	299,177	7,585	2,583	2,574	1,740	595	591	1,444	493	489

**Table B.21: Case counts, age-standardised rates and modelled rates per 100,000 population for fall injury cases for residents of *Remote* areas, people aged 65+, Australia 2002–11**

	<i>Remote</i> population	Total			Hip fractures			Head injuries		
		Cases	Age-std. rate	Modelled rate	Cases	Age-std. rate	Modelled rate	Cases	Age-std. rate	Modelled rate
2001–02	26,894	620	2,575	2,413	169	721	617	102	416	400
2002–03	27,420	656	2,615	2,457	146	595	612	106	422	419
2003–04	27,848	592	2,391	2,502	139	575	608	111	441	439
2004–05	28,149	583	2,293	2,548	142	572	603	103	404	460
2005–06	28,873	668	2,564	2,595	151	600	599	129	496	483
2006–07	29,889	676	2,491	2,642	139	529	595	137	501	506
2007–08	30,668	762	2,721	2,691	146	528	590	155	554	530
2008–09	31,474	826	2,893	2,740	182	652	586	162	568	556
2009–10	32,510	808	2,726	2,790	159	558	582	173	584	583
2010–11	33,435	894	2,948	2,842	190	638	577	181	598	611

**Table B.22: Case counts, age-standardised rates and modelled rates per 100,000 population for fall injury cases for residents of *Very remote* areas, people aged 65+, Australia 2002–11**

	<i>Very remote</i> population	Total			Hip fractures			Head injuries		
		Cases	Age-std. rate	Modelled rate	Cases	Age-std. rate	Modelled rate	Cases	Age-std. rate	Modelled rate
2001–02	9,348	206	2,442	2,196	53	657	599	34	400	396
2002–03	9,621	192	2,156	2,228	49	582	595	33	381	403
2003–04	9,435	151	1,784	2,261	49	604	591	28	336	411
2004–05	9,372	207	2,599	2,294	46	575	586	42	550	418
2005–06	9,733	212	2,490	2,328	44	526	582	38	438	426
2006–07	10,048	183	2,066	2,362	46	522	578	35	402	433
2007–08	10,299	222	2,463	2,396	58	666	574	43	455	441
2008–09	10,553	230	2,512	2,432	45	517	570	38	423	449
2009–10	10,941	220	2,358	2,467	47	493	566	39	432	457
2010–11	11,477	256	2,599	2,504	63	656	562	49	487	465

**Table B.23: Case counts, age-standardised rates and modelled rates per 100,000 population for fall injury cases for Aboriginal and Torres Strait Islander people aged 65+, Australia<sup>(a)</sup> 1999–00 to 2010–11**

	Aboriginal and Torres Strait Islander population	Total			Hip fractures			Head injuries		
		Cases	Age-std. rate	Modelled rate	Cases	Age-std. rate	Modelled rate	Cases	Age-std. rate	Modelled rate
1999–00	7,136	103	1,560	1,643	35	538	513	13	182	249
2000–01	7,366	105	1,602	1,718	30	459	538	18	290	275
2001–02	7,631	143	1,999	1,796	41	610	564	23	282	304
2002–03	7,854	120	1,596	1,878	31	466	591	24	333	335
2003–04	8,099	158	2,202	1,964	44	684	620	35	452	370
2004–05	8,381	176	2,371	2,053	54	764	651	38	504	408
2005–06	8,742	173	2,231	2,147	59	832	682	36	446	450
2006–07	9,089	160	1,881	2,244	39	521	715	33	398	496
2007–08	16,098	312	2,232	2,244	66	489	479	73	504	460
2008–09	16,765	357	2,649	2,473	63	556	525	67	500	519
2009–10	17,575	355	2,399	2,725	65	490	576	82	501	586
2010–11	18,588	478	3,166	3,002	92	675	631	112	723	662

(a) 1999–07 data was analysed using the four states model (Queensland, Western Australia, South Australia and the Northern Territory) while 2007–11 data was analysed using the six states model (also including New South Wales and Victoria).

**Table B.24: Case counts, age-standardised rates and modelled rates per 100,000 population for fall injury cases for people other than Aboriginal and Torres Strait Islanders aged 65+, Australia<sup>(a)</sup> 1999–00 to 2010–11**

	Other Australian population <sup>(b)</sup>	Total			Hip fractures			Head injuries		
		Cases	Age-std. rate	Modelled rate	Cases	Age-std. rate	Modelled rate	Cases	Age-std. rate	Modelled rate
1999–00	820,212	17,631	18,051	2,149	5,330	670	657	2,224	278	280
2000–01	839,955	18,271	18,426	2,158	5,449	656	641	2,496	300	294
2001–02	862,580	18,267	18,230	2,166	5,238	605	625	2,672	309	309
2002–03	885,708	18,776	18,647	2,175	5,380	602	609	2,757	309	325
2003–04	909,981	19,920	19,691	2,183	5,429	588	594	3,146	342	342
2004–05	935,159	21,039	20,663	2,192	5,443	568	579	3,597	378	359
2005–06	960,934	21,646	21,045	2,200	5,642	565	565	3,818	387	377
2006–07	987,323	23,109	22,272	2,209	5,881	567	551	3,895	380	397
2007–08	2,662,840	71,597	2,547	2,521	16,194	567	560	13,293	471	466
2008–09	2,729,002	75,295	2,606	2,629	16,264	553	561	14,410	498	503
2009–10	2,807,171	80,504	2,706	2,741	16,915	558	563	15,993	535	543
2010–11	2,891,982	88,791	2,890	2,858	17,872	571	564	18,318	594	586

(a) 1999–07 data was analysed using the four states model (Queensland, Western Australia, South Australia and the Northern Territory) while 2007–11 data was analysed using the six states model (also including New South Wales and Victoria).

(b) Other Australians includes cases for which the Indigenous status was not reported.

**Table B.25: Case counts, age-standardised rates and modelled rates per 100,000 population for other types of fall-related separations, people aged 65+, Australia 1999–00 to 2010–11**

	Inward transfers			Fall-related follow-up care			'Other fall-related' separations			'Tendency to fall' separations <sup>(a)</sup>		
	Cases	Age-std. rate	Modelled rate	Cases	Age-std. rate	Modelled rate	Cases	Age-std. rate	Modelled rate	Cases	Age-std. rate	Modelled rate
1999–00	4,321	188	211	10,036	438	435	14,570	634	614			
2000–01	5,218	219	220	11,314	475	478	14,569	611	632			
2001–02	5,404	219	230	12,288	497	525	16,027	649	652			
2002–03	6,239	246	240	13,143	517	577	17,256	680	672			
2003–04	7,275	279	251	15,825	605	633	18,034	692	692			
2004–05	7,340	273	262	22,077	818	696	18,779	701	714			
2005–06	7,970	287	274	23,411	839	764	20,301	734	736			
2006–07	8,626	301	286	26,828	934	839	22,108	775	758	16,828	585	571
2007–08	9,081	308	299	24,429	828	921	22,604	773	781	18,010	610	612
2008–09	9,212	305	312	29,634	980	1,012	24,020	801	805	19,256	634	656
2009–10	9,623	309	326	33,904	1,094	1,111	25,431	824	830	21,607	693	704
2010–11	10,110	315	340	37,567	1,175	1,220	27,581	868	856	24,947	777	755

(a) Data only available from 2006–07 onwards.

**Table B.26: Patient days for fall injury case separations, men and women aged 65+, Australia 1999–00 to 2010–11**

	Men							Women							People		
	65–69	70–74	75–79	80–84	85–89	90–94	95+	Total	65–69	70–74	75–79	80–84	85–89	90–94	95+	Total	Total 65+
1999–00	11,437	17,957	27,745	25,985	26,238	9,061	1,868	120,291	16,679	34,352	60,761	80,612	94,017	36,895	10,388	333,704	<b>453,995</b>
2000–01	10,149	16,575	25,925	28,561	27,311	12,333	2,174	123,028	16,251	31,407	57,645	80,587	86,986	48,546	13,307	334,729	<b>457,757</b>
2001–02	11,786	16,270	26,470	29,269	24,853	12,952	3,125	124,725	15,264	30,512	58,679	84,077	88,620	49,725	13,915	340,792	<b>465,517</b>
2002–03	10,120	17,060	25,154	31,113	25,649	12,525	2,861	124,482	15,846	29,069	57,858	83,797	83,148	48,613	14,705	333,036	<b>457,518</b>
2003–04	10,788	16,821	27,160	33,838	27,179	14,133	3,331	133,250	16,955	29,552	58,754	88,804	92,067	52,307	15,816	354,255	<b>487,505</b>
2004–05	11,399	17,241	28,065	36,396	29,485	14,457	4,439	141,482	18,710	27,882	57,427	93,211	87,605	55,297	17,028	357,160	<b>498,642</b>
2005–06	12,684	17,288	28,224	38,727	30,331	16,540	3,892	147,686	18,673	29,466	56,616	94,736	90,315	57,789	19,775	367,370	<b>515,056</b>
2006–07	13,805	16,424	29,006	40,841	34,725	17,984	4,542	157,327	19,525	29,103	58,198	96,992	98,214	62,495	19,009	383,536	<b>540,863</b>
2007–08	13,988	19,541	29,897	40,196	36,929	19,273	4,933	164,757	20,249	31,996	59,016	97,405	106,386	64,648	20,363	400,063	<b>564,820</b>
2008–09	14,448	19,967	29,370	41,381	40,287	19,303	5,126	169,882	21,272	32,218	59,122	97,085	112,095	65,534	22,073	409,399	<b>579,281</b>
2009–10	16,404	20,676	30,047	43,892	43,443	20,184	5,111	179,757	22,273	35,196	58,886	94,331	113,191	64,145	21,876	409,898	<b>589,655</b>
2010–11	17,248	23,526	30,494	45,774	47,102	23,624	6,536	194,304	23,256	35,625	56,918	97,280	119,682	68,502	25,062	426,325	<b>620,629</b>



**Table B.27: Patient days for fall injury inward transfer separations, men and women aged 65+, Australia 1999-00 to 2010-11**

	Men							Women							Total 65+		
	65-69	70-74	75-79	80-84	85-89	90-94	95+	Total	65-69	70-74	75-79	80-84	85-89	90-94		95+	Total
1999-00	1,991	1,953	3,552	3,860	2,935	1,198	175	15,664	2,291	4,126	7,910	9,793	12,463	5,401	1,738	43,722	<b>59,386</b>
2000-01	1,738	2,219	4,506	3,798	3,254	1,725	263	17,503	2,364	5,039	9,032	12,544	14,175	7,275	1,991	52,420	<b>69,923</b>
2001-02	1,491	2,580	4,219	4,541	3,756	1,870	425	18,882	2,426	4,622	8,864	13,670	15,422	7,016	2,275	54,295	<b>73,177</b>
2002-03	2,045	2,493	4,565	5,382	4,720	2,342	521	22,068	2,462	5,680	10,216	15,522	15,011	9,148	2,810	60,849	<b>82,917</b>
2003-04	2,156	3,481	5,112	6,743	5,651	2,832	501	26,476	3,431	6,381	11,999	17,688	17,693	10,807	2,798	70,797	<b>97,273</b>
2004-05	2,511	3,359	5,385	6,577	5,742	2,526	625	26,725	3,332	5,266	10,789	18,138	16,598	11,322	3,158	68,603	<b>95,328</b>
2005-06	2,911	4,332	6,322	7,949	6,285	3,131	900	31,830	3,249	5,864	10,858	20,065	19,506	11,505	3,353	74,400	<b>106,230</b>
2006-07	2,804	4,396	6,271	8,745	7,982	4,177	1,069	35,444	3,885	7,026	13,465	19,899	20,767	14,718	4,196	83,956	<b>119,400</b>
2007-08	3,471	3,411	7,594	9,111	8,441	4,235	894	37,157	3,728	6,971	13,588	22,005	22,057	14,226	4,264	86,839	<b>123,996</b>
2008-09	3,294	4,581	6,244	9,744	8,254	4,693	1,013	37,823	3,933	6,897	13,128	21,339	24,756	14,160	5,421	89,634	<b>127,457</b>
2009-10	3,069	4,300	7,429	10,451	9,379	5,232	1,202	41,062	4,319	7,354	13,352	22,395	26,181	15,459	5,173	94,233	<b>135,295</b>
2010-11	3,423	5,684	7,457	9,499	10,551	5,847	1,761	44,222	3,731	7,202	12,491	22,101	26,435	16,164	5,698	93,822	<b>138,044</b>

**Table B.28: Patient days for fall-related follow-up care separations, men and women aged 65+, Australia 1999–00 to 2010–11**

	Men								Women								Total 65+
	65–69	70–74	75–79	80–84	85–89	90–94	95+	Total	65–69	70–74	75–79	80–84	85–89	90–94	95+	Total	
1999–00	4,653	7,965	14,433	14,030	13,915	4,649	1,040	60,685	6,795	16,751	26,861	39,662	49,594	17,810	4,589	162,062	<b>222,747</b>
2000–01	4,864	9,270	15,443	17,570	16,578	7,141	1,229	72,095	6,842	16,792	34,326	44,946	50,615	26,538	6,916	186,975	<b>259,070</b>
2001–02	5,443	9,415	15,180	19,618	18,174	7,423	1,621	76,874	6,247	15,122	35,251	53,810	58,343	31,747	8,349	208,869	<b>285,743</b>
2002–03	7,892	9,220	16,011	21,884	18,312	8,894	2,698	84,911	6,471	16,439	36,442	54,448	59,591	29,837	8,468	211,696	<b>296,607</b>
2003–04	6,320	12,219	17,127	23,750	19,918	9,106	1,450	89,890	8,676	19,578	40,217	67,173	65,646	41,346	8,420	251,056	<b>340,946</b>
2004–05	8,696	12,191	26,695	32,948	29,245	14,207	3,718	127,700	11,189	23,459	55,745	90,196	84,936	51,065	13,300	329,890	<b>457,590</b>
2005–06	9,369	17,202	28,064	34,319	27,657	14,205	2,469	133,285	13,132	23,622	51,744	89,569	87,472	53,439	14,038	333,016	<b>466,301</b>
2006–07	11,137	15,846	27,735	39,528	33,138	16,138	4,535	148,057	14,509	24,566	54,971	96,508	100,036	56,947	15,193	362,730	<b>510,787</b>
2007–08	11,681	17,309	29,986	38,713	32,619	16,230	3,893	150,431	13,971	26,641	54,122	93,175	94,366	55,441	15,257	352,973	<b>503,404</b>
2008–09	13,268	16,795	28,170	38,972	38,893	17,822	3,324	157,244	14,682	26,149	55,082	96,659	108,176	60,282	17,214	378,244	<b>535,488</b>
2009–10	14,152	20,924	28,472	40,890	39,250	17,244	4,819	165,751	16,853	32,982	60,043	100,566	116,303	60,197	17,176	404,120	<b>569,871</b>
2010–11	14,329	21,029	33,191	41,509	43,123	21,437	3,978	178,596	18,267	33,657	57,023	101,013	121,949	67,124	17,408	416,441	<b>595,037</b>

# Glossary

Definitions in the *Glossary* contain, where applicable, an identification number from the Metadata Online Registry (METeOR). METeOR is Australia's central repository for health, community services and housing assistance metadata, or 'data about data'. It provides definitions for data for health and community services-related topics and specifications for related national minimum data sets (NMDSs), such as the NMDSs that form the basis of this report. METeOR can be viewed on the AIHW website at <[www.aihw.gov.au](http://www.aihw.gov.au)>. For further information on the terms used in this report, refer to the definitions in the *National health data dictionary*, version 15 (AIHW 2010a).

**Aboriginal:** A person of Aboriginal descent who identifies as an Aboriginal and is accepted as such by the community in which he or she lives.

**Activity when injured:** The type of activity being undertaken by a person at the time of injury. METeOR identifier: 361025.

**Acute:** Having a short and relatively severe course.

**Acute care:** See Care type.

**Acute care hospital:** See Establishment type.

**Admitted patient:** A patient who undergoes a hospital's formal admission process to receive treatment and/or care. This treatment and/or care is provided over a period of time and can occur in hospital and/or in the person's home (for hospital-in-the-home patients). METeOR identifier: 268957.

**Age-standardisation:** A set of techniques used to remove, as far as possible, the effects of differences in age when comparing two or more populations.

**Episode of care:** The period of admitted patient care between a formal or statistical admission and a formal or statistical separation, characterised by only one care type (see Care type and Separation). METeOR identifier: 270174 (Care type). METeOR identifier: 268956 (Episode of admitted patient care).

**External cause:** The environmental event, circumstance or condition as the cause of injury, poisoning and other adverse effect. METeOR identifier: 361926.

**Hip fracture:** a break in the thigh bone (femur) just below the hip joint. Hip fractures are also called fractures of the femoral neck and are defined in this report by the ICD-10-AM diagnoses S72.0–S72.2.

**Hospital:** A health-care facility established under Commonwealth, state or territory legislation as a hospital or a free-standing day procedure unit and authorised to provide treatment and/or care to patients. METeOR identifier: 268971.

**International Statistical Classification of Diseases and Related Health Problems (ICD):** The World Health Organization's internationally accepted classification of diseases and related health conditions. The 10th revision, Australian modification (ICD-10-AM) is currently in use in Australian hospitals for admitted patients.

**Length of stay:** The length of stay of an overnight patient is calculated by subtracting the date the patient is admitted from the date of separation and deducting days the patient was

on leave. A same-day patient is allocated a length of stay of 1 day. METeOR identifier: 269982.

**Mean length of stay:** The mean (average) number of patient days for admitted patient episodes. Patients admitted and separated on the same day are allocated a length of stay of 1 day.

**Mode of admission:** The mechanism by which a person begins an episode of admitted patient care. METeOR identifier: 269976.

**Mode of separation:** Status at separation of person (discharge/transfer/death) and place to which person is released (where applicable). METeOR identifier: 270094.

**Patient days:** The total number of days for patients who were admitted for an episode of care and who separated during a specified reference period. A patient who is admitted and separated on the same day is allocated 1 patient day. METeOR identifier: 270045.

**Principal diagnosis:** The diagnosis established after study to be chiefly responsible for occasioning an episode of admitted patient care. METeOR identifier: 391326.

**Private hospital:** A privately owned and operated institution, catering for patients who are treated by a doctor of their own choice. Patients are charged fees for accommodation and other services provided by the hospital and relevant medical and paramedical practitioners. Acute care and psychiatric hospitals are included, as are private free-standing day hospital facilities.

**Public hospital:** A hospital controlled by a state or territory health authority. Public hospitals offer free diagnostic services, treatment, care and accommodation to all eligible patients.

**Same-day patient:** An admitted patient who is admitted and separated on the same date.

**Separation:** An episode of care for an admitted patient, which can be a total hospital stay (from admission to discharge, transfer or death) or a portion of a stay beginning or ending in a change of type of care (for example, from acute to rehabilitation). Separation also means the process by which an admitted patient completes an episode of care either by being discharged, dying, transferring to another hospital or changing type of care. See METeOR identifier: 270407.

**Separation rate:** The total number of episodes of care for admitted patients divided by the total number of persons in the population under study. Often presented as a rate per 1,000 or 100,000 members of a population. Rates may be crude or standardised.

**Torres Strait Islander:** A person of Torres Strait Island descent who identifies as a Torres Strait Islander and is accepted as such by the community in which he or she lives.

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## Related publications

This report, *Trends in hospitalisations due to falls by older people, Australia 1999–00 to 2010–11*, is the first such report that the AIHW has produced. It extends work previously published in the six-edition series *Hospitalisations due to falls by older people, Australia*. These reports can be downloaded free from the AIHW publications website <http://www.aihw.gov.au/publications/>. The website also includes information on ordering printed copies.

The following AIHW publications relating to falls by older Australians might also be of interest:

- AIHW 2011. A snapshot of osteoporosis in Australia 2011. Arthritis series no. 15. Cat. no. PHE 137. Canberra: AIHW.
- Bradley C 2007. Ladder-related fall injuries. NISU Briefing series no. 11. Cat. no. INJCAT 105. Canberra: AIHW.
- Karmel R, Lloyd J and Anderson P 2008. Movement from hospital to residential aged care. Data linkage series no. 6. Cat. no. CSI 6. Canberra: AIHW.

This report focuses on trends in fall-related hospital care for people aged 65 and older from 1999–00 to 2010–11. While age-standardised rates of fall injury cases increased over the 12 years to June 2011, the rate of hip fractures due to falls decreased. The patient days for hospital care directly attributable to fall-related injury doubled over the study period.