An Epidemiological Analysis of Osteoporosis Among South Australian Adults

Population Research & Outcome Studies Unit
SA Health
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The purpose of this report is to provide an epidemiological analysis relating to osteoporosis in South Australia. This includes an examination of the demographic characteristics of survey respondents with self-reported osteoporosis and an examination of associations with other chronic conditions, health risk factors, mental health and economic factors. Recommendations for policy and research directions have also been provided to assist Osteoporosis SA, through the Arthritis Foundation of South Australia, in developing and targeting programs and information to the needs of the population.

The following are the main findings of the analysis undertaken:

- Females, those in older age groups, and those with a lower socioeconomic status were statistically significantly more likely to report that they had osteoporosis.
- Respondents with osteoporosis were significantly more likely to have been born in a country other than Australia.
- Respondents with osteoporosis were significantly more likely to speak a language at home other than English.

The prevalence of osteoporosis is projected to increase for the period 2007 to 2020. The trend for both males and females is projected to generally remain relatively stable throughout age groups, except the 65 years and over age group where there appears to be an increase in prevalence over time.

Respondents with osteoporosis were statistically significantly more likely to also report that they had diabetes, asthma, other respiratory conditions, cardiovascular disease, or arthritis, and that their activities were limited due to an impairment or health problem.

There were statistically significant differences between males and females with osteoporosis and another chronic condition and those within specific age groups with osteoporosis and another chronic condition.

Respondents with osteoporosis were statistically significantly more likely to also have high blood pressure, high cholesterol, be classified as underweight, be classified as sedentary, or to eat the recommended number of serves of fruit and vegetables a day.

Respondents with osteoporosis were statistically significantly less likely to be a current smoker.

There were statistically significant differences between males and females with osteoporosis who had a health risk factor and those within specific age groups with osteoporosis and a health risk factor.

Respondents with self-reported osteoporosis aged 65 years and over, are statistically significantly more likely to have fallen in the past year.
Respondents with self-reported osteoporosis are statistically significantly more likely to have a self-reported current mental health condition, or psychological distress as defined by the Kessler Psychological Distress Scale (K10).

There were statistically significant differences between those within specific age groups with osteoporosis and a current mental health condition, psychological distress or suicidal ideation.

Osteoporosis had an impact on the number of days off from work or normal duties in the last four weeks, with respondents with osteoporosis statistically significantly more likely to have had three or more days either off work, or with their activities limited due to health, than respondents without osteoporosis. There were also statistically significant differences between those within specific age groups with osteoporosis and the number of days off work due to health.

This report summarises the data available relating to the surveillance and monitoring of osteoporosis prevalence in South Australia which has been collected using different survey vehicles since 1995. This information can be used to focus the targeting of campaigns and the development of new research and future programs conducted for and by Osteoporosis SA.
CHAPTER 1: INTRODUCTION
1.1 Introduction

Osteoporosis is a condition causing low bone mass which leads to greater bone fragility and an increase in fractures. Osteoporosis is under-rated, under-diagnosed, and under-treated, and a major public health problem due to its association with morbidity, mortality and cost to society. The self-reported prevalence of osteoporosis in Australia is 3%, which increases with advancing age, although, this is likely to be a significant under-estimate of the true prevalence as osteoporosis is asymptomatic until a fracture is sustained. The lifetime risk of an osteoporotic fracture of persons aged over 60 is 29% for men and 56% for women.

In view of this high burden of disease, osteoporosis (together with other musculoskeletal conditions such as arthritis) was declared a National Health Priority Area in July 2002. With the ageing of the population, the burden of osteoporosis on the economic and health care systems is expected to increase. Hip fractures were projected to increase by 31% between 1996 and 2006, to double by 2026, and to quadruple by 2051; this is due to substantial increases in the number of very elderly persons in Australia over that time.

This report has been undertaken to provide information required to develop and target programs to the needs of the population. It is a detailed analysis of the data available in South Australia on self-reported osteoporosis. Data on the prevalence of osteoporosis and other musculoskeletal disorders have been routinely collected using a number of different survey instruments including monthly telephone interviewing and annual face-to-face surveys. These surveys include the South Australian Monitoring and Surveillance System (SAMSS), the Health Monitor (HM) and the Health Omnibus Survey (HOS).

The data available allow information to be reported in association with various demographic factors. Data are also available that allows examination of the associations between osteoporosis and other chronic conditions such as diabetes, asthma, cardiovascular disease, relationships with risk factors such as smoking, obesity, high blood pressure, and mental health issues including psychological distress. Economic factors, such as days lost from work and days limited from work, can also be explored.
1.2 Relevant literature

Osteoporosis resulted in an estimated 25,000 healthy years of life lost to Australians in the financial year 2000-01, and costs to the community of A$7.4 billion per annum, including A$1.9 billion in direct costs.

The overall prevalence of self-reported osteoporosis, across the population, from the 2004-05 National Health Survey is 1% in males and 5% in females (average 3%), which increased with advancing age. This was an increase from 1.6% in the 2001 National Health Survey. However, this is likely to be a significant underestimate as osteoporosis is asymptomatic until a fracture is sustained, and by this time a significant loss in bone mass has already occurred. Therefore the majority of persons with osteoporosis (and at high risk of sustaining an osteoporotic fracture) are unaware that they have the condition. The lifetime risk of an osteoporotic fracture among those aged over 60 is 29% for men and 56% for women.

Osteoporosis is diagnosed using a diagnostic test which is a type of X-ray called dual-energy x-ray absorptiometry (DXA). If the density of the bone mineral (or bone mineral density (BMD)) is less than two and a half standard deviations from the BMD of young adults (T score), there is a diagnosis of osteoporosis. Osteoporosis has no symptoms until the first bone fracture occurs. Traditionally, osteoporosis is linked to the proximal femur (hip), vertebrae (spine) and distal forearm (wrist), although because bone is lost throughout the skeleton, fractures can occur at other sites, such as the ribs. Not all persons with osteoporosis will have sustained a fracture, however, experts recommend that every individual with a low-trauma fracture be considered to have osteoporosis unless proven otherwise. Osteoporosis can be diagnosed in asymptomatic individuals by measuring bone mineral density which is a good predictor of fracture risk, similar to, or better than, other comparable measures to predict events in other illnesses, such as blood pressure to prevent strokes. Diagnosing osteoporosis in individuals who have not sustained a bone fracture enables the opportunity for early treatment to prevent future fractures.

In addition to sex and advancing age, common risk factors for osteoporotic fractures include: genetic factors (such as family history of fracture); nutrition and lifestyle factors (such as inadequate dietary calcium intake, physical inactivity, cigarette smoking, and excessive alcohol intake); hormonal and reproductive factors (such as early menopause, vitamin D deficiency, low body weight); medications (such as corticosteroids); co-morbid medical conditions (malabsorption illnesses such as coeliac or Crohn’s disease or rheumatoid arthritis); and factors related to falls (such as poor balance or visual impairment).

The data presented in this report are solely based on self-report and the limitations associated with this data collection method are acknowledged. Notwithstanding, the data in this report are the most comprehensive ongoing collection of data relating to osteoporosis prevalence in Australia, and are a valuable contribution to the epidemiology of osteoporosis in both South Australia and Australia.
1.3 Definitions used in this report

1.3.1 Osteoporosis

Osteoporosis is a disease of the bone, and is not to be confused with arthritis, which is a disease of the joints. It literally means “porous bones” and is a condition where the bones have lost mass, the micro-architecture of the bone has deteriorated, leaving the bone weakened and unable to withstand minor stresses such as a bump or fall. Fracture risk is a function of both trauma sustained by an episode such as a fall and bone strength.

The data presented in this report are obtained from self-report data from the Health Omnibus Survey (HOS), the South Australian Monitoring and Surveillance System (SAMSS), and the Health Monitor Survey conducted in October to December 2005. In each survey, respondents are asked the question: “Have you ever been told by a doctor that you have osteoporosis?”

1.4 Outline of report

Each chapter in this report focuses on a particular theme.

Chapter 2: The prevalence of osteoporosis in South Australia, describes the current self-reported prevalence of osteoporosis in the South Australian population aged 18 years and over using various survey vehicles.

Chapter 3: Demographic profile of people with osteoporosis, describes the prevalence of osteoporosis in the South Australian population over the age of 18 years by a range of different demographic variables. These include sex, age groups, marital status, country of birth, household size, children in the household, main language spoken at home, gross annual household income, employment status, highest educational attainment, area of residence, and the Socioeconomic Indexes for Areas (SEIFA) Index of Relative Socioeconomic Disadvantage (IRSD). This chapter also provides a more comprehensive analysis of the prevalence of osteoporosis by country of birth and main language spoken at home.

Chapter 4: Osteoporosis prevalence trends and projections, highlights future projections in osteoporosis prevalence for South Australia. Data from the Health Omnibus Survey (HOS) were used as information has been collected on osteoporosis since 1995. This enables analysis of trends over 11 years and future projections.

Chapter 5: Osteoporosis and associations with other chronic conditions, presents information on the prevalence of osteoporosis and the association with other chronic conditions such as diabetes, asthma, other respiratory conditions (emphysema, bronchitis, chronic obstructive pulmonary disease), cardiovascular conditions, arthritis, and disability. In addition, this chapter provides an analysis of the people with osteoporosis and another chronic condition in terms of their sex and age group.
Chapter 6: *Osteoporosis and associations with risk factors*, describes the prevalence of osteoporosis and associations with risk factors such as high blood pressure, high blood cholesterol, underweight and overweight, smoking, alcohol consumption, insufficient physical activity, and fruit and vegetable consumption. In addition, this chapter provides an analysis of the people with osteoporosis and risk factors in terms of their sex and age group.

Chapter 7: *Osteoporosis and falls*, describes the prevalence of osteoporosis for people aged 65 years and over who had experienced a fall in the last year. This chapter also provides an analysis of these people in terms of their sex and age group.

Chapter 8: *Osteoporosis and associations with mental health*, describes the prevalence of osteoporosis and associations with mental health issues such as having a current mental health condition, psychological distress, and suicidal ideation. In addition, this chapter provides an analysis of the people with osteoporosis and mental health in terms of their sex and age group.

Chapter 9: *Osteoporosis and associations with economic factors*, describes the prevalence of osteoporosis and the associations with economic issues such as days lost because of health, and days limited because of health. This chapter also provides an analysis of the people with osteoporosis and economic factors in terms of their sex and age group.

Chapter 10: *Recommendations*, presents recommendations for further research and health promotion action.
CHAPTER 2: PREVALENCE OF OSTEOPOROSIS IN SOUTH AUSTRALIA
2.1 Introduction

The overall prevalence of self-reported osteoporosis across the population, from the 2004-05 National Health Survey was 1% in males and 5% in females (average 3%). This was an increase from 1.6% of persons in the 2001 National Health Survey. These estimates are likely to be a significant underestimate of the true prevalence, since osteoporosis is asymptomatic until the person sustains a fracture, and by this time a significant loss in bone mass has already occurred.

It is recognised that the prevalence of osteoporosis increases with age, and the ageing population means that there is, and will continue to be, an increased number of people with osteoporosis. The high prevalence and increase in the number of people with osteoporosis has implications for the health system and the economy.

In this chapter, the current prevalence of self-reported doctor-diagnosed osteoporosis in the South Australian population aged 18 years and over is presented.

2.2 Data sources – Prevalence of osteoporosis

The prevalence of osteoporosis in South Australia has been assessed using a number of self-report surveys.

The following chapters use different data sources: the South Australian Monitoring and Surveillance System (SAMSS), the Health Monitor (HM) and the Health Omnibus Survey (HOS). Table 2.1 presents the osteoporosis prevalence estimates using data sources used in this report.

<table>
<thead>
<tr>
<th>Data Source</th>
<th>n</th>
<th>%</th>
<th>(95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HOS (1995 - 2006)</td>
<td>1184/25647</td>
<td>4.6</td>
<td>(4.4 – 4.9)</td>
</tr>
<tr>
<td>SAMSS (July 2004 - June 2007)</td>
<td>727/16513</td>
<td>4.4</td>
<td>(4.1 – 4.7)</td>
</tr>
<tr>
<td>Health Monitor (October 2005)</td>
<td>854/17140</td>
<td>5.0</td>
<td>(4.7 – 5.3)</td>
</tr>
</tbody>
</table>

Note: The weighting of data can result in rounding discrepancies or totals not adding up. Source: HOS 1995 – 2006, SAMSS July 2004 – June 2007, Health Monitor 2005
As a result of the different methodologies employed, different prevalence estimates are produced. Each data source has benefits (e.g. HOS – longitudinal nature which enables analysis of trends over time and future projections; SAMSS which has a number of covariates also asked as part of the survey; and Health Monitor – provides a large sample enabling country of birth and language spoken at home analysis) and as such, each is used as appropriate throughout this report.

2.3 Prevalence of osteoporosis by year

As data relating to the prevalence of osteoporosis have been collected using the HOS since 1995, the yearly prevalence can be examined. The methodology of HOS is presented in detail in Appendix 1 but is summarised briefly below.

HOS is a face-to-face interview survey in which respondents aged 15 years and over were asked if they had ever been told by a doctor that they had osteoporosis. Data from respondents aged 18 years and over are presented in this report. HOS may result in underestimations of the overall prevalence of osteoporosis, due to hostels, nursing homes, boarding houses, and other institutions being excluded from the sample frame.

The prevalence of osteoporosis for people aged 18 years and over for each year the question was asked in a HOS survey is detailed in Table 2.2. The overall prevalence of osteoporosis from 1995 to 2006 using HOS is 4.6% (95% CI 4.4 – 4.9).

Table 2.2: Prevalence of osteoporosis by year using HOS, South Australia, 18 years and over

<table>
<thead>
<tr>
<th>Year</th>
<th>n</th>
<th>%</th>
<th>(95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995</td>
<td>95/2843</td>
<td>3.3</td>
<td>(2.7 - 4.1)</td>
</tr>
<tr>
<td>1997</td>
<td>114/2859</td>
<td>4.0</td>
<td>(3.3 - 4.8)</td>
</tr>
<tr>
<td>1998</td>
<td>88/2847</td>
<td>3.1</td>
<td>(2.5 - 3.8)</td>
</tr>
<tr>
<td>1999</td>
<td>125/2865</td>
<td>4.4</td>
<td>(3.7 - 5.2)</td>
</tr>
<tr>
<td>2001</td>
<td>145/2884</td>
<td>5.0</td>
<td>(4.3 - 5.9)</td>
</tr>
<tr>
<td>2002</td>
<td>136/2842</td>
<td>4.8</td>
<td>(4.1 - 5.6)</td>
</tr>
<tr>
<td>2003</td>
<td>141/2827</td>
<td>5.0</td>
<td>(4.3 - 5.9)</td>
</tr>
<tr>
<td>2004</td>
<td>155/2868</td>
<td>5.4</td>
<td>(4.6 - 6.3)</td>
</tr>
<tr>
<td>2006</td>
<td>183/2813</td>
<td>6.5</td>
<td>(5.7 - 7.5)</td>
</tr>
<tr>
<td>Overall</td>
<td>1184/25647</td>
<td>4.6</td>
<td>(4.4 - 4.9)</td>
</tr>
</tbody>
</table>

Note: The weighting of data can result in rounding discrepancies or totals not adding.
2.4 Summary

While different types of surveys provide varying self-reported prevalence estimates of osteoporosis in South Australia (these discrepancies may be as a result of a variety of reasons), it can be seen that prevalence estimates for the general population aged 18 years and over are on average 4.6%.

The following chapter highlights prevalence estimates by demographic variables; including age and sex, in order to determine the demographic characteristics of those survey respondents reporting that they had osteoporosis. Prevalence by age group is also detailed more fully.
CHAPTER 3: DEMOGRAPHIC PROFILE OF PEOPLE WITH OSTEOPOOROSIS
3.1 Introduction

Cross-sectional studies of reference populations show that bone density declines with advancing age, and is lower in women.9 The bone density of women peaks in early adulthood, declines slightly until menopause, then declines more quickly following menopause and into older age. The bone density of men peaks in early adulthood and declines slowly into old age. There is no equivalent change in mid life to that of the menopause in women.

Demographic variables assessed in this chapter are:

- Sex;
- Age groups;
- Country of birth;
- Language spoken at home;
- Marital status;
- Area of residence;
- Household size;
- Children under 16 years in the household;
- Work status;
- Highest educational attainment;
- Income; and
- Socioeconomic Indexes for Areas (SEIFA) Index of Relative Socioeconomic Disadvantage (IRSD) quintiles.10-12

The measure of socioeconomic status and social disadvantage used in this report is SEIFA (IRSD). These values are produced by the Australian Bureau of Statistics to measure socioeconomic status by postcode. IRSD scores have been grouped into quintiles (highest, high, middle, low and lowest) for analysis where the highest quintile represents postcodes with the highest IRSD scores (most advantaged areas) and the lowest quintile represents postcodes with the lowest IRSD scores (most disadvantaged areas).

In addition, this chapter includes a more comprehensive look at the profile of respondents with osteoporosis through their country of birth and main language spoken at home.

3.2 Data sources

The data in this section are from SAMSS, using interviews conducted between July 2004 and June 2007 in respondents aged 18 years and over (n=16,513). The methodology of SAMSS is described in detail in Appendix 1.
This section also involves a more detailed analysis of osteoporosis by country of birth and main language spoken at home utilising data from HOS from October to December 2005 for respondents aged 18 years and older (n=17,140). The methodology of HOS is also described in detail in Appendix 1.

### 3.3 Demographic profile of respondents with osteoporosis

The demographic profile of respondents with osteoporosis is shown in Table 3.1 and Table 3.2. These tables show that there is a significantly higher prevalence of osteoporosis in those respondents who:

- were female;
- were aged 55 years and over;
- did not have children under 16 years in the household;
- had only one person over 16 years in the household;
- belonged to the middle SEIFA quintile;
- were born in the UK/Ireland, or a country other than Australia;
- spoke a language other than English at home;
- were widowed;
- had no schooling to secondary level education;
- were not employed; or
- had an annual household income of up to $40,000.
<table>
<thead>
<tr>
<th>Demographic Profile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table 3.1: Prevalence of osteoporosis by demographic variables, South Australia, age 18 years and over</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Osteoporosis</th>
<th></th>
<th>No Osteoporosis</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>95% CI</td>
<td>n</td>
</tr>
<tr>
<td><strong>Sex</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>117</td>
<td>1.5</td>
<td>(1.2 - 1.7)</td>
<td>7963</td>
</tr>
<tr>
<td>Female</td>
<td>610</td>
<td>7.2</td>
<td>(6.7 - 7.8)</td>
<td>7823</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18 to 34 years</td>
<td>11</td>
<td>0.2</td>
<td>(0.1 - 0.4)</td>
<td>4667</td>
</tr>
<tr>
<td>35 to 44 years</td>
<td>29</td>
<td>0.9</td>
<td>(0.6 - 1.3)</td>
<td>3172</td>
</tr>
<tr>
<td>45 to 54 years</td>
<td>72</td>
<td>2.4</td>
<td>(1.9 - 3.0)</td>
<td>2969</td>
</tr>
<tr>
<td>55 to 64 years</td>
<td>141</td>
<td>6.0</td>
<td>(5.1 - 7.0)</td>
<td>2219</td>
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<tr>
<td>65 to 74 years</td>
<td>189</td>
<td>11.6</td>
<td>(10.1 - 13.2)</td>
<td>1441</td>
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<tr>
<td>75 years and over</td>
<td>287</td>
<td>17.9</td>
<td>(16.1 - 19.8)</td>
<td>1318</td>
</tr>
<tr>
<td><strong>Children aged under 16 years in the household</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>671</td>
<td>6.1</td>
<td>(5.7 - 6.6)</td>
<td>10293</td>
</tr>
<tr>
<td>1 child</td>
<td>30</td>
<td>1.4</td>
<td>(0.9 - 1.9)</td>
<td>2181</td>
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<tr>
<td>2 children</td>
<td>18</td>
<td>0.8</td>
<td>(0.5 - 1.2)</td>
<td>2394</td>
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<tr>
<td>3 or more children</td>
<td>8</td>
<td>0.9</td>
<td>(0.4 - 1.7)</td>
<td>918</td>
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<tr>
<td><strong>Adult aged 16 years and over in the household</strong></td>
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<td></td>
</tr>
<tr>
<td>1 adult</td>
<td>247</td>
<td>10.5</td>
<td>(9.3 - 11.8)</td>
<td>2108</td>
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<tr>
<td>2 adults</td>
<td>386</td>
<td>4.0</td>
<td>(3.7 - 4.5)</td>
<td>9175</td>
</tr>
<tr>
<td>3 adults</td>
<td>63</td>
<td>2.4</td>
<td>(1.9 - 3.0)</td>
<td>2589</td>
</tr>
<tr>
<td>4 or more adults</td>
<td>31</td>
<td>1.6</td>
<td>(1.1 - 2.3)</td>
<td>1914</td>
</tr>
<tr>
<td><strong>Area of residence</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Metropolitan Adelaide</td>
<td>521</td>
<td>4.4</td>
<td>(4.1 - 4.8)</td>
<td>11197</td>
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<tr>
<td>SA Country</td>
<td>187</td>
<td>4.3</td>
<td>(3.8 - 5.0)</td>
<td>4137</td>
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<td><strong>SEIFA IRSD Quintiles</strong></td>
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<tr>
<td>Lowest quintile</td>
<td>119</td>
<td>4.5</td>
<td>(3.8 - 5.4)</td>
<td>2494</td>
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<tr>
<td>Low quintile</td>
<td>133</td>
<td>4.0</td>
<td>(3.4 - 4.7)</td>
<td>3179</td>
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<tr>
<td>Middle quintile</td>
<td>185</td>
<td>5.5</td>
<td>(4.8 - 6.3)</td>
<td>3182</td>
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<tr>
<td>High quintile</td>
<td>129</td>
<td>3.8</td>
<td>(3.2 - 4.5)</td>
<td>3268</td>
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<tr>
<td>Highest quintile</td>
<td>161</td>
<td>4.3</td>
<td>(3.7 - 5.0)</td>
<td>3616</td>
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<tr>
<td><strong>Overall</strong></td>
<td>727</td>
<td>4.4</td>
<td>(4.1 - 4.7)</td>
<td>15786</td>
</tr>
</tbody>
</table>

Source: SAMSS July 2004 – June 2007
↑↓ Statistically significantly higher or lower (p<0.05) than the other categories combined.
Note: The weighting of data can result in rounding discrepancies or totals not adding.
Note: Unknown and Not Stated responses are not reported.
### Table 3.2: Prevalence of osteoporosis by demographic variables, South Australia, age 18 years and over

<table>
<thead>
<tr>
<th></th>
<th>Osteoporosis</th>
<th></th>
<th>No Osteoporosis</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>95% CI</td>
<td>n</td>
</tr>
<tr>
<td><strong>Country of birth</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Australia</td>
<td>510</td>
<td>3.9</td>
<td>(3.6 - 4.3)</td>
<td>12407</td>
</tr>
<tr>
<td>UK/Ireland</td>
<td>113</td>
<td>6.6</td>
<td>(5.5 - 7.9)</td>
<td>1596</td>
</tr>
<tr>
<td>Other</td>
<td>104</td>
<td>5.5</td>
<td>(4.6 - 6.7)</td>
<td>1781</td>
</tr>
<tr>
<td><strong>Language spoken at home</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>English</td>
<td>631</td>
<td>4.2</td>
<td>(3.9 - 4.6)</td>
<td>14226</td>
</tr>
<tr>
<td>Language other than English</td>
<td>96</td>
<td>5.8</td>
<td>(4.8 - 7.1)</td>
<td>1558</td>
</tr>
<tr>
<td><strong>Marital Status</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married/Living with partner</td>
<td>428</td>
<td>3.8</td>
<td>(3.5 - 4.2)</td>
<td>10837</td>
</tr>
<tr>
<td>Separated/divorced</td>
<td>63</td>
<td>5.4</td>
<td>(4.2 - 6.8)</td>
<td>1108</td>
</tr>
<tr>
<td>Widowed</td>
<td>204</td>
<td>20.4</td>
<td>(18.0 - 23.0)</td>
<td>800</td>
</tr>
<tr>
<td>Never married</td>
<td>32</td>
<td>1.1</td>
<td>(0.7 - 1.5)</td>
<td>3031</td>
</tr>
<tr>
<td><strong>Educational Attainment</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No schooling to secondary</td>
<td>521</td>
<td>5.9</td>
<td>(5.4 - 6.4)</td>
<td>8296</td>
</tr>
<tr>
<td>Trade, Certificate, Diploma</td>
<td>121</td>
<td>2.8</td>
<td>(2.4 - 3.4)</td>
<td>4144</td>
</tr>
<tr>
<td>Degree or higher</td>
<td>84</td>
<td>2.5</td>
<td>(2.0 - 3.1)</td>
<td>3316</td>
</tr>
<tr>
<td><strong>Employment Status</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employed</td>
<td>123</td>
<td>1.2</td>
<td>(1.0 - 1.4)</td>
<td>10028</td>
</tr>
<tr>
<td>Not Employed</td>
<td>605</td>
<td>9.5</td>
<td>(8.8 - 10.2)</td>
<td>5758</td>
</tr>
<tr>
<td><strong>Income</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Up to $20,000</td>
<td>286</td>
<td>13.2</td>
<td>(11.9 - 14.7)</td>
<td>1874</td>
</tr>
<tr>
<td>$20,001-$40,000</td>
<td>210</td>
<td>6.6</td>
<td>(5.8 - 7.5)</td>
<td>2977</td>
</tr>
<tr>
<td>$40,001-$60,000</td>
<td>59</td>
<td>2.3</td>
<td>(1.8 - 2.9)</td>
<td>2539</td>
</tr>
<tr>
<td>$60,001-$80,000</td>
<td>32</td>
<td>1.4</td>
<td>(1.0 - 2.0)</td>
<td>2244</td>
</tr>
<tr>
<td>$80,001 or more</td>
<td>46</td>
<td>1.2</td>
<td>(0.9 - 1.5)</td>
<td>3937</td>
</tr>
<tr>
<td>Not stated</td>
<td>94</td>
<td>4.1</td>
<td>(3.3 - 4.9)</td>
<td>2214</td>
</tr>
<tr>
<td><strong>Overall</strong></td>
<td>727</td>
<td>4.4</td>
<td>(4.1 - 4.7)</td>
<td>15786</td>
</tr>
</tbody>
</table>

Source: SAMSS July 2004 – June 2007

† † Statistically significantly higher or lower (p<0.05) than the other categories combined.

Note: The weighting of data can result in rounding discrepancies or totals not adding.

Note: Unknown and Not Stated responses are not reported.
3.4 In more depth – Country of birth comparisons

Table 3.3 uses the HOS dataset and describes the country of birth reported by respondents over the age of 18 who have osteoporosis.

Respondents with osteoporosis were significantly less likely to be from Australia and significantly more likely to be from:

> Other Southern Europe (Bosnia-Herzegovina, Spain, Slovenia, Former Yugoslav Republics of Serbia and Montenegro, Former Yugoslav Republic of Macedonia, Cyprus, Malta, Portugal, Croatia);
> Other Western Europe (Bulgaria, Poland, Belarus, Czech Republic, Hungary, Romania, Slovakia);
> UK/ Ireland;
> Germany;
> Italy; or
> Greece.
### Table 3.3: Osteoporosis prevalence by country of birth, South Australia, age 18 years and over

<table>
<thead>
<tr>
<th></th>
<th>Osteoporosis</th>
<th></th>
<th></th>
<th>No Osteoporosis</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>95% CI</td>
<td>n</td>
<td>%</td>
<td>95% CI</td>
</tr>
<tr>
<td>Australia</td>
<td>576</td>
<td>4.3</td>
<td>(4.0 - 4.7)</td>
<td>12696</td>
<td>95.7</td>
<td>(95.3 - 96.0)</td>
</tr>
<tr>
<td>English speaking</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>countries</td>
<td>149</td>
<td>7.2</td>
<td>(6.2 - 8.4)</td>
<td>1923</td>
<td>92.8</td>
<td>(91.6 - 93.8)</td>
</tr>
<tr>
<td>Non-English speaking</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>countries</td>
<td>128</td>
<td>7.2</td>
<td>(6.0 - 8.4)</td>
<td>1661</td>
<td>92.8</td>
<td>(91.6 - 94.0)</td>
</tr>
<tr>
<td>Africa and North Africa</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2.7</td>
<td>#</td>
<td>16</td>
<td>97.3</td>
<td>(76.9 - 99.7)</td>
</tr>
<tr>
<td>Australia</td>
<td>576</td>
<td>4.3</td>
<td>(4.0 - 4.7)</td>
<td>12696</td>
<td>95.7</td>
<td>(95.3 - 96.0)</td>
</tr>
<tr>
<td>Eastern Europe</td>
<td>5</td>
<td>4.9</td>
<td>(2.1 - 10.8)</td>
<td>101</td>
<td>95.1</td>
<td>(89.2 - 97.9)</td>
</tr>
<tr>
<td>Germany</td>
<td>19</td>
<td>10.4</td>
<td>(6.8 - 15.7)</td>
<td>163</td>
<td>89.6</td>
<td>(84.3 - 93.2)</td>
</tr>
<tr>
<td>Greece</td>
<td>12</td>
<td>11.0</td>
<td>(6.4 - 18.2)</td>
<td>98</td>
<td>89.0</td>
<td>(81.8 - 93.6)</td>
</tr>
<tr>
<td>Italy</td>
<td>43</td>
<td>14.8</td>
<td>(11.2 - 19.3)</td>
<td>250</td>
<td>85.2</td>
<td>(80.7 - 88.8)</td>
</tr>
<tr>
<td>Melanesia and</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Micronesia</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>21</td>
<td>100.0</td>
<td>-</td>
</tr>
<tr>
<td>Middle East</td>
<td>3</td>
<td>3.8</td>
<td>#</td>
<td>87</td>
<td>96.2</td>
<td>(90.1 - 98.6)</td>
</tr>
<tr>
<td>New Zealand</td>
<td>7</td>
<td>4.3</td>
<td>(2.1 - 8.8)</td>
<td>150</td>
<td>95.7</td>
<td>(91.2 - 97.9)</td>
</tr>
<tr>
<td>North East Asia</td>
<td>1</td>
<td>1.4</td>
<td>#</td>
<td>78</td>
<td>98.6</td>
<td>(93.0 - 99.7)</td>
</tr>
<tr>
<td>Northern Europe</td>
<td>1</td>
<td>3.1</td>
<td>#</td>
<td>22</td>
<td>96.9</td>
<td>(80.4 - 99.6)</td>
</tr>
<tr>
<td>Other Africa</td>
<td>5</td>
<td>5.2</td>
<td>(2.2 - 11.9)</td>
<td>84</td>
<td>94.8</td>
<td>(88.1 - 97.8)</td>
</tr>
<tr>
<td>Other Southern Europe</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>14</td>
<td>8.8</td>
<td>(5.3 - 14.3)</td>
<td>143</td>
<td>91.2</td>
<td>(85.7 - 94.7)</td>
</tr>
<tr>
<td>Other Western Europe</td>
<td>17</td>
<td>8.4</td>
<td>(5.3 - 13.0)</td>
<td>190</td>
<td>91.6</td>
<td>(87.0 - 94.7)</td>
</tr>
<tr>
<td>Russian Federation,</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baltic States and</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Central Asia</td>
<td>5</td>
<td>10.6</td>
<td>(4.7 - 21.9)</td>
<td>46</td>
<td>89.4</td>
<td>(78.1 - 95.3)</td>
</tr>
<tr>
<td>South East Asia</td>
<td>4</td>
<td>1.7</td>
<td>#</td>
<td>203</td>
<td>98.3</td>
<td>(95.4 - 99.4)</td>
</tr>
<tr>
<td>Southern Asia</td>
<td>2</td>
<td>2.4</td>
<td>#</td>
<td>95</td>
<td>97.6</td>
<td>(92.4 - 99.3)</td>
</tr>
<tr>
<td>South and Central</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>America and Caribbean</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>43</td>
<td>100.0</td>
<td>-</td>
</tr>
<tr>
<td>U.K. and Ireland</td>
<td>137</td>
<td>7.6</td>
<td>(6.5 - 9.0)</td>
<td>1651</td>
<td>92.4</td>
<td>(91.0 - 93.5)</td>
</tr>
<tr>
<td>USA and Canada</td>
<td>1</td>
<td>1.9</td>
<td>#</td>
<td>74</td>
<td>98.1</td>
<td>(91.9 - 99.6)</td>
</tr>
<tr>
<td>Vietnam</td>
<td>1</td>
<td>0.4</td>
<td>#</td>
<td>73</td>
<td>99.6</td>
<td>(94.3 – 100.0)</td>
</tr>
<tr>
<td><strong>Overall</strong></td>
<td><strong>853</strong></td>
<td><strong>5.0</strong></td>
<td><strong>(4.7 - 5.3)</strong></td>
<td><strong>16280</strong></td>
<td><strong>95.0</strong></td>
<td><strong>(94.7 - 95.3)</strong></td>
</tr>
</tbody>
</table>

Source: Health Monitor 2005. † †† Statistically significantly higher or lower (p<0.05) than the other categories combined. # Insufficient numbers for statistical tests. Note: The weighting of data can result in rounding discrepancies or totals not adding. Unknown and Not Stated responses are not reported.
3.5 In more depth – Language spoken at home

Table 3.4 describes the main language spoken at home as reported by respondents aged 18 years and over using the Health Monitor dataset (n=17,140). Respondents with osteoporosis were significantly less likely to speak English and significantly more likely to speak German, Greek, or Italian.

Table 3.4: Osteoporosis prevalence by language spoken at home, age 18 years and over

<table>
<thead>
<tr>
<th>Language</th>
<th>Osteoporosis</th>
<th>No Osteoporosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cambodian</td>
<td>-</td>
<td>2 (100.0)</td>
</tr>
<tr>
<td>Cantonese</td>
<td>1 (0.9)</td>
<td>32 (99.1)</td>
</tr>
<tr>
<td>Chinese</td>
<td>-</td>
<td>55 (100.0)</td>
</tr>
<tr>
<td>Croatian</td>
<td>3 (9.2)</td>
<td>30 (90.8)</td>
</tr>
<tr>
<td>Dutch</td>
<td>2 (20.8)</td>
<td>7 (79.2)</td>
</tr>
<tr>
<td>English</td>
<td>782 (4.8)</td>
<td>15443 (95.2)</td>
</tr>
<tr>
<td>Filipino</td>
<td>-</td>
<td>24 (100.0)</td>
</tr>
<tr>
<td>German</td>
<td>5 (12.0)</td>
<td>39 (88.0)</td>
</tr>
<tr>
<td>Greek</td>
<td>12 (12.9)</td>
<td>81 (87.1)</td>
</tr>
<tr>
<td>Italian</td>
<td>32 (17.3)</td>
<td>153 (82.7)</td>
</tr>
<tr>
<td>Polish</td>
<td>2 (4.9)</td>
<td>44 (95.1)</td>
</tr>
<tr>
<td>Serbian</td>
<td>1 (4.9)</td>
<td>26 (95.1)</td>
</tr>
<tr>
<td>Spanish</td>
<td>-</td>
<td>30 (100.0)</td>
</tr>
<tr>
<td>Vietnamese</td>
<td>-</td>
<td>63 (100.0)</td>
</tr>
<tr>
<td>Arabic languages/ Afghan/ Farsi/ Turkish</td>
<td>2 (2.3)</td>
<td>91 (97.7)</td>
</tr>
<tr>
<td>Russian / Latvian / Lithuanian/ Albanian</td>
<td>4 (13.4)</td>
<td>26 (86.6)</td>
</tr>
<tr>
<td>Czech / Romanian / Hungarian/ Bulgarian/ Bosnian</td>
<td>4 (14.4)</td>
<td>27 (85.6)</td>
</tr>
<tr>
<td>Other Asian language (eg Hindi/ Bengali/ Urdu / Mandarin / Japanese / Korean / Indonesian)</td>
<td>-</td>
<td>66 (100.0)</td>
</tr>
<tr>
<td>Other European language (eg Swedish / French / Norwegian / Maltese)</td>
<td>2 (6.9)</td>
<td>28 (93.1)</td>
</tr>
<tr>
<td>African languages (inc Afrikaans)</td>
<td>-</td>
<td>13 (100.0)</td>
</tr>
<tr>
<td>Aboriginal languages</td>
<td>1 (23.0)</td>
<td>3 (77.0)</td>
</tr>
</tbody>
</table>

Overall 854 (5.0) 16282 (95.0)

Source: Health Monitor 2005

↑↓ Statistically significantly higher or lower (p<0.05) than the other categories combined.

Note: The weighting of data can result in rounding discrepancies or totals not adding.

Note: Unknown and Not Stated responses are not reported.

# Insufficient numbers for statistical tests.
3.6 Summary

In general, respondents with osteoporosis are statistically significantly more likely to be female and aged 55 years and over. These respondents were also more likely to: live alone, be widowed, or not have children in the household. Those self-reporting that they had osteoporosis were generally from lower socioeconomic groups (unemployed, earn a gross income of less than $40,000, belong to the middle SEIFA category, and only have an education up to the level of secondary school). These factors will impact on how health promotion information is presented and how easily this information and services are accessed.

It is also of note that respondents were statistically significantly more likely to come from overseas countries and speak a language other than English at home. This is of particular importance when considering targeting of health promotion information and campaigns. These results were supported by the more specific analysis of country of birth and language spoken at home data which determined that respondents with osteoporosis are statistically significantly more likely to come from European countries and speak German, Greek or Italian.
CHAPTER 4: OSTEOPOROSIS
PREVALENCE TRENDS AND PROJECTIONS
4.1 Introduction

The trend in disease prevalence is of particular importance when determining whether a condition is increasing or decreasing in the population, and consequently whether programs and campaigns are effective or ineffective. Projections are also of interest when identifying what impact a disease may have into the future and which population groups may be at greatest risk, which assists with program development and targeting.

4.2 Data source

As data relating to the prevalence of osteoporosis have been collected using HOS since 1995, these data can be used to determine the trend in the prevalence of osteoporosis over time. Additionally, these trends can be used to project the prevalence of osteoporosis. The methodology of HOS is presented in detail in Appendix 1.

4.3 Osteoporosis prevalence trends and projections

4.3.1 Trends in the prevalence of osteoporosis between 1995 and 2005

The analysis of HOS data involves comparison of the rates of occurrence of osteoporosis across different subgroups of the population. However, most health related topics (including osteoporosis) are closely related to the age and sex of the respondent - older people typically have poorer health than younger people and females tend to live longer than males. Age-sex standardisation is used to account for the differences in the age and sex distributions of populations being compared.

The age-sex standardisation prevalence is that which would have been observed at another point in time or other geographic area should the actual population have the standard age-sex composition.

Figure 4-1 illustrates the age-sex standardised prevalence of osteoporosis in the South Australian population 18 years and over for the period between 1995 and 2006. The data have been standardised to the 2001 Census figures for the South Australian population. It is important to note that the Health Omnibus survey did not include a question on osteoporosis in the years 1996 and 2000. In addition, in the years 1998 and 2004 there were two Health Omnibus surveys conducted, both including a question on osteoporosis. In order to conduct the trend analysis, only the second survey from 1998 and the second survey from 2004 were used.
Overall, there has been a statistically significant increasing trend in osteoporosis prevalence in South Australia over the period of 1995 to 2006 ($\chi^2$ test for trend, $\chi^2 = 59.74$, $p < 0.001$). The greatest increase in prevalence has occurred between 2002 and 2005, perhaps due to early diagnosis or increased awareness.

The age-sex standardised prevalence of osteoporosis among South Australians aged 50 years and over for the period between 1995 and 2006 was also determined, using the 2001 Census figures for the South Australian population. Overall, there has been a statistically significant increasing trend in osteoporosis prevalence in South Australia over the period of 1995 to 2006 among those aged 50 years and over ($\chi^2$ test for trend, $\chi^2 = 102.91$, $p < 0.001$). The greatest increase in prevalence has occurred since 2003, particularly among females (Figure 4-5), again perhaps due to early diagnosis or increased awareness.
Figure 4-2  Age-sex standardised prevalence of osteoporosis 1995 to 2006, South Australia, 50 years and over

Source: HOS 1995-2006
4.3.2 Projections in the prevalence of osteoporosis

It is important to be able to estimate the number of people who are likely to have osteoporosis in the future, in order for policy-makers and health service planners to effectively plan for the future needs of the population.

Using HOS we can predict the prevalence of osteoporosis in the South Australian population in the future and therefore the need for healthcare and other services.

Figure 4-3 shows the overall trend in osteoporosis prevalence, with the prevalence projected to 2020. The graph demonstrates that the prevalence of osteoporosis in South Australians aged 18 years and over is expected to increase in the coming years if the current rate of increase remains the same.

Source: HOS 1995-2006

**Figure 4-3: Overall projected prevalence of osteoporosis to 2020, South Australia, 18 years and over**
Figure 4-4 shows the trends and future projections in the prevalence of osteoporosis for males by age group. The projected prevalence until 2020 remains relatively stable except in the 65 years and over age group where there appears to be an increase in the prevalence over time.

**Figure 4-4**: Projected prevalence of osteoporosis to 2020 for males, by age groups, South Australia, 18 years and over
Figure 4-5 shows the trends and future projections in the prevalence of osteoporosis for females by age group. The projected prevalence of osteoporosis for females until 2020 appears to remain relatively stable except in the 65 years and over age group where there appears to be an increase in the prevalence over time.

![Graph showing trends and projections of osteoporosis prevalence by age group from 1995 to 2020.](image)

Source: HOS 1995-2005

**Figure 4-5: Projected prevalence of osteoporosis to 2020 for females, by age group, South Australia, 18 years and over**

However, it must be noted that Figure 4-4 and Figure 4-5 do not take into account increased levels of diagnosis, awareness campaigns, generational change as respondents move from one age group to another, or ageing of the population.

### 4.4 Summary

Planning for an increased prevalence in osteoporosis should begin now. The trends and projections indicate that the prevalence of osteoporosis is high in the older age groups and will increase, particularly in females, over the next 13 years to 2020. For males, the projections indicate that the prevalence will rise in the older age groups, which will have an ongoing impact as ageing occurs. As the population is ageing, this indicates that the number of people with osteoporosis will continue to rise and have a significant impact on the South Australian community. Adequate planning is required to decrease the burden on healthcare and other services and to improve services which promote prevention, early detection and maintenance of function.
CHAPTER 5: OSTEOPOROSIS AND ASSOCIATIONS WITH OTHER CHRONIC CONDITIONS
5.1 Introduction

Osteoporosis is often associated with people who have other chronic diseases. Osteoporosis has been shown to be more common in people who have chronic lung conditions such as asthma and chronic obstructive pulmonary disease (COPD),\textsuperscript{14} malabsorption disorders such as coeliac and Crohn’s disease, and musculoskeletal conditions such as rheumatoid arthritis.

Those with a chronic illness are more likely to have multiple risk factors for osteoporosis such as; immobility from prolonged bed-rest, low body weight from nutrient malabsorption, hyperthyroidism or over-treatment of hypothyroidism (especially with immune disorders such as Crohn’s and rheumatoid arthritis), and high lifetime cigarette consumption in the case of persons with emphysema.

The association may also be due to medications taken to treat chronic illness. Oral glucocorticosteroids are used to treat a wide range of inflammatory conditions, and treatment using more than five milligrams of prednisolone (or equivalent) daily led to a reduction in bone mineral density and a rapid increase in the risk of fracture during the treatment period. This increased fracture risk is independent of underlying disease, age and sex.\textsuperscript{15}

The association between osteoporosis and the following self-reported doctor-diagnosed chronic conditions are presented in this chapter:
- Diabetes;
- Asthma;
- Other respiratory problems such as emphysema, bronchitis, or chronic lung disease;
- Cardiovascular conditions;
- Arthritis; and
- Disability.

5.2 Data sources

The data presented in this chapter are from SAMSS using interviews conducted between July 2004 to June 2007 for respondents aged 18 years and older (n=16,513). The methodology of SAMSS is described in detail in Appendix 1.

5.3 Prevalence of osteoporosis

The overall prevalence of self-reported osteoporosis among people aged 18 years and over in South Australia is 4.4\% (95\% CI 4.1 – 4.7; n=727). This prevalence will be examined in conjunction with the other chronic conditions listed above.
5.4 Diabetes

A retrospective population-based cohort study of health care data from Ontario, Canada compared the risk of hip fractures among men and women with and without diabetes. It was found that compared to those without diabetes, individuals with diabetes had increased fracture risk in both men and women, even after adjusting for age, greater co-morbidities, the likelihood of having had a BMD test, and medication use, despite persons with diabetes having higher BMD, which is usually associated with lower fracture risk. This higher BMD is thought to be explained by higher body mass index (BMI) in patients with type 2 diabetes, although the increased fracture risk may be due to diabetic complications.

To determine the prevalence of diabetes in this report, respondents aged 18 years and over were asked if they had ever been told by a doctor that they had diabetes.

5.4.1 Prevalence of diabetes

The overall prevalence of current diabetes among people aged 18 years and over in South Australia is 6.8% (95% CI 6.4 – 7.2; n=1,124).

5.4.2 Osteoporosis and diabetes

Of the respondents with osteoporosis, 12.6% (95% CI 10.3 – 15.2; n=91) also had diabetes. This is a statistically significantly higher proportion compared to respondents with diabetes and no osteoporosis (Figure 5-1).
Chronic conditions

Osteoporosis in SA

12.6

6.5

Source: SAMSS July 2004 – June 2007

* Statistically significantly higher or lower (p<0.05) between diabetes and osteoporosis and diabetes and no osteoporosis

Figure 5-1: Prevalence of diabetes in respondents with and without osteoporosis, South Australia, 18 years and over

5.4.3 Sex and age profile of respondents with osteoporosis and diabetes

The sex of the 12.6% of respondents with osteoporosis and diabetes is shown in Figure 5-2.

Source: SAMSS July 2004 – June 2007

Figure 5-2: Distribution of respondents with osteoporosis and diabetes, by sex, South Australia, 18 years and over
Figure 5-3 shows the distribution of respondents with osteoporosis and diabetes by age group. The highest proportions of respondents are in the 55 to 64 year age group, 65 to 74 year age group and the 75 years and over age group.

Source: SAMSS July 2004 – June 2007

Figure 5-3: Distribution of respondents with osteoporosis and diabetes, by age groups, South Australia, 18 years and over

It was also determined whether there are significant differences between males and females and age groups in the proportion of respondents reporting that they had diabetes and osteoporosis. There was no statistically significant difference between the proportion of females with diabetes and osteoporosis compared to males with diabetes and osteoporosis (Figure 5-4).
Figure 5-4: Proportion of males and females with osteoporosis and diabetes, South Australia, 18 years and over

Figure 5-5 shows the proportion of respondents within each age group with osteoporosis and diabetes. There was no statistically significant difference between the proportion of respondents in each of the age groups.

Figure 5-5: Proportion of respondents within each age group with osteoporosis and diabetes, South Australia, 18 years and over
5.5 Asthma

People with asthma are at increased risk of developing osteoporosis. They often receive treatment with oral or inhaled corticosteroids. Oral corticosteroids are known to reduce BMD and increase fracture risk at doses of at least five milligrams per day, independent of underlying disease, age and sex. The role of inhaled corticosteroids has been more controversial, but a retrospective cohort study of the large General Practice Research Database in the UK found that users of inhaled corticosteroids had higher fracture rates than non-asthmatic controls. However, there was no difference between inhaled corticosteroid users and those with asthma who only used bronchodilators, suggesting that the increase in risk may be related more to the underlying respiratory disease than to inhaled corticosteroid.

The Australian Centre for Asthma Monitoring (ACAM) definition of asthma is used for this report. ACAM define an asthmatic as a person having been diagnosed with asthma and experiencing symptoms and/or receiving treatment in the last 12 months. Information was collected on people as to whether they had ever been told by a doctor that they had asthma, and had experienced symptoms (wheeze, shortness of breath or chest tightness) of asthma in the last 12 months, or had taken treatment for asthma in that last 12 months.

5.5.1 Prevalence of asthma

The overall prevalence of current asthma among people aged 18 years and over in South Australia is 13.5% (95% CI 13.0 – 14.0; n=2,224).

5.5.2 Osteoporosis and asthma

Of the respondents with osteoporosis, 20.7% (95% CI 17.9 – 23.8; n=151) also had asthma. This is a statistically significantly higher proportion compared to respondents with asthma and no osteoporosis. This is shown in Figure 5-6.
Chronic conditions

Osteoporosis in SA

Prevalence (%)

Asthma

![Bar graph showing prevalence of asthma in respondents with and without osteoporosis](source)

- **20.7%** with osteoporosis
- **13.1%** without osteoporosis

* Statistically significantly higher or lower (p<0.05) between asthma and osteoporosis compared to asthma and no osteoporosis

**Figure 5-6:** Prevalence of asthma in respondents with and without osteoporosis, South Australia, 18 years and over

### 5.5.3 Sex and age profile of respondents with osteoporosis and asthma

The sex of the 20.7% of respondents with osteoporosis and asthma is shown in Figure 5-7.

![Pie chart showing sex distribution](source)

- **83.4%** Males
- **16.6%** Females

**Figure 5-7:** Distribution of respondents with osteoporosis and asthma, by sex, South Australia, 18 years and over
Figure 5-8 shows the distribution of respondents with osteoporosis and asthma by age group. The highest proportions of respondents are in the 65 to 74 year age group and the 75 years and over age group.

![Distribution of respondents with osteoporosis and asthma, by age groups, South Australia, 18 years and over](image)

Source: SAMSS July 2004 – June 2007

**Figure 5-8: Distribution of respondents with osteoporosis and asthma, by age groups, South Australia, 18 years and over**

It was determined whether there were significant differences between males and females and age groups in the proportion of respondents reporting that they had asthma and osteoporosis. There was no statistically significant difference between the proportion of females with asthma and osteoporosis compared to males with asthma and osteoporosis (Figure 5-9).

![Proportion of males and females with osteoporosis and asthma, South Australia, 18 years and over](image)

Source: SAMSS July 2004 – June 2007

**Figure 5-9: Proportion of males and females with osteoporosis and asthma, South Australia, 18 years and over**
There was no statistically significant difference between the proportions of respondents with asthma in each of the age groups (Figure 5-10).

![Figure 5-10: Proportion of respondents within each age group with osteoporosis and asthma, South Australia, 18 years and over](image)

**5.6 Other respiratory conditions**

Similar to asthma, osteoporosis has also been associated with other chronic respiratory diseases. These respiratory conditions share common treatments of oral and inhaled corticosteroids, which have both been shown to reduce BMD and increase fracture risk.14 15 18 Persons with emphysema also have usually been heavy smokers, which has been found to have an independent, dose-dependent effect on bone loss, which increased fracture risk.21

Respondents were asked if they had ever been told by a doctor that they have any other respiratory conditions such as bronchitis, emphysema, or chronic lung disease that had lasted six months or more.

**5.6.1 Prevalence of other respiratory conditions**

The prevalence of other respiratory conditions among people aged 18 years and over in South Australia is 4.5% (95% CI 5.1 – 5.8; n=745).
5.6.2 Osteoporosis and other respiratory conditions

Of the respondents with osteoporosis, 11.5% (95% CI 9.2 – 14.3; n=69) also had some form of other respiratory condition. This is a statistically significantly higher proportion compared to respondents with some form of other respiratory condition and no osteoporosis (Figure 5-11).

![Figure 5-11: Prevalence of other respiratory conditions in respondents with and without osteoporosis, South Australia, 18 years and over](image)

Source: SAMSS July 2004 – June 2007

* Statistically significantly higher or lower (p<0.05) between other respiratory condition and osteoporosis compared to other respiratory condition and no osteoporosis

5.6.3 Sex and age profile of respondents with osteoporosis and other respiratory conditions

The sex of the 11.5% of respondents with osteoporosis and other respiratory conditions is shown in Figure 5-12.

![Figure 5-12: Distribution of respondents with osteoporosis and other respiratory conditions, by sex, South Australia, 18 years and over](image)

Source: SAMSS July 2004 – June 2007
Figure 5-13 shows the distribution of respondents with osteoporosis and an “other” respiratory condition by age group. The highest proportions of respondents were in the 65 to 74 year age group and 75 years and over age group.

![Distribution of respondents with osteoporosis and other respiratory conditions, by age groups, South Australia, 18 years and over](image)

Source: SAMSS July 2004 – June 2007

**Figure 5-13: Distribution of respondents with osteoporosis and other respiratory conditions, by age groups, South Australia, 18 years and over**

It was also determined whether there were significant differences between males and females and age groups in the proportion of respondents reporting that they had a respiratory condition and osteoporosis. There was no statistically significant difference between the proportion of males and females who had osteoporosis and a respiratory condition (Figure 5-14).

![Proportion of males and females with osteoporosis and other respiratory condition, South Australia, 18 years and over](image)

Source: SAMSS July 2004 – June 2007

**Figure 5-14: Proportion of males and females with osteoporosis and other respiratory condition, South Australia, 18 years and over**
There was no statistically significant difference between age groups in the proportion who had osteoporosis and a respiratory condition (Figure 5-15).

![Bar chart showing prevalence of osteoporosis and respiratory conditions by age group](image)


**Figure 5-15: Proportion of respondents within each age group with osteoporosis and other respiratory conditions, South Australia, 18 years and over**

### 5.7 Cardiovascular conditions

Low BMD has been associated with increased mortality from all causes, and also from cardiovascular conditions in some subgroups. The association may be mediated through the relationship between osteoporosis and low levels of physical activity. Persons undertaking low amounts of physical activity or with poor exercise tolerance may be more likely to have cardiovascular disease. Early menopause causes the drop in BMD associated with menopause to occur earlier, and also increases the risk of cardiovascular disease, therefore indicating a plausible relationship between osteoporosis and cardiovascular conditions. However, there has been little research on osteoporosis and cardiovascular disease outside of effects on menopause and mortality rates.

In the analysis that follows, respondents were asked if they had ever been told by a doctor that they have had any cardiovascular problems such as heart attack, angina, heart disease or stroke. The presence of any of these conditions indicates cardiovascular disease.
5.7.1 Prevalence of cardiovascular disease

Overall, 7.9% (95% CI 7.5 – 8.4; n=1309) of the respondents aged 18 years and over reported having been told by a doctor that they have some form of cardiovascular disease.

5.7.2 Osteoporosis and cardiovascular disease

Of the respondents with osteoporosis, 22.7% (95% CI 19.8 – 25.8; n=165) also had cardiovascular disease. This is a statistically significantly higher proportion compared to respondents with cardiovascular disease and no osteoporosis (Figure 5-16).

Source: SAMSS July 2004 – June 2007

* Statistically significantly higher or lower (p<0.05) between CVD and osteoporosis compared to CVD and no osteoporosis

Figure 5-16: Prevalence of cardiovascular disease in respondents with and without osteoporosis, South Australia, 18 years and over
5.7.3 Sex and age profile of respondents with osteoporosis and cardiovascular disease

The sex of the 22.7% of respondents with osteoporosis and cardiovascular disease is shown in Figure 5-17.

![Figure 5-17: Distribution of respondents with osteoporosis and cardiovascular conditions, by sex, South Australia, 18 years and over](image1)

Source: SAMSS July 2004 – June 2007

Figure 5-18 shows the distribution of respondents with osteoporosis and cardiovascular disease by age group. The highest proportion of respondents is in the 75 years and over age group.

![Figure 5-18: Distribution of respondents with osteoporosis and cardiovascular disease, by age groups, South Australia, 18 years and over](image2)

Source: SAMSS July 2004 – June 2007
It was determined whether there were significant differences between males and females and age groups in the proportion of respondents reporting that they had cardiovascular disease and osteoporosis. There was a statistically significantly higher proportion of males with cardiovascular disease and osteoporosis compared to females with cardiovascular disease and osteoporosis ($\chi^2=9.14$, $p=0.003$, Figure 5-19).

![Figure 5-19: Proportion of males and females with osteoporosis and cardiovascular disease, South Australia, 18 years and over](image1)

Source: SAMSS July 2004 – June 2007
* Statistically significantly higher or lower ($p<0.05$) than the other categories combined

There was a statistically significantly lower proportion of respondents with osteoporosis and cardiovascular disease aged between 18 and 64 years and a statistically significantly higher proportion of respondents with osteoporosis and cardiovascular disease aged 75 years and over when all of the age groups were compared ($\chi^2=47.41$, $p<0.001$, Figure 5-20).

![Figure 5-20: Proportion of respondents within each age group with osteoporosis and cardiovascular disease, South Australia, 18 years and over](image2)

Source: SAMSS July 2004 – June 2007
* Statistically significantly higher or lower ($p<0.05$) than the other categories combined

Osteoporosis in SA
5.8 Arthritis

There are many types of arthritis. The most common is osteoarthritis (OA), which occurs as a result of biochemical changes and biomechanical stresses affecting articular cartilage. Rheumatoid arthritis (RA) is an inflammatory condition where the body attacks the joints, and has been associated with osteoporosis and increased risk of fractures. Research studies indicate that persons with osteoarthritis have higher BMD, however, this may not protect against fracture in these individuals, due to the increased risk of falls.\(^{23}\)

A case control study of adults aged over 40 years with RA from the British General Practice Research Database\(^{24}\) matched by age, sex, length of time since diagnosis of RA, and practice showed that compared with controls, patients with RA had an increased risk of fracture, which was most marked at the hip (RR 2.0, 95% CI 1.8-2.3) and the spine (RR 2.4, 95% CI 2.0-2.8). Indicators of a substantially elevated risk of fracture (at the hip) included greater than 10 years duration of RA (RR 3.4, 95% CI 3.0-3.9), low BMI (RR 3.9, 95% CI 3.1-4.9), and use of oral corticosteroids (RR 3.4, 95% CI 3.0-4.0).\(^{24}\) Osteoporosis is now more widely recognised as a complication of RA, correspondingly, prevention and management of osteoporosis is more common than it once was. One study reports that 48% had received a BMD test or medication for osteoporosis, and 64% of patients were taking at least five milligrams per day of prednisolone.\(^{25}\)

In the following analysis, respondents were asked if they had ever been told by a doctor that they had arthritis.

5.8.1 Prevalence of arthritis

The overall prevalence of arthritis among people aged 18 years and over in South Australia is 21.5% (95% CI 20.8 – 22.1; n=3,545).

5.8.2 Osteoporosis and arthritis

Of the respondents with osteoporosis, 58.9% (95% CI 55.3 – 62.4; n=428) also had arthritis. This is a statistically significantly higher proportion of respondents with arthritis and osteoporous compared to respondents with arthritis and no osteoporosis. This is shown in Figure 5-21.
Osteoporosis in SA

5.8.3 Sex and age profile of respondents with osteoporosis and arthritis

The sex profile of the 58.9% with osteoporosis and arthritis is shown in Figure 5-22.

Figure 5-21: Prevalence of arthritis in respondents with and without osteoporosis, South Australia, 18 years and over

Figure 5-22: Distribution of respondents with osteoporosis and arthritis, by sex, South Australia, 18 years and over

Source: SAMSS July 2004 – June 2007
* Statistically significantly higher or lower (p<0.05) arthritis and osteoporosis compared to arthritis and no osteoporosis
Figure 5-23 shows the distribution of respondents with osteoporosis and arthritis by age group. The highest proportion of respondents is in the 75 years and over age group.

![Pie chart showing distribution of respondents with osteoporosis and arthritis by age group.]

Source: SAMSS July 2004 – June 2007

Figure 5-23: Distribution of respondents with osteoporosis and arthritis, by age groups, South Australia, 18 years and over

It was also determined whether there were significant differences between males and females and age groups in the proportion of respondents reporting that they had osteoporosis and arthritis. There was no statistically significant difference between sex in the proportion of respondents who had osteoporosis and arthritis (Figure 5-24).

![Bar chart showing prevalence of osteoporosis and arthritis in males and females.]

Source: SAMSS July 2004 – June 2007

Figure 5-24: Proportion of males and females with osteoporosis and arthritis, South Australia, 18 years and over
There was a statistically significantly lower proportion of respondents with osteoporosis and arthritis aged between 18 to 54 years and a statistically significantly higher proportion of respondents with osteoporosis and arthritis aged 65 years and over when all of the age groups are compared ($\chi^2=27.63$, p<0.001; Figure 5-25).

Figure 5-25: Proportion of respondents within each age group with osteoporosis and arthritis, South Australia, 18 years and over

5.9 Disability

Most of the disability research on osteoporosis has been done in the context of disability after bone fractures. An American cohort study found that new vertebral deformities were associated with limitations in several functional activities, particularly pushing or pulling a large object (OR 2.51, 95% CI 1.40 - 4.52). Women who had both vertebral deformity and back symptoms had greater limitations than would be expected from the additive contribution of both conditions.26

Disability is the greatest after fractures of the hip (94% with days in bed and 100% with having limited activity days) and lumbar vertebrae (an average of 25.8 bed days and a mean of 158.5 limited activity days). Substantial disability was also reported after fractures of the thoracic vertebrae, humerus, distal forearm, ankle and foot. Within fracture types, post-fracture disability was highly variable, ranging from none to more than six months.26
In the following analysis, respondents were asked if they had any disability. Disability was defined as any physical, mental or emotional problems or limitations the respondent had in their daily life.

5.9.1 Prevalence of disability

The prevalence of disability was 21.2% (95% 20.6 – 21.8; n=3,497) in the South Australian population aged 18 years and over.

5.9.2 Osteoporosis and disability

Of the respondents with osteoporosis, 50.5% (95% CI 46.8 – 54.1; n=367) also reported having a disability. This is a statistically significantly higher proportion compared to respondents with a disability and no osteoporosis. This is shown in Figure 5-26.

![Figure 5-26: Prevalence of disability in respondents with and without osteoporosis, South Australia, 18 years and over](image)

Source: SAMSS July 2004 – June 2007

* Statistically significantly higher or lower (p<0.05) disability and osteoporosis compared to disability and no osteoporosis

**Figure 5-26: Prevalence of disability in respondents with and without osteoporosis, South Australia, 18 years and over**
5.9.3 Sex and age profile of respondents with osteoporosis and disability

The sex of the 50.5% of respondents with osteoporosis and disability is shown in Figure 5-27.

Figure 5-27: Distribution of respondents with osteoporosis and disability, by sex, South Australia, 18 years and over

Figure 5-28 shows the distribution of respondents with osteoporosis and disability by age group. The highest proportions of respondents are in the 55 to 64 year age group, the 65 to 74 year age group, and the 75 years and over age group.

Figure 5-28: Distribution of respondents with osteoporosis and disability, by age groups, South Australia, 18 years and over

Source: SAMSS July 2004 – June 2007
It was also determined whether there were significant differences between males and females and age groups in the proportion of respondents reporting that they had a disability and osteoporosis. There was no statistically significant difference between sex in the proportion of respondents who had a disability and osteoporosis (Figure 5-29).

![Figure 5-29: Proportion of males and females with osteoporosis and disability, South Australia, 18 years and over](image)

Source: SAMSS July 2004 – June 2007
* Statistically significantly higher or lower (p<0.05) than the other categories combined

There was a statistically significantly higher proportion of respondents with osteoporosis and disability in the 75 years and over age group and a statistically significantly lower proportion of respondents with osteoporosis and disability in the 55 to 64 year age group and the 65 to 74 year age group ($\chi^2=17.12, p=0.002$, Figure 5-30).

![Figure 5-30: Proportion of respondents within each age group with osteoporosis and disability, South Australia, 18 years and over](image)

Source: SAMSS July 2004 – June 2007
* Statistically significantly higher or lower (p<0.05) than the other categories combined
5.10 Summary

The literature highlighted in this chapter indicates that osteoporosis is often associated with another chronic condition. Data obtained from SAMSS indicates that those respondents self-reporting that they have osteoporosis are also likely to self-report that they have another chronic condition.

Overall, respondents with osteoporosis were statistically significantly more likely to report also having diabetes, asthma, cardiovascular disease, arthritis, a disability or some other respiratory disease than those without osteoporosis. Males were statistically significantly more likely to have osteoporosis associated with cardiovascular disease.

Respondents reporting that they had arthritis associated with osteoporosis were:
> statistically significantly less likely to be 18 to 54 years of age; or
> statistically significantly more likely to be 65 years and over.

Respondents reporting that they had CVD associated with osteoporosis were:
> statistically significantly less likely to be 18 to 64 years of age; or
> statistically significantly more likely to be 75 years and over.

Respondents reporting that they had a disability associated with osteoporosis were:
> statistically significantly less likely to be 55 to 74 years of age; or
> statistically significantly more likely to be 75 years of age and over.

This chapter highlights the association between osteoporosis and other chronic conditions. This has implications for targeting and treatments as limitations are imposed not only by osteoporosis but also by the associated chronic conditions. The evidence also suggests that males and females are impacted differently, as are different age groups, which may also affect program targeting.
CHAPTER 6: OSTEOPOROSIS AND ASSOCIATIONS WITH RISK FACTORS
6.1 Introduction

Risk factors associated with osteoporosis are considered to be a combination of age-related, hormonal, dietary, lifestyle and genetic factors, with the key factor being low bone mass.6

Inherited risk factors include race, being females, and genetic risk factors. Caucasians and Asians have lower bone mass than African people, and women have lower bone density than men.9 People who have relatives who have sustained fractures, or had other manifestations of osteoporosis such as dowager’s humps (also known as dorsal kyphoses), are more likely to have low BMD and/or fractures.27 28

Hormonal risk factors in females include early menopause (natural or surgical) or prolonged amenorrhea (absence of periods). Low testosterone in men has a similar effect on bone health but effects are felt later in life than in women.

Dietary risk factors include inadequate calcium intake. Dietary calcium is primarily obtained through ingestion of dairy foods, with the remainder from bony fish, almonds, oranges and green leafy vegetables.

The following self-reported risk factors are presented in this chapter:
- High blood pressure;
- High cholesterol;
- Underweight and overweight (which is determined from self-reported height and weight);
- Current smoking;
- Insufficient physical activity;
- Poor diet and nutrition, including eating less than five serves of vegetables per day and less than two serves of fruit per day; and
- Alcohol consumption leading to harm in the long term.

6.2 Data sources

The data source used for this chapter is SAMSS from July 2004 to June 2007 for respondents aged 18 years and older (n=16,513). The methodology of SAMSS is described in detail in Appendix 1.
6.3 High blood pressure

High blood pressure has been associated with higher bone mineral density, but some studies have reported this to disappear after adjustment for other factors. To some degree it may depend on which medications are taken to control high blood pressure, as thiazides and other potassium-sparing diuretics are associated with an increase in bone mineral density and reduction in fracture risk, and loop diuretics increase excretion of calcium from the kidneys and thus reduce bone density. Those with hypertension will take more than one type of anti-hypertensive medication after being diagnosed with high blood pressure and may be taking more than one type concurrently.

The definition of current high blood pressure used in this report includes all those who reported having doctor-diagnosed current high blood pressure and/or those who reported currently taking antihypertensive medication.

6.3.1 Prevalence of high blood pressure

The overall prevalence of self-reported current high blood pressure among people aged 18 years and over in South Australia is 19.0% (95% CI 18.4 – 19.6; n=3,140).

6.3.2 Osteoporosis and high blood pressure

Of the respondents with osteoporosis, 41.4% (95% CI 37.9 – 45.0; n=301) had high blood pressure. This is a statistically significantly higher proportion compared to respondents with high blood pressure and no osteoporosis. This is shown in Figure 6-1.

Source: SAMSS July 2004 – June 2007
* Statistically significantly higher or lower (p<0.05) between high blood pressure and osteoporosis and high blood pressure and no osteoporosis

Figure 6-1: Prevalence of high blood pressure in respondents with and without osteoporosis, South Australia, 18 years and over
6.3.3 Sex and age profile of respondents with osteoporosis and high blood pressure

The sex profile of the 41.4% of respondents with osteoporosis and high blood pressure is shown in Figure 6-2.

![Figure 6-2](image)

Source: SAMSS July 2004 – June 2007

**Figure 6-2**: Distribution of respondents with osteoporosis and high blood pressure, by sex, South Australia, 18 years and over

Figure 6-3 shows the distribution of respondents with osteoporosis and high blood pressure by age group. The highest proportion of respondents is in the 75 years and over age group.

![Figure 6-3](image)

Source: SAMSS July 2004 – June 2007

**Figure 6-3**: Distribution of respondents with osteoporosis and high blood pressure, by age groups, South Australia, 18 years and over
It was also determined whether there were significant differences between males and females and age groups in the proportion of respondents reporting that they had high blood pressure and osteoporosis. There was no statistically significant difference in the proportion of males and females who had high blood pressure and osteoporosis (Figure 6-4).

![Risk factors graph](image)

Source: SAMSS July 2004 – June 2007

**Figure 6-4:** Proportion of males and females with osteoporosis and high blood pressure, South Australia, 18 years and over

Respondents with high blood pressure and osteoporosis were statistically significantly more likely to be aged 75 years and over and statistically significantly less likely to be aged 45 to 54 years or 55 to 64 years when compared to the other age groups ($\chi^2=57.67$, $p<0.001$). This is shown in Figure 6-5.

![Age group graph](image)

Source: SAMSS July 2004 – June 2007

* Statistically significantly higher or lower ($p<0.05$) than other categories combined

**Figure 6-5:** Proportion of respondents within each age group with osteoporosis and high blood pressure, South Australia, 18 years and over
6.4 High cholesterol

Limited data are available on a link between cholesterol levels and osteoporosis. However, a class of cholesterol-lowering drugs known as statins has demonstrated the ability to induce bone formation. A case-control study of data from the General Practice Research Database in the UK investigated statin use in 81,880 adults aged over 50 years with fractures, and compared them with age-, sex-, and practice-matched controls. They concluded that the use of statins at dosages prescribed in clinical practice was not associated with a reduction in risk of fracture.34

The definition of self-reported current high cholesterol used in this report includes those who self-reported having doctor-diagnosed current high cholesterol and/or those who were currently taking medication for high cholesterol.

6.4.1 Prevalence of high cholesterol

The overall prevalence of current high cholesterol among people aged 18 years and over in South Australia is 14.6% (95% CI 14.1 – 15.2; n=2,414).

6.4.2 Osteoporosis and cholesterol

Of the respondents with osteoporosis, 31.9% (95% CI 28.6 – 35.4; n=232) had high cholesterol. This is a statistically significantly higher proportion compared to respondents with high cholesterol and no osteoporosis. This is shown in Figure 6-6.

Source: SAMSS July 2004 – June 2007
* Statistically significantly higher or lower (p<0.05) between high cholesterol and osteoporosis and high cholesterol and no osteoporosis

Figure 6-6: Prevalence of high cholesterol in respondents with and without osteoporosis, South Australia, 18 years and over
6.4.3 Sex and age profile of respondents with osteoporosis and high cholesterol

The sex profile of the 31.9% of respondents with osteoporosis and high cholesterol is shown in Figure 6-7.

![Pie chart showing sex profile]

Source: SAMSS July 2004 – June 2007

**Figure 6-7**: Distribution of respondents with osteoporosis and high cholesterol, by sex, South Australia, 18 years and over

Figure 6-8 shows the distribution of respondents with osteoporosis and high cholesterol by age group. The highest proportions of respondents are in the 65 to 74 year age group and the 75 years and over age group.

![Pie chart showing age distribution]

Source: SAMSS July 2004 – June 2007

**Figure 6-8**: Distribution of respondents with osteoporosis and high cholesterol, by age groups, South Australia, 18 years and over
It was determined whether there were significant differences between males and females and age groups in the proportion of respondents reporting that they had high cholesterol and osteoporosis. There was no statistically significant difference in the proportion of males and females who had high cholesterol and osteoporosis (Figure 6-9).

![Figure 6-9: Proportion of males and females with osteoporosis and high cholesterol, South Australia, 18 years and over](image)

Source: SAMSS July 2004 – June 2007

Respondents with high cholesterol and osteoporosis were statistically significantly more likely to be aged 75 years and over and statistically significantly less likely to be aged 45 to 54 years when compared to the other age groups ($\chi^2=21.56$, $p<0.001$, Figure 6-10).

![Figure 6-10: Proportion of respondents within each age group with osteoporosis and high cholesterol, South Australia, 18 years and over](image)

Source: SAMSS July 2004 – June 2007

Statistically significantly higher or lower ($p<0.05$) than other categories combined
6.5 Body mass index

Low body mass index (BMI) is a risk factor for osteoporosis and osteoporotic fractures. When compared with a BMI of 25 kg/m² (the upper limit of healthy BMI) a BMI of 20 kg/m² was associated with a nearly twofold increase in risk ratio (RR=1.95; 95% CI 1.71-2.22) for fractures of the hip. In contrast, a BMI of 30 kg/m², when compared with a BMI of 25 kg/m², was associated with only a 17% reduction in hip fracture risk (RR=0.83; 95% CI 0.69-0.99). This increase in fracture risk is largely independent of age and sex, but dependent on underlying bone density. The association between low BMI and osteoporosis is consistent enough that it is usually included in algorithms used to predict whether someone is likely to have osteoporosis.

For this report, respondents aged 18 years and over were asked for their height and weight. These measurements were used to calculate BMI. The BMI categories are defined using the World Health Organization (WHO) criteria (Table 6.1).

BMI was calculated using self-reported height and weight using the following formula:

\[ \text{BMI} = \frac{\text{weight (kg)}}{\text{height (m)}^2} \]

<table>
<thead>
<tr>
<th>Category</th>
<th>Criteria (kg/m²)</th>
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<tr>
<td>Underweight</td>
<td>&lt; 18.50</td>
</tr>
<tr>
<td>Normal</td>
<td>18.50 - &lt; 25.00</td>
</tr>
<tr>
<td>Overweight</td>
<td>25.00 - &lt; 30.00</td>
</tr>
<tr>
<td>Obese</td>
<td>≥ 30.00</td>
</tr>
</tbody>
</table>

6.5.1 Prevalence of underweight, normal, overweight and obese

The prevalence of overweight and obesity among people aged 18 years and over in South Australia is shown in Table 6.2.

<table>
<thead>
<tr>
<th>BMI Category</th>
<th>n</th>
<th>%</th>
<th>(95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underweight</td>
<td>314</td>
<td>2.0</td>
<td>(1.8 - 2.3)</td>
</tr>
<tr>
<td>Normal</td>
<td>6536</td>
<td>42.2</td>
<td>(41.4 - 42.9)</td>
</tr>
<tr>
<td>Overweight</td>
<td>5629</td>
<td>36.3</td>
<td>(35.5 - 37.1)</td>
</tr>
<tr>
<td>Obese</td>
<td>3027</td>
<td>19.5</td>
<td>(18.9 - 20.2)</td>
</tr>
<tr>
<td>Total</td>
<td>15506</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

Source: SAMSS July 2004 – June 2007
Note: The weighting of data can result in rounding discrepancies or totals not adding. Not all respondents (n=1008) were able to provide height and weight.
6.5.2 Osteoporosis and underweight, normal, overweight and obese

Respondents with osteoporosis were statistically significantly more likely to be underweight than respondents without osteoporosis and statistically significantly less likely to be overweight than respondents without osteoporosis. The prevalence of the four BMI categories among respondents with osteoporosis aged 18 years and over in South Australia is shown in Figure 6-11.

![Figure 6-11: BMI in respondents with and without osteoporosis, South Australia, 18 years and over](#)

Due to small numbers in the underweight category, respondents in the underweight and normal BMI categories were combined for the following analyses. Also, further analyses were not performed for respondents in the overweight category, even though there was a statistically significant difference between overweight respondents that had osteoporosis and those that did not. This was due to the fact that respondents with osteoporosis were less likely to be overweight, and therefore having a BMI in the overweight range was not classified as a risk factor.
6.5.3 Sex and age profile of respondents underweight and normal

The sex profile of the 2.0% of respondents with osteoporosis and who were classified as underweight or normal is shown in Figure 6-12.

Source: SAMSS July 2004 – June 2007

**Figure 6-12: Distribution of respondents with osteoporosis and underweight or normal, by sex, South Australia, 18 years and over**

Figure 6-13 shows the distribution of respondents with osteoporosis and underweight or normal by age group. The highest proportion of respondents is in the 75 years and over age group.

Source: SAMSS July 2004 – June 2007

**Figure 6-13: Distribution of respondents with osteoporosis and underweight or normal, by age groups, South Australia, 18 years and over**
It was also determined whether there were statistically significant differences between males and females and age groups in the proportion of respondents reporting an underweight or normal BMI and osteoporosis. There was a statistically significantly higher proportion of females in the underweight or normal BMI category who had osteoporosis compared with males with osteoporosis in the same category ($\chi^2=22.80$, $p<0.001$, Figure 6-14).

**Figure 6-14: Proportion of males and females with osteoporosis and underweight or normal BMI, South Australia, 18 years and over**

Respondents reporting an underweight or normal BMI and osteoporosis were statistically significantly more likely to be aged 75 years and over and statistically significantly less likely to be aged 55 to 64 years when compared to the other age groups ($\chi^2=22.80$, $p=0.004$). This is shown in Figure 6-15.
Risk factors

42.3 46.7 38.0 46.6 57.2

0 10 20 30 40 50 60 70

Prevalence (%) 18 to 44 years 45 to 54 years 55 to 64 years 65 to 74 years 75 years and over

Source: SAMSS July 2004 – June 2007
* Statistically significantly higher or lower (p<0.05) between BMI and osteoporosis and BMI and no osteoporosis

Figure 6-15: Proportion of respondents within each age group with osteoporosis and underweight or normal BMI, South Australia, 18 years and over

6.6 Smoking

Cigarette smoking has been associated with low BMD and increased fracture risk. A meta-analysis including 86 studies and 40,753 people found that the bone density of smokers is approximately 10% of one standard deviation lower than those who had never smoked. Absolute effect sizes at most bone sites were the greatest for current smokers compared with non smokers, intermediate for current smokers compared with former smokers and lowest for former smokers compared with non smokers. This suggests smoking cessation may have a positive influence on bone mass. Cigarette smoking was shown to increase lifetime fracture risk at the hip by 31% in women and 40% in men, and in Australia persons in the lowest socioeconomic status groups have the highest rates of cigarette smoking and thus may be at greatest risk of osteoporotic fracture.

Given the public health implications of smoking on bone health, it is important that this information be incorporated into smoking prevention and cessation efforts.

This section presents results of answers from respondents who were asked a series of questions relating to smoking to determine if they were current smokers.
### 6.6.1 Prevalence of smoking

The overall prevalence of self-reported current smoking in people aged 18 years and over in South Australia is 18.9% (95% CI 18.3 – 19.5; n=3,127).

### 6.6.2 Osteoporosis and smoking

Of the respondents with osteoporosis, 11.0% (95% CI 8.9 – 13.5; n=80) were current smokers. Respondents with osteoporosis were statistically significantly less likely to be current smokers than respondents without osteoporosis (Figure 6-16).

![Figure 6-16: Prevalence of smoking in respondents with and without osteoporosis, South Australia, 18 years and over](source)

*Statistically significantly higher or lower (p<0.05) osteoporosis and current smoker compared to no osteoporosis and current smoker
6.6.3 Sex and age profile of respondents with osteoporosis and current smokers

The sex profile of the 11.0% of respondents with osteoporosis who were current smokers is shown in Figure 6-17.

![Pie chart showing sex profile of respondents with osteoporosis who were current smokers.]

Source: SAMSS July 2004 – June 2007

**Figure 6-17: Distribution of respondents with osteoporosis who were current smokers, by sex, South Australia, 18 years and over**

Figure 6-18 shows the distribution by age group of respondents with osteoporosis who were current smokers. The highest proportion of respondents is in the 75 years and over age group (21.0%).

![Pie chart showing age distribution of respondents with osteoporosis who were current smokers.]

Source: SAMSS July 2004 – June 2007

**Figure 6-18: Distribution of respondents with osteoporosis who were current smokers, by age groups, South Australia, 18 years and over**
It was also determined whether there were statistically significant differences between males and females and age groups in the proportion of respondents reporting that they were current smokers and have osteoporosis. There was no statistically significant difference in the proportion of males and females who were classified as current smokers and had osteoporosis (Figure 6-19).

Figure 6-19: Proportion of males and females with osteoporosis who were current smokers, South Australia, 18 years and over

There was a statistically significantly higher proportion of respondents with osteoporosis who were current smokers and aged between 18 and 54 years, and a statistically significantly lower proportion of respondents with osteoporosis who were current smokers in the 75 years and over age group ($\chi^2=53.80$, p<0.001). This is shown in Figure 6-20.

Figure 6-20: Proportion of respondents within each age group with osteoporosis and who were current smokers, South Australia, 18 years and over

Source: SAMSS July 2004 – June 2007

* Statistically significantly higher or lower (p<0.05) than other categories combined
6.7 Insufficient physical activity

Cross-sectional studies have shown associations between low levels of physical activity and low bone mineral density. Studies often control for physical activity when investigating other factors.

People who have a chronic illness may have reduced ability to participate in moderate to high levels of physical activity.

In this report, the level of physical activity undertaken by respondents was assessed using a number of different questions quantifying the amount and sessions of different types of physical activity. This definition is taken from the Physical Activity Survey of Australian Adults undertaken in 1999. Sufficient physical activity was calculated using the following definition:

Sufficient Activity = at least 150 minutes of walking, moderate, or vigorous exercise weighted by a factor of 2 to account for the greater intensity, per week.

This provides a definition of sufficient physical activity to provide a health benefit.

6.7.1 Prevalence of physical activity

The overall prevalence of self-reported insufficient physical activity among people aged 18 years and over in South Australia is shown in Table 6.3.

Table 6.3: Prevalence of insufficient physical activity, South Australia, 18 years and over

<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>%</th>
<th>(95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No physical activity/sedentary</td>
<td>3082</td>
<td>18.9</td>
<td>(18.3 - 19.5)</td>
</tr>
<tr>
<td>Some physical activity, but not sufficient</td>
<td>5039</td>
<td>30.8</td>
<td>(30.1 - 31.5)</td>
</tr>
<tr>
<td>Sufficient activity</td>
<td>8225</td>
<td>50.3</td>
<td>(49.5 - 51.1)</td>
</tr>
<tr>
<td>Total</td>
<td>16346</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

Source: SAMSS July 2004 – June 2007
Note: The weighting of data can result in rounding discrepancies or totals not adding. Not all respondents able to provided a time spent undertaking physical activity (n=167)
6.7.2 Osteoporosis and insufficient physical activity

Of the respondents with osteoporosis, 36.1% (95% CI 32.6 – 39.7; n=258) were not physically active. This is a statistically significantly higher proportion compared to respondents that do not have osteoporosis (Figure 6-21).

![Figure 6-21: Proportion of respondents with and without osteoporosis, not undertaking activity, South Australia, 18 years and over](source)

* Statistically significantly higher or lower (p<0.05) osteoporosis and no activity compared to no osteoporosis and no activity

6.7.3 Sex and age profile of respondents with osteoporosis who do not undertake physical activity

The sex of the 36.1% of respondents with osteoporosis and who were classified as sedentary is shown in Figure 6-22.

![Figure 6-22: Distribution of respondents with osteoporosis and who were sedentary, by sex, South Australia, 18 years and over](source)
Figure 6-23 indicates that the largest proportion of respondents with osteoporosis who did not undertake physical activity were in the 75 years and over age group.

Figure 6-23: Distribution of respondents with osteoporosis who were sedentary, by age groups, South Australia, 18 years and over

It was also determined whether there were statistically significant differences between males and females and age groups in the proportion of respondents classified as sedentary who have osteoporosis. There was no statistically significant difference in the proportion of males and females who were classified as sedentary and had osteoporosis (Figure 6-24).

Figure 6-24: Proportion of males and females with osteoporosis who are classified as sedentary, South Australia, 18 years and over
There was a statistically significantly higher proportion of respondents with osteoporosis in the 75 years and over age group who did not undertake physical activity and a statistically significantly lower proportion of respondents with osteoporosis aged between 55 and 74 years who did not undertake physical activity ($\chi^2=49.83$, p<0.001). This is shown in Figure 6-25.

**Figure 6-25: Proportion of respondents within each age group with osteoporosis and classified as sedentary, South Australia, 18 years and over**

6.8 Vegetable serves per day

The Australian Guide to Healthy Eating\textsuperscript{43} recommends that adults should be eating at least five serves of vegetables per day as part of an overall healthy diet.

Calcium is an important mineral for bone health as it forms part of the bone matrix. Although the majority of dietary calcium is ingested from dairy foods, vegetable sources are also an important source of dietary calcium. Other nutrients also need to be present to ensure optimal absorption of calcium (such as Vitamin C, magnesium, and potassium), and therefore a balanced diet including vegetables is important. Few studies have investigated any association with vegetable intake and osteoporosis. However, vegetable intake has been suggested to be protective against pre-menopausal bone loss,\textsuperscript{44} and to be protective against bone loss in older men,\textsuperscript{45} but another study found no effect.\textsuperscript{46}
A cross-sectional study found that anti-oxidant carotenoids (found in vegetables and fruits) were associated with BMD in post-menopausal women.\textsuperscript{47} Also, high vegetable consumption is likely to be substituted for consumption of processed foods that are often high in salt, as high salt consumption may also be associated with osteoporosis.\textsuperscript{48}

### 6.8.1 Prevalence of eating recommended serves of vegetables each day

The proportion of respondents eating less than five serves of vegetables per day is 89.3\% (95\% CI 88.8 – 89.7; \(n=14740\)) in the South Australian population aged 18 years and over.

### 6.8.2 Osteoporosis and respondents eating less than five serves of vegetables each day

Of the respondents with osteoporosis, 88.0\% (95\% CI 85.4 – 90.2; \(n=640\)) were eating less than the recommended five serves of vegetables per day. There was no statistically significant difference between respondents with osteoporosis and those without osteoporosis in the proportion of respondents eating less than the recommended five serves of vegetables per day. This is shown in Figure 6-26.

![Figure 6-26: Proportion of respondents with and without osteoporosis who ate less than five serves of vegetables per day, South Australia, 18 years and over](source)

Source: SAMSS July 2004 – June 2007

**Figure 6-26:** Proportion of respondents with and without osteoporosis who ate less than five serves of vegetables per day, South Australia, 18 years and over
6.8.3 Sex and age profile of respondents with osteoporosis eating less than five serves of vegetables

The sex of the 88.0% of respondents with osteoporosis who were eating less than the recommended five serves of vegetables per day is shown in Figure 6-27.

Source: SAMSS July 2004 – June 2007

**Figure 6-27: Distribution of respondents with osteoporosis who ate less than five serves of vegetables per day, by sex, South Australia, 18 years and over**

Figure 6-28 indicates that the largest proportion of respondents with osteoporosis who ate less than five serves of vegetables per day were in the 75 years and over age group.

Source: SAMSS July 2004 – June 2007

**Figure 6-28: Distribution of respondents with osteoporosis who ate less than five serves of vegetables per day, by age groups, South Australia, 18 years and over**
It was also determined whether there were statistically significant differences between males and females and age groups in the proportion of respondents who did not eat five serves of vegetables per day and who have osteoporosis. It was found that there was no statistically significant difference in the proportion of males and females who did not eat five serves of vegetables per day and had osteoporosis (Figure 6-29).

Source: SAMSS July 2004 – June 2007

**Figure 6-29: Proportion of males and females with osteoporosis who ate less than five serves of vegetables per day, South Australia, 18 years and over**

There was no statistically significant difference between age groups for respondents who ate less than five serves of vegetables each day and who have osteoporosis (Figure 6-30).

Source: SAMSS July 2004 – June 2007

**Figure 6-30: Proportion of respondents within each age group with osteoporosis who ate less than five serves of vegetables per day, South Australia, 18 years and over**
6.9 Fruit serves per day

The Australian Guide to Healthy Eating recommends that adults should be eating at least two serves of fruit per day as part of an overall healthy diet.

Similar to the literature on vegetable consumption and osteoporosis, there have been few studies done that have looked at the association of fruit consumption with osteoporosis. Fruit intake has been suggested to be protective against pre-menopausal bone loss, as a number of other nutrients contained in fruits (such as Vitamin C, magnesium, and potassium) are required for calcium absorption.

There is little research on the effect of fruit consumption on osteoporosis or bone density. A study done as a subset of the Framingham Heart Study found that a diet high in fruit, vegetables and cereals was protective against low BMD in men (but not women). However, another cross-sectional study in older adults found no effect of fruit or vegetable consumption on bone density. There is also evidence from a cross-sectional study which found that anti-oxidant carotenoids (found in fruits and vegetables) are associated with BMD in post-menopausal women.

6.9.1 Prevalence of eating recommended serves of fruit each day

The proportion of respondents eating less than two serves of fruit per day was 57.9% (95% CI 57.1 – 58.6; n=16,513) in the South Australian population aged 18 years and over.

6.9.2 Osteoporosis and people eating less than two serves of fruit each day

Of the respondents with osteoporosis, 49.1% (95% CI 45.5 – 52.7; n=357) were eating less than the recommended two serves of fruit per day. This is a statistically significantly lower proportion compared to respondents that ate less than two serves of fruit per day and did not have osteoporosis. This is shown in Figure 6-31.
6.9.3 Sex and age profile of respondents with osteoporosis eating less than two serves of fruit per day

The sex of the 49.1% of respondents with osteoporosis who were eating less than the recommended two serves of fruit per day is shown in Figure 6-32.

Source: SAMSS July 2004 – June 2007

Figure 6-32: Distribution of respondents with osteoporosis who ate less than two serves of fruit each day, by sex, South Australia, 18 years and over
Figure 6-33 shows that the greatest proportion of respondents with osteoporosis who were not eating the recommended two serves of fruit per day were in the 75 years and over age group (38.2%).

![Pie chart showing distribution of respondents with osteoporosis who ate less than two serves of fruit each day, by age groups, South Australia, 18 years and over.]

Source: SAMSS July 2004 – June 2007

**Figure 6-33: Distribution of respondents with osteoporosis who ate less than two serves of fruit each day, by age groups, South Australia, 18 years and over**

It was also determined whether there were statistically significant differences between males and females and age groups in the proportion of respondents who ate less than two serves of fruit per day and who have osteoporosis. There was a statistically significantly higher proportion of males than females who ate less than two serves of fruit per day and had osteoporosis ($\chi^2=7.73, p=0.02$). This is shown in Figure 6-34.

![Bar chart showing prevalence of osteoporosis among males and females who ate less than two serves of fruit each day, South Australia, 18 years and over.]

Source: SAMSS July 2004 – June 2007
Statistically significantly higher or lower ($p<0.05$)

**Figure 6-34: Proportion of males and females with osteoporosis who ate less than two serves of fruit each day, South Australia, 18 years and over**
There was no statistically significant difference in the proportion of respondents consuming less that two serves of fruit each day between age groups (Figure 6-35).

![Figure 6-35: Proportion of respondents within each age group with osteoporosis that eat less than two serves of fruit each day, South Australia, 18 years and over](image)

Source: SAMSS July 2004 – June 2007

**6.10 Risky and high risk alcohol consumption leading to harm in the long term**

Epidemiological studies have shown that there is a relationship between alcohol intake and bone density and alcohol intake and fractures, and that these relationships are not linear.\(^{49,50}\) Alcohol in moderation is good for bones, resulting in increased bone density\(^{49}\) and lower fracture risk.\(^{50}\) However, high levels of alcohol consumption have the opposite effect.

Pooled data from three prospective cohort studies showed that alcohol intake above two units per day was associated with an increased risk of any fracture (RR = 1.23; 95% CI, 1.06-1.43), and hip fractures (RR = 1.68; 95% CI, 1.19-2.36). Risk ratios were moderately, but not significantly, higher in men than in women, and there was no evidence for a different threshold for effect by sex.\(^{50}\) There was also some evidence that this effect was due to factors other than bone density,\(^{50}\) such as falls, which are more common in persons consuming excessive amounts of alcohol.
Risk factors

Risk of harm from alcohol consumption in the long term, as defined by the 2001 National Health and Medical Research Council (NHMRC) alcohol guidelines, was used for the alcohol analyses presented in this report. According to these guidelines, risky alcohol drinking leading to harm in the long term is defined as five to six standard drinks per day, or 29 to 42 standard drinks per week, for males, and three to four standard drinks per day, or 15 to 28 standard drinks per week, for females. High risk alcohol drinking leading to harm in the long term is defined as seven or more standard drinks per day, or 43 or more standard drinks per week, for males, and five or more standard drinks per day, or 29 or more standard drinks per week, for females. In this report, risk of harm from alcohol consumption in the long term was analysed using combined risky and high risk alcohol drinking categories.

6.10.1 Prevalence of risky and high risk alcohol drinking leading to harm in the long term

The overall prevalence of self-reported risky and high risk alcohol drinking potentially leading to harm in the long term in people aged 18 years and over in South Australia is 3.8% (95% CI 3.5 – 4.1; n=625).

6.10.2 Osteoporosis and alcohol drinking leading to harm in the long term

Of the respondents with osteoporosis, 2.5% (95% CI 1.6 – 3.9; n=18) were classified at risk of harm from alcohol in the long term. There was no statistically significant difference in proportion of respondents at risk of harm from alcohol in the long term between respondents with osteoporosis and those without osteoporosis (Figure 6-36).

Source: SAMSS July 2004 – June 2007

Figure 6-36: Proportion of respondents with and without osteoporosis at risk of harm in the long term from alcohol, South Australia, 18 years and over
6.10.3 Sex and age profile of respondents with osteoporosis at risk of harm from alcohol in the long term

The sex of the 2.5% of respondents with osteoporosis and at risk of harm in the long term from alcohol is shown in Figure 6-37.

Source: SAMSS July 2004 – June 2007

Figure 6-37: Distribution of respondents with osteoporosis and at risk of harm in the long term from alcohol, by sex, South Australia, 18 years and over

Figure 6-38 shows that the largest proportion of respondents with osteoporosis who were at risk of harm in the long term from alcohol was in the 55 to 64 year age group (27.1%).

Source: SAMSS July 2004 – June 2007

Figure 6-38: Distribution of respondents with osteoporosis and at risk of harm in the long term from alcohol, by age groups, South Australia, 18 years and over
It was determined whether there were statistically significant differences between males and females and age groups in the proportion of respondents who were at risk of harm in the long term from alcohol and who have osteoporosis. There was no statistically significant difference between males compared to females with osteoporosis and at risk of harm in the long term from alcohol (Figure 6-39).

Figure 6-39: Proportion of males and females with osteoporosis and at risk of harm in the long term from alcohol, South Australia, 18 years and over

There were no statistically significant differences between age groups in proportion of respondents at risk of harm from alcohol in the long term (Figure 6-40).

Figure 6-40: Proportion of respondents with osteoporosis and at risk of harm from alcohol in the long term, by age group, South Australia, 18 years and over
6.11 Summary

Data presented in this chapter indicate that people with osteoporosis are statistically significantly more likely to have high blood pressure, high cholesterol, be classified as underweight according to BMI, or be classified as sedentary. Respondents with osteoporosis were statistically significantly less likely to eat the recommended number of serves of fruit per day or be a current smoker.

Males with osteoporosis were statistically significantly more likely to eat less than two serves of fruit each day than females, while females were statistically significantly more likely to be classified as normal or underweight according to BMI.

Respondents reporting that they had high blood pressure associated with osteoporosis were:
> statistically significantly less likely to be 45 to 64 years of age; or
> statistically significantly more likely to be 75 years and over.

Respondents reporting that they had high cholesterol associated with osteoporosis were:
> statistically significantly less likely to be 45 to 54 years of age; or
> statistically significantly more likely to be 75 years of age and over.

Respondents that were classified as underweight or normal and reported having osteoporosis were:
> statistically significantly less likely to be 55 to 64 years of age; or
> statistically significantly more likely to be 75 years of age and over.

Respondents reporting that they were a current smoker and had osteoporosis were:
> statistically significantly less likely to be 75 years and over; or
> statistically significantly more likely to be 18 to 54 years of age.

Respondents that were classified as sedentary and reported having osteoporosis were:
> statistically significantly less likely to be 55 to 74 years of age; or
> statistically significantly more likely to be 75 years of age and over.

This chapter highlights the associations that exist between self-reported osteoporosis and self-reported risk factors. These associations are supported within the literature. An understanding of the possible presence of these risk factors is important in the targeting of interventions and programs as the effects of these conditions may also need to be addressed in conjunction with the impact of osteoporosis.
Risk factors
CHAPTER 7: OSTEOPOROSIS AND FALLS
7.1 Introduction

Falls are the primary factor associated with osteoporotic fracture. Other associated factors are; reduced balance, reduced muscle strength, lack of physical activity and low bone density. The frequency of falling increases with age.\textsuperscript{52} Falls risk also increases following the occurrence of a previous fracture and this risk is highest immediately following the fracture event.\textsuperscript{53}

7.2 Data sources

The data source used for this chapter is SAMSS from July 2004 to June 2007 for respondents aged 65 years and older (n=3235). The methodology of SAMSS is described in detail in Appendix 1.

7.3 Prevalence of falls

Respondents aged 65 years and over were asked about falls they had in the last year: “How many falls (including, slips, trips and falls to the ground) did you have in the past year?”

Overall, the prevalence of falls among those aged 65 year and over in South Australia is 31.3\% (95\% CI 29.7 – 32.9; n=1,012).

7.4 Osteoporosis and falls

Of the respondents with osteoporosis, 37.8\% (95\% CI 33.5 - 42.2; n=180) had also fallen in the last year. This is a statistically higher proportion compared to respondents who had fallen and did not have osteoporosis (Figure 7-1).
Falls

![Bar chart showing prevalence of falls by osteoporosis status.]

Source: SAMSS July 2004 – June 2007
* Statistically significantly higher or lower (p<0.05) between falls and osteoporosis and falls and no osteoporosis

Figure 7-1: Proportion of respondents who had fallen in the past year, shown by osteoporosis status

7.5 Sex and age profile of respondents with osteoporosis who had fallen

The sex of the 37.8% of respondents with osteoporosis who had fallen is shown in Figure 7-2.

![Pie chart showing distribution of respondents with osteoporosis who had fallen by sex.]

Source: SAMSS July 2004 – June 2007

Figure 7-2: Distribution of respondents with osteoporosis who had fallen in the past year, by sex, South Australia, 65 years and over
Figure 7-3 shows the distribution of respondents with osteoporosis and who had fallen in the last year by age group. The highest proportion of respondents is in the 75 years and over age group.

![Pie chart showing distribution of respondents with osteoporosis and falls condition by age group](image)

Source: SAMSS July 2004 – June 2007

**Figure 7-3: Distribution of respondents with osteoporosis and falls condition, by age groups, South Australia, 65 years and over**

It was also determined whether there were statistically significant differences between males and females and age groups in the proportion of respondents reporting that they had a fall and osteoporosis. There was no statistically significant difference between the proportion of females who had fallen and who had osteoporosis and males who had fallen and who had osteoporosis (Figure 7-4).
Figure 7-4: Proportion of males and females with osteoporosis and had fallen in the last year, South Australia, 65 years and over

Figure 7-5: Proportion of respondents within each age group with osteoporosis and who had fallen in the last year, South Australia, 65 years and over
7.6 Summary

Data presented in this chapter indicate that those with osteoporosis are statistically significantly more likely to fall compared to those without osteoporosis. While there were no statistically significant differences between males and females and between age groups among those who had osteoporosis in falls prevalence, the fact that those with osteoporosis were more likely to have fallen is a significant issue. Falls and associated trauma from falls is a significant factor in the burden that osteoporosis has on the health care system and the targeting of interventions is important to reduce this impact.
CHAPTER 8: OSTEOPOROSIS AND ASSOCIATIONS WITH MENTAL HEALTH
8.1 Introduction

The following self-reported mental health issues are presented in this chapter:

- Current doctor diagnosed mental health condition;
- Psychological distress as measured by the Kessler 10 (K10) scale; and
- Suicidal ideation.

8.2 Data sources

The data source used for this chapter is SAMSS from July 2004 to June 2007 for respondents aged 18 years and older (n=16,513). The methodology of SAMSS is described in detail in Appendix 1.

8.3 Current mental health condition

An association has been demonstrated between mental health disorders, particularly depression, and an increased prevalence of chronic disease. A Canadian study involving a representative, population based, cross-sectional survey, using structured interviews and self-report, established that an association existed between depression and health care use and role impairment among persons with chronic physical disorders.

Osteoporosis has been associated with poorer scores on questionnaires measuring depression in cross-sectional studies in white women, but not white men. A cohort study also identified that depression was associated with increased hip fracture risk, even after controlling for other risk factors including age at baseline, sex, race, BMI, smoking status, alcohol consumption, and physical activity level. Therefore, osteoporosis and hip fractures are associated with depression in women, with mixed evidence for an association in men.

There are limited data on anxiety disorders. It has been shown that there are lower levels of anxiety in people with osteoporosis, however this requires further investigation as those with severe osteoporosis and existing fractures, especially vertebral crush fractures which cause pain due to postural changes, may actually have higher anxiety levels.

In this report, current diagnosed mental health condition was determined if the respondent self-reported that they had been told by a doctor that they had been diagnosed with a mental health condition such as anxiety, depression, a stress related problem, or any other mental health problem in the last 12 months, or were currently receiving treatment for a mental health condition.
8.3.1 Prevalence of current mental health condition

The overall prevalence of self-reported current diagnosed mental health conditions among people aged 18 years and over in South Australia was 14.3% (95% CI 13.8 – 14.9; n=2,367).

Figure 8-1 shows that for persons who have a current mental health condition, the most common types are depression, stress-related problems, and anxiety, with a much smaller proportion reporting other mental health conditions. Those with osteoporosis reported higher prevalence of depression and anxiety, as well as a higher proportion of mental health conditions in general.

![Figure 8-1: Proportion of respondents with specific mental health conditions, and overall mental health condition, shown by osteoporosis status](image)

Source: SAMSS July 2004 – June 2007

* Statistically significantly higher or lower (p<0.05) between specified mental health condition and osteoporosis and specified mental health condition and no osteoporosis

8.3.2 Osteoporosis and current mental health condition

Of the respondents with osteoporosis, 21.8% (95% CI 19.0 – 24.9; n=159) reported having a current diagnosed mental health condition. Respondents with osteoporosis were statistically significantly more likely to have a current diagnosed mental health condition than respondents without osteoporosis. This is shown in Figure 8-2.
**8.3.3 Sex and age profile of respondents with osteoporosis and current mental health condition**

The sex of the 21.8% of respondents with osteoporosis and a current diagnosed mental health condition is shown in Figure 8-3.

*Source: SAMSS July 2004 – June 2007*

*Statistically significantly higher or lower (p<0.05) between current mental health condition and osteoporosis and current mental health condition and no osteoporosis*

**Figure 8-2: Prevalence of current mental health conditions in respondents with and without osteoporosis, South Australia, 18 years and over**

**Figure 8-3: Distribution of respondents with osteoporosis and a current mental health condition, by sex, South Australia, 18 years and over**
Figure 8-4 shows the distribution of respondents with osteoporosis and a current mental health condition by age group. The highest proportion of respondents with osteoporosis is in the 55 to 64 age group (25.8%).

![Pie chart showing distribution of respondents with osteoporosis and current mental health condition by age group. The highest proportion is in the 55 to 64 age group (25.8%).]

Source: SAMSS July 2004 – June 2007

**Figure 8-4: Distribution of respondents with osteoporosis and a current mental health condition, by age groups, South Australia, 18 years and over**

It was also determined whether there were statistically significant differences between males and females and age groups in the proportion of respondents reporting that they had a current mental health condition and osteoporosis. There was no statistically significant difference in the proportion of males and females who had a current mental health condition and osteoporosis (Figure 8-5).

![Bar chart showing prevalence (%) of males and females with osteoporosis and current mental health condition. The prevalence is higher for males (25.7%) than females (21.1%).]

Source: SAMSS July 2004 – June 2007

**Figure 8-5: Proportion of males and females with osteoporosis and current mental health condition, South Australia, 18 years and over**
Respondents with a current mental health condition and osteoporosis were statistically significantly more likely to be aged between 18 and 64 years, and statistically significantly less likely to be aged 75 years and over when compared to the other age groups ($\chi^2=48.32$, $p<0.001$, Figure 8-6).

![Figure 8-6: Proportion of respondents within each age group with osteoporosis and current mental health condition, South Australia, 18 years and over](image)

**Figure 8-6**: Proportion of respondents within each age group with osteoporosis and current mental health condition, South Australia, 18 years and over

### 8.4 Psychological distress

Gold et al. demonstrated that there are psychological sequelae from osteoporosis, however, it is unclear whether this indicates an increased prevalence of depression, poor health-related quality of life, or anxiety in persons with osteoporosis. There is little data on psychological distress in people with osteoporosis, and what is described as “psychological distress” has been used interchangeably with health-related quality of life.

For this report, the level of psychological distress experienced by respondents aged 18 years and over was determined using the Kessler Psychological Distress 10 item scale (K10). The scale was developed to measure non-specific psychological distress, and measures current anxiety and depressive symptoms in the general population. Four levels of psychological distress were calculated, and then a psychological distress variable was derived combining low and moderate psychological distress (no psychological distress), and high and very high distress (psychological distress).
8.4.1 Prevalence of psychological distress

Overall, 9.3% (95% CI 8.9–9.8; n=1542) of the respondents aged 18 years and over were determined, according to the K10, to be experiencing psychological distress.

8.4.2 Osteoporosis and psychological distress

Of the respondents with osteoporosis, 14.8% (95% CI 12.4–17.6; n=108) had psychological distress according to the K10 scale. Respondents with osteoporosis were statistically significantly more likely to have psychological distress than respondents without osteoporosis. This is shown in Figure 8-7.

![Bar chart showing the proportion of males and females with osteoporosis and psychological distress, South Australia, 18 years and over.](chart)

Source: SAMSS July 2004 – June 2007

* Statistically significantly higher or lower (p<0.05) between psychological distress and osteoporosis and psychological distress and no osteoporosis

Figure 8-7: Proportion of males and females with osteoporosis and psychological distress, South Australia, 18 years and over

8.4.3 Sex and age profile of respondents with osteoporosis and psychological distress

The sex profile of the 14.8% of respondents with osteoporosis and psychological distress is shown in Figure 8-8.
Mental health

83.0%

17.0%

Males

Females

Source: SAMSS July 2004 – June 2007

Figure 8-8: Distribution of respondents with osteoporosis and psychological distress, by sex, South Australia, 18 years and over

Figure 8-9 shows the distribution of respondents with osteoporosis and psychological distress by age group. The highest proportions of respondents were in the 75 years and over age group (26.2%).

11.0%

26.2%

17.3%

21.9%

23.6%

Source: SAMSS July 2004 – June 2007

Figure 8-9: Distribution of respondents with osteoporosis and psychological distress, by age groups, South Australia, 18 years and over

Osteoporosis in SA

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It was also determined whether there were statistically significant differences between males and females and age groups in the proportion of respondents reporting that they had a psychological distress and osteoporosis. There was no statistically significant difference in the proportion of males and females who had psychological distress and osteoporosis (Figure 8-10).

![Figure 8-10: Proportion of males and females with osteoporosis and psychological distress, South Australia, 18 years and over](source: SAMSS July 2004 – June 2007)

There was a statistically significantly higher proportion of respondents with osteoporosis who had psychological distress and were aged between 18 and 54 years, and a statistically significantly lower proportion of respondents with osteoporosis and psychological distress in the 75 years and over age group ($\chi^2=21.75$, $p<0.001$). This is shown in Figure 8-11.

![Figure 8-11: Proportion of respondents within each age group with osteoporosis and psychological distress, South Australia, 18 years and over](source: SAMSS July 2004 – June 2007)

* Statistically significantly higher or lower ($p<0.05$) than other categories combined
8.5 Suicidal ideation

There have been few studies which examine the association between osteoporosis and suicidal ideation. However, people with osteoporotic fractures, such as vertebral fractures, experience high levels of morbidity,\textsuperscript{64} including chronic pain. Research shows that rates of suicide are higher in people with chronic pain relative to the general population,\textsuperscript{65} and the risk of death by suicide appears to be at least doubled in chronic pain patients compared with a control group.\textsuperscript{66} A study using a structured clinical interview for suicide history, the McGill Pain Questionnaire and the Beck Depression Inventory, found that having a family history of suicide was a factor strongly associated with increased risk for suicidal ideation in chronic pain patients.\textsuperscript{67} This study highlights the need for monitoring of suicidal behaviour in chronic pain.

To determine suicidal ideation in this report, respondents aged 18 years and over were asked a series of questions relating to suicidal ideation. Suicidal ideation was determined based on four questions contained in the 28-item General Health Questionnaire (GHQ-28).\textsuperscript{68-70} Suicidal ideation refers to current thoughts of suicide in the past few weeks, and is used as a measure of mental health in the community.

8.5.1 Prevalence of suicidal ideation

Overall, 5.4\% (95\% CI 4.9 – 5.9; n=443) of the respondents aged 18 years and over in South Australia reported suicidal ideation.

8.5.2 Osteoporosis and suicidal ideation

Of the respondents with osteoporosis, 7.0\% (95\% CI 4.8 – 10.1; n=25) had suicidal ideation. There was no statistically significant difference in suicidal ideation between respondents with osteoporosis and those without osteoporosis. This is shown in Figure 8-12.
Figure 8-12: Proportion of males and females with osteoporosis and suicidal ideation, South Australia, 18 years and over

8.5.3 Sex and age profile of respondents with osteoporosis and suicidal ideation

The sex of the 7.0% of respondents with osteoporosis and suicidal ideation is shown in Figure 8-13.

Figure 8-13: Distribution of respondents with osteoporosis and suicidal ideation, by sex, South Australia, 18 years and over
Figure 8-14 shows the distribution of respondents with osteoporosis and suicidal ideation by age group. The highest proportion of respondents was in the 18 to 44 year age group (25.7%).

Source: SAMSS July 2004 – June 2007

Figure 8-14: Distribution of respondents with osteoporosis and suicidal ideation, by age groups, South Australia, 18 years and over

It was also determined whether there were statistically significant differences between males and females and age groups in the proportion of respondents reporting that they had suicidal ideation and osteoporosis. There was no statistically significant difference between males and females with osteoporosis and suicidal ideation (Figure 8-15).

Source: SAMSS July 2004 – June 2007

Figure 8-15: Proportion of males and females with osteoporosis and suicidal ideation, South Australia, 18 years and over
There was a statistically significantly higher proportion of respondents with osteoporosis and suicidal ideation in the 18 to 44 year age group ($\chi^2=24.69, p<0.001$). This is shown in Figure 8-16.

![Figure 8-16: Proportion of respondents within each age group with osteoporosis and current mental health condition, South Australia, 18 years and over](image)

Source: SAMSS July 2004 – June 2007

* Statistically significantly higher or lower ($p<0.05$) than other categories combined

**8.6 Summary**

The data presented demonstrate that respondents with self-reported osteoporosis are statistically significantly more likely to have a self-reported current mental health condition, or have psychological distress as defined by the K10. There was no statistically significant difference in suicidal ideation between respondents with osteoporosis and those without osteoporosis.

There were no statistically significant differences between males and females with osteoporosis in terms of the proportions who had a current mental health condition, psychological distress or suicidal ideation.
Respondents with a current mental health condition associated with osteoporosis were:

- statistically significantly less likely to be 75 years of age and over; or
- statistically significantly more likely to be 18 to 64 years of age.

Respondents with psychological distress associated with osteoporosis were:

- statistically significantly less likely to be 75 years of age and over; or
- statistically significantly more likely to be 18 to 54 years of age.

Respondents with suicidal ideation and osteoporosis were:

- statistically significantly more likely to be 45 to 54 years of age.

This chapter highlights that a current mental health condition such as anxiety, depression, or any other mental health problem and psychological distress are significantly associated with the presence of osteoporosis.

These factors will impact on the ability to seek and respond to treatment and also highlight the need to consider that these factors may be present when targeting campaigns and implementing programs. It may be of benefit to also address these conditions in addition to osteoporosis in order to improve health.
CHAPTER 9: OSTEOPOROISIS AND ASSOCIATIONS WITH ECONOMIC FACTORS
9.1 Introduction

Osteoporosis and other musculoskeletal conditions place a burden on the individual through pain and disability, but they also have a substantial economic impact.\textsuperscript{6,71,72}

The costs due to osteoporosis can be classified into three components: direct costs (such as medical costs, hospital, treatment, medication), indirect costs (such as productivity losses borne by the individual, their family, their employer or the community), and psychosocial costs (such as deterioration in quality of life).\textsuperscript{6,71,72}

In terms of direct medical costs, data from the AIHW Health Expenditure Database, shows that expenditure for osteoporosis is substantial, accounting for $221 million in 2000-01.\textsuperscript{72} Approximately one third of costs incurred (35.4\%) was for pharmaceuticals, one third (29.4\%) was for aged care, and one fifth (17.7\%) was for hospital care, with the remaining costs for out of hospital and professional services and research\textsuperscript{72}. From these data, pharmaceutical costs appear to make up a larger proportion of direct costs for osteoporosis than an earlier report where pharmaceuticals accounted for 7\% of the costs and hospital inpatients accounted for 45\% of the costs.\textsuperscript{6} This report used data from 1993-1994, prior to the widespread use of pharmaceutical treatments for osteoporosis.

In addition to direct costs, indirect costs such as potential earnings lost due to absenteeism or early retirement, loss of tax revenue, and equipment and devices are also incurred. A conservative estimate is that indirect costs are three times that of direct costs.\textsuperscript{6}

This chapter presents the economic costs of osteoporosis to the South Australian community in terms of days lost from work because of health, and days limited at work because of health.

9.2 Data sources

The data source used for this chapter is SAMSS from July 2004 to June 2007 for respondents aged 18 years and older (n=16,513). The methodology of SAMSS is described in detail in Appendix 1.

9.3 Days lost because of health

Persons with osteoporosis are under-represented in the labour market, with only 1.6\% of workers aged 15-64 with osteoporosis\textsuperscript{73} compared with 2.7\% of persons in the same age range in the general population with osteoporosis. This has been reported to be primarily through the early retirement of women. Data are limited, but there is some evidence showing that people with osteoporosis have more time off than people who do not have osteoporosis.\textsuperscript{74}
For this report, respondents aged 18 years and over were asked how many days they were totally unable to work or carry out their normal duties because of their health during the last four weeks.

### 9.3.1 Proportion of respondents with days off work because of health

Overall, 16.2% (95% CI 15.7 – 16.8; n=2681) of the respondents reported being unable to work or carry out normal duties for one or more days.

### 9.3.2 Osteoporosis and days lost due to ill health

Table 9.1 shows the number of days lost due to health for respondents with osteoporosis and those without osteoporosis. Of the respondents with osteoporosis, 7.8% (95% CI 6.0 – 9.9; n=57) reported having six or more days off work due to health.

Respondents with osteoporosis were statistically significantly more likely to have had three or more days off work due to ill health than respondents without osteoporosis.

**Table 9.1: Number of days lost because of health for respondents with and without osteoporosis, South Australia, 18 years and over**

<table>
<thead>
<tr>
<th></th>
<th>Osteoporosis</th>
<th></th>
<th>No Osteoporosis</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>95% CI</td>
<td>n</td>
</tr>
<tr>
<td>None</td>
<td>580</td>
<td>79.7</td>
<td>(76.6 - 82.4) ↓</td>
<td>13223</td>
</tr>
<tr>
<td>1 - 2 Days</td>
<td>46</td>
<td>6.3</td>
<td>(4.8 - 8.3) ↓</td>
<td>1386</td>
</tr>
<tr>
<td>3 - 5 Days</td>
<td>41</td>
<td>5.6</td>
<td>(4.1 - 7.5) ↑</td>
<td>552</td>
</tr>
<tr>
<td>6 or more days</td>
<td>57</td>
<td>7.8</td>
<td>(6.0 - 9.9) ↑</td>
<td>601</td>
</tr>
<tr>
<td>Don’t know</td>
<td>5</td>
<td>0.7</td>
<td>(0.3 - 1.6) ↑</td>
<td>25</td>
</tr>
<tr>
<td><strong>Overall</strong></td>
<td>727</td>
<td>100.0</td>
<td></td>
<td>15785</td>
</tr>
</tbody>
</table>

Source: SAMSS July 2004 – June 2007

Note: The weighting of data can result in rounding discrepancies or totals not adding.

↑↓ Statistically significantly higher or lower (p<0.05) osteoporosis compared to no osteoporosis group.

### 9.3.3 Sex and age profile of respondents with osteoporosis who take days off work

The proportion of males and females with osteoporosis who had taken days off work in the last four weeks is shown in Table 9.2. There was no statistically significant difference between males and females for those with osteoporosis who had taken days off work.
Table 9.2: Number of days lost because of health for respondents with osteoporosis, by sex, South Australia, 18 years and over

<table>
<thead>
<tr>
<th></th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>None</td>
<td>90</td>
<td>76.6</td>
</tr>
<tr>
<td>1 - 2 Days</td>
<td>8</td>
<td>7.0</td>
</tr>
<tr>
<td>3 - 5 Days</td>
<td>7</td>
<td>6.3</td>
</tr>
<tr>
<td>6 or more days</td>
<td>11</td>
<td>9.1</td>
</tr>
<tr>
<td>Don’t know</td>
<td>1</td>
<td>1.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>117</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Source: SAMSS July 2004 – June 2007

Note: The weighting of data can result in rounding discrepancies or totals not adding
The proportion of males and females in each age group who had taken time off work in the last four weeks is shown in Table 9.3. There was a statistically significantly higher proportion of respondents with osteoporosis in the 55 to 64 age group who also had taken three to five days off work in the last four weeks and a statistically significantly lower proportion in the 75 years and over age group that had taken six or more days off.

There was also a statistically significantly higher proportion of respondents in the 18 to 44 year age group who had taken one or two days off work in the last four weeks ($\chi^2=41.65$, $p<0.001$).

Table 9.3: Number of days lost because of health for respondents with osteoporosis, by age groups, South Australia, 18 years and over

<table>
<thead>
<tr>
<th></th>
<th>18 to 44 years</th>
<th>45 to 54 years</th>
<th>55 to 64 years</th>
<th>65 to 74 years</th>
<th>75 years and over</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>% (95% CI)</td>
<td>% (95% CI)</td>
<td>% (95% CI)</td>
<td>% (95% CI)</td>
<td>% (95% CI)</td>
</tr>
<tr>
<td>None</td>
<td>63.2 (47.6 - 76.4) ↓</td>
<td>68.5 (57.0 - 78.0) ↓</td>
<td>74.5 (66.7 - 81.0)</td>
<td>84.1 (78.2 - 88.6)</td>
<td>84.4 (79.7 - 88.1) ↑</td>
</tr>
<tr>
<td>1 - 2 Days</td>
<td>20.3 (10.7 - 35.1) ↑</td>
<td>8.9 (4.2 - 17.7)</td>
<td>7.1 (3.9 - 12.6)</td>
<td>6.1 (3.5 - 10.5)</td>
<td>3.5 (1.9 - 6.3) ↓</td>
</tr>
<tr>
<td>3 - 5 Days</td>
<td>3.7 (0.9 - 14.7)</td>
<td>6.4 (2.6 - 14.5)</td>
<td>10.2 (6.2 - 16.3) ↑</td>
<td>5.1 (2.7 - 9.2)</td>
<td>3.7 (2.1 - 6.6)</td>
</tr>
<tr>
<td>6 or more days</td>
<td>12.8 (5.6 - 26.5) ↑</td>
<td>16.3 (9.5 - 26.6) ↑</td>
<td>7.4 (4.1 - 12.9)</td>
<td>4.4 (2.3 - 8.4)</td>
<td>7.3 (4.8 - 10.9) ↓</td>
</tr>
<tr>
<td>Don’t know</td>
<td>- -</td>
<td>- -</td>
<td>0.8 (0.1 - 4.0)</td>
<td>0.3 (0.0 - 2.5)</td>
<td>1.1 (0.4 - 3.1)</td>
</tr>
<tr>
<td>Overall</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Source: SAMSS July 2004 – June 2007

Note: The weighting of data can result in rounding discrepancies or totals not adding

↑↓ Statistically significantly higher or lower ($p<0.05$) compared to other age groups combined
9.4 Days limited due to health

Respondents aged 18 years and over were asked during the last four weeks how many days they were partially unable to work or carry out their normal duties because of their health.

9.4.1 Proportion of respondents limited at work due to ill health

Overall, 23.2% (95% CI 22.6 – 23.9; n=3833) of the respondents reported being partially unable to work or carry out their normal duties for one or more days.

9.4.2 Osteoporosis and days at work limited due to ill health

Table 9.4 shows the number of days limited due to health for respondents with osteoporosis and those without osteoporosis. Of the respondents with osteoporosis, 20.2% (95% CI 17.4 – 23.3; n=147) reported having six or more days at work limited due to ill health. Respondents with osteoporosis were statistically significantly more likely to have been partially unable to work or carry out their normal duties for three or more days in a month compared to respondents without osteoporosis.

Table 9.4: Number of days limited because of health, South Australia, 18 years and over

<table>
<thead>
<tr>
<th></th>
<th>Osteoporosis</th>
<th></th>
<th>No Osteoporosis</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>95% CI</td>
<td>n</td>
</tr>
<tr>
<td>None</td>
<td>437</td>
<td>60.1 (56.5 - 63.6)</td>
<td>↓</td>
<td>12179</td>
</tr>
<tr>
<td>1 - 2 Days</td>
<td>61</td>
<td>8.4 (6.6 - 10.6)</td>
<td></td>
<td>1453</td>
</tr>
<tr>
<td>3 - 5 Days</td>
<td>72</td>
<td>9.8 (7.9 - 12.2)</td>
<td>↑</td>
<td>903</td>
</tr>
<tr>
<td>6 or more days</td>
<td>147</td>
<td>20.2 (17.4 - 23.3)</td>
<td>↑</td>
<td>1198</td>
</tr>
<tr>
<td>Don’t know</td>
<td>11</td>
<td>1.5 (0.8 - 2.7)</td>
<td>↑</td>
<td>53</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>727</strong></td>
<td><strong>100.0</strong></td>
<td></td>
<td><strong>15786</strong></td>
</tr>
</tbody>
</table>

Source: SAMSS July 2004 – June 2007
Note: The weighting of data can result in rounding discrepancies or totals not adding
↑↓ Statistically significantly higher or lower (p<0.05) osteoporosis compared to no osteoporosis
9.4.3 Sex and age profile of respondents with osteoporosis who also had days at work limited due to ill health

The proportion of males and females with osteoporosis who had taken days off work in the last four weeks is shown in Table 9.5. There was no statistically significant difference between males and females for those with osteoporosis who had limited days of work due to health.

Table 9.5: Number of days limited because of health for respondents with osteoporosis, by sex, South Australia, 18 years and over

<table>
<thead>
<tr>
<th></th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>None</td>
<td>62</td>
<td>52.6</td>
</tr>
<tr>
<td>1 - 2 Days</td>
<td>7</td>
<td>6.1</td>
</tr>
<tr>
<td>3 - 5 Days</td>
<td>14</td>
<td>12.2</td>
</tr>
<tr>
<td>6 or more days</td>
<td>32</td>
<td>27.6</td>
</tr>
<tr>
<td>Don’t know</td>
<td>2</td>
<td>1.6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>117</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Source: SAMSS July 2004 – June 2007
Note: The weighting of data can result in rounding discrepancies or totals not adding
Table 9.6 shows that the highest proportion of respondents with osteoporosis who had six or more days limited at work in the last four weeks was in the 45 to 54 year age group.

There were no statistically significant differences within each age group in the proportion of people with osteoporosis who had days at work limited due to ill health in the last four weeks.

<table>
<thead>
<tr>
<th></th>
<th>18 to 44 years</th>
<th>45 to 54 years</th>
<th>55 to 64 years</th>
<th>65 to 74 years</th>
<th>75 years and over</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>% (95% CI)</td>
<td>% (95% CI)</td>
<td>% (95% CI)</td>
<td>% (95% CI)</td>
<td>% (95% CI)</td>
</tr>
<tr>
<td>None</td>
<td>60.4 (44.9 - 74.0)</td>
<td>48.8 (37.6 - 60.2)</td>
<td>58.5 (50.2 - 66.3)</td>
<td>62.8 (55.7 - 69.4)</td>
<td>61.9 (56.2 - 67.3)</td>
</tr>
<tr>
<td>1 - 2 Days</td>
<td>12.7 (5.6 - 26.4)</td>
<td>8.4 (3.9 - 17.2)</td>
<td>9.5 (5.7 - 15.4)</td>
<td>8.8 (5.6 - 13.8)</td>
<td>6.9 (4.5 - 10.5)</td>
</tr>
<tr>
<td>3 - 5 Days</td>
<td>6.3 (2.0 - 18.4)</td>
<td>11.5 (6.0 - 20.9)</td>
<td>12.5 (8.0 - 18.9)</td>
<td>11.9 (11.3 - 21.7)</td>
<td>7.3 (4.8 - 10.9)</td>
</tr>
<tr>
<td>6 or more days</td>
<td>20.5 (10.9 - 35.4)</td>
<td>30.7 (21.2 - 42.1)</td>
<td>18.5 (12.9 - 25.7)</td>
<td>15.8 (11.3 - 21.7)</td>
<td>21.2 (16.9 - 26.3)</td>
</tr>
<tr>
<td>Don’t know</td>
<td>- -</td>
<td>0.6 (0.1 - 6.2)</td>
<td>1.1 (0.3 - 4.6)</td>
<td>0.7 (0.1 - 3.2)</td>
<td>2.7 (1.3 - 5.2)</td>
</tr>
<tr>
<td>Total</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Source: SAMSS July 2004 – June 2007
Note: The weighting of data can result in rounding discrepancies or totals not adding.
9.5 Summary

The literature discussed in this chapter suggests that people with osteoporosis are under-represented in the labour force.

Respondents with osteoporosis were statistically significantly more likely to have had three or more days off work, or 3 or more days limited, due to ill health than respondents without osteoporosis.

Respondents aged 18 to 45 years with osteoporosis were statistically significantly more likely to have had one or two days off in the last four weeks.

Respondents aged 45 to 54 years with osteoporosis were statistically significantly more likely to have had six or more days off in the last four weeks.

Respondents aged 55 to 64 years with osteoporosis were statistically significantly more likely to have had three to five days off in the past in the last four weeks.

Respondents aged 75 years and over with osteoporosis were statistically significantly less likely to have had one to two, or six or more days off in the past in the last four weeks.

There were no statistically significant differences between age groups or sex in the proportions of respondents with osteoporosis who had had activities limited at work due to ill health in the last four weeks.

This chapter highlights the impact that osteoporosis may have on the working capacity of respondents, particularly those still in the workforce. These factors need to be considered within the workplace in terms of ability to perform duties and the possibility that time off may be required.
CHAPTER 10: RECOMMENDATIONS
10.1 Recommendations for further research and/or health promotion action

This report presents a number of significant findings which should be taken into account when planning programs or interventions to address the prevalence of osteoporosis in South Australia.

The prevalence of osteoporosis remains underestimated in the South Australian population, however, the subsequent burden on the health care system as a result of fracture requires a significant investment in program development and targeting in order to provide information to those with osteoporosis regarding treatment and self management.

The highest prevalence of osteoporosis is among females, those in the older age groups, and those with lower levels of education and income. Programs need to be targeted specifically at these populations in order to achieve benefits.

The prevalence of osteoporosis is also high among people from non-English speaking backgrounds and those born in countries other than Australia. Consideration needs to be given to provide programs and information in specific languages addressing these populations.

Trends and projections of osteoporosis prevalence indicate that the prevalence will continue to rise to 2020. Trends and projections also indicate that the prevalence will generally be maintained in the younger age groups, however with rise in the older age group for both males and females which will have an ongoing impact as ageing occurs. These trends demand that a focus is placed on these age groups in order to prevent and manage arthritis into the future.

There are significant associations between osteoporosis and other chronic conditions and health risk factors. These associations may impact on prevention, undertaking of intervention programs, and maintenance of mobility and function over the long term. These factors need to be taken into consideration when providing information and planning interventions. Sex and age groups are impacted by different factors and specific targeting may need to occur in these areas.

Physicians also need to be aware of the increased risk of chronic disease associated with osteoporosis and ensure that adequate investigation and appropriate diagnosis occurs.

There are significant associations between having a current mental health condition or psychological distress and osteoporosis. These factors also need to be taken into consideration when designing programs and interventions so that there is also capacity to address these conditions in order to improve overall health status.

Osteoporosis has a significant impact on the ability to complete tasks or even attend work. Information and targeting of employers is important to ensure adequate care of the worker.


62. K10 Symptom Scale: Clinical Research Unit for Anxiety and Depression. School of Psychiatry, University of New South Wales, 2000.


APPENDIX 1: DATA SOURCES & ANALYTICAL TECHNIQUES
Data related to osteoporosis in the South Australian population were obtained from several different sources, including population surveys and surveillance systems.

Three sources of population data were used to provide the data for the analyses in this report, the South Australian Monitoring and Surveillance System (SAMSS), the Health Omnibus Survey (HOS), and the Health Monitor (HM) Survey. All surveys are managed by the Population Research and Outcome Studies Unit, SA Health.

The South Australian Monitoring and Surveillance System (SAMSS)

SAMSS is a random selection computer assisted telephone interview (CATI) health surveillance system administered by the Population Research and Outcome Studies (PROS) Unit, SA Health, to monitor key indicators of national and state priority health and related issues among South Australians of all ages. SAMSS ensures that appropriate, timely and valid population health information is available to monitor health status, respond to changing population health needs, and support planning, implementation and evaluation of health services and programs.

SAMSS data are weighted by age, sex and probability of selection in the household, using current Australian Bureau of Statistics (ABS) census data. Weighting of data occasionally results in rounding discrepancies in counts, and reference should be made to percentages rather than counts, as these have been calculated on pre-rounded figures.

In this report data from July 2004 to June 2007 for respondents aged 18 years and older (n=16,513) were used for analyses. The response rates for SAMSS for the period from July 2004 to June 2007 are shown in Table A1.1.

In this report, SAMSS data is used for the demographic profile, for associations with other chronic conditions, for associations with risk factors, for associations with mental health, and for associations with economic issues.

Table A1.1: SAMSS response rates for the period July 2004 to June 2007

<table>
<thead>
<tr>
<th>Year</th>
<th>Eligible sample size</th>
<th>Number of completed interviews</th>
<th>Response rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jul-Dec 2004</td>
<td>5179</td>
<td>3643</td>
<td>70.3</td>
</tr>
<tr>
<td>Jan-Jun 2005</td>
<td>5158</td>
<td>3634</td>
<td>70.5</td>
</tr>
<tr>
<td>Jul-Dec 2005</td>
<td>5047</td>
<td>3625</td>
<td>71.8</td>
</tr>
<tr>
<td>Jan-Jun 2006</td>
<td>5094</td>
<td>3574</td>
<td>70.1</td>
</tr>
<tr>
<td>Jul-Dec 2006</td>
<td>5180</td>
<td>3573</td>
<td>68.9</td>
</tr>
<tr>
<td>Jan-Jun 2007</td>
<td>5216</td>
<td>3575</td>
<td>68.5</td>
</tr>
</tbody>
</table>
The Health Omnibus Survey

The Health Omnibus Survey (HOS) is an annual face-to-face user-pays survey that enables organisations to share the cost of undertaking a survey, whereby each organisation only pays for questions that are relevant to their information requirements. HOS sampling procedure is a clustered, multi-stage, systematic self-weighting area sample. This includes a minimum of 3,000 interviews per survey.

The overall response rates and participation rates for the HOS surveys are shown in Table A1.2.

In this report HOS is used for the overall prevalence of osteoporosis chapter, and the chapter on trends and projections.

Table A1.2: HOS response and participation rates

<table>
<thead>
<tr>
<th>Year</th>
<th>Initial sample size</th>
<th>Number of completed interviews</th>
<th>Response rate (%)</th>
<th>Participation rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995</td>
<td>4200</td>
<td>3016</td>
<td>74.2</td>
<td>87.0</td>
</tr>
<tr>
<td>1996</td>
<td>4200</td>
<td>3011</td>
<td>73.8</td>
<td>79.7</td>
</tr>
<tr>
<td>1997</td>
<td>4400</td>
<td>3019</td>
<td>70.8</td>
<td>78.3</td>
</tr>
<tr>
<td>1998</td>
<td>4400</td>
<td>3001</td>
<td>69.7</td>
<td>78.6</td>
</tr>
<tr>
<td>1999</td>
<td>4400</td>
<td>3013</td>
<td>70.6</td>
<td>77.0</td>
</tr>
<tr>
<td>2000</td>
<td>4400</td>
<td>3027</td>
<td>70.4</td>
<td>76.7</td>
</tr>
<tr>
<td>2001</td>
<td>4400</td>
<td>3037</td>
<td>71.3</td>
<td>78.9</td>
</tr>
<tr>
<td>2002</td>
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<td>2005</td>
<td>5000</td>
<td>3047</td>
<td>63.1</td>
<td>70.8</td>
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<tr>
<td>2006</td>
<td>5600</td>
<td>2969</td>
<td>54.9</td>
<td>63.8</td>
</tr>
</tbody>
</table>
The Health Monitor

The South Australian Health Monitor (HM) is a user-pays telephone survey system that has been in operation since 1999 and is administered by the PROS Unit, SA Health. It is a randomly selected sample of people aged 18 years and over. The goal of the HM survey is to collect, analyse and interpret data, which can be used to plan, implement and monitor health programs and other initiatives. Each organisation pays only for survey questions that have direct relevance to their information requirements. Alternatively, surveys that focus on a specific topic may be commissioned by a sole organisation.

HM survey data are weighted to the sex, age and geographical area profile of the population of interest and the probability of selection within a household so that the survey findings are applicable to that population as a whole. The most recent Australian Bureau of Statistics (ABS) Estimated Residential Population data, available from the ABS website (www.abs.gov.au), are used for this weighting process.

The HM data presented in this report were obtained between October and December 2005. The overall participation rate for this survey was 73.1%. From the eligible sample of 27,518, a response rate of 64.5% was calculated. The final sample size was n=17,745.

Statistical Analyses

Data in this report were analysed using SPSS for Windows Version 15.0. Chi-square tests examined statistical significance between categories. The significance level used for all tests was p<0.05 and 95% confidence intervals were reported for estimates. Chi-square tests for trends were used to examine prevalence trends over time.