Australian Government
Australian Institute of Health and Welfare
Department of Health and Ageing

a snapshot of **osteoporosis** in Australia 2011

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ARTHRITIS SERIES Number 15

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National Centre for Monitoring Arthritis and Musculoskeletal Conditions

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Please note that there is the potential for minor revisions of data in this report. Please check the online version at <www.aihw.gov.au> for any amendments.

Contents

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Summary points

Osteoporosis causes bones to become weak, and increase the likelihood of fracture. This report updates the key figures and facts about osteoporosis in Australia.

How prevalent is osteoporosis in Australia?

- An estimated 692,000 Australians (3.4% of the total population) had doctor-diagnosed cases of osteoporosis in 2007–08. Women accounted for the majority of cases (81.9%). The disease occurs mainly in people aged 55 years and over (84.0%).
- Osteoporosis, a condition without overt symptoms, is known to be under-diagnosed. While the extent of this is difficult to establish, the prevalence of doctor-diagnosed osteoporosis is almost certainly an underestimate.

Is osteoporosis more prevalent in some subpopulations than in others?

- The diagnosis of osteoporosis was more prevalent among those who live in *Major cities* than in rural and remote locations.
- In 2004–05, 0.74% of Indigenous males and 1.11% of Indigenous females reported having doctor-diagnosed cases of osteoporosis. The age-standardised prevalence rates show that osteoporosis was more common among Indigenous males (1.8 times) but less common among Indigenous females (0.5 times) than their non-Indigenous counterparts.

Where are the common sites of osteoporotic fractures?

- Hip and pelvis (40.5%) and wrist and forearm (17.1%) were the most common sites of minimal trauma fractures in 2007–08.

How has the rate of osteoporotic hip fracture changed over time?

- The rate of hospital separation for minimal trauma hip fracture decreased between 1998–99 and 2007–08, a trend consistent with reports from North America and Scandinavia.

How is osteoporosis managed in primary care settings and hospitals?

- Osteoporosis was managed at a rate of one in 100 GP–patient encounters in 2007–08, at a rate double that of 1998–99. In these encounters, prescription, advice and supply of medications were the mainstays. In hospital settings, surgical procedures as well as allied health services were provided to treat fractures.

Does osteoporosis cause death?

- Osteoporosis usually does not cause death. Osteoporotic fractures, however, can lead to premature deaths among the elderly. In 2007, osteoporosis was listed as the underlying cause of 240 deaths in Australia.

How much is spent on osteoporosis management?

- In 2004–05, the total direct health expenditure for osteoporosis was $304 million. Over 70% of this was spent to cover the cost of pharmaceutical medicines ($215 million). Surgical and non-surgical procedures to treat fractures in hospitals constitute another large component of this outlay ($35 million, 11.5%).

Can osteoporosis be prevented?

- Osteoporosis is a largely preventable condition. Changes in certain lifestyle factors, management of established osteoporosis through anti-resorptive therapy, and falls prevention programs can help reduce the impact of osteoporosis in Australia.

What is osteoporosis?

Osteoporosis is a systemic skeletal disease that causes the bones to become thin, weak and fragile, such that even a minor bump or accident can cause serious fractures. The disease impairs density of the bone as well as its structural quality. Often people do not know that they have osteoporosis because the condition lacks overt symptoms.

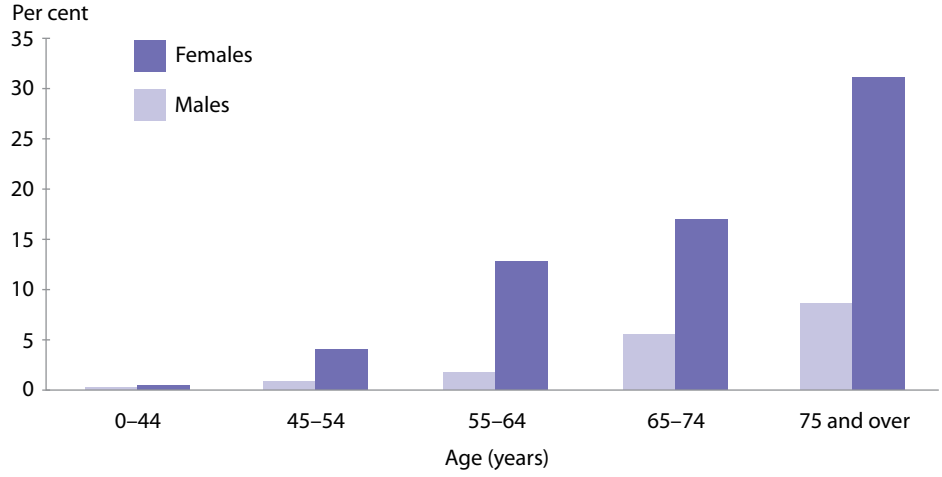
Osteoporosis is a major cause of fractures, deformity and mobility limitations among elderly Australians, in particular females (AIHW 2008a). While osteoporosis is rarely a direct cause of death, osteoporotic hip fractures are linked to premature deaths in the years following the event (Haentjens et al. 2010). Currently there is no known cure for osteoporosis, however, it is largely a preventable condition.

This snapshot provides the latest national data on osteoporosis in Australia. Information is included about its epidemiology, fractures and other complications, treatment and management, mortality, health expenditure and prevention. A major focus of the report is on fractures, also called osteoporotic fractures, following minimal trauma.

A variety of data sources has been used to provide information about osteoporosis in Australia. These include information obtained from people with the disease, their health-care providers, and various administrative data sets. Where required, information from research studies has also been included.

Prevalence

Estimating the prevalence of osteoporosis in a population can be difficult. An estimated 692,000 Australians (3.4% of the total population) have doctor-diagnosed osteoporosis based on the 2007–08 National Health Survey (NHS) (ABS 2009). More than eight out of 10 (81.9%) of these people are females and most are aged 55 years and over (Figure 1).



Note: Based on self-reports of having had a doctor-diagnosed osteoporosis.
Source: AIHW analysis of ABS 2007–08 National Health Survey CURF.

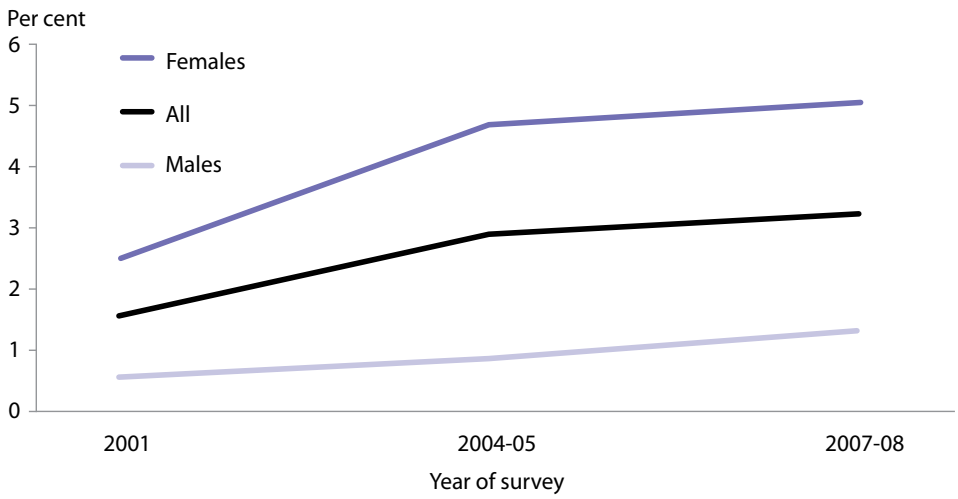
Figure 1: Age-specific prevalence of osteoporosis, 2007–08

NHS data suggests there was a considerable increase in the known prevalence rate for osteoporosis, almost double, between 2001 and 2004–05. Only a slight change in the rate was observed between 2004–05 and 2007–08 (Figure 2).

There are concerns however that the estimation of osteoporosis prevalence using NHS self-reports underestimates the number of people with the disease. In the absence of overt physical symptoms, the diagnosis of osteoporosis tends to occur after an untoward event, such as sustaining fracture(s) with minimal trauma.

Even after experiencing minimal trauma fracture(s), however, some cases of osteoporosis go undiagnosed and/or untreated (Eisman et al. 2004). This may occur where fractures, particularly spinal fractures, are undetected (Delmas et al. 2005). In other cases underlying osteoporosis may not be investigated following minimal trauma fractures (Elliot-Gibson et al. 2004).

In the absence of population studies using biomedical criteria to diagnose osteoporosis, the extent of this underestimation is not fully known.



Note: Rates are age-standardised to the Australian population as at 30 June 2001.
Source: AIHW analysis of ABS 2001, 2004–05, and 2007–08 National Health Survey CURF.

Figure 2: Trends in the prevalence of osteoporosis, 2001 to 2007–08

Inter-population variation

The prevalence of osteoporosis varies between different populations (AIHW 2008a). This variation may be due to differences in the underlying risk factors, access to treatment or education, or the age structures of the populations. Broad level population groups usually demarcated for mapping epidemiological variation in Australia are:

- people living in certain regional areas (see Box 1)
- overseas-born Australians
- socioeconomically disadvantaged Australians
- Indigenous Australians.

Box 1: Rural and remote populations

The rural and remote populations of Australia, as distinct from those living in urban areas, are identified using the Accessibility/Remoteness Index of Australia (ABS 2008a). This index takes into account how distant a place is by road from major service centres. Given that the disease prevalence data may be used as proxies for health care needs, this information can be viewed against the relative difficulty experienced in accessing health care and education services in rural and remote locations.

Variation in the prevalence of osteoporosis is described in this report across three regions, namely *Major cities, Inner regional* areas and *Other* areas (including *Outer regional, Remote,* and *Very remote* locations). The three categories respectively covered 68%, 20% and 12% of the Australian population in 2006.

Regional profile

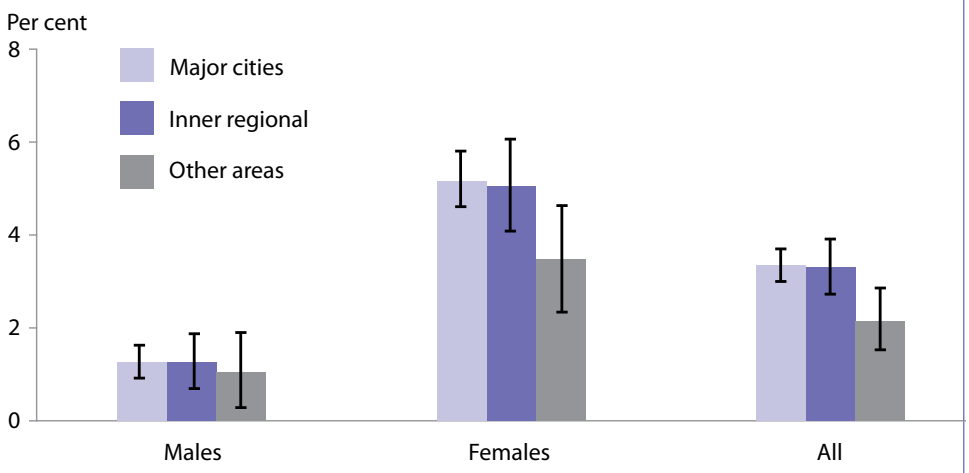
Data from the NHS and cancer registries suggest people in rural and remote areas are generally more likely to have chronic diseases (for example, melanoma, lung cancer, arthritis) than people living in *Major cities* (AIHW 2008b: AIHW 2010a). People living outside *Major cities* are also much less likely than their city counterparts to report their health status as being excellent or very good (AIHW 2010b).

Contrary to the above observation, doctor-diagnosed cases of osteoporosis were more prevalent among those living in *Major cities* compared to *Other* areas (or *Outer regional, Remote* and *Very remote* locations of Australia) (Figure 3). The difference did not reach statistical significance when the data were analysed separately for males and females.

The prevalence of doctor-diagnosed osteoporosis was similar between *Major cities* and *Inner regional* areas for both males and females.

While the urban–rural difference in osteoporosis prevalence has been reported in many countries, the causes for this have not been fully explained (Chevalley et al. 2002). One explanation for the difference may be related to poorer access to primary health care and to bone densitometry for people in rural and remote areas. Bone densitometry use in Australia appears lower in rural areas compared with urban areas. One study showed that both men and women in capital cities were around 3 times more likely to undergo the investigation than those in remote areas (Ewald et al. 2009).

Another explanation for the higher prevalence of doctor-diagnosed osteoporosis is a selective migration of people with osteoporosis to urban areas. People with osteoporosis or related fractures may move to urban areas where access to care (hospitals, families, etc.) is easier.



Notes

1. Rates are age-standardised to the Australian population as at 30 June 2001.
2. Regional areas have been defined using the Accessibility/Remoteness Index of Australia (ABS 2008a).
3. Other areas include *Outer regional, Remote*, and *Very remote* locations.
4. Error bars represent 95% confidence intervals of the estimate. The data used in this figure are given in Appendix 2 Table A2.1.

Source: AIHW analysis of ABS 2007–08 National Health Survey CURF.

Figure 3: Regional variation in the prevalence of osteoporosis, 2007–08

Overseas-born Australians

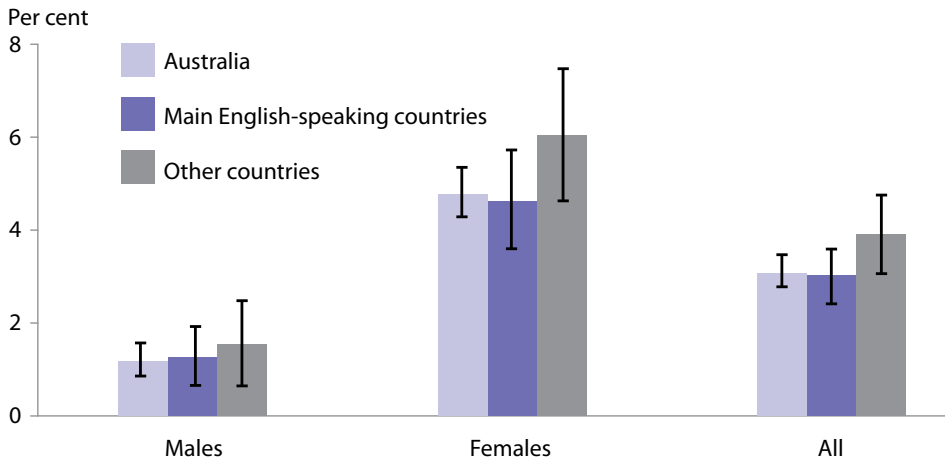
Most migrants to Australia enjoy health that is equal to or better than that of the Australian-born population. This is known as the 'healthy migrant effect'. Immigrant populations often have lower rates of death, hospitalisation and mental illness (AIHW 2004; 2010b). The fact that most migrants are partly selected on the basis of their health, age, education level, and relatively high socioeconomic status explains, to some extent, the 'healthy migrant effect'. Many immigrants also come from regions of the world where lifestyle-associated behaviours contributing to chronic diseases, particularly those associated with obesity, inactivity and diet, are less prevalent than Australia.

This report categorises current Australian citizens by their country of birth to study variation in the prevalence of osteoporosis. Three different categories were used, namely Australian-born, those born in other mainly English-speaking countries, and Other countries. Box 2 outlines this categorisation briefly.

Box 2: Country of birth categorisation

The country of birth for current Australian citizens was grouped into three categories: Australia, Other English-speaking countries (UK, Ireland, Canada, US, South Africa, New Zealand), and Other (non-English-speaking) countries. It would be preferable to use finer categories by country of birth, however, small NHS samples preclude this level of detail.

If the 'healthy migrant effect' applies to osteoporosis, then the condition would be less prevalent among those who were born overseas. The data, however, show no difference based on the country of birth (Figure 4).



Notes

1. Rates are age-standardised to the Australian population as at 30 June 2001.
2. Main English speaking countries includes: UK, Ireland, Canada, US, South Africa, and New Zealand.
3. Error bars represent 95% confidence intervals of the estimate. The data used in this figure are given in Appendix 2 Table A2.2.

Source: AIHW analysis of ABS 2007–08 National Health Survey CURF.

Figure 4: Variation in the prevalence of osteoporosis by country of birth, 2007–08

Variation by socioeconomic status

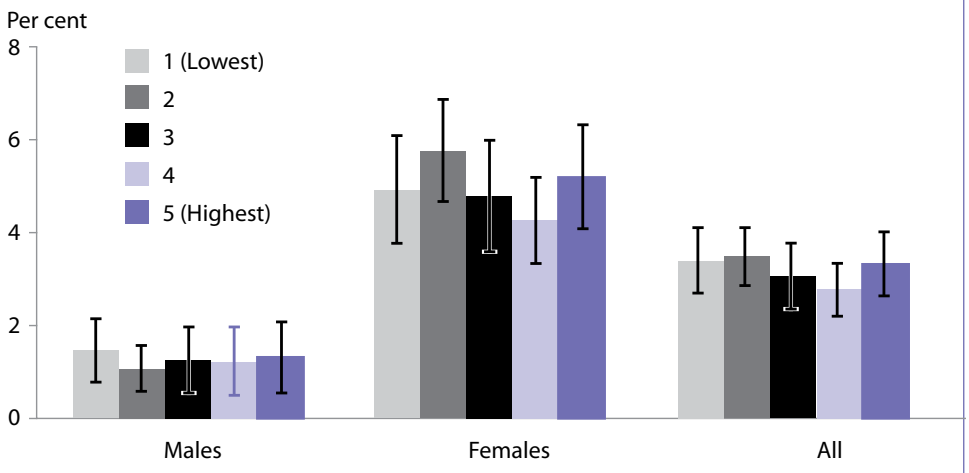
Generally lower socioeconomic status (SES) Australians report higher prevalence of chronic diseases and their associated risk factors (Draper et al. 2005) (see Box 3 for information about how SES categories are formulated). Contrary to this, no such association was found in the prevalence of osteoporosis (Figure 5).

Box 3: Classification of socioeconomic disadvantage

The level of socioeconomic disadvantage that a person experiences is calculated using the Index of Relative Socioeconomic Disadvantage (IRSD) developed by the Australian Bureau of Statistics (ABS 2006a). The IRSD is based on several variables including income, education, occupation, government housing, divorce or separation, access to a car, Indigenous status and fluency in English.

The IRSD is an area-based measure that represents the average level of disadvantage across a geographic area in which a person resides. The area of usual residence is used to assign a person to a specific socioeconomic category or SES.

In this report, the population living in the 20% of areas with the greatest overall level of disadvantage is described as the 'lowest SES group', the 20% at the other end of the scale—the top fifth—is described as the 'highest SES group'.



Notes

1. Rates are age-standardised to the Australian population as at 30 June 2001.
2. Socioeconomic status (SES) is based on the ABS Index of Relative Socioeconomic Disadvantage (ABS 2009).

Source: AIHW analysis of ABS 2007–08 National Health Survey CURF.

Figure 5: Prevalence of osteoporosis by socioeconomic status, 2007–2008

Indigenous Australians

Aboriginal and Torres Strait Islander persons (Indigenous Australians) (see Box 4 for description of the population) have a younger age structure compared to non-Indigenous Australians (ABS & AIHW 2008). People aged 65 years and over comprise just 3% of this population, compared with 13% of the non-Indigenous population (AIHW 2010b). Consequently, ageing-associated conditions such as osteoporosis are less likely to be prevalent among Indigenous Australians. The prevalence rates are age-standardised here to eliminate the effects of differences in population age structures when comparing rates for Indigenous and non-Indigenous Australians.

Several risk factors that may contribute to low bone mass, such as smoking, alcohol misuse, physical inactivity and socioeconomic disadvantage, are more common among Indigenous than non-Indigenous Australians (ABS & AIHW 2008).

Box 4: Classification of the Indigenous population

Self-identification as an Aboriginal and/or a Torres Strait Islander person generally determines the Indigenous status of an Australian. The extent to which this happens varies considerably between data sources. In the 2006 Census, the Indigenous population comprised 2.5% of the total Australian population. The majority of Indigenous Australians (76%) live in Major cities and Inner regional areas. Socioeconomic disadvantage, as measured using rates of unemployment and household income, is common among Indigenous Australians (ABS & AIHW 2008).

Based on the National Aboriginal and Torres Straight Islander Health Survey (see Box 5 for more information about the survey), an estimated 4,405 Indigenous Australians (0.9% of the total Indigenous population) had doctor-diagnosed osteoporosis in 2004–05. Indigenous females were around 1.5 times more likely to report being diagnosed with osteoporosis than Indigenous males (1.11% and 0.74% respectively).

Based on a comparison of age-standardised rates, Indigenous males were almost twice as likely to report being diagnosed with osteoporosis, compared with non-Indigenous males (Table 1). In contrast, Indigenous females were half as likely to report being diagnosed with osteoporosis compared to their non-Indigenous counterparts.

Table 1: Prevalence of osteoporosis in Indigenous and non-Indigenous Australians, 2004–05

		Indigenous	Non-Indigenous	Rate ratio[a]
Males	Number	1,730	87,963	–
	Per cent [b]	0.74	0.92	–
	Age-standardised prevalence[c] (%)	1.66	0.90	1.84
Females	Number	2,675	488,645	–
	Per cent [b]	1.11	5.04	–
	Age-standardised prevalence[c] (%)	2.25	4.68	0.48
All	Number	4,405	576,608	–
	Per cent [b]	0.93	2.99	–
	Age-standardised prevalence[c] (%)	1.97	2.85	0.69

(a) Rate ratios are the age-standardised rates for Indigenous Australians divided by the age-standardised rates for non-Indigenous Australians.

(b) The percentages are based on the total number of people in each subpopulation.

(c) Prevalence rates are age-standardised to the Australian population as at 30 June 2001.

Source: AIHW analysis of of the 2004–05 NATSIHS CURF.

Box 5: 2004–05 National Aboriginal and Torres Straight Islander Health Survey

The 2004–05 National Aboriginal and Torres Strait Islander Health Survey (NATSIHS) is the largest health survey of Indigenous Australians that the ABS conducts, with a sample size of 10,439 persons (approximately one in 45 of the total Indigenous population) (ABS 2006b). This survey was run concurrently with the NHS, and similar questions were asked in the two surveys. The NATSIHS was designed to collect a range of information from Indigenous Australians about health- related issues including health status, risk factors and actions, and socioeconomic circumstances. The Indigenous data included here are based on the 2004–05 NATSIHS as these are the most recent population-based health data available for Indigenous Australians.

Fractures and other complications

Minimal trauma fracture, or osteoporotic fracture, refers to a type of pathologic fracture that occurs as a result of a fall from standing height or less. Minimal trauma fractures are a noteworthy feature of the disease burden of osteoporosis. Not only are these fractures a source of pain, mobility limitations and disability, they may also set into motion a cascade of adverse events. Fractures may lead to further morbidity, complications, and increased mortality compared to age- and gender- matched peers (Center et al. 2007). The National Hospital Morbidity Database (NHMD) was used to examine the common sites of minimal trauma fractures, hospital separation rate over time, and interventions provided for management of fracture.

Many fractures, in particular those of the spine, may present as no more than back pain for a few days, or even be asymptomatic. Therefore, not all osteoporotic fractures come to medical attention in hospitals, and it is likely that the numbers reported here underestimate the number of minimal trauma fractures occurring in Australia. However, in the absence of any comprehensive population-based data, the number of hospital separations constitutes a useful indicator of the extent of the problem in the population.

The NHMD records the fractures and injuries using the fifth edition of the International Statistical Classification of Diseases and Related Health Problems, 10th Revision, Australian Modification (ICD-10-AM). The database records the hospital interventions using the Australian Classification of Health Interventions (ACHI) (NCCH 2006). The codes used in the analyses are provided in Appendix 1.

Osteoporotic fractures

There were a total of 52,730 hospital separations for minimal trauma fractures (osteoporotic fractures) of people aged 40 years and over in 2007–08 (Table 2). Cases where the patient was transferred between hospitals were excluded to avoid double counting.

Table 2: Hospital separations for minimal trauma fractures, 2007–08

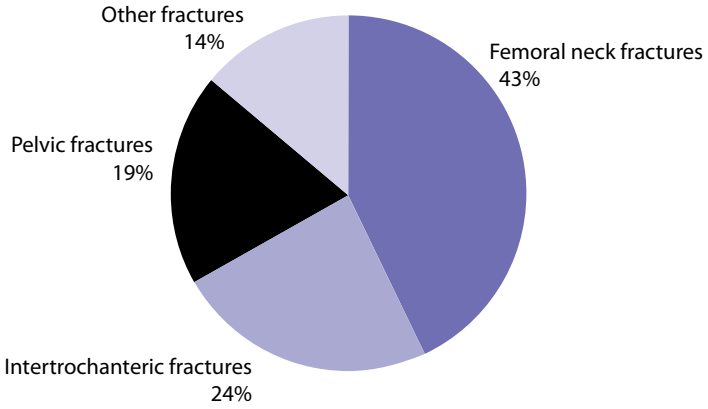
	Separations	
Fracture location	Number	Per cent
Hip and pelvis	21,360	40.5
Other sites	12,507	23.7
Wrist and forearm	9,038	17.1
Shoulder	4,320	8.2
Spine	2,952	5.6
Ankle	2,553	4.8
Total	**52,730**	**100.0**

Notes

1. A separation for minimal trauma fracture was defined as any separation of a person aged 40 years and over with the principal diagnosis of a fracture and the first reported external cause code indicating minor trauma (see Appendix 1 Table A1.1 for codes used).
2. Separations where the patient was transferred from another hospital were excluded (7,568 cases, or approximately 13% of all minimal trauma fracture separations). This provides a more accurate estimate of the number of fractures that required hospital treatment as an admitted patient.

Source: AIHW National Hospital Morbidity Database.

Fractures of hip and pelvis were the most common type of minimal trauma fractures that required hospitalisation (Table 2). These fractures accounted for more than 40% of the minimal trauma fractures; a rate of 198.2 per 100,000 population aged 40 years and over. More than 4 out of 10 of these fractures were of the neck of the femur (Figure 6). Intertrochanteric hip fracture accounts for another quarter of these hospital separations.



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2. Separations where the patient was transferred from another hospital were excluded (7,568 cases, or approximately 13% of all minimal trauma fracture separations). This provides a more accurate estimate of the number of fractures that required hospital treatment as an admitted patient.

Source: AIHW National Hospital Morbidity Database.

Figure 6: Proportions of various hip and pelvis fractures following minimal trauma, 2007–08

The fractures of wrist and forearm were the second most common type of osteoporotic fractures that required hospitalisation (9,038) in 2007–08, a rate of 83.9 per 100,000 population aged 40 years and over.

Colles' fracture (Box 6) was the most common type of wrist and forearm fracture requiring hospitalisation, accounting for almost one-half of these fractures (Table 3). Hospitalisation for wrist fractures, such as in the scaphoid bone, was much less common.

Box 6: Trends in hip and Colles' fractures

Colles' fracture is a fracture of the radius bone just above the wrist, seen most commonly among post-menopausal females (Solomon et al. 2005). Hip fracture and Colles' fracture are useful indicators of osteoporotic fractures as these fractures usually occur after falls. The great majority of hip fractures are caused by a sideways fall with direct impact on the greater trochanter of the proximal femur (or side of the hip) (Kannus & Parkkari 2006). In contrast, Colles' fractures most often occur when a person falls forward and then attempts to break the fall by extending the hands forward (Bakken et al. 2007).

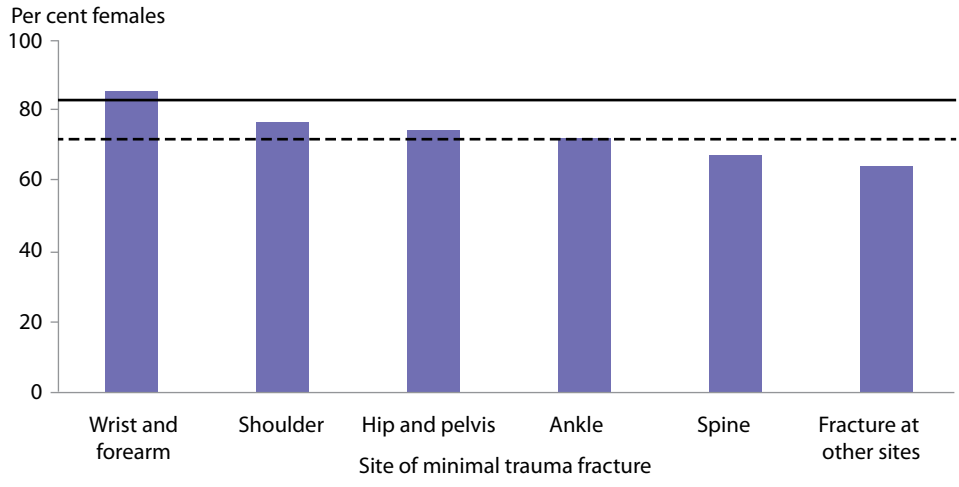
Table 3: Types of wrist and forearm fracture following minimal trauma, 2007–08

Fracture location	Separations	
	Number	Per cent
Colles' fracture	4,189	46.3
Lower end of radius, unspecified	2,568	28.4
Other fractures of the lower arm	2,173	24.0
Scaphoid bone	108	1.2
Total	**9,038**	**100.0**

Notes
1. A separation for minimal trauma fracture was defined as any separation of a person aged 40 years and over with the principal diagnosis of a fracture and the first reported external cause code indicating minor trauma (see Appendix 1 Table A1.1 for codes used).
2. Separations where the patient was transferred from another hospital were excluded (7,568 cases, or approximately 13% of all minimal trauma fracture separations). This provides a more accurate estimate of the number of fractures that required hospital treatment as an admitted patient.

Source: AIHW National Hospital Morbidity Database.

There was some variation in the proportion of hospital separations for females for various types of minimal trauma fractures (Figure 7). The female proportion of minimal fracture hospitalisation ranged from 66.8% for spine fractures to 85.5% for wrist and forearm fractures



Notes
1. Dashed line represents the average proportion of females hospitalised for minimal trauma fractures (73.6%); the solid line is the expected proportion if the prevalence of osteoporosis in females (81.9%) is applied.
2. A separation for minimal trauma fracture was defined as any separation of a person aged 40 years and over with the principal diagnosis of a fracture and the first reported external cause code indicating minor trauma (see Appendix 1 Table A1.1 for codes used).
3. Separations where the patient was transferred from another hospital were excluded (7,568 cases, or approximately 13% of all minimal trauma fracture separations). This provides a more accurate estimate of the number of fractures that required hospital treatment as an admitted patient.

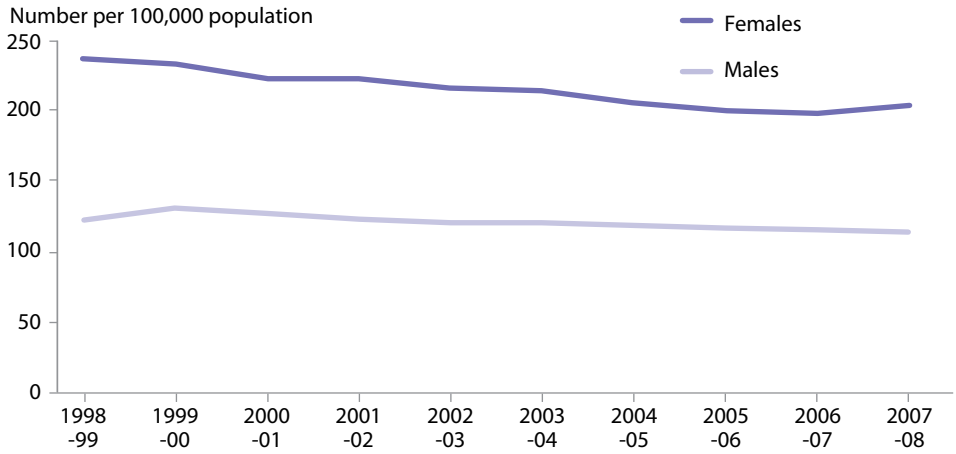
Source: AIHW National Hospital Morbidity Database.

Figure 7: Proportion of females in people hospitalised for minimal trauma fractures, 2007–08

Osteoporotic hip fractures

There were a total of 17,192 hospital separations for minimal trauma hip fracture in 2007–08, an incidence rate of 179 per 100,000 population aged 40 years and over. The rate was much higher in females (252 per 100,000) compared to males (100 per 100,000).

Although the overall number of minimal trauma hip fractures is on the increase (from 14,671 to 17,192 between 1998–99 and 2007–08), because of the ageing of the Australian population as well as overall population growth, the incidence rate, as indexed by hospital separation rate, appears to be declining (Figure 8). Over the 1998–99 to 2007–08 decade, the hospital separation rate for minimal trauma hip fracture (age-standardised) fell by 8% in males and 15% in females. Most of the decline occurred in ages 65 years and over.



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3. Separations where the patient was transferred from another hospital were excluded (7,568 cases, or approximately 13% of all minimal trauma fracture separations). This provides a more .

Source: AIHW National Hospital Morbidity Database.

Figure 8: Trends in the hospitalisation rate for osteoporotic hip fractures, 1998–99 to 2007–08

The downward trend in the hospital separation rate for osteoporotic hip fractures is not unique to Australia. Studies from North America and Scandinavia have also reported similar trends (Brauer et al. 2009; Jaglal et al. 2005; Kannus et al. 2006; Leslie et al. 2009; Stevens & Rudd 2010). The list of possible causes for this decline includes:

- widespread use of bone mineral density (BMD) tests
- use of anti-resorptive medicines
- increased intake of calcium and vitamin D

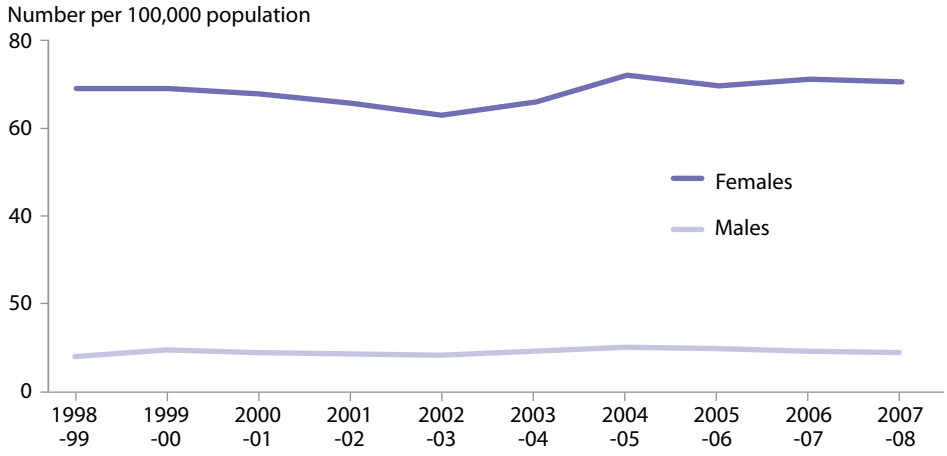
- increased physical activity
- decreased smoking rate
- fall prevention programs
- greater body weight (greater bone density and padding for falls)
- a cohort effect of a healthier aging population (Stevens & Rudd 2010).

The exact reasons, however, for the change in the rate of hip fracture are currently unknown.

Colles' fracture

There were a total of 4,189 hospital separations for this particular type of fracture due to minimal trauma, at a rate of 44 per 100,000 population aged 40 years and over, in 2007–08. More than 90% of these fractures were in females.

Unlike osteoporotic hip fractures, no downward trend is noted in hospital separations for Colles' fracture (Figure 9). The age-standardised hospital separation rate for these fractures has fluctuated around 70 per 100,000 females and 9 per 100,000 males over the 1998–99 to 2007–08 decade, although in 2002–03 the female rate dropped to almost 63 per 100,000.



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3. Separations where the patient was transferred from another hospital were excluded (7,568 cases, or approximately 13% of all minimal trauma fracture separations). This provides a more accurate estimate of the number of fractures that required hospital treatment as an admitted patient..

Source: AIHW National Hospital Morbidity Database.

Figure 9: Trends in hospitalisations for minimal trauma Colles' fracture, 1998–99 to 2007–08

Complications

Osteoporotic fractures can lead to a variety of complications, including restriction of activity, reduced quality of life and loss of independence (AIHW 2007). Some people with the disease may develop a fear of falling (Iglesias et al. 2009), while others may suffer further fractures following the initial event (Kanis et al. 2004). Deaths following hip fractures have been reported in a number of studies (Johnell & Kanis 2006; Haentjens et al. 2010).

More than one-third (35.5%) of people with osteoporosis reported some form of restriction in the level of their core activities in 2007–08 (Table 4). Most of these restrictions were at a mild or moderate level; 15.4% of people with osteoporosis reported severe or profound activity restrictions in their daily life.

Table 4: Osteoporosis and activity restrictions, 2007–08

		People with activity restrictions	
Disability	Level of activity restriction	Number ('000)	Per cent
Core activity restrictions		245.6	35.5
	Mild	54.5	7.9
	Moderate	84.3	12.2
	Severe	47.3	6.8
	Profound	59.6	8.6
No activity restriction		446.7	64.5
Total		**692.3**	**100.0**

Notes: : Rates were age-standardised to the Australian population as at 30 June 2001.
Source: AIHW analysis of ABS 2007–08 National Health Survey CURF

Treatment and management

The treatment and management of osteoporosis occur in a variety of health care settings, including:

- out-of-hospital care by general practitioners (GPs)
- community-based medical specialists (for example orthopaedic surgeons, endocrinologists, rheumatologists, geriatricians)
- hospital care for more serious conditions requiring surgical procedures.

Many people also use allied health services, for example physiotherapists, occupational therapists, dietitians, pharmacists and social workers, to assist with problems that osteoporosis causes.

General practice visits

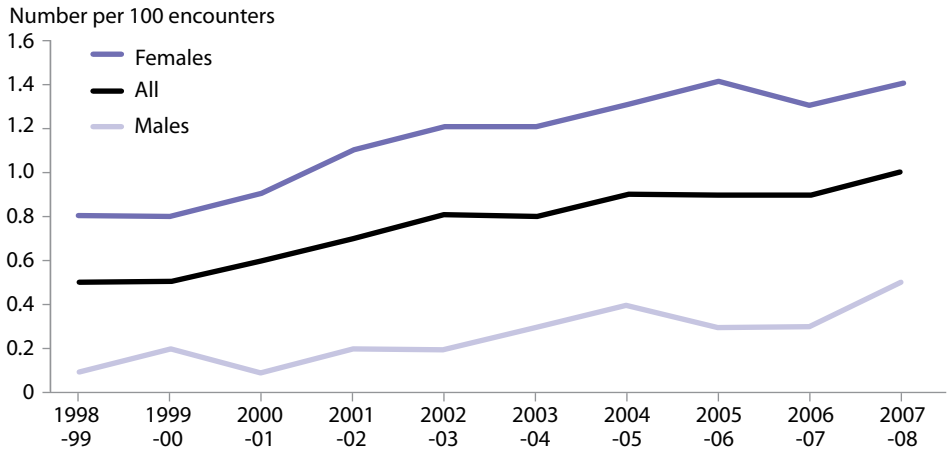
In Australia, information about the management of osteoporosis by GPs is collected through the Bettering the Evaluation and Care of Health (BEACH) survey (Britt et al. 2009). The BEACH program is a continuous national study of general practice activity. It is based on a new sample each year of about 1,000 GPs, each of whom provides details for 100 consecutive GP–patient encounters. The BEACH program began in 1998 and is ongoing.

Data collected in the survey include reasons for GP–patient encounter, problems managed, and details of pharmacological and non-pharmacological management actions. With regard to pharmacological management, the survey records whether the GP wrote a prescription for the medicine, supplied the medicine, or advised the patient to purchase medicine available without a prescription (over-the-counter medicine).

In 2007–08, osteoporosis was managed at a rate of 1.0 per 100 GP–patient encounters, and made up 0.6% of all problems managed (O'Halloran & Pan 2009). The most commonly reported reason for encounter was requests for prescriptions (37.9 per 100 encounters for osteoporosis problem managed). Medications were prescribed, advised, or supplied in the management of more than four out of five osteoporosis problems managed.

There was a major change in the management of osteoporosis by GPs over the decade between 1998–99 and 2007–08 (O'Halloran & Pan 2009). The management rate of osteoporosis doubled from 0.5 per 100 encounters to 1.0 per 100 encounters (Figure 10) in this time period. The increase is noteworthy in view of virtually no change in the GP–patient encounter rate for all other musculoskeletal conditions during that decade.

While osteoporosis management in GP encounters continued to centre around medications in 2007–08, the rate of prescription decreased from 91.9 per 100 osteoporosis problems managed in 1998–99 to 72.9 per 100 osteoporosis problems managed in 2007–08. Partly counteracting this was a substantial increase in the rate of GPs advising purchase of over-the-counter medicine. The rate of advice for over-the-counter medicines increased from 1.0 per 100 osteoporosis problems managed to 9.6 per 100 osteoporosis problems managed. The increased availability of combination products including vitamin D and calcium is likely to have influenced this (O'Halloran & Pan 2009).



Source: O'Halloran and Pan (2009)

Figure 10: Trends in the management of osteoporosis by general practitioners, 1998–99 to 2007–08

Hospitalisations

Both surgical and allied health interventions are performed to treat fractures in a hospital. In 2007–08, there were 54,243 hospital separations of people aged 55 years and over following minimal trauma fracture. A total of 193,600 interventions were performed during these hospitalisations, an average of 3.6 procedures per hospital separation. The average length of hospital stay was 10.1 days.

Surgical interventions

A variety of surgical procedures were performed to treat fractures. Reduction, with or without fixation, was the most common procedure employed (Table 5). Reduction refers to the manipulation of a bone or bones after a fracture to restore normal alignment, rotation, and length. It is important to ensure that bone ends meet correctly after a fracture to encourage healing and to prevent deformity. Reduction can be done surgically or non-surgically. The ends of the bone can then be held in place ('fixed') non-surgically with a cast or splint, or surgically by inserting pins, plates, screws or rods through or along the bone.

Total and partial arthroplasties (joint replacement) were also common, and these accounted for 11.4% and 8.8% of hospital separations respectively.

Table 5: Surgical interventions for minimal trauma fractures, 2007–08

Type of procedure	Interventions	
	Number [(a)]	Per cent
Immobilisation of fracture	524	1.0
Reduction with or without fixation	20,754	38.3
Arthroplasty (joint replacement)	6,172	11.4
Partial arthroplasty of hip	4,763	8.8

(a) Refers to the number of separations in which the intervention was provided. Interventions may have been provided more than once within a separation and multiple interventions may have been provided. See Appendix 1 Table A1.2 for the ACHI codes used.

Notes

1. A separation for minimal trauma fracture was defined as any separation of a person aged 55 years and over with the principle diagnosis of a fracture and the first reported external cause code indicating minor trauma (see Appendix 1 Table A1.2 for codes used).
2. Separations where the patient was transferred from another hospital have been included in order to capture all treatment provided.
3. Per cent of hospitalisations (n = 54,243) at which the procedure was performed.

Source: AIHW National Hospital Morbidity Database

Allied health intervention

Allied health interventions are very common in people with minimal trauma fractures, particularly where the fractures involve the spine, hip, pelvis or lower limbs. These interventions can assist people to regain mobility, adapt to any functional limitations caused by their injury, and reduce their risk of further fractures and falls.

A recent systematic review (Chudyk et al. 2009) reported that intensive physiotherapy and occupational therapy following hip fractures decreased the length of hospital stay and improved functional recovery. Thus, allied health interventions may play an important part in patient recovery and reducing costs.

The NHMD showed that a variety of generalised allied health interventions were provided in hospitals during 2007–08. Seven out of 10 hospital separations for minimal trauma fractures in 2007–08 involved some type of allied health support (Table 6). Physiotherapy was the most common generalised allied health intervention provided.

Table 6: In-hospital non-surgical procedures for minimal trauma fractures, 2007–08

	Interventions	
Allied health support	Number [(a)]	Per cent
Any allied health intervention	39,205	72.3
Physiotherapy	37,065	68.3
Occupational therapy	18,565	34.2
Social work	11,016	20.3
Dietetics	7,753	14.3

(a) Refers to the number of separations in which the intervention was provided. Interventions may have been provided more than once within a separation and multiple interventions may have been provided. See Appendix 1 Table A1.2 for the ACHI codes used.

Notes

1. A separation for minimal trauma fracture was defined as any separation of a person aged 55 years and over with the principle diagnosis of a fracture and the first reported external cause code indicating minor trauma (see Appendix 1 Table A1.2 for codes used).
2. Separations where the patient was transferred from another hospital have been included in order to capture all treatment provided.
3. Per cent of hospitalisations (n = 54,243) at which the procedure was performed.

Source: AIHW National Hospital Morbidity Database

Mortality

Osteoporosis usually does not directly cause death. In 2007, osteoporosis was listed as the underlying cause of 240 deaths in Australia. Certain osteoporotic fractures, however, increase the risk of death considerably. For example, it has been suggested that hip fracture increases the risk of death between five to eight fold within the first 3 months of the event (Haentjens et al. 2010). The increased risk may continue for as long as 10 years following the event (Johnell et al. 2004).

The role of osteoporotic fractures in mortality is mostly assessed as an associated cause of death. Hip or pelvic fractures were recorded as associated causes in 1,688 deaths (Table 7). The most commonly recorded underlying cause of death involving hip fractures were diseases of the circulatory system (25.8%). Falls and 'exposure to an unspecified factor' were recorded as the second (19.8%) and third (18.4%) most common underlying causes of death respectively. Deaths from 'exposure to an unspecified factor' where a fracture is also recorded often involve falls (Kreisfeld & Harrison 2005). Therefore, falls may in fact be the most common underlying cause of death in these cases.

It has been suggested that the contribution of injuries to death may be underestimated due to the tendency to record 'natural' causes in preference to external causes as the underlying cause of death among elderly people (Kreisfeld & Newson 2006). The extent to which this might affect estimates of mortality due to osteoporosis and minimal fracture is unknown.

Table 7: Hip or pelvic fracture as an associated cause of death, 2007

Underlying cause of death	Hip or pelvic fracture as an associated cause	
	Number	Per cent
Disease of the circulatory system	436	25.8
Falls	334	19.8
Exposure to an unspecified factor	311	18.4
Neoplasms	134	7.9
Mental and behavioural disorders	103	6.1
Diseases of the respiratory system	90	5.3
All other	280	16.7
Total	**1,688**	**100.0**

Notes

1. The numbers refer to the cases of deaths where hip or pelvic fracture was not the underlying cause but an associated cause of death.
2. See Appendix 1 Table A1.1 for the ICD-10-AM codes used to identify hip and pelvic fractures and Appendix Table A1.3 for the ICD-10-AM codes used to identify underlying cause of death.

Source: : AIHW National Mortality Database.

Expenditure

Arthritis and musculoskeletal conditions were a major source of health expenditure in 2004–05. They accounted for $4.0 billion in direct expenditure, the third largest set of disease costs following cardiovascular conditions ($5.9 billion) and mental health disorders ($4.1 billion) (AIHW 2010c). These expenditures cover hospital-admitted patient services, out-of-hospital medical services, prescription pharmaceuticals and research.

The direct cost of osteoporosis in 2004–05 was $304.3 million, and it accounted for 7.7% of the direct expenditure for arthritis and musculoskeletal conditions in that year. Prescription pharmaceuticals constituted the largest (more than 70%) component (AIHW 2009).

The health expenditure for osteoporosis more than doubled between 2000–01 and 2004–05 (Table 8). Most of this increase was due to prescription pharmaceuticals.

Table 8: Direct health expenditure for osteoporosis, 2000–01 and 2004–05

Health service area	Amount ($million)		Per cent growth
	2000–01	2004–05	
Admitted patient services	31.8	35.0	10.1
Out-of-hospital medical services	29.4	47.3	60.8
Prescription pharmaceuticals	75.5	215.0	184.8
Research	2.6	7.0	169.2
Total	**139.3**	**304.3**	**118.5**

Source: AIHW 2009. AIHW Disease Expenditure Database

Prevention of osteoporosis and fractures

Prevention of osteoporosis and minimal trauma fractures is an important health-care goal, not only due to the significant disabilities they cause, but also to contain the upward trend in the cost of managing osteoporosis. The fact that there is no known cure for osteoporosis makes prevention all the more important.

Various prevention strategies have been suggested, and there is clear evidence to support the effectiveness of some of those in reducing osteoporotic fractures and their associated hospital bed-days and costs (Sambrook et al. 2002). These include pharmacological intervention with bisphosphonates, calcium supplement with or without vitamin D, and falls prevention programs. On the other hand, for some recommended prevention strategies, such as regular exercise and more recently introduced medications, not enough rigorous studies have been conducted to conclude their effectiveness (Nikander et al. 2010).

The prevention of osteoporosis and associated fractures can be grouped into three categories: (1) primary prevention of osteoporosis, (2) management of established osteoporosis, and (3) prevention of falls and traumas that lead to fractures. In the following section, the current situation in each of these is summarised.

Primary prevention of osteoporosis

There are several risk factors for the development of osteoporosis. Some of these are non-modifiable, such as female sex, menopause, age, other metabolic disorders, and genetic dispositions to poor skeletal health. These are useful markers to identify people at increased risk of developing osteoporosis.

Several other suggested risk factors for osteoporosis are modifiable and include:

- cigarette smoking
- excessive alcohol consumption
- lack of exercise

- poor calcium intake
- vitamin D deficiency
- significantly low body weight
- long-term use of corticosteroids.

Although the effects of reduction in these lifestyle risks on prevention of osteoporosis are said to be modest, osteoporosis experts recognise these as being an important part of primary prevention of osteoporosis (Sambrook & Eisman, 2000).

Table 9 shows the distribution of some of these risk factors in people with osteoporosis in 2007–08. Other than exercise levels, no major difference was noted in the prevalence of various risk factors between people with and without osteoporosis.

Table 9: Risk factors for osteoporosis, 2007–08

Health risk behaviour	Males		Females	
	With oateoporisis	Without oateoporisis	With oateoporisis	Without oateoporisis
	Per cent			
Current smoker, daily	12.7	17.2	12.0	15.6
Risk/high-risk alcohol consumption	7.1	7.1	2.3	3.1
Sedentary/low exercise level	48.6	34.0	43.0	36.7
Inadequate fruit or vegetable consumption	86.9	90.1	89.8	88.4
Low body weight	0.0	0.8	1.7	1.9

Notes

1. Risk/high-risk alcohol consumption based on 7-day average, in accordance with the 2001 NHMRC guidelines (NHMRC 2001).
2. Fruit or vegetable consumption is rated as inadequate if the recommended intake in the 2003 NHMRC guidelines is not met (NHMRC 2003).

Source: AIHW analysis of ABS 2007–08 National Health Survey CURF

Management of established osteoporosis

A variety of pharmaceutical agents may be used to both encourage bone formation or to reduce bone loss in people with osteoporosis. Most prominent of these are anti-resorptives and various anabolic agents. The anti-resorptives, such as bisphosphonates, reduce the absorption of minerals from the bones while the anabolic agents promote bone formation.

Complementary medicines that play an important role in bone remodelling, and aiding in the reconstruction of bone, include calcium supplements and vitamin D supplements. These medicines are used in conjunction with anti-resorptives (Akesson, 2003).

According to the NHS, complementary medicine was the most widely used medication for osteoporosis and arthritis prevention in 2007–08, with almost one in two people (47%) with these conditions using this type of medication (ABS 2009).

Falls prevention

Avoidance of falls is an integral component of prevention of osteoporotic fractures (Lord et al. 2007). The current clinical guidelines for osteoporosis (RACGP 2010) acknowledge the value of identifying fall risks and implementing strategies to avoid them.

Factors that may be used to identify individuals at increased risk of falls include:

- prior history of falls
- muscle weakness
- gait and balance deficits
- sensory impairment
- old age (80 years and over)
- incontinence
- health conditions such as cognitive impairment, depression, arthritis, and vitamin D deficiency.

Falls clinics are offered at most major public hospitals and many community health centres throughout Australia. These may offer:

- education on the risk of falling and prevention strategies
- medication review and modification
- exercise programs tailored to the individual's specific needs and abilities
- use of appropriate mobility aids
- treatment of postural hypotension (or low blood pressure caused when a person stands up) and cardiovascular disorders
- reduction of environmental hazards.

Appendix 1: Data sources

A variety of data sources were used in the production of this report. These are described briefly below. While some of the information included in the report is based on self-reports, information obtained from service providers has also been used.

National Health Survey and National Aboriginal and Torres Strait Islander Health Survey

Population health surveys, such as the ABS National Health Survey (NHS) and National Aboriginal and Torres Strait Islander Health Survey (NATSIHS), collect national information about a variety of health-related issues linked to long-term diseases including osteoporosis. The respondents are asked if they had ever been told by a doctor or nurse that they have osteoporosis. If they answered 'yes', they were counted as having 'doctor-diagnosed osteoporosis'. The latest NHS was conducted in 2007–08, and NATSIHS in 2004–05.

The prevalence rate of osteoporosis obtained using these survey data needs to be interpreted with caution as it is likely to underestimate the reality. One of the reasons for this is that these surveys do not include people who live in institutions, such as hostels and residential care units, many of whom are elderly and may have osteoporosis. These surveys are community-based surveys and the sample covered residents in private dwellings only.

The second reason for the underestimated rates is that the NHS and NATSIHS capture doctor-diagnosed cases of osteoporosis but leave out the undiagnosed cases. Osteoporosis has no outward symptoms, and people often do not know that they have the condition until they sustain a fracture and come to medical attention. In fact, the prevalence estimate from the Geelong osteoporosis study, where bone mineral density was used as the criterion for diagnosis, suggested much higher prevalence of osteoporosis (46% of women aged over 50 years and in 87% of those aged over 79 years) (Henry et al. 2000).

AIHW National Mortality Database

The AIHW National Mortality Database contains information about all deaths registered in Australia. The registration of deaths in Australia is the responsibility of the state and territory Registrars of Births, Deaths and Marriages. The Registrars provide the deaths data to the ABS for coding and compilation into national statistics. The AIHW also holds these data.

The database lists the cause of death information under two categories. The underlying cause of death is the condition, disease or injury that started the event which led to death. Any other factor that is not the underlying cause, but is considered to have contributed to death, is known as an associated cause of death.

The latest information available in this database is for the year 2007.

AIHW National Hospital Morbidity Database

The National Hospital Morbidity Database is an electronic collection of data from nearly every hospital in Australia. It covers information such as the reasons for a patient's admission and the treatment they received. State and territory health authorities forward the data to the AIHW for collation and housing.

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 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.

For each separation, patients are assigned a principal diagnosis, which is the diagnosis established after study to be chiefly responsible for occasioning the patient's episode of admitted patient care. Whenever a patient has a principal or additional diagnosis of an injury or poisoning, an external cause code is recorded. An external cause is defined as the environmental event, circumstance or condition that caused the injury, poisoning or adverse event (HDSC 2006). Principal diagnosis and external causes for 2007–08 were classified, coded and reported to the National Hospital Morbidity Database by all states and territories using the fifth edition of the International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, Australian Modification (ICD-10-AM).

For each of the separations, procedures provided are also reported if applicable. These can be surgical or non-surgical, therapeutic, diagnostic or of a patient-support nature (for example, anaesthesia). In the National Hospital Morbidity Database, the hospital procedures for admitted patients were coded and reported using the fifth edition of the Australian classification of health interventions (ACHI).

AIHW Disease Expenditure Database

The AIHW Disease Expenditure Database contains information about the monies spent by governments, other institutions and individuals to purchase or provide goods and services in relation to a particular disease. The information is derived from a wide range of data sources including the ABS, Commonwealth, state and territory health authorities, the Department of Veterans' Affairs, the Private Health Insurance Administration Council, Comcare, and the major workers compensation and compulsory motor vehicle third-party insurers in each state and territory.

The information is available at both the chapter level and for specific diseases and conditions. The expenditure information about osteoporosis is included under the chapter heading, 'Arthritis and musculoskeletal conditions'.

The latest disease-specific expenditure information in this database is for the period 2004–05.

Bettering the Evaluation and Care of Health (BEACH) survey

Information about the BEACH survey is provided in the relevant section of this report.

Table A1.1: ICD-10-AM codes used in identifying fractures and injuries in NHMD

Fractures and injuries	ICD–10–AM codes
Fractures	
Fracture of ankle	S82.5–S82.6, S82.8, S92.1
Fracture of hip and pelvis	
– Femoral neck fracture	S72.0
– Intertrochanteric fracture	S72.11
– Pelvic fracture	S32.3–S32.5, S32.81, S32.83, S32.89
– Other	S72.1–S72.2, S72.9
Fracture of shoulder	
– Fracture of clavicle	S42.0
– Fracture of neck of humerus	S42.2
– Other	S42.1, S42.7–S42.9
Fracture of spine	S12.0–S12.7, S12.9, S22.0–S22.1, S32.0–S32.2, S32.7, S32.82, T08
Fracture of wrist and forearm	
– Colles' fracture	S52.51
– Lower end of radius, unspecified	S52.5
– Other fractures of the lower arm	S52, S62.1
– Scaphoid bone	S62.0
Fracture at other sites	S02, S12.8, S22.2–S22.9, S42.3–S42.4, S62.2–S62.8, S72.3–S72.8 S82.0–S82.4, S78.7, S82.9, S92, T02, T10, T12, T14.2
Injury	
Minimal trauma falls	W00, W01, W03–W08, W18, W19
Other minimal trauma events	W22, W50, W51, W54.8

Source: The ICD-10-AM.

Table A1.2: The Australian Classification of Health Interventions (ACHI) codes used in identifying hospital procedures for admitted patients in NHMD

Interventions	ACHI codes (block number*/procedure code)
Surgical interventions	
– Immobilisation	53400-00, 53403-00, 47471-00, 47684-00, 47687-00, 47423-00, 47444-00, 47453-00, 4736000, 47378-00, 47360-01, 47378-01, 47387-00, 47492-00, 50352-00, 47576-00, 4757900, 4754300, 47552-00, 47561-00, 49721-00, 47606-00, 47606-01, 47606-02, 47627-00, 4760603, 4763300, 47594-00, 47690-00, 47693-00, 47483-00, 47480-00, 47495-00, 47516-00
– Reduction with or without fixation*	1365, 1366, 1367, 1368, 1369, 1370, 1377, 1387, 1388, 1401, 1402, 1413, 1414, 1415, 1416, 1427, 1428, 1429, 1430, 1431, 1432, 1433, 1434, 1452, 1453, 1454, 1455, 1456, 1457, 1458, 1459, 1486, 1487, 1506, 1507, 1508, 1509, 1510, 1536, 1537, 1538, 1539, 1540, 1541, 1567, 1361, 1390, 1479, 1500, 1521, 1550, 1697, 1704, 1706, 1708
– Arthroplasty (joint replacement)	46306-00, 46306-01, 46307-00, 46307-01, 46309-00, 46309-01, 46312-00, 46312-01, 46315-00, 46315-01, 46318-00, 46318-01, 46321-00, 46321-01, 46324-00, 47522-00, 48915-00, 48918-00, 48921-00, 48924-00, 49115-00, 49206-00, 49209-00, 49312-00, 49315-00, 49318-00, 49319-00, 49324-00, 49327-00, 49330-00, 49333-00, 49339-00, 49342-00, 49345-00, 49346-00, 49517-00, 49518-00, 49519-00, 49521-00, 49521-01, 49521-02, 49521-03, 49524-00, 49524-01, 49527-00, 49530-00, 49530-01, 49533-00, 49534-00, 49554-00, 49715-00, 49821-00, 49824-00, 49839-00, 49842-00, 50127-00, 90537-00, 90543-00
– Partial arthroplasty of hip	47522-00, 49315-00
Generalised allied health interventions	
– Allied health Interventions*	1916
– Physiotherapy	95550–03
– Occupational therapy	95550–02
– Social work	95550–01
– Dietetics	95550–00

* Block numbers are listed in the above table if all procedures which come under a block number are used to extract the data.
Source: The ACHI 5th edition.

Table A1.3: ICD-10-AM codes used in identifying underlying cause of death in the National Hospital Mortality Database

Interventions	ICD–10–AM codes
Diseases of the circulatory system	I
Falls	W
External causes of morbidity and mortality (Other external causes of accidental injury)	X
Neoplasms	C
Mental and behavioural disorders	F
Diseases of the respiratory system	J

Source: The ICD-10-AM.

Appendix 2: Detailed statistical tables

Table A2.1: Regional variation in the prevalence of osteoporosis, 2007–08

Area of residence	Per cent prevalence rate (95% confidence intervals)		
	Males	Females	All
Major cities	1.27 (0.91, 1.63)	5.18 (4.55, 5.80)	3.36 (3.00, 3.71)
Inner regional	1.28 (0.69, 1.87)	5.10 (4.10, 6.09)	3.32 (2.73, 3.92)
Other areas	1.08 (0.28, 1.88)	3.50 (2.34, 4.65)	2.18 (1.51, 2.84)

Notes

1. Rates are age-standardised to the Australian population as at 30 June 2001.
2. Regional areas have been defined using the Accessibility/Remoteness Index of Australia (ABS 2008a).

Source: AIHW analysis of ABS 2007–08 National Health Survey CURF

Table A2.2: The prevalence of osteoporosis by country of birth, 2007–08

Area of residence	Per cent prevalence rate (95% confidence intervals)		
	Males	Females	All
Australia	1.19 (0.83, 1.55)	4.77 (4.23, 5.31)	3.09 (2.76, 3.42)
Main English-speaking countries	1.27 (0.62, 1.92)	4.65 (3.58, 5.72)	2.99 (2.40, 3.59)
Other countries	1.55 (0.63, 2.47)	6.03 (4.62, 7.45)	3.91 (3.06, 4.76)

Notes

1. Rates are age-standardised to the Australian population as at 30 June 2001.
2. Main English-speaking countries include: UK Ireland, Canada, US, South Africa, and New Zealand

Source: AIHW analysis of ABS 2007–08 National Health Survey CURF

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This snapshot brings together the latest data on osteoporosis in Australia. The purpose of the snapshot is to provide the latest statistical information in a timely and efficient manner.