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# A picture of **osteoporosis**

in Australia

**July 2008**

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osteoporosis australia

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## What this booklet is about

This booklet has been written for anyone who wants to learn about osteoporosis, including people who have osteoporosis, their families and friends. Topics include:

- a description of what osteoporosis is
- how and where it affects the body
- who is at risk
- the financial and health impacts of osteoporosis, and
- how it can be prevented.

It provides an overview of the status of osteoporosis in Australia using the latest statistics available.

### **Caution**

Although this booklet describes some of the current management strategies for osteoporosis, it should not be used to replace expert medical advice. Please consult a qualified health professional for the treatment and management of osteoporosis.

## Contents

Key facts about osteoporosis.....	1
What is osteoporosis?.....	2
Diagnosing osteoporosis.....	4
Where do fractures occur?.....	6
How common is osteoporosis?.....	9
Risk factors for osteoporosis and fractures.....	12
Impacts of osteoporosis.....	16
Osteoporosis treatment and management.....	19
Support and health-care services.....	26
Health spending on osteoporosis.....	27
Preventing osteoporosis and fractures.....	28
Where to get more information.....	29
Useful websites.....	29
References.....	30

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## Key facts about osteoporosis

- Osteoporosis affects at least 600,000 Australians, mostly women and men of middle-age and older.
- The disease causes bones to become fragile and weak, increasing the likelihood of fracture.
- Osteoporosis is a silent disease and usually shows no signs or symptoms until a fracture occurs.
- Osteoporotic fractures occur most commonly in the hip, spine and wrist.
- One in two women and one in four men over the age of 60 will suffer an osteoporotic fracture in their lifetime.
- These fractures may lead to chronic pain, immobility, restricted activities, other limitations and, sometimes, death.
- Management of osteoporosis includes medication, exercise, physical therapy and healthy eating.
  - About 43% of Australians with osteoporosis take pharmaceuticals and 40% use vitamin/mineral supplements.
  - To help reduce bone loss, about 20% of people with osteoporosis report exercising most days and almost 6% do strength training.
- Osteoporosis places a significant financial burden on individuals, community organisations, private industry and governments.
- Osteoporosis is largely preventable. To prevent it and to limit its effects, it is important to:
  - maintain a balanced, healthy diet including the recommended intake of calcium
  - ensure adequate levels of vitamin D are maintained through limited sun exposure or by taking supplements
  - exercise regularly and maintain a healthy body weight
  - strengthen the bones and muscles
  - avoid smoking and excessive alcohol consumption
  - prevent falls.

## What is osteoporosis?

Osteoporosis is a disease affecting both men and women that causes bones to become fragile and brittle. Osteoporosis literally means 'porous bones' (osteo = bones, porosis = porous). Porous bones increase the risk of fracture after minimal trauma.

Osteoporosis is a major health concern for older Australians and often goes undiagnosed due to its 'silent' nature. Loss of bone strength, measured as a fall in bone mineral density (BMD), occurs gradually over many years and usually shows no symptoms. Many people are not diagnosed with osteoporosis until bone density and quality are so low that they suffer their first fracture.

Although any bone in the body can be affected by osteoporosis, fractures occur more often in the hip, spine and wrist and can lead to long-lasting pain, reduced mobility and disability. With population ageing, a large number of Australians are at risk of developing osteoporosis and sustaining osteoporotic fractures.

### What is a minimal trauma (osteoporotic) fracture?

Because people with osteoporosis have weaker bones, they can fracture easily. Normally it takes significant force for a bone to fracture. Minimal trauma, such as small bumps or falls from a standing height, would usually not cause a fracture. However, when people with osteoporosis suffer minimal trauma, they are more likely to sustain a fracture. Fractures occurring after minimal trauma can also be called 'fragility' fractures or 'osteoporotic' fractures.

### Bone remodelling

To understand osteoporosis, it is important to appreciate the dynamic nature of our bones. Bone is a living tissue composed of a solid, thick outer layer known as cortical bone and an internal honeycomb-like structure called trabecular bone (Figure 1). The bone tissue is in a continual process of breakdown and rebuilding, ensuring that bones are repaired and remain strong. Specialised bone cells, known as osteoclasts, do the breakdown whilst osteoblasts do the building.

Bones reach their maximum strength and density (peak bone mass) between the ages of 20 and 30 years. Nutrition and exercise during childhood and adolescence are important to maximise peak bone mass. A 10% increase in peak bone mass could significantly delay the onset of osteoporosis and reduce the risk of osteoporotic fractures later in life (Bonjour et al. 2007; Hernandez et al. 2003).

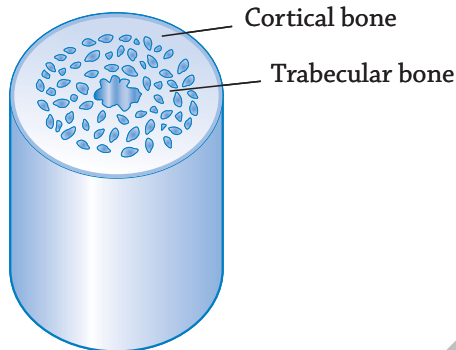
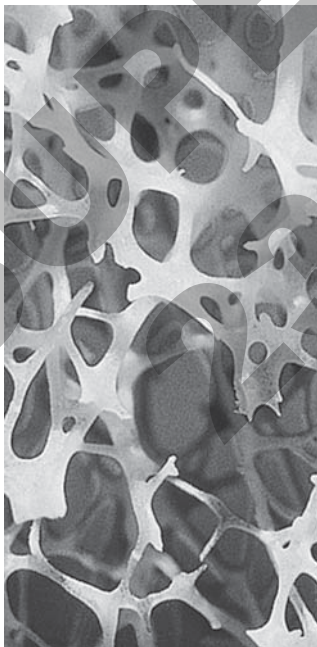


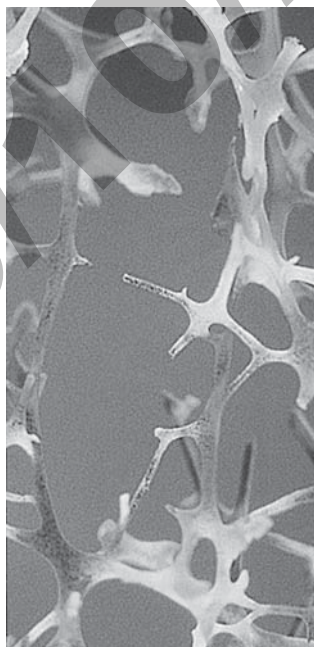
Image courtesy of <[www.familydoctor.co.uk](http://www.familydoctor.co.uk)>.

**Figure 1: Normal bone structure**

Bone remodelling remains relatively stable until later in life (around 40–55 years), when bone loss becomes more pronounced. Unless people exercise and have a healthy diet to reduce bone loss, osteoporosis may take place. Bones that are affected by osteoporosis show thinning of cortical bone and loss of the honeycomb connections in trabecular bone (Figure 2).



**Normal bone**



**Osteoporotic bone**

Image courtesy of Osteoporosis Australia.

**Figure 2: Normal versus osteoporotic bone**

## Diagnosing osteoporosis

Doctors will usually make a preliminary diagnosis of osteoporosis after a person has a minimal trauma fracture. The diagnosis may also involve taking a detailed medical history, a physical examination or running specific tests for osteoporosis.

One of the main tests involves measuring bone strength through bone mineral density (BMD). A specialised X-ray known as a dual-energy X-ray absorptiometry (DXA) scan is used to determine BMD in the hips and spine (Figure 3). The DXA scan result is expressed as a T-score which compares a person's BMD with the average BMD of a 30 year old of the same sex. The World Health Organization (WHO) has developed guidelines using T-score values to diagnose people with normal bone mass, some bone loss (osteopenia) and osteoporosis.

### Guidelines for diagnosing osteoporosis using bone mineral density (BMD)

- **Osteoporosis:** T-score value of less than or equal to  $-2.5$
- **Osteopenia:** T-score value between  $-1$  and  $-2.5$
- **Normal:** T-score value greater than  $-1$

Source: WHO Study Group (1994).

Other methods used for measuring BMD include quantitative computed tomography (QCT) and quantitative ultrasound (QUS). QUS is the screening test often seen at pharmacies or shopping centres, where the measurement is taken at the heel. It is useful for identifying people who are at risk, but is not used alone for diagnosis.

Other tests that may provide evidence of osteoporosis or increased risk of fracture include:

- detecting unknown fractures with a conventional X-ray
- determining if a person has lost more than 3 cm in height
- measuring the rate of bone breakdown
- identifying underlying conditions that can lead to osteoporosis.



Image courtesy of Osteoporosis Australia.

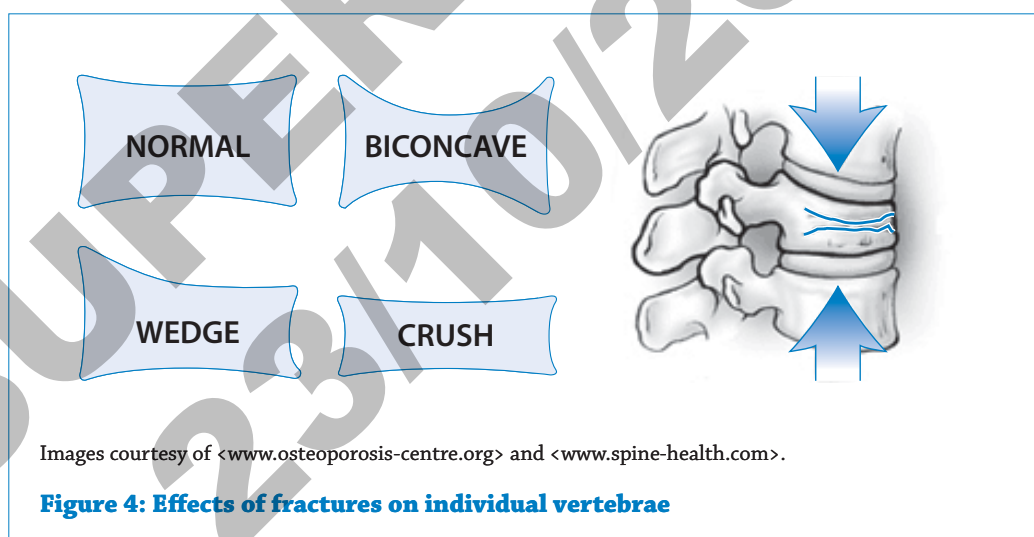
**Figure 3: Bone mineral density being assessed using a dual-energy X-ray absorptiometry (DXA) scan**

## Where do fractures occur?

Osteoporosis can affect any bone in the body. However, osteoporotic fractures are more commonly seen in the spine (vertebrae), hip joint or thigh bone (femur), upper arm (humerus), ribs, forearm (radius and ulna) and wrist. In Australia, one in two women and one in four men over the age of 60 will experience an osteoporotic fracture in their lifetime (Nguyen et al. 2007).

### Spine

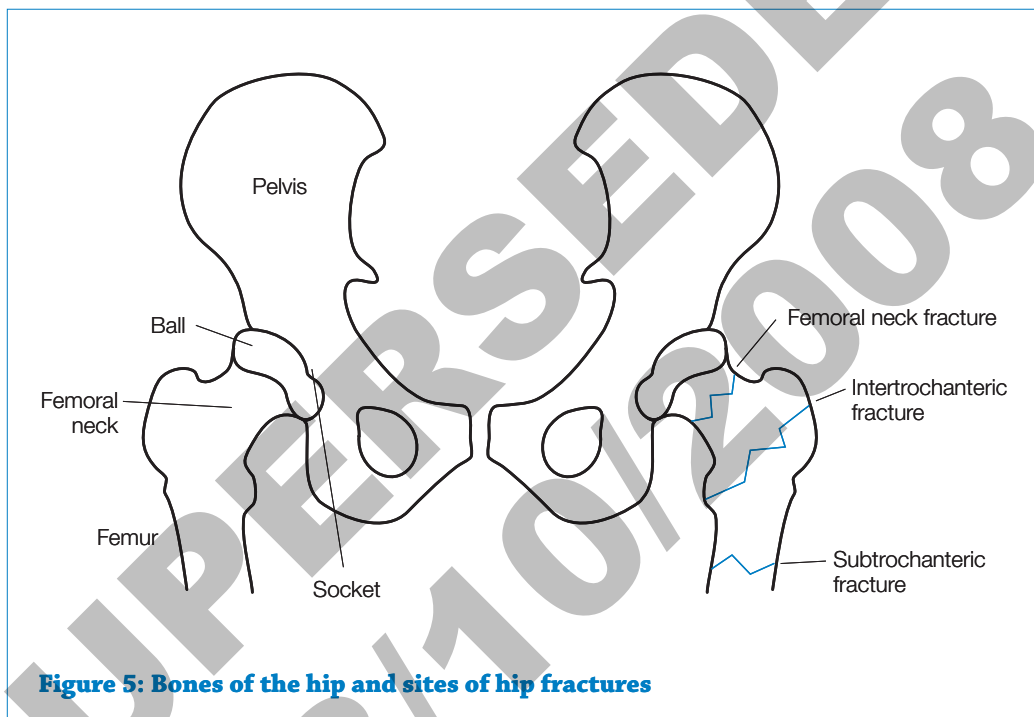
Spinal fractures can occur with or without pain and are often dismissed as back pain in old age. Once a fracture occurs, the risk of further spinal fractures dramatically increases. When spine bones (vertebrae) are weakened by osteoporosis, normal spinal movement can cause tiny fractures that affect their structure (Figure 4). This can lead to an increased curvature of the spine, a hunched posture (known as kyphosis or a 'widow's' or 'dowager's' hump) and ultimately marked height loss.



### Hip

The term 'hip fracture' usually refers to fractures in the head (ball), neck or shaft of the thigh bone (femur). Doctors can refer to these fractures as femoral neck, intertrochanteric or subtrochanteric fractures (Figure 5). Hip fractures are the most serious consequence of osteoporosis (Sambrook & Cooper 2006). They commonly occur when people fall onto their hip. They are painful and cause immediate immobility.

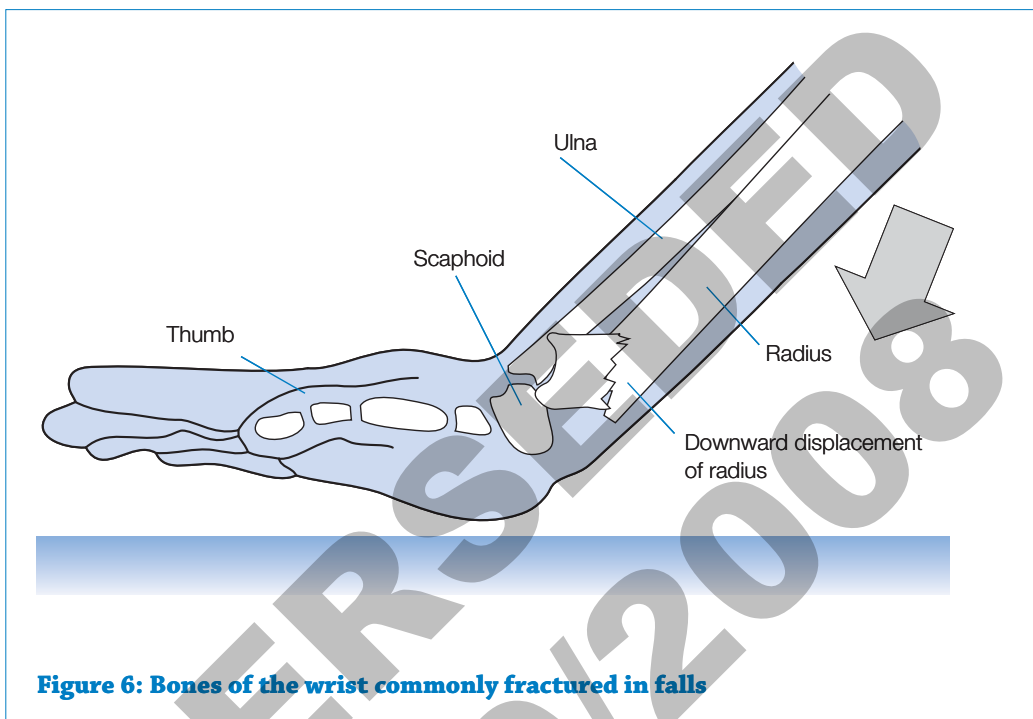
Most hip fractures require complex surgical treatment and long stays in hospital. In 2005–06, about 16,200 hospitalisations occurred for minimal trauma hip fractures in Australia. On average, a person will spend at least 11 days in hospital for the treatment of their hip fracture. Rehabilitation is often required to restore muscle strength, balance and mobility. Even after a lengthy rehabilitation process, many people can not return to the life they had before the fracture.



**Figure 5: Bones of the hip and sites of hip fractures**

### Forearm and wrist

Fractures of the forearm and wrist occur when people protect themselves with outstretched arms during a fall (Figure 6). A common example is Colles' fracture, which occurs at the lower end of one of the forearm bones (radius). Scaphoid fracture, a fracture to a small bone on the thumb side of the wrist, may also occur, but is less common. The incidence of wrist fracture in both men and women increases with age and is highest in people aged 75 years and older (Cooley & Jones 2001). The chance of having a wrist or forearm fracture through life is about 9–13% (Doherty et al. 2001).



**Figure 6: Bones of the wrist commonly fractured in falls**

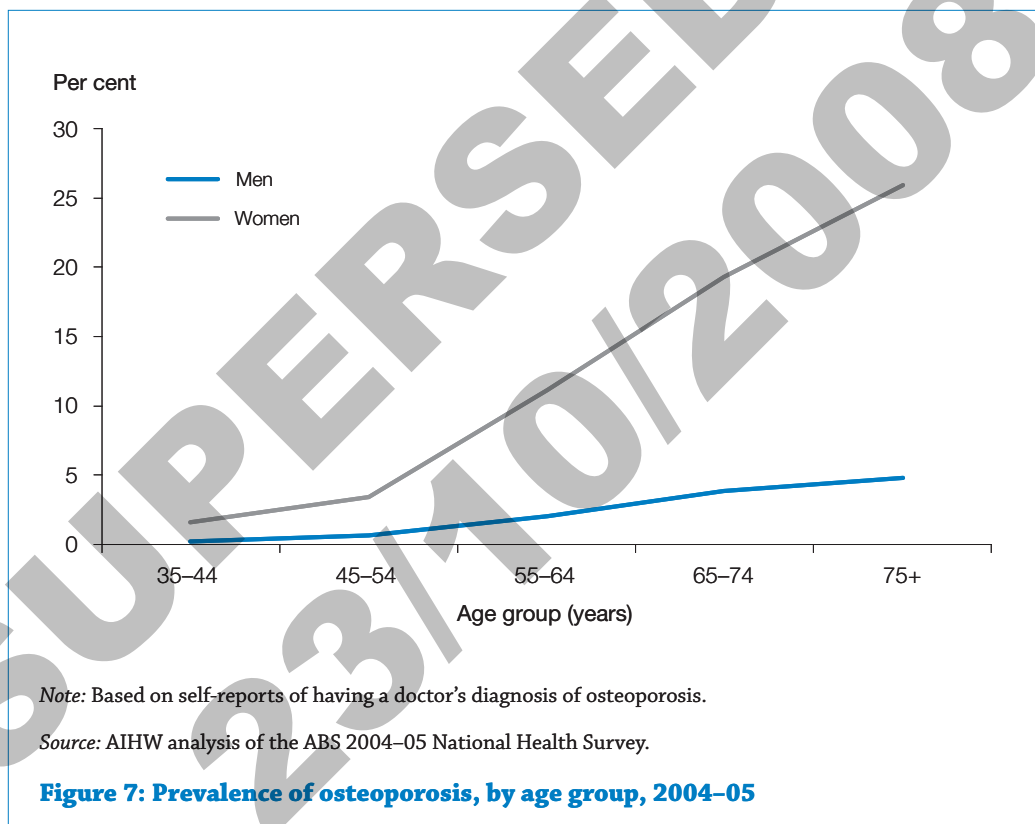
### Data in this booklet

*This booklet presents data about osteoporosis and its impacts on the Australian population from a range of sources. Most of the data were obtained from national population health surveys conducted by the Australian Bureau of Statistics (ABS). These include the Survey of Disability, Ageing and Carers (SDAC), the National Aboriginal and Torres Strait Islander Health Survey (NATSIHS) and the National Health Survey (NHS). The information collected in these surveys was self-reported—that is, people were asked questions about their health, rather than having a physical examination or medical tests. Based on the information collected from a sample of randomly chosen Australians, researchers can make estimates about the whole Australian population. At relevant points in this booklet, you will find boxes like this one, which describe some of these surveys.*

*Data were also obtained from the Australian Institute of Health and Welfare's National Hospital Morbidity Database, which includes information about hospital admissions and procedures.*

## How common is osteoporosis?

Estimates from the Australian Bureau of Statistics' 2004–05 National Health Survey suggest that about 600,000 Australians (3% of the population) have doctor-diagnosed osteoporosis. Of these, 85% (about 510,000) are women and 15% (about 90,000) are men. Osteoporosis is uncommon before the age of 45 years, after which its prevalence significantly increases over time (Figure 7). The number of people with osteoporosis is likely to be significantly higher than reported because many people do not know they have it.



The prevalence of health conditions such as osteoporosis may vary between different populations in Australia. This variation may be due to differences in underlying risk factors, the types of jobs people perform and access to treatment or education. Two sections of the Australian community that often have poorer health than others are Aboriginal and Torres Strait Islander persons, and people who live in socioeconomically disadvantaged areas.

The prevalence of osteoporosis in Aboriginal and Torres Strait Islander persons (Indigenous Australians) is lower than for non-Indigenous Australians, when differences in age structure are taken into account. About 2% (1.5% of men and 2.5% of women) of Indigenous Australians have doctor-diagnosed osteoporosis compared to about 3% of non-Indigenous Australians (0.9% of men and 4.7% of women) (Figure 8).

No variation was noted in the prevalence of osteoporosis between different socioeconomic areas.

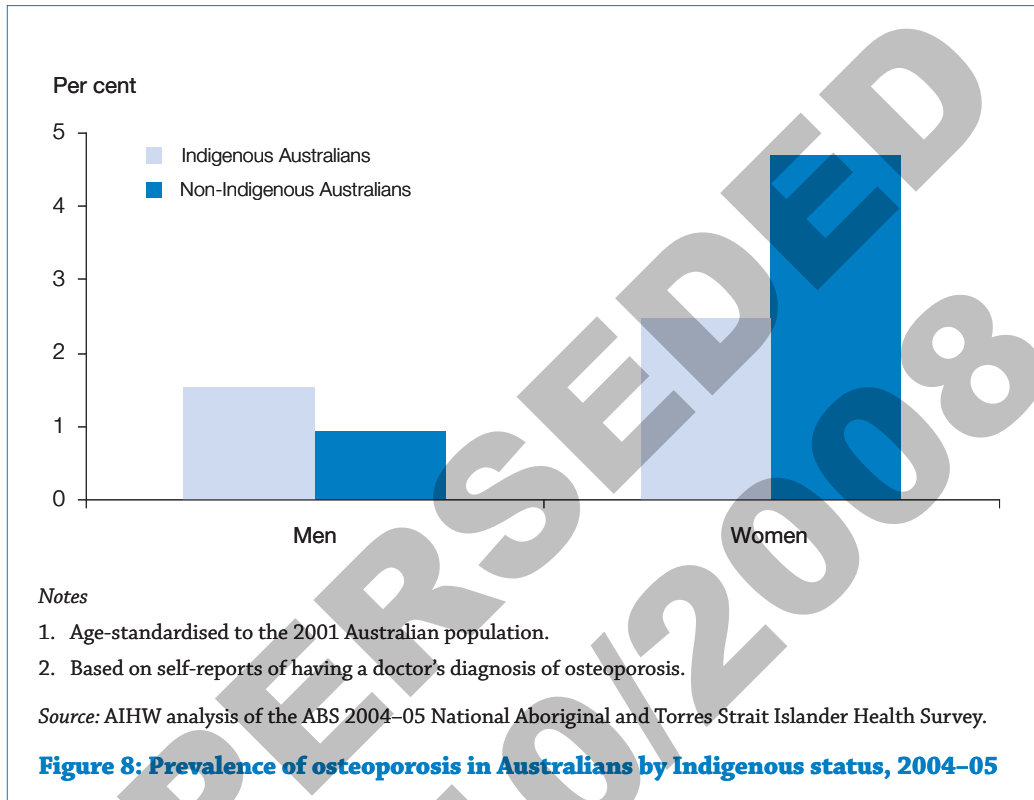
### **The National Health Survey**

*The last National Health Survey (NHS) was conducted in 2004–05 by the Australian Bureau of Statistics. In this survey, people were asked if they had ever been told by a doctor or nurse that they have osteoporosis. If people answered ‘yes’, we say that they have self-reported ‘doctor-diagnosed osteoporosis’. The NHS data in this booklet are about people who have doctor-diagnosed osteoporosis.*

*The survey does not collect information from people who live in institutions, such as hostels and residential care units, many of whom are elderly. As osteoporosis is more common among older people, the lack of information from these institutions might cause the prevalence of osteoporosis to be underestimated.*

### **The National Aboriginal and Torres Strait Islander Health Survey**

*The National Aboriginal and Torres Strait Islander Health Survey (NATSIHS) is a survey of Indigenous Australians, run concurrently with the 2004–05 NHS by the Australian Bureau of Statistics. Data were collected by interview in the same way as in the NHS, but slightly different questions were sometimes asked of people in remote and non-remote areas. This was important so that information about the most relevant issues in Indigenous health could be collected efficiently. For the 2004–05 NATSIHS, the questions about osteoporosis were asked of Indigenous Australians living in both non-remote and remote areas. Therefore, osteoporosis data are comparable between Indigenous and non-Indigenous Australians in all regions of Australia.*



## Risk factors for osteoporosis and fractures

The risk of getting osteoporosis or having an osteoporotic fracture can be reduced by paying particular attention to certain risk factors (Table 1). Some risk factors are modifiable because changes in lifestyle or behaviours can reduce risk. The primary means of reducing risk involves achieving the best possible peak bone mass early in life and slowing bone loss later in life.

Unfortunately, there are some risk factors which are fixed because people are born with them or they cannot be modified. However, people with fixed risk factors can substantially reduce their risk of getting osteoporosis. An awareness of these fixed risk factors is the first step towards lessening their effects by focusing on modifiable risk factors.

**Table 1: Risk factors for osteoporosis**

<b>Modifiable risk factors</b>	<b>Fixed risk factors</b>
Physical inactivity	Family history and genetics
Low calcium and vitamin intake	Physical disability
Vitamin D deficiency	Old age
Tobacco smoking	Female sex
Excessive alcohol consumption	Previous minimal trauma fracture
Low body mass index	Other medical conditions

### Modifiable risk factors

#### Physical inactivity

Insufficient physical activity increases the risk of developing osteoporosis. Exercise is important for maximising peak bone mass in early years and slowing the rate of bone loss later in life. It can also help to promote better posture, balance, and greater muscle power leading to fewer falls and therefore fewer fractures. More than 5 million Australians aged 15 years and over are at an increased risk of developing osteoporosis because they perform no or a very low level of exercise.

All types of exercise protect against falls, however certain types of exercise are better than others at building and maintaining healthy bones. Weight-bearing exercises such as walking, running, lifting weights, and dancing are best. Back-strengthening exercises can reduce vertebral fracture risk by almost three-fold (Sinaki et al. 2002).

### **Low calcium and vitamin intake**

A healthy, balanced diet is essential for developing and maintaining healthy bones. The mineral calcium combines with collagen protein to form our bones and is an essential dietary requirement at all stages of life. Calcium is particularly important during adolescence and young adulthood when the skeleton grows rapidly. Milk and other dairy products are the most readily available sources of calcium in the diet. Adequate calcium intake is also essential for postmenopausal women because they have less oestrogen to help bone building.

There is emerging evidence that the adequate intake of several other nutrients including the B vitamins, homocysteine, vitamin K, vitamin A, magnesium and zinc will help to make healthy bones.

Inadequate dietary protein has been linked with greater rates of hip and spine bone loss (Hannan et al. 2000). Recently, consumption of cola carbonated beverages (soft drinks) have been associated with low bone mineral density (BMD) in women (Tucker et al. 2006) and fractures in children (Ma & Jones 2004).

### **Vitamin D deficiency**

Vitamin D deficiency is associated with reduced BMD, more bone turnover and an increased risk of falls and fractures. Vitamin D is formed by the action of sunlight on the skin and is important for calcium absorption from foods. The sun exposure that comes from normal daily activities is usually enough for our vitamin D needs. However, some older people may be at risk of vitamin D deficiency if they are confined indoors. Vitamin D supplements, in combination with calcium, have been shown to reduce the risk of all types of fractures (Tang et al. 2007).

### **Tobacco smoking**

Tobacco smoking can reduce BMD, increase bone loss and elevate fracture risk. It is also believed that smoking during younger years may affect peak bone mass. Precisely how smoking affects bones is not well understood, although the toxic effects of nicotine are believed to play a direct role in the function of bone cells. Smoking can also lower body weight and levels of hormones such as oestrogen.

Estimates from the 2007 National Drug Strategy Household Survey suggest that about 3.3 million Australian adults are current smokers and a further 4.3 million are ex-smokers.

### **Excessive alcohol consumption**

Alcohol is known to have harmful effects on bone-forming cells and calcium metabolism, as well as affecting balance. In 2001, the National Health and Medical Research Council (NHMRC) published alcohol consumption guidelines for men and women (NHMRC 2001). These guidelines recommend that men consume no more than 4 Australian standard drinks of alcohol per day and women consume no more than 2. Consumption at these levels or

lower minimises the longer-term risks of ill health, such as contributing to bone loss and osteoporosis. Based on these guidelines, the 2004–05 National Health Survey suggests that just over 2 million Australian adults have a risky or high-risk level of alcohol consumption.

In late 2007, the NHMRC released revised guidelines with a simplified overall recommendation that men and women not consume more than 2 standard drinks on any drinking occasion (NHMRC 2007).

### **Low body mass index**

Body mass index (BMI) is a measure of weight that takes into account height. People with low BMI (less than 18.5) are at greater risk of developing osteoporosis. Over 350,000 Australian adults have a low BMI.

Low BMI is associated with having lower levels of oestrogen, a hormone which helps to prevent bone loss. In addition, when a person has a fall, people with low BMI have less 'cushioning' to reduce the impact of falls on the bones.

### **Fixed risk factors**

#### **Family history and genetics**

A family history of osteoporosis is one of the major risk factors for developing the disease. This is because parents and their children often share similar bone remodelling characteristics. For example, daughters of women with osteoporosis of the spine are more likely to have low bone mass. Similarly, sons of men with osteoporotic fractures have thinner bones than other men.

Better understanding the genetic blueprint of osteoporosis may help to improve the management and treatment of the disease. Knowing more about how genes affect our bones may help to diagnose osteoporosis earlier and design better medications.

#### **Physical disability**

Some people have an increased risk of developing osteoporosis because they have a disability preventing them from doing weight-bearing exercise. Exercise programs can be tailored to suit an individual's particular disability in order to prevent increased bone loss and osteoporotic fractures.

#### **Old age**

As we get older our bone mineral density (BMD) decreases and we are more susceptible to getting fractures following minimal trauma. In the 2004–05 National Health Survey, 12% of persons aged 65–74 and 17% of persons aged 75 years and over reported being diagnosed with osteoporosis. With an increasing older population in Australia, the number of people with osteoporosis is predicted to grow markedly.

### **Female sex**

Women are significantly more likely than men to develop osteoporosis and sustain a fracture. Oestrogen levels fall when women undergo menopause, causing bones to lose calcium and other minerals at a faster rate. Men compensate better for bone loss by laying down new bone on the outer surface of bones. Therefore, osteoporosis is often considered a disease of women. However, the lifetime risk of a man having an osteoporotic fracture is higher than for prostate cancer (Melton 1995).

### **Previous minimal trauma fracture**

In both men and women, having a previous minimal trauma fracture can significantly increase the risk of having another, compared to people who have not had a fracture (Kanis et al. 2004; Klotzbuecher et al. 2000). The degree of increased risk depends on age, sex and site of the fracture. The increased risk may even be due to factors unrelated to BMD, such as reduced mobility and poor coordination following a fracture (Johnell et al. 2001).

### **Other medical conditions**

Several diseases or medical conditions may lead to secondary osteoporosis. This may be due to the condition itself or the medications taken for the condition. Such conditions include:

- hyperparathyroidism
- hypogonadism
- amenorrhea
- rheumatoid arthritis
- chronic kidney disease
- chronic liver disease
- inflammatory bowel disease
- asthma
- some cancers (e.g. myeloma).

Medications such as glucocorticoids, usually taken for anti-inflammatory purposes, can worsen osteoporosis. Prolonged high doses of glucocorticoids can reduce calcium absorption and bone building, and lead to more bone breakdown (Sambrook 2002). Some studies show that taking steroids even for short periods can increase fracture risk (Van Staa et al. 2000). Potential side effects of medications should be discussed with a qualified medical professional.

## Impacts of osteoporosis

Minimal trauma fractures are a serious impact of having weakened bones due to osteoporosis. Fractures can cause pain, significant activity limitations and reduce the normal function of the body. The long periods of immobility following surgery for some types of fractures have also been shown to increase mortality. However, simply being diagnosed with osteoporosis can have psychosocial implications even before a person has a fracture.

### Pain

Osteoporosis itself does not usually cause pain. The lack of pain is a significant contributor to the silent nature of the disease and its underdiagnosis. It is not until a fracture occurs that pain is considered an impact of osteoporosis.

Osteoporotic fractures can cause both chronic and acute pain, although it is common for spinal fractures to occur without pain. Acute pain usually occurs with other fractures and is the body's way of responding to an injury. However, when pain persists beyond the expected time of healing and interferes with normal life, it is classified as chronic. Among adults disabled by their osteoporosis, about 65% report chronic or recurrent pain (AIHW: Rahman & Bhatia 2007).

There are several options available for coping with this chronic pain. These include heat and ice treatment, braces and supports, exercise and physical therapy, massage therapy, relaxation training and pain-relieving medications.

### Reduced functioning

Osteoporotic fractures will inevitably limit how the body normally functions. The degree to which the body is affected will depend on the site and severity of a fracture. The level of pain and the person's response to it is another factor. Spinal fractures often cause little or no pain at all so they usually lead to a gradual loss of function over time. Hip fractures usually result in an immediate loss of function as mobility is severely restricted. After a hip fracture, only 50% of people regain their previous function (Sernbo & Johnell 1993). Institutional or at-home care may be required as a result of reduced functioning.

### **The Survey of Disability, Ageing and Carers**

*The Australian Bureau of Statistics' Survey of Disability, Ageing and Carers (SDAC) collects information about people with disability, people aged 60 years or over, and carers. It was last conducted in 2003. Unlike the National Health Survey, the SDAC includes people living in non-private dwellings, such as aged-care homes and hospitals. In the SDAC, people reporting a disability are asked to name the health condition or injury that caused them the most problems. This is called the 'main disabling condition'. This booklet provides information about people whose main disabling condition is osteoporosis. We say that these people have 'osteoporosis-associated disability'.*

### **Activity restriction**

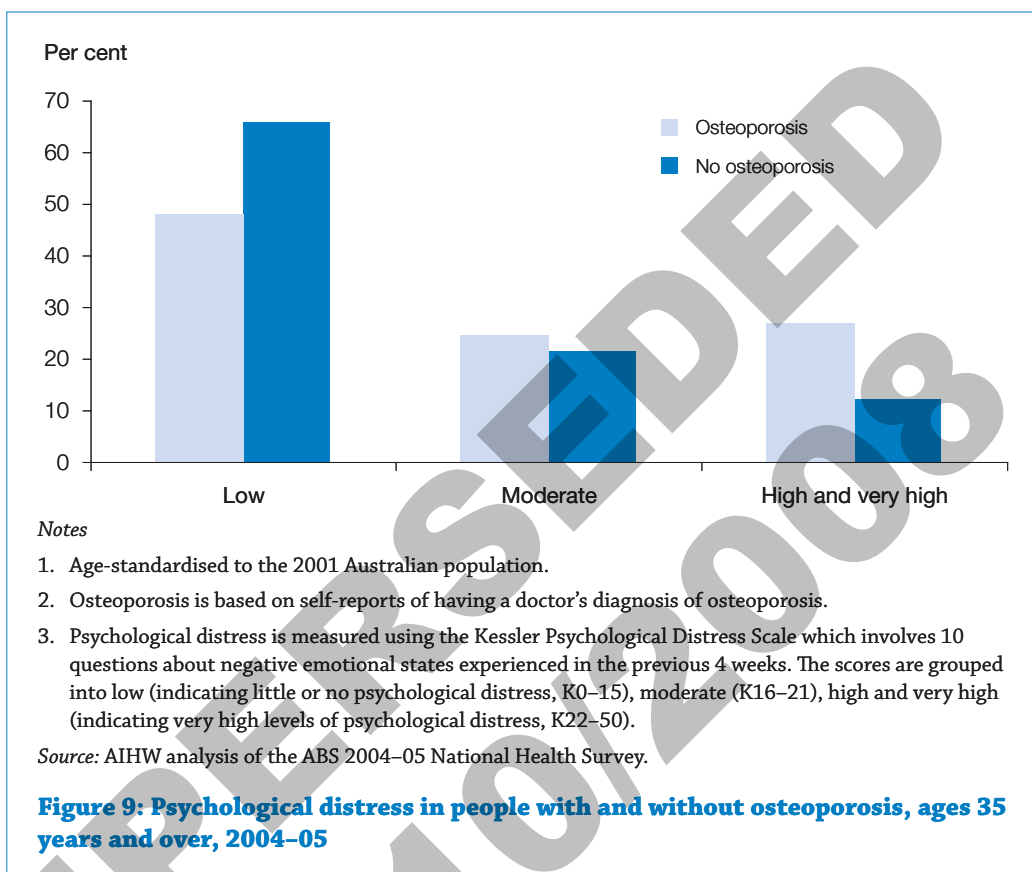
Osteoporotic fractures can often affect a person's ability to perform everyday tasks at home or at work. The fear of having an initial or subsequent fracture can also prevent people from participating in everyday activities.

For example, wrist fractures may affect the ability to write or type, prepare meals, perform personal-care tasks and manage household chores. Fractures of the spine and hip usually affect mobility, often restricting activities that involve walking, bending, lifting, pulling or pushing. About 65% of people who are disabled by their osteoporosis report needing assistance when using public transport and when doing housework (AIHW: Rahman & Bhatia 2007).

### **Psychological distress**

After diagnosis with osteoporosis or an osteoporotic fracture, many people suffer anxiety for fear of fracture and possible physical effects. Feelings of sadness, anger, stress and denial are also common. Many people lose self-esteem because they cannot perform their normal role at work or at home. The pain and disability due to fractures can affect a person's mental wellbeing, as can the loss of independence through needing assistance for everyday tasks.

The 2004–05 National Health Survey reveals that about 27% of people aged 35 years and over with osteoporosis have a high or very high level of psychological distress, compared with 12% of people aged 35 years and over without osteoporosis (Figure 9).



Help and support for dealing with the psychological impact of osteoporosis can be gained from community services, mental health services, telephone help lines (for example, Lifeline, on 13 11 14) and Osteoporosis Australia (freecall 1800 242 141).

## Mortality

People who have an osteoporotic fracture have a higher death rate (mortality) than their counterparts of the same age. The site of the fracture is an important factor in determining the risk of death. Those with a wrist/forearm fracture have little, if any, increased risk of death, whereas those with hip and spine fractures have a significantly higher risk of death.

Most deaths following hip fractures occur within the first year. In Australia, about 24% of people having a hip fracture are estimated to die within 12 months. An increased risk of death compared to the general population continues for at least another 4 years (Johnell et al. 2004). Of these deaths, relatively few are clinically caused by the disease or fracture themselves. Rather, those affected are often already in poorer health and more susceptible to aggravating existing conditions because of immobility caused by the hip fracture. However, even those in good health can acquire other conditions, such as pneumonia, during extended periods of immobility.

## Osteoporosis treatment and management

The primary aim in treating and managing osteoporosis is to halt or slow further bone loss and sometimes directly strengthen the bones. The ultimate aim is to prevent fractures. This is usually achieved by taking medications combined with lifestyle and nutrition measures.

### Treatment and management strategies for osteoporosis

- Physical therapy
- Medication
- Weight-bearing exercise
- Vitamin/mineral supplements
- Education
- Diet
- Fall prevention
- Surgery

### Self-management and education

As osteoporosis is a chronic disease, those affected use various forms of self-management. In many cases, they may only seek professional help when they have an osteoporotic fracture.

Ideally, self-management involves the individual with osteoporosis, along with their family, carers and health-care professionals. It aims to optimise the person's quality of life despite their condition and any complications, provide self-care education, promote adherence to management regimes, and encourage regular follow-up and monitoring. Self-management also includes the ability to regulate the use of medication and physical therapies, and to seek appropriate help and treatments.

Education helps people with osteoporosis to understand the disease process, its natural history and the rationale and implications of managing their disease. Relevant information can be provided by general practitioners (GPs), specialists, other health professionals, community groups and the Internet.

A variety of self-management information is offered by Osteoporosis Australia (through their website and state and territory offices; see page 29 for contact details) and by community health centres.

### Medication

Several different classes of medications are available for treating osteoporosis (refer to shaded box). The type required depends on an individual's specific condition and takes into account: progression of osteoporosis, sex, age, diet, cost, current pharmaceutical use, risk of side effects and the presence of other conditions.

The 2004–05 National Health Survey reported that about 43% of people were taking pharmaceutical medications for their osteoporosis. The most common were bisphosphonates—alendronate (18% of osteoporosis medication users) and risedronate (6%). For more information on various medication options, please speak to your doctor.

Compliance—taking medications regularly and as directed—is one of the most important factors in treating osteoporosis. Non-compliance often occurs because the benefits of taking osteoporosis medications are not usually obvious. It is important to follow the advice of your doctor or pharmacist.

## Medications used for osteoporosis

### Bisphosphonates

The bisphosphonate medications include alendronate (sold as Fosamax® and Alendro®) and risedronate (Actonel®). They increase bone mass by promoting bone building through inhibiting cells (osteoclasts) that break down bone. Bisphosphonates are considered safe and effective first-line treatments of osteoporosis in both men and women.

### Hormone replacement therapy

Hormone replacement therapy (HRT) was previously used as a first-line therapy for postmenopausal osteoporosis as it significantly reduced the risk of fracture. Unfortunately HRT poses an increased risk of breast cancer and cardiovascular disease. HRT is no longer recommended for reducing fracture risk alone.

### Selective oestrogen receptor modulators

Selective oestrogen receptor modulators (SERMs) work by acting like oestrogen in some tissues of the body. They can provide the benefits of oestrogen on bone formation without the negative effect of increased cancer risk. Currently, raloxifene (Evista®) is the only SERM available for use in Australia and it is prescribed for preventing and treating osteoporosis in postmenopausal women.

### Teriparatide

A special synthetic form of parathyroid hormone known as teriparatide (Forteo®), injected intermittently under the skin, has been shown to increase the number of bone building cells (osteoblasts). This results in new bone formation which can strengthen bones and reduce the possibility of fracture. This treatment is mostly used for people with severe osteoporosis.

## Medications used for osteoporosis (continued)

### Strontium ranelate

Strontium ranelate can stimulate bone formation and slow the rate of bone loss. In postmenopausal women, it has been shown to reduce the risk of vertebral and non-vertebral fractures. Strontium ranelate is available through the Pharmaceutical Benefits Scheme (PBS) for postmenopausal women who have had a minimal trauma fracture.

### Calcium and vitamin D

Supplemental calcium is commonly in the form of calcium phosphate, calcium carbonate and calcium citrate. Vitamin D comes in two forms known as cholecalciferol (vitamin D3) and ergocalciferol (vitamin D2). Vitamin D and calcium are almost always taken together and a variety of different formulations are available in Australia. Calcium and vitamin D can reduce the risk of hip fractures and other non-vertebral fractures.

## Nutrition

A balanced, healthy diet that includes the appropriate levels of vitamin D, protein and calcium is one of the essential ways of maintaining healthy bones. Vitamin D is an unusual nutrient as it is generally maintained by exposure to sunlight and not through diet. Currently, there is no recommended dietary intake for vitamin D in Australia because it is assumed that Australians are sufficiently exposed to sunlight. However, detailed recommendations are available for daily sun exposure depending on the time of year and location in Australia (Working Group of the ANZBMS, ESA & OA 2005). It is important to limit sun exposure to those recommended to reduce the risk of skin cancer.

If sun exposure is low, vitamin D can be supplemented in the diet by eating fatty fish such as salmon and mackerel or margarine containing added vitamin D. Appropriate calcium levels can be maintained by eating foods high in calcium such as dairy products, small bony fish or tofu.

Sufficient dietary protein is important for bone health and decreasing fracture risk. Elderly people with a low intake of protein can have greater rates of hip and spine bone loss (Hannan et al. 2000).

The current National Health and Medical Research Council (NHMRC) recommended dietary intake of protein and calcium differ by age and sex and are summarised in Table 2 for the age groups at greater risk of developing osteoporosis.

**Table 2: Recommended dietary intake of calcium and protein**

<b>Nutrient</b>	<b>Sex</b>	<b>Age (years)</b>	<b>RDI</b>
Calcium	Both sexes	51–70	1,000 mg
		Over 70	1,300 mg
Protein	Men	51–70	64 g
		Over 70	81 g
	Women	51–70	46 g
		Over 70	57 g

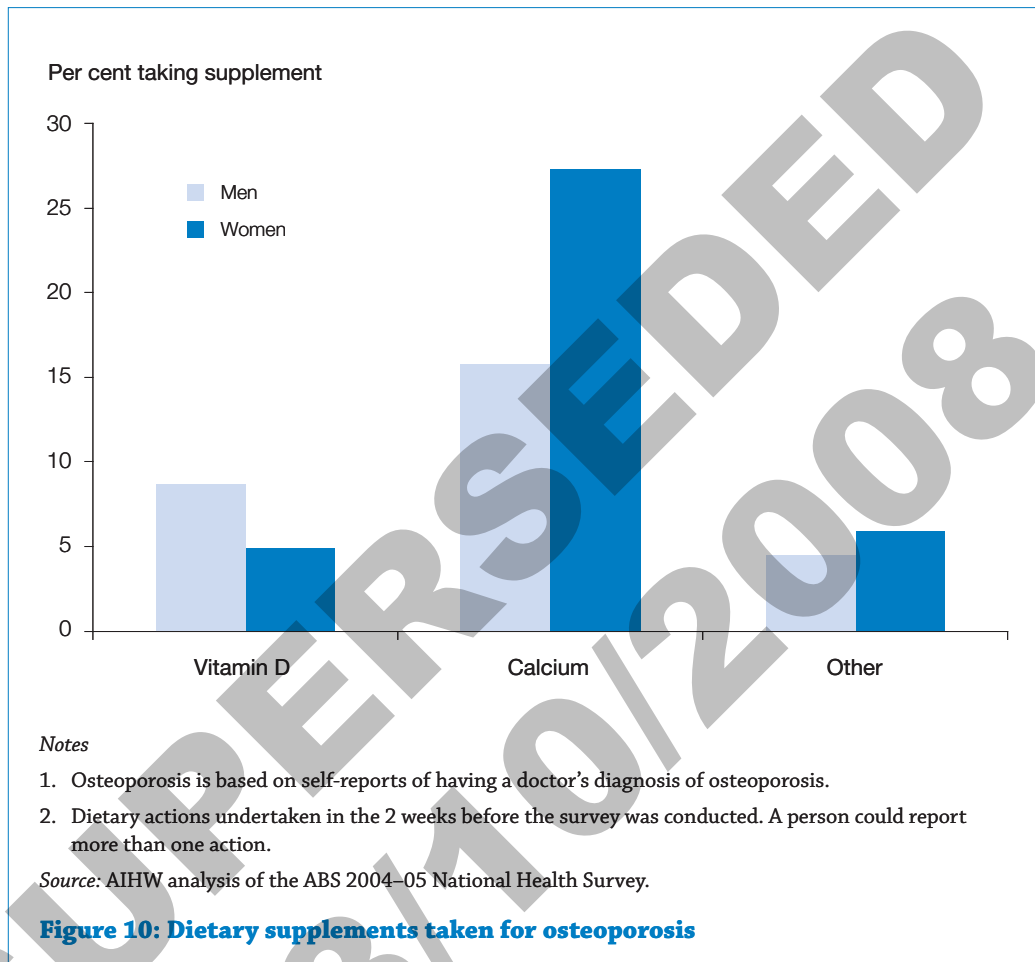
*Note:* The National Health and Medical Research Council (NHMRC) definition of recommended dietary intake (RDI) is the average daily dietary intake level that is sufficient to meet the nutrient requirements of nearly all (97–98%) healthy individuals in a particular life stage and sex group.

*Source:* NHMRC nutrient reference values for Australia and New Zealand 2006.

### **Dietary supplementation**

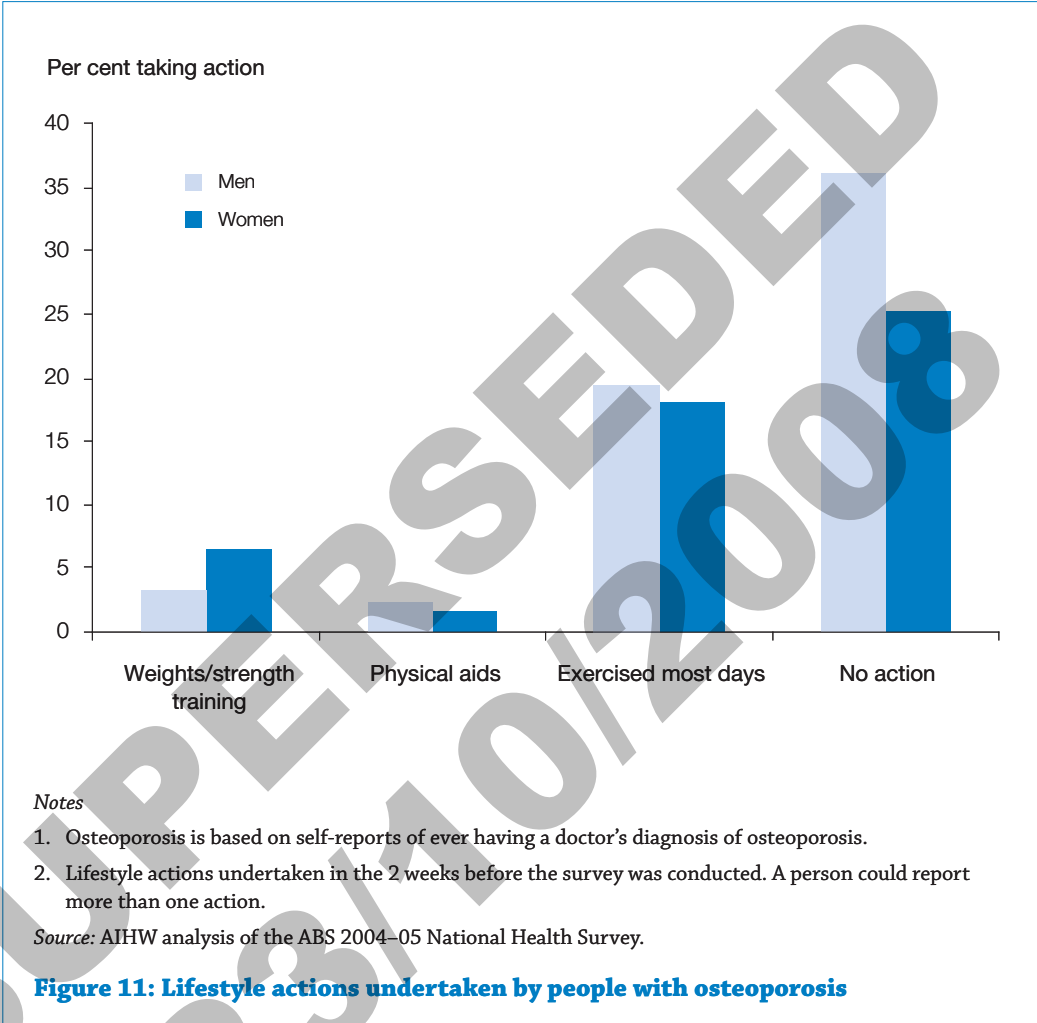
As part of self-management, many people with osteoporosis supplement their diet with vitamin/mineral supplements. According to the 2004–05 National Health Survey, about 40% of people with osteoporosis took vitamin/mineral supplements for their osteoporosis; the most common being vitamin D and calcium. These can be prescribed by a doctor or are available without prescription from pharmacies and health stores.

At the time of the survey, more women than men were taking calcium supplements but the reverse was true for taking vitamin D supplements (Figure 10). Some osteoporosis medications also contain calcium and vitamin D.



## Lifestyle actions

Modification of certain lifestyle factors is recommended for people who have been diagnosed with osteoporosis or who are at risk of developing it. Stopping smoking, avoiding excessive alcohol intake and being in the healthy weight range will reduce the risk. Participating in regular weight-bearing exercise such as walking, running, lifting weights, and dancing should also reduce the risk of falls and future fractures by improving bone and muscle strength, balance and mobility. Based on the 2004–05 National Health Survey, in the 2 weeks preceding the survey, about 20% of people with osteoporosis exercised most days and more women (6.4%) than men (3.1%) did weights/strength training (Figure 11). A specific exercise regime should be recommended by a qualified health professional depending on a person's physical ability and stage of disease.

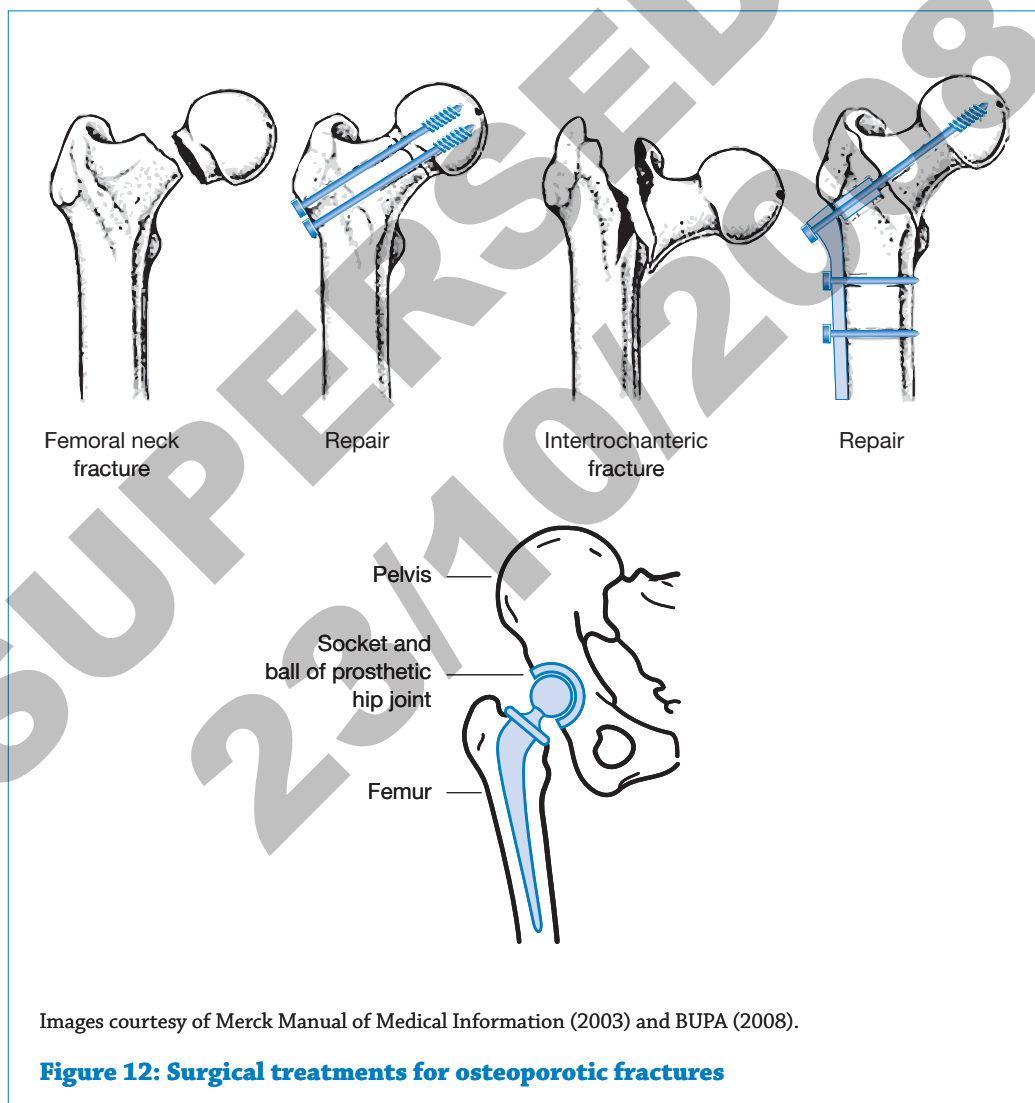


### Aids and modifications

Fall prevention strategies are an important step to reduce the risk of fractures. Modifications around the home such as making rooms well lit, removing tripping obstacles from floors and installing handrails can reduce the likelihood of falls. Other approaches include wearing supportive footwear, using walking aids and ensuring corrective glasses are suitable. Hip protectors which absorb the impact of falls have been shown to significantly reduce the risk of fracture (Sawka et al. 2007). Only a small percentage (about 2%) of people with osteoporosis in the 2004–05 National Health Survey reported obtaining or using physical aids for their osteoporosis (Figure 11).

## Surgery

Surgery may be required for any osteoporotic fracture to correctly re-align and provide additional strength for the fractured bones. Hip fractures involving the head or neck of the femur (thigh bone) almost always require surgery. The type of surgery differs with the age and physical mobility of the person before the fracture, the degree of osteoporosis in the fractured bone and the severity of the fracture. Common surgical treatments are internal fixation using screws and plates, and partial or total hip replacement using an artificial ball and socket (Figure 12).



Images courtesy of Merck Manual of Medical Information (2003) and BUPA (2008).

**Figure 12: Surgical treatments for osteoporotic fractures**

## Support and health-care services

### Health professionals

In many cases, general practitioners (GPs) are the first health professionals consulted for osteoporosis. They provide assessments, prescriptions, education, referrals and advice on self-management. Specialists such as orthopaedic surgeons, rheumatologists, and geriatric medical specialists also contribute. About 10% of people with osteoporosis who responded to the 2004–05 National Health Survey visited a GP or specialist for their osteoporosis in the 2 weeks before being surveyed.

Osteoporosis and post-fracture management may require physical therapy, which helps a person return to their normal function. About 4% of people with osteoporosis visited other health professionals such as a physiotherapist, chiropractor or occupational therapist in the 2 weeks before responding to the survey.

### Carers

People with osteoporosis often receive support or assistance to help them manage day-to-day tasks. Assistance can be provided by family, friends, volunteers, and paid care workers or service providers.

Family members are the main providers of help or informal care for people with osteoporosis. The frequency and duration of assistance needed will depend on the degree of pain, and the type and severity of any functional limitations or disability. According to the 2003 Survey of Disability, Ageing and Carers, 50% of carers of people with osteoporosis-associated disability spend more than 40 hours a week caring (AIHW: Rahman & Bhatia 2007). Almost half (49.5%) of carers have been providing care for at least 10 years.

Carers often find that they need advice, support or assistance with caring and with the impacts caring has on their life. The National Respite for Carers Program provides information, counselling and support for carers, and assistance to help carers take a break (respite) from caring. More information about this program and other carer support services can be obtained from Carers Australia (on the Internet at <[www.carersaustralia.com.au](http://www.carersaustralia.com.au)> or phone 1800 242 636).

## Health spending on osteoporosis

Osteoporosis places a financial burden on individuals with the disease and their families. Governments and insurance companies also spend large amounts on osteoporosis. Access Economics (2001) has estimated that the total health costs of osteoporosis are in the billions of dollars.

A person with osteoporosis can incur costs for prescription medications, diagnostic tests (pathology, X-ray and DXA scan), devices or aids to assist with pain or disability, over-the-counter medications, herbal or natural supplements and allied health-care visits. Osteoporosis may also incur indirect costs such as forfeited income due to illness or early retirement and loss of income to family members who assist with care.

The Australian Government incurs costs by subsidising various medications through the Pharmaceutical Benefits Scheme (PBS) and Repatriation PBS (for war veterans and war widows), and hospital, general practitioner and specialist services fees through Medicare.

Prescription medications subsidised under the PBS and Repatriation PBS make up the majority of medication-related expenditure. For example, in 2007, Medicare Australia data indicates that the Australian Government contributed more than \$105 million towards the cost of alendronate prescribed for people with osteoporosis.

The Australian Government also supports osteoporosis research. In 2007, the National Health and Medical Research Council committed over \$5.5 million for research into the disease.

## Preventing osteoporosis and fractures

Osteoporosis is largely preventable. Lifestyle and dietary changes can be made to help prevent or delay its onset. For people with osteoporosis, several actions are recommended to reduce the likelihood of sustaining an osteoporotic fracture. Preventive actions include:

- maintaining a balanced, healthy diet including the recommended intake of vitamin D and calcium
- ensuring adequate levels of vitamin D are maintained through limited sun exposure or by taking supplements
- exercising regularly to maintain a healthy body weight and strengthen the bones and muscles
- avoiding smoking and excessive alcohol consumption
- using strategies to prevent falls.

Although some risk factors cannot be changed, careful consideration of modifiable factors can greatly reduce the risk.

One of the major factors which affects our bone health relates to our levels of calcium and vitamin D. Eating foods rich in calcium, such as dairy products, and ensuring we have the recommended sun exposure for adequate vitamin D production, will help ensure our bones remain strong throughout our lives. This is particularly important during childhood and adolescence to maximise peak bone mass in early adulthood. Continuing a healthy diet and ensuring adequate vitamin D production throughout life should ensure the effects of increased bone loss in old age are reduced.

Apart from these efforts to prevent osteoporosis, those who have it can still take action to prevent fractures. Exercise such as Tai Chi, which promotes better balance and posture, will help to prevent falls. Several other measures that can be undertaken around the home include:

- removing or repositioning potential hazards or obstacles such as rugs, electrical cords and furniture
- ensuring all areas are suitably lit
- wearing sensible footwear
- visiting an optometrist to ensure eyesight has not deteriorated.

## Where to get more information

More information about preventing and managing osteoporosis can be obtained from:

- your general practitioner or Aboriginal and Torres Strait Islander health worker
- your local community health centre or Aboriginal Medical Service
- Osteoporosis Australia
  - on their website at <[www.osteoporosis.org.au](http://www.osteoporosis.org.au)>
  - by calling them on 1800 242 141
  - by visiting your local state or territory office (see below).

### **Osteoporosis ACT**

2B Grant Cameron Community Centre  
27 Mulley St  
Holder ACT 2611

### **Osteoporosis Queensland**

Cartwright St (Cnr Lutwyche Rd)  
Windsor QLD 4030

### **Osteoporosis Northern Territory**

4/6 Caryota Crt  
Coconut Grove NT 0810

### **Osteoporosis New South Wales**

13 Harold St  
North Parramatta NSW 2151

### **Osteoporosis South Australia**

1/202–208 Glen Osmond Rd  
Fullarton SA 5063

### **Osteoporosis Tasmania**

127 Argyle St  
Hobart TAS 7000

### **Osteoporosis Victoria**

263–265 Kooyong Rd  
Elsternwick VIC 3185

### **Osteoporosis Western Australia**

17 Lemnos St  
Shenton Park WA 6008

## Useful websites

HealthInsite

<[www.healthinsite.gov.au/topics/Osteoporosis](http://www.healthinsite.gov.au/topics/Osteoporosis)>

National Osteoporosis Society  
(United Kingdom)

<[www.nos.org.uk](http://www.nos.org.uk)>

Australian & New Zealand Bone & Mineral Society

<[www.anzbms.org.au](http://www.anzbms.org.au)>

National Osteoporosis

Foundation (United States)

<[www.nof.org](http://www.nof.org)>

International Osteoporosis Foundation (IOF)

<[www.iofbonehealth.org](http://www.iofbonehealth.org)>

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