

CHRONIC DISEASES AND ASSOCIATED RISK FACTORS IN AUSTRALIA, 2006



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CHRONIC DISEASES AND ASSOCIATED RISK FACTORS IN AUSTRALIA, 2006



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ABBREVIATIONS

ANZDATA	Australia and New Zealand Dialysis and Transplant Registry
AusDiab	Australian Diabetes, Obesity and Lifestyle Study
CAPANS	Child and Adolescent Physical Activity and Nutrition Survey (WA)
CHD	coronary heart disease
CKD	chronic kidney disease
COPD	chronic obstructive pulmonary disease
ESKD	end-stage kidney disease
IOTF	International Obesity Task Force
NCDS	National Chronic Disease Strategy
NHS	National Health Survey



This report

In 2002, the Australian Institute of Health and Welfare (AIHW) published *Chronic diseases and associated risk factors in Australia, 2001*. Building on this foundation, this new report presents updated statistics on chronic diseases and their associated risk factors in Australia. It focuses on patterns of disease across the age groups, the prevalence of risk factors and their trends, the impact of chronic diseases on health services in Australia, and differences in chronic diseases and their risk factors across geographical areas, socioeconomic status and Indigenous status.

Main findings

- Chronic diseases are common: in 2004–05, 77% of Australians had at least one long-term condition; common were asthma (10.0% of the total population), osteoarthritis (7.9%), depression (5.3%) and diabetes (3.5%).
- Chronic diseases can be a problem at all ages: almost 10% of children 0–14 years had three or more long-term conditions; this figure increased to more than 80% for those aged 65 years and over.
- Many people are at risk of developing chronic diseases: for example, 54% of adult Australians are either overweight or obese.
- Some people are affected much more than others: for example, compared with other Australians, Aboriginal and Torres Strait Islander persons have higher mortality from diabetes (14 times higher), chronic kidney disease (8 times) and heart disease (5 times).
- Chronic diseases are a drain on the health system: in 2000–01 they accounted for nearly 70% of the total health expenditure that can be allocated to diseases.

Other findings

- In 2004 the major chronic diseases featured in this report (excluding depression) accounted for almost 50% of all deaths in Australia; the leading single cause of death was coronary heart disease (25,000), followed by stroke (12,000).
- These same diseases were implicated in 21.6% (or 1.5 million) of all hospital episodes of care in 2003–04; chronic kidney disease alone accounted for nearly 0.8 million episodes.
- Chronic diseases (including cancers) were responsible for more than 80% of the burden of disease and injury; the conditions reported here accounted for 42% of the total burden.
- Older people carry a relatively large share of coronary heart disease, stroke, diabetes, osteoarthritis and osteoporosis.
- The middle ages are not exempt, with large shares of depression, chronic kidney disease and coronary heart disease.



- More than 85% of adults are not consuming enough vegetables.
- One in two adults are not getting sufficient physical activity.
- Almost 50% of adults are not consuming enough fruit.
- Around 21% of adults smoke tobacco.
- Compared with major cities, regional areas of Australia experience higher prevalence of many of the risk factors for chronic disease, such as smoking (11% higher) and excess weight (7% higher); have higher death rates for coronary heart disease, chronic obstructive pulmonary disease, and diabetes; but have lower prevalence of asthma.
- Compared with areas of high socioeconomic status, the least advantaged areas of Australia have higher levels of smoking, physical inactivity and obesity; experience higher prevalence of diabetes, behavioural problems, asthma, heart disease and arthritis; and have higher mortality across most chronic conditions.
- Compared with other Australians, Aboriginal and Torres Strait Islander persons have higher prevalence of smoking, risky alcohol use and excess weight, and have higher rates of asthma, arthritis and diabetes.

Arthritis

What is it? Group of conditions in which there is inflammation of the joints, causing pain, stiffness, disability and deformity. The two most common forms are rheumatoid arthritis and osteoarthritis (see the Glossary for further information on these two forms).

10.4% of all Australians (around 2 million).

Prevalence More common among females than males.

Prevalence of osteoarthritis increases with age.

Mortality Minor cause of deaths (about 0.3% of all deaths).

Majority of deaths in persons aged 85 years and over.

Morbidity 71,000 hospital separations.

Average age at separation 65 years.

Majority of separations in persons aged 65 years and over.

Health resource use \$1.18 billion of health system expenditure, equivalent to 2.4% of total health expenditure.

Increase of 52% in per capita expenditure between 1993–94 and 2000–01.

Major component of expenditure is hospital care.

Inequalities Prevalence significantly greater in regional areas compared with major cities.

Prevalence significantly higher in disadvantaged areas.

Prevalence among Indigenous Australians more than double that of other Australians.

Associated risk factors Physical inactivity (34.0% of adults).

Excess weight (53.5% of adults overweight or obese).

Asthma

What is it? Disease involving inflammation of the air passages, causing episodes of wheezing, chest tightness and shortness of breath. The inflammation can be triggered by exercise, infection, allergens, smoke, and some medications.

Prevalence 10.2% of all Australians (around 2 million).

Males slightly lower (9.0%) than females (11.5%).

Prevalence similar across age groups, but highest in 15–24 years age group (12.4%).

Mortality Minor cause of death (0.2% of all deaths), but rates high by international standards.

Male death rate lower than female except ages 5–34 years.

Death rate better than halved in past 15 years.

Morbidity 38,000 hospital separations.

Average age at separation 24 years.

Majority of separations in persons aged under 15 years.

Health resource use \$692 million of health system expenditure, equivalent to 1.4% of total health expenditure.

Increase of 21% in per capita expenditure between 1993–94 and 2000–01.

Major component of expenditure is medications.

Inequalities Prevalence not significantly different across regions.

Generally more common in disadvantaged areas.

Substantially more prevalent among Indigenous Australians compared with other Australians.

Associated risk factors Tobacco smoking (21.3% of adults current smokers).

Excess weight (53.5% of adults overweight or obese).

Cardiovascular disease

What is it? Group of diseases of the heart and blood vessels—in this report limited to coronary heart disease, in which the blood vessels supplying the heart muscle itself become blocked, causing episodes of chest pain (angina) and possibly heart attack.

Prevalence 1.9% of all Australians (around 367,000). Angina makes up the majority of this.

Males (1.3%) higher than females (0.9%) for angina, rates for other conditions similar.

Rates generally increase with age.

Mortality Largest single cause of death: 19 out of every 100 deaths (totalling almost 25,000 in 2004).

Male rates about twice those of females.

Death rate declined by around 40% in past decade.

Morbidity 164,000 hospital separations.

Average age at separation 67 years.

Majority of separations in persons aged 65 years and over.

Health resource use \$1.47 billion of health system expenditure, equivalent to 2.9% of total health expenditure.

Increase of 2% in per capita expenditure between 1993–94 and 2000–01.

Major component of expenditure is hospital care.

Inequalities Mortality significantly higher in rural and remote areas compared with major cities.

Mortality significantly higher in disadvantaged areas.

Mortality in Indigenous Australians 5 times that of other Australians.

Associated risk factors Tobacco smoking (21.3% of adults current smokers).

High blood pressure (28.8% of adults have treated or untreated high blood pressure).

High cholesterol (51.2% of adults have elevated total cholesterol).

Physical inactivity (34.0% of adults).

Excess weight (53.5% of adults overweight or obese).

Poor diet (46.0% of adults have inadequate fruit consumption; 85.6% have inadequate vegetable consumption).

Excessive alcohol use (13.5% of adults).

Cerebrovascular disease

What is it? Group of disorders of the blood vessels supplying the brain or its covering membranes. A major form is stroke, in which a vessel is either blocked or bleeds, causing part of the brain to be deprived of oxygen. This can result in paralysis or other loss of bodily functions.

Prevalence Around 44,000 stroke events every year, or 1.8% of Australians have ever had a stroke.

Males more likely to have stroke than females, but females affected more because they live longer.

Rates increase dramatically with age.

Mortality Leading cause of death: 9 out of every 100 deaths (totalling just over 12,000 in 2004). Most (83%) were for people aged 75 years and over.

Male rate slightly higher than female overall.

Death rate declined by almost one-third in past decade.

Morbidity 41,000 hospital separations for initial stroke and related incidents; a further 20,000 separations for management of stroke complications.

Average age at separation 72 years.

Majority of separations in persons aged 65 years and over.

Health resource use \$894 million of health system expenditure, equivalent to 1.8% of total health expenditure.

Increase of 13% in per capita expenditure between 1993–94 and 2000–01.

Major components of expenditure are hospital care and residential aged care.

Inequalities Mortality for males significantly higher in disadvantaged areas.

Mortality in Indigenous Australians 4 times that of other Australians.

Associated risk factors Tobacco smoking (21.3% of adults current smokers).

High blood pressure (28.8% of adults have treated or untreated high blood pressure).

High cholesterol (51.2% of adults have elevated total cholesterol).

Physical inactivity (34.0% of adults).

Excess weight (53.5% of adults overweight or obese).

Poor diet (46.0% of adults have inadequate fruit consumption; 85.6% have inadequate vegetable consumption).

Excessive alcohol use (13.5% of adults).

Chronic kidney disease

What is it? Disease involving long-term loss of kidney function. In severe cases, kidney function may deteriorate to the extent that it is no longer sufficient to sustain life (end-stage kidney disease: ESKD), and the person requires dialysis or a kidney transplant.

Prevalence Figures available for treated ESKD: 0.7% of population.

Males more likely to have treated ESKD than females.

Rates increase with age.

Mortality Major cause of death: 1.8% (totalling almost 2,400 in 2004).

Male rate higher than female.

Minimal change over past decade.

Morbidity 780,000 hospital separations (mainly for dialysis).

Average age at separation 61 years.

Majority of separations in persons aged under 65 years.

Health resource use \$484 million of health system expenditure, equivalent to 1.0% of total health expenditure.

Nearly all expenditure is for hospital care.

Inequalities Mortality for females significantly higher in regional areas compared with major cities.

Mortality significantly higher in disadvantaged areas.

Mortality in Indigenous Australians 8 times that of other Australians.

Associated risk factors High blood pressure (28.8% of adults have treated or untreated high blood pressure).

Tobacco smoking (21.3% of adults current smokers).

Excess weight (53.5% of adults overweight or obese).

Poor diet (46.0% of adults have inadequate fruit consumption; 85.6% have inadequate vegetable consumption).

Diabetes is also a significant prior disease in people being treated for ESKD.

Chronic obstructive pulmonary disease (COPD)

What is it? Progressive disease of the lungs and airways resulting in worsening shortness of breath on exertion. The main underlying disease process is emphysema, in which the lung cells are gradually destroyed and the lungs are less able to move air in and out. In COPD this is coupled with chronic bronchitis—the overproduction of mucus in the upper airways—resulting in excessive phlegm and persistent coughing.

Prevalence Around 3% of Australian population (590,000) based on self-report data.

Actual rates could be much higher (up to 21% of adults have irreversible airway obstruction).

Rates increase with age.

Mortality Leading cause of death: 4 out of every 100 (totalling almost 5,200 in 2004). More than 90% were people aged 65 years and over.

Male rate considerably higher than female.

Death rate about halved since 1980 for males, but increased for females.

Morbidity 54,000 hospital separations.

Average age at separation 72 years.

Majority of separations in persons aged 65 years and over.

Health resource use \$432 million of health system expenditure, equivalent to 0.9% of total health expenditure.

Increase of 15% in per capita expenditure between 1993–94 and 2000–01.

Major component of expenditure is hospital care.

Inequalities Prevalence higher in major cities, but mortality significantly higher in regional areas.

Mortality significantly higher in disadvantaged areas.

Mortality in Indigenous Australians 6 times that of other Australians

Associated risk factors Almost exclusively tobacco smoking (21.3% of adults current smokers).

Colorectal cancer

What is it? Malignant tumour of the large intestine or rectum. It develops from abnormal growths, known as polyps, on the internal linings of the colon and the rectum.

Prevalence 12,800 new cases in 2001 (projected to 14,600 in 2006).

Male incidence slightly higher than females.

Incidence rises sharply with age.

Mortality Major cause of death: 3.1% (4,100 deaths in 2004).

Majority of deaths in people aged 65 years or over.

Males have substantially higher mortality than females.

Death rate declined by 29% over past decade.

Morbidity 27,600 hospital separations.

Average age at separation 68 years.

Majority of separations in persons aged 65 years and over.

Health resource use \$235 million of health system expenditure, equivalent to 0.5% of total health expenditure.

Increase of 39% in per capita expenditure between 1993–94 and 2000–01.

Major component of expenditure is hospital care.

Inequalities No obvious gradient in mortality by region or socioeconomic disadvantage.

Mortality in Indigenous Australians 1.7 times that of other Australians.

Associated risk factors Poor diet (46.0% of adults have inadequate fruit consumption; 85.6% have inadequate vegetable consumption).

Physical inactivity (34.0% of adults).

Excessive alcohol use (13.5% of adults).

Excess weight (53.5% of adults overweight or obese).

Depression

What is it? A mood disorder characterised by prolonged feelings of sadness, loss of interest or pleasure in nearly all activities, feelings of hopelessness, suicidal thoughts or self-blame.

Prevalence 5.8% of adults.

Similar across age groups, but reduced in persons aged 65 years and over.

Mortality Deaths not usually coded for depression, although a portion of suicides will have depression as a factor (suicides often reported as a proxy for depression deaths).

Morbidity 80,100 hospital separations.

Average age at separation 48 years.

Majority of separations in persons aged under 25–64 years.

Health resource use \$1.00 billion of health system expenditure, equivalent to 2.0% of total health expenditure.

Increase of 41% in per capita expenditure between 1993–94 and 2000–01.

Major components of expenditure are hospital care, medical services and pharmaceuticals.

Inequalities Comparative analysis for depression not appropriate.

Mental and behavioural conditions (of which depression is a subset) are significantly more common in disadvantaged areas.

Associated risk factors Excessive alcohol use (13.5% of adults).

Excess weight (53.5% of adults overweight or obese).

Diabetes

What is it? A metabolic disease in which high blood glucose levels result from defective insulin secretion or insulin production, or both. The most common form is Type 2, in which there are reduced levels of insulin or the inability of the body cells to properly use insulin.

Prevalence Up to 7.5% of adults (around 950,000 Australians), of which a portion are unaware that they have it.

Prevalence greater in males than in females.

Prevalence generally increases with age.

Mortality Major cause of death: 2.7% of all deaths (3,600 deaths), and an associated cause for another 8,100 deaths.

Majority of deaths in people aged 65 years and over.

Males have substantially higher mortality than females.

Death rate increased slightly over past decade.

Morbidity 66,700 hospital separations.

Average age at separation 62 years.

Majority of separations in persons aged 65 years and over.

Health resource use \$812 million of health system expenditure, equivalent to 1.6% of total health expenditure.

Major components of expenditure are hospital care, medical services and pharmaceuticals.

Inequalities Generally lower prevalence in regional areas, but significantly higher in disadvantaged areas.

Significantly higher mortality in regional areas and disadvantaged areas.

Mortality for Indigenous Australians 14 times that of other Australians.

Associated risk factors Excess weight (53.5% of adults overweight or obese).

Physical inactivity (34.0% of adults).

Poor diet (46.0% of adults have inadequate fruit consumption; 85.6% have inadequate vegetable consumption).

Lung cancer

What is it? A malignant tumour of the lungs. It begins in cells that line the airways and often invades adjacent tissues or spreads elsewhere in the body before symptoms are noticed.

Prevalence 8,300 new cases in 2001 (projected to 9,200 in 2006).

Male incidence almost double that of females.

Incidence rises sharply with age, peaking in 70–79 years age group.

Mortality Leading cause of death: 5.5% (totalling almost 7,300 in 2004). Nearly three-quarters were for people aged 65 years and over.

Male rate more than double female.

Death rate falling rapidly for males, but slightly increasing for females.

Morbidity 17,700 hospital separations.

Average age at separation 69 years.

Majority of separations in persons aged 65 years and over.

Health resource use \$136 million of health system expenditure, equivalent to 0.3% of total health expenditure.

Increase of 19% in per capita expenditure between 1993–94 and 2000–01.

Major component of expenditure is hospital care.

Inequalities Higher mortality in regional areas, and significantly higher in disadvantaged areas.

Mortality in Indigenous Australians 4 times that of other Australians.

Associated risk factors Almost exclusively tobacco smoking (21.3% of adults current smokers).

Oral disease

What is it? Any disease of the mouth, teeth and gums. The two main forms are dental caries (tooth decay) and periodontal (gum) disease.

Prevalence 16% of adult population had fewer than 20 natural teeth (a measure of oral disease), and 17% experienced impaired quality of life because of oral disease.

Mortality Deaths not usually coded for oral disease as defined above (although there are about 600 deaths per year from cancers of the oral cavity).

Morbidity 128,000 hospital separations.

Average age at separation 28 years.

Majority of separations in persons aged under 25 years.

Health resource use \$3.3 billion of health system expenditure, equivalent to 6.7% of total health expenditure.

Increase of 39% in per capita expenditure between 1993–94 and 2000–01.

Major component of expenditure is out of hospital medical (dental) services.

Inequalities Comparative analysis not reliable.

Associated risk factors Poor diet (46.0% of adults have inadequate fruit consumption; 85.6% have inadequate vegetable consumption).

Tobacco smoking (21.3% of adults current smokers).

Excessive alcohol use (13.5% of adults).

Osteoporosis

What is it? A progressive loss of bone density which occurs when calcium dissolves from the bones, leaving them weak and more likely to break.

Prevalence 3% of population (based on self-report), or 590,000 Australians.

Self-reported prevalence four times higher for females than for males.

Prevalence rises sharply with age.

Mortality Minor cause of death: 0.1% (totalling 180 in 2004).

Male death rate about one-quarter that of females.

Death rate increased slightly over past decade.

Morbidity 8,000 hospital separations.

Average age at separation 71 years.

Majority of separations in persons aged 65 years and over.

Health resource use \$221 million of health system expenditure, equivalent to 0.4% of total health expenditure.

Major components of expenditure are allied health services and aged care homes.

Inequalities Comparative analysis not reliable.

Associated risk factors Poor diet (46.0% of adults have inadequate fruit consumption; 85.6% have inadequate vegetable consumption).

Physical inactivity (34.0% of adults).

Tobacco smoking (21.3% of adults current smokers).

Excessive alcohol use (13.5% of adults).



Chronic diseases — conditions such as heart disease and diabetes (to name a few) that tend to be long-lasting and persistent in their symptoms or development — are a major health concern in Australia and other developed countries, placing great burden on individuals, communities and health. The top ten causes of disease burden in Australia are chronic diseases and it is estimated that in 1996 all chronic diseases and conditions were responsible for 80% of the total burden of disease, mental problems and injury, as measured in terms of disability-adjusted life years (AIHW: Mathers et al. 1999).

However, chronic diseases have not always been so dominant in terms of their impact on health, with infectious diseases and injury featuring more strongly in the health scene up until the middle of the twentieth century. The control of infectious diseases, along with changes to demographic factors and living and working conditions, and increases in the prevalence of risk factors, have seen chronic diseases grow in relative importance.

Yet many of these diseases are preventable through the modification of risk factors that contribute to their development (AIHW 2004a).

Over the last three years Australian governments have developed the first National Chronic Disease Strategy (NCDS) to provide national policy directions for improving chronic disease prevention and care across Australia for the next five to ten years. Accompanying the NCDS is the *Blueprint for nation-wide surveillance of chronic diseases and associated determinants*, which sets out the foundations for a systematic approach to population health surveillance in Australia.

About this report

This report builds on *Chronic diseases and associated risk factors in Australia, 2001*, which provided information on 12 major chronic diseases and 7 risk factors, as identified in the National Public Health Partnership's paper, *Preventing chronic disease: a strategic framework*.

This second report updates the earlier information and examines cross-cutting issues concerning the diseases and their risk factors, namely:

- the life course of chronic disease — that is, how different conditions affect age groups differently
- risk factors for chronic disease: their prevalence and trends within age groups
- the impact that chronic diseases have on health services
- the differences in chronic diseases and risk factors across regional, socioeconomic and Indigenous population groups.

This layout complements information already available by individual disease and risk factor in the chronic disease section of the AIHW website (<www.aihw.gov.au/cdarf/risk_fact/index.cfm>). The website also contains a statistics section — with comprehensive data on morbidity, mortality, disability and expenditure for chronic diseases and their risk factors — and has many links to other useful information sources.



This report refers to National Health Survey (NHS) data from the 2001 survey and from the most recent 2004–05 survey. As the recent release of 2004–05 NHS data coincided with the intended release of this publication, attempts were made to update NHS data in this publication where possible. However, as time was limited for doing comprehensive analyses, it was not possible to update all data and in some cases 2001 NHS data are still reported.

In addition, the release of 2004 mortality data also coincided with the release of this publication. Again, where possible, mortality data have been updated to the most recent data available. However, in some cases (for example, reporting by region, socioeconomic status and Indigenous status), 2003 data are reported.

Introducing chronic diseases

Because of their complex and varied nature, chronic diseases are very difficult to define. They vary considerably in terms of their nature, how they are caused and the extent of their impact on communities. Whereas some chronic diseases may be large contributors to premature death, others contribute more to disability. Some may last indefinitely, whereas others may resolve over time, although, generally, chronic diseases are never cured completely.

Features common to most chronic diseases include:

- ♦ complex causality, with multiple factors leading to their onset
- ♦ a long development period, some of which may have no symptoms
- ♦ a prolonged course of illness, perhaps leading to other health complications
- ♦ associated functional impairment or disability.

Although more common in older age groups (suggesting an underlying role of the ageing process), chronic disease can occur across all age groups. Type 1 diabetes and childhood asthma are classic examples of chronic diseases that begin early in life.

This report focuses on 12 specific chronic diseases, which are summarised in the snapshot table above. These diseases were chosen because their development and clinical course are generally typical of chronic diseases, they contribute largely to the burden of chronic disease and they are strongly influenced by a small number of risk factors. These risk factors are all modifiable at the population and individual level and offer major prospects for prevention of disease.

Limitations of the data

Much of the prevalence data on chronic diseases and their risk factors reported in this publication are collected from self-report cross-sectional surveys (for example, the National Health Survey). Subsequently, the prevalence of some diseases or conditions and their risk factors may be underestimated or overestimated. For example, people often inaccurately report food intake, alcohol consumption and smoking, and this can result in underestimates of the true prevalence.



Introduction

The development and impact of chronic diseases and their risk factors is largely a life-long process. In Australia, most children (0–14 years) and young people (15–24 years) are in good health (ABS 2002a; AIHW 2005a). However, by early adulthood (25–44 years), the effects of exposure to risk factors such as tobacco smoking, physical inactivity and obesity may manifest as diseases such as Type 2 diabetes, or as the early stages of diseases such as coronary heart disease and chronic obstructive pulmonary disease. It is usually in middle age (45–64 years) that the ‘accumulated interactions of genetic predisposition, environment and lifestyle commonly start to impact on health’ (Usherwood 2003:239). As the Australian population ages and people survive longer with cancer and chronic diseases of the circulatory and respiratory systems, dementia and related neurodegenerative disorders are likely to become more prevalent and have a greater impact on the health and wellbeing of older Australians (Access Economics 2005; AIHW 2004b).

The life course approach to chronic diseases epidemiology and prevention recognises that chronic diseases may arise either as an accumulation of risk or as exposure to risk factors at critical periods in life (Ben-Shlomo & Kuh 2002).

An important concept of the life course approach is the biological ageing of the human organism. Whereas a person’s chronological age is simply a measure of how long that person has lived since birth, biological ageing reflects the progressive loss of physiological function and ability to meet the demands of living. Biological ageing accompanies chronological ageing, but not necessarily at the same rate (Adams & White 2004). The Frenchwoman Jeanne Calment, who died in 1997 at the age of 122 years, is the only person verified to have lived beyond 120 years. In engineering terms, Jeanne Calment is evidence that the ‘design life’ of the human body (the theoretical maximum life span) is about 120 years. Many factors, however, interact to ensure that most people die well short of this theoretical maximum limit. These factors include genetic traits and disorders, behaviour and lifestyle, environmental and social settings, accidents and injuries, infections, coexisting conditions, social support, disease management, and health care quality and accessibility.

This chapter illustrates the progression of chronic diseases through the life course. It presents epidemiological data showing the different impact chronic diseases have at major stages of life — ‘children’ (0–14 years), ‘young people’ (15–24 years), ‘young adults’ (25–44 years), ‘middle-aged’ (45–64 years), and two groups of ‘older Australians’ (65–84 years and 85 years and over). Trends in hospitalisation and mortality associated with chronic diseases are presented to illustrate changes in patterns over time.

With a few exceptions such as depression, the shape of the distribution of chronic disease morbidity and mortality data across ages tends to be the same for both sexes, even though the magnitude is often very different. Therefore, describing the age structure for all persons tends to reflect the situation for both sexes.

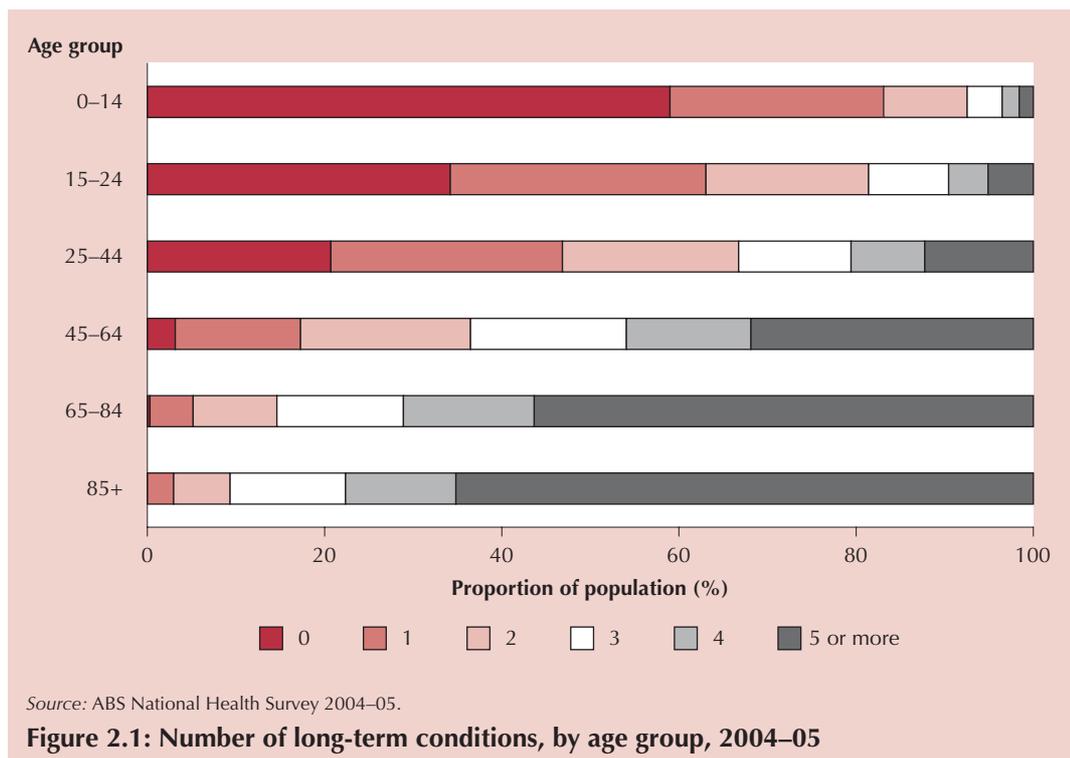


Statistics presented in this chapter show that, although major chronic diseases may affect people at all ages, their impact is generally greatest among the older age groups. An important point to consider throughout the chapter is the possibility that what may be, in part, age-related effects may simply be cohort effects. For example, middle-aged people of today may be healthier and have access to better health care than middle-aged people of the recent past.

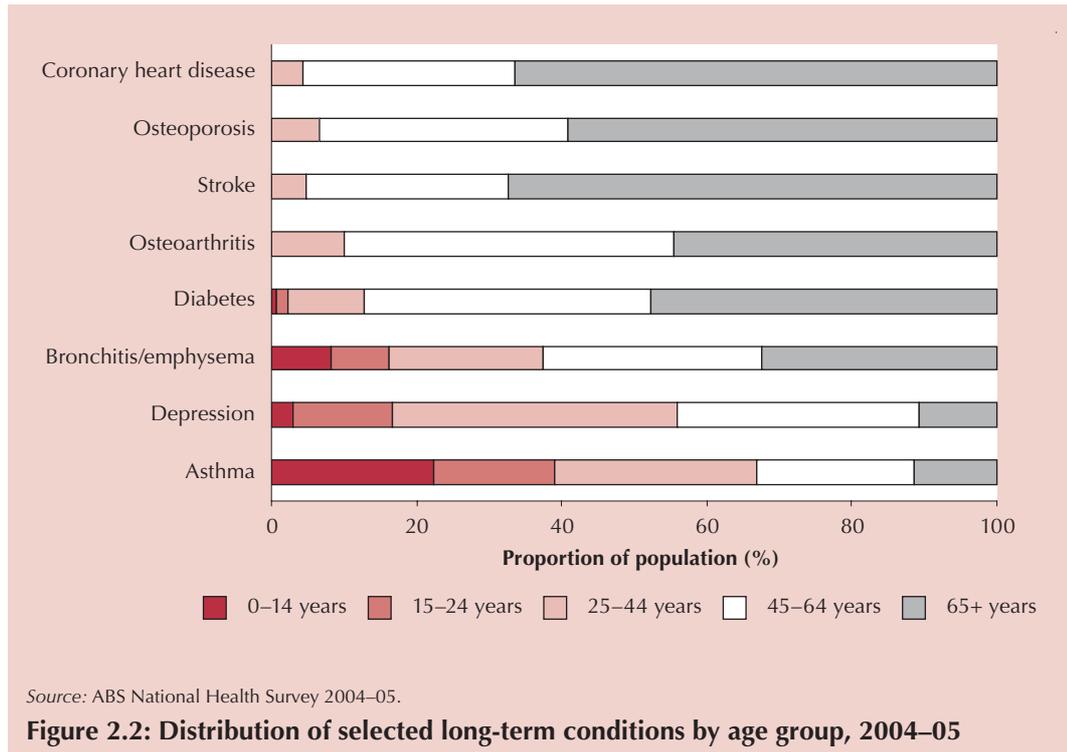
Prevalence of chronic diseases across the life course

Self-reported prevalence

According to self-reports from the (NHS), an estimated 77% of the Australian population had one or more long-term medical condition in 2004–05. A long-term medical condition was defined as one which has lasted or is expected to last for at least six months (ABS 2006). According to the NHS, all people aged 85 years and over in 2004–05 had at least one long-term condition (Figure 2.1). At the other end of the scale, nearly 60% of people aged 0–14 years had no long term conditions, and the distribution shifted fairly evenly in between.



Vision and hearing problems, allergic conditions, and arthritis and musculoskeletal conditions were the most commonly reported long-term conditions (ABS 2006). In general, the most common chronic conditions were present across most age groups. However, clear age-related patterns are usually observable with the major chronic diseases. For example, over 90% of coronary heart disease and osteoporosis and over 80% of diabetes were reported in people aged 45 years and over. On the other hand, the majority of self-reported cases of asthma (67%) and depression (56%) were reported in people aged under 45 years (Figure 2.2).



Other information on prevalence

Sources other than the NHS exist for estimating the prevalence (or, sometimes, incidence) of several major chronic diseases and some of these are outlined below.

CANCER

Cancer is the only chronic disease highlighted in this report that is notifiable in each state and territory. Therefore, good-quality data on national-level incidence (new cases) exist for this disease category in addition to the self-reported prevalence data provided by the NHS.

In 2001, there were 12,844 new cases of colorectal cancer and 8,275 new cases of lung cancer in Australia (AIHW & AACR 2004). Of the new cases, 68% and 70%, respectively, occurred in people aged 65 years and over.

CHRONIC KIDNEY DISEASE

The prevalence of chronic kidney disease is difficult to determine. The Australia and New Zealand Dialysis and Transplant Registry (ANZDATA) collects data on the prevalence of treated end-stage kidney disease, a severe outcome of chronic kidney disease requiring dialysis or kidney transplant. According to ANZDATA, 13,625 Australians were receiving treatment for end-stage kidney disease in 2003 (AIHW 2005b). The prevalence of treated end-stage kidney disease increased rapidly up to 65–74 years, declining thereafter (AIHW 2005b).



DEPRESSION

Depression can affect people at all ages. Although it affects a significant number of children and older people, depression tends to be most prevalent in early and late adulthood. The National Survey of Mental Health and Wellbeing was conducted in 1997 for adults aged 18 years and over (ABS 1998). According to the survey, 5.8% of adults had depressive disorders. The prevalence of depression was fairly stable from 18–64 years but declined substantially from age 65 onwards (ABS 1998). The child and adolescent component of the survey was conducted in 1998 (Sawyer et al. 2000). According to the survey, about 3% of children (6–12 years) and about 5% of adolescents (13–17 years) had depression.

Most cases of chronic major depression develop after the age of 21 years (Akiskal et al. 1981; Klein et al. 1999). There is evidence that most depressed adults were not depressed as children and that the risk factors for early onset and later onset major depression differ (Jaffee et al. 2002; Jorm 2000; Sorensen et al. 2005). Jaffee et al. (2002:220) concluded that 'with the exception of having experienced unwanted sexual contact, adult-onset MDD [major depressive disorder] does not seem to have an early developmental diathesis [predisposition to disease]'. However, the same research also suggests that major depression that develops in childhood or adolescence is associated with more comorbidity than depression that develops in adulthood.

DIABETES

The Australian Diabetes, Obesity and Lifestyle Study (AusDiab) provided a more accurate indication of the prevalence of diabetes than self report surveys as it involved blood samples and would therefore detect undiagnosed diabetes. According to the 1999–2000 AusDiab study, 7.2% of Australians aged 25 years and over (about 850,000 people) had Type 2 diabetes (AIHW 2002a). Type 2 diabetes was most prevalent among males aged 65–74 years and females aged 75 years and over. An estimated 37,000 people aged 25 years and over had Type 1 diabetes (AIHW 2002a).

Hospitalisations for major chronic diseases across the life course

Patterns of hospitalisation

Chronic diseases are associated with a considerable number of hospitalisations. The 12 major chronic diseases highlighted here accounted for approximately one in five hospital separations in 2003–04. Of the diseases listed in Table 2.1, chronic kidney disease accounted for over half of the separations (11.5% of all separations). This number is high because of regular dialysis care required by people with end-stage kidney disease. Coronary heart disease had the next highest number of separations, and osteoporosis had the least.

There is considerable variation in the distribution of hospital separations in 2003–04 for the 12 major chronic diseases across the six age groups highlighted in this chapter (Figure 2.3). (For comparison, Figure 2.3 also shows the distribution across the age groups of all hospital separations and the whole population as at 31 December 2003.) For most of the diseases, the bulk of hospitalisation occurred among the older age groups. Almost 80% of hospitalisations for chronic obstructive pulmonary disease (COPD) involved people

aged 65 years and over. Most of the other major chronic diseases involved a substantial proportion of hospitalisation among people aged 45–64 years. On the other hand, almost half (46%) of the separations for depression involved people aged under 45 years, and over half (53%) of the separations for asthma involved children under 15 years of age.

Table 2.1: Hospital separations and average age at separation, for major chronic diseases, 2003–04

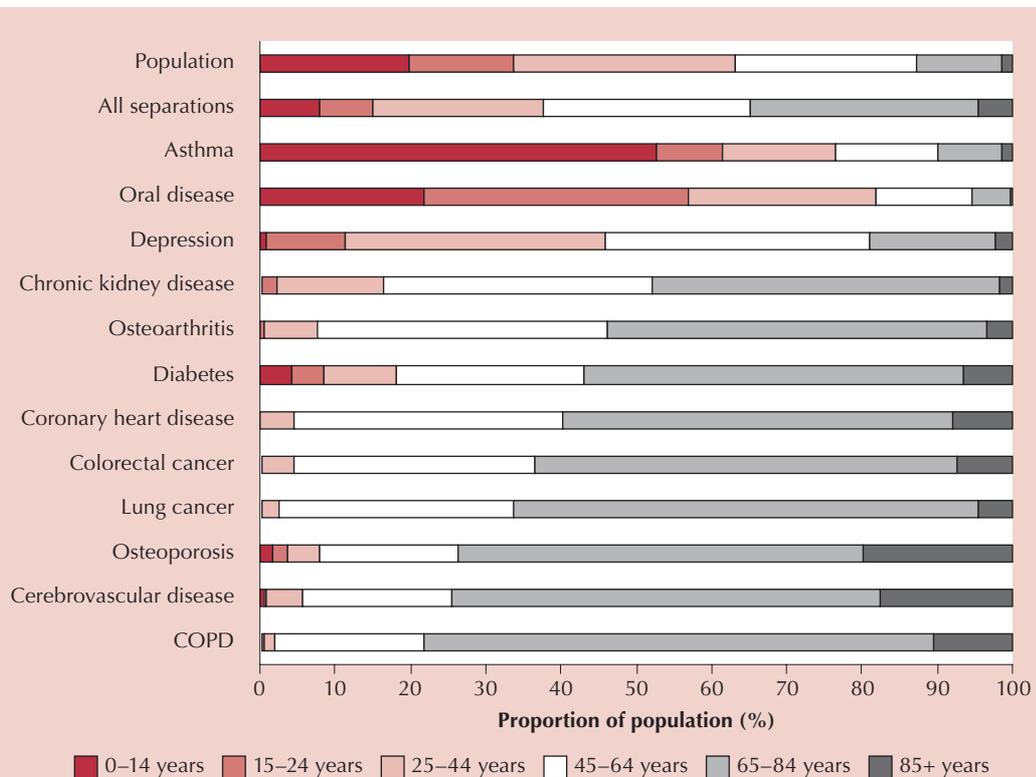
Disease	Number of separations	Average age at separation (years)
Chronic kidney disease	784,926	60.7
Coronary heart disease	164,225	67.3
Oral disease	128,235	27.8
Depression	80,111	47.6
Osteoarthritis	70,702	64.5
Diabetes	60,281	62.0
Chronic obstructive pulmonary disease ^(a)	54,281	72.1
Cerebrovascular disease ^(b)	40,791	71.7
Asthma	37,990	24.0
Colorectal cancer	27,601	67.9
Lung cancer	17,716	68.6
Osteoporosis	7,969	71.2

(a) Definition includes emphysema and chronic bronchitis.

(b) Definition includes stroke.

Note: 4,075 separations for chronic kidney disease also coded as separations for diabetes.

Source: AIHW National Hospital Morbidity Database.



Note: COPD = chronic obstructive pulmonary disease.

Source: AIHW National Hospital Morbidity database.

Figure 2.3: Distribution of hospital separations for major chronic diseases, by age group, 2003–04



The relative size of each age group can be taken into account by referring to age-specific hospital separation rates (Table 2.2). For example, people aged 85 years and over made up only 10.5% of the COPD separations in 2003–04, but the separation rate for COPD was highest among this relatively small age group. For all diseases outlined here, excluding asthma, chronic kidney disease and oral disease, the two oldest age groups had the highest separation rate (Table 2.2). For asthma, children aged 0–14 years had the highest separation rate; for chronic kidney disease, the rate for people aged 45–64 years was higher than the rate for people aged 85 years and over. For oral disease, the highest separation rate was observed in those aged 15–24 years, with the majority of principal diagnoses in this age group relating to disorders of tooth development and embedded teeth.

Changes in hospitalisation rates over time

Between 1998–99 and 2003–04, the age-specific hospital separation rates among the two older age groups often either increased the most or decreased the least for the major chronic diseases (Table 2.3). The hospital separation rate among the oldest age group (85 years and over) increased from 1998–99 to 2003–04 by more than 10% for 8 of the 11 chronic diseases listed in Table 2.3. The largest increases were observed for chronic kidney disease in those aged 85 years and over (an increase of 236%) and for osteoporosis in those aged 0–14 (177%) and 15–24 years (162%).

Table 2.2: Age-specific hospital separation rates for major chronic diseases, 2003–04

Chronic disease	Age group (years)					
	0–14	15–24	25–44	45–64	65–84	85 and over
	(per 100,000 population)					
Asthma	501.1	124.6	95.9	107.1	143.9	177.7
Cerebrovascular disease	4.9	7.5	32.5	169.3	1,014.4	2,471.1
Chronic kidney disease	77.7	546.5	1,889.7	5,849.6	15,889.7	4,219.8
Colorectal cancer	0.1	1.9	19.7	184.3	680.3	692.9
COPD ^(a)	4.4	2.9	13.1	226.7	1,606.8	1,962.1
Coronary heart disease	0.3	2.4	123.5	1,223.7	3,739.1	4,404.4
Depression	18.9	299.3	472.7	583.5	591.7	614.3
Diabetes	62.7	92.9	99.8	311.5	1,337.1	1,334.0
Lung cancer	0.4	0.4	7.0	115.2	479.2	281.6
Oral disease	706.1	1,625.2	542.6	340.0	286.1	186.3
Osteoarthritis	0.6	12.0	87.5	565.4	1,560.3	844.2
Osteoporosis	3.5	5.3	5.8	30.8	187.6	543.7

(a) COPD = chronic obstructive pulmonary disease.

Source: AIHW National Hospital Morbidity Database.

Mortality from chronic diseases across the life course

Patterns of mortality

The major chronic diseases featured in this report (excluding deaths from depression and oral diseases) accounted for 49.7% of all deaths in Australia in 2004. Deaths owing to depression and oral disease are not reported, as the mortality data for these chronic conditions were not considered suitable.

Table 2.3: Change in age-specific hospital separation rates for major chronic diseases, 1998–99 to 2003–04

Chronic disease	Age group (years)					
	0–14	15–24	25–44	45–64	65–84	85 and over
	(per cent change in rate since 1998–99)					
Asthma	–32.5	–41.8	–26.3	–32.1	–32.8	–20.1
Cerebrovascular disease	1.5	–6.4	6.0	–8.7	–13.8	–3.1
Chronic kidney disease	–19.9	10.6	11.0	31.8	66.4	235.9
Colorectal cancer	23.7	119.0	20.9	9.4	14.9	11.6
COPD	–63.2	–47.8	–9.5	–4.9	4.6	26.1
Coronary heart disease	–8.1	–5.5	–4.8	–11.2	–7.4	11.3
Depression	39.9	33.4	25.3	29.5	15.9	31.1
Lung cancer	126.2	–37.0	–14.5	–8.6	–3.4	12.4
Oral disease	27.2	21.6	32.0	50.1	42.9	32.3
Osteoarthritis	–19.4	–15.3	–1.8	24.2	18.8	4.8
Osteoporosis	177.0	162.0	81.3	81.7	60.7	56.6

Notes

1. Per cent change in rate = (2003–04 rate – 1998–99 rate)/1998–99 rate x 100.
2. COPD = chronic obstructive pulmonary disease.
3. Diabetes not included because of changes in morbidity coding rules since 1998–99.

Source: AIHW National Hospital Morbidity Database.

Because such a significant proportion of people die from chronic diseases, these diseases are likely to have a strong influence on the average life span. The average age at death associated with many of the major chronic diseases in 2004 was above or near the average age at death for all causes, which in 2004 was 71.5 years for males and 77.0 years for females (Table 2.4). People with certain types of cancers tend to die before the overall average age at death, and there are other chronic diseases (for example, cystic fibrosis) that usually end peoples' lives at an early age.

Table 2.4: Number of deaths and average age at death associated with major chronic diseases, 2004

Cause of death	Number of deaths	Average age at death (years)		
		Males	Females	Persons
Coronary heart disease	24,576	75.4	82.2	78.6
Cerebrovascular diseases	12,041	78.9	82.5	81.1
Lung cancer	7,264	71.7	71.5	71.6
Chronic obstructive pulmonary disease	5,199	77.8	77.9	77.8
Colorectal cancer	4,126	71.2	73.9	72.5
Diabetes	3,599	74.7	78.5	76.5
Chronic kidney disease	2,363	78.7	80.5	79.6
Asthma	313	61.4	71.7	68.1
Osteoporosis	176	85.0	85.3	85.3
Osteoarthritis	71	83.6	84.7	84.4

Notes

1. Deaths owing to oral disease not included because of small numbers.
2. Deaths owing to depression not included as data for this chronic disease were not considered adequate.

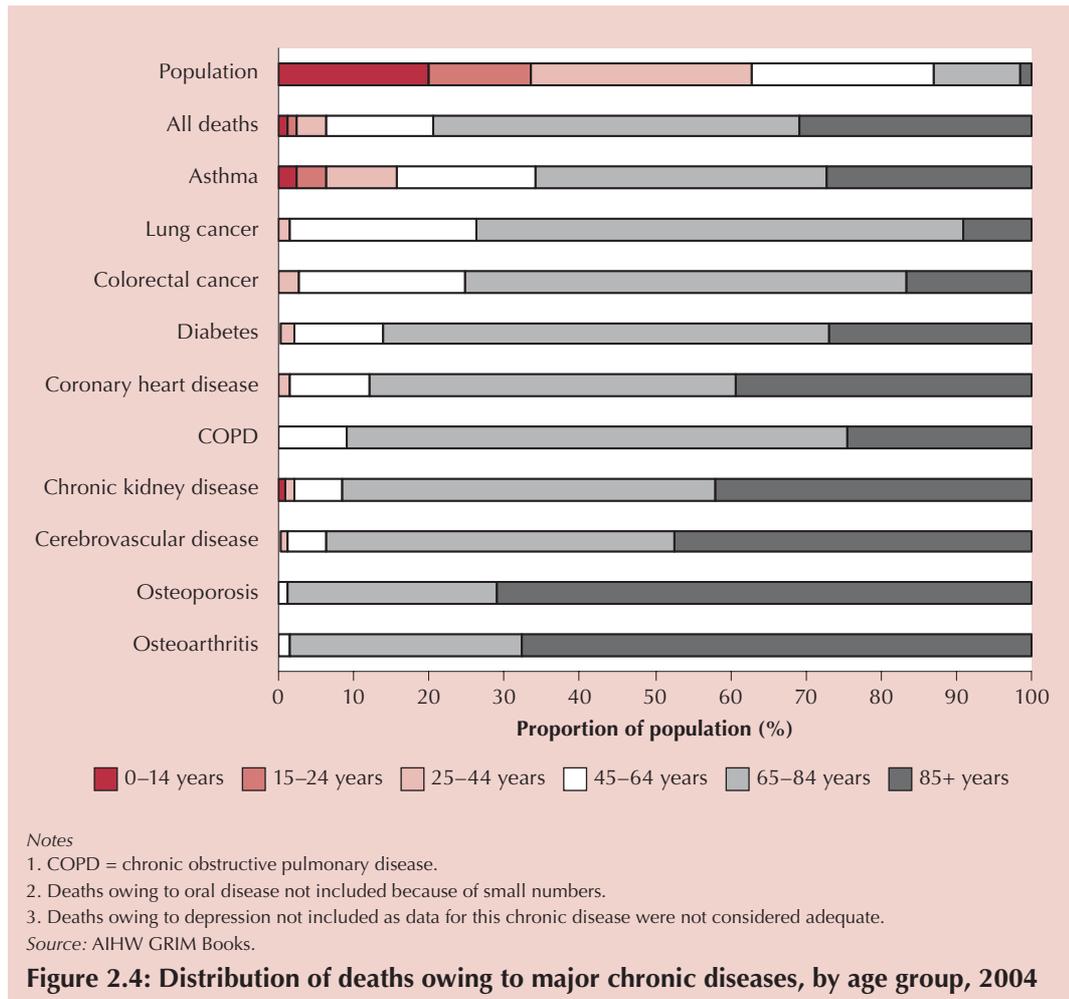
Source: AIHW GRIM Books.

Of all deaths in Australia in 2004, 20.5% occurred in people aged less than 65 years. With a few exceptions, deaths from the major chronic diseases occur later in life, that is, from



65 years of age (Figure 2.4). Only asthma and the two cancers listed had more than 20% of deaths occurring in people aged less than 65 years. Nevertheless, the proportion of deaths occurring in the two oldest age groups (65–84 years and 85 years and over) varies from disease to disease.

Age-specific death rates show that, when taking into account the relative size of each age group, deaths from the major chronic diseases in 2004 were even more skewed towards the two oldest age groups, even for asthma (Table 2.5).



Changes in mortality over time

Since 1999, the age-specific death rate for all the major chronic diseases decreased in the 45–64 years age group (Table 2.6). For asthma, cerebrovascular disease, chronic kidney disease, colorectal cancer, chronic obstructive pulmonary disease, and coronary heart disease, the death rate decreased for all the age groups from middle age onwards. In each case the smallest decrease was observed in the 85 years and over age group, excluding colorectal cancer where the smallest decrease was observed in those aged 65–84 years. Large increases in age-specific rates were observed for diabetes and osteoporosis in those aged 85 years and over (an increase of 14.9% and 32.9% respectively).

Table 2.5: Age-specific death rates for major chronic diseases, 2004

Chronic disease	Age group (years)					
	0–14	15–24	25–44	45–64	65–84	85 and over
	(per 100,000 population)					
Asthma	0.2	0.4	0.5	1.2	5.2	28.8
Cerebrovascular disease	0.2	0.5	1.9	13.1	240.9	1928.9
Chronic kidney disease	0.5	0.0	0.5	3.1	50.8	334.9
Colorectal cancer	0.0	0.1	1.9	18.8	104.4	232.7
COPD ^(a)	0.0	0.0	< 0.1	9.6	149.7	429.6
Coronary heart disease	0.1	0.3	6.0	54.3	515.3	3271.3
Diabetes	0.0	0.2	1.1	8.8	92.1	327.5
Lung cancer	< 0.1	0.0	1.8	36.9	203.2	226.0
Osteoarthritis	0.0	0.0	0.0	< 0.1	1.0	16.2
Osteoporosis	0.0	0.0	0.0	< 0.1	2.1	42.3

(a) COPD = chronic obstructive pulmonary disease.

Notes

1. Deaths due to oral disease not included due to small numbers.
2. Deaths due to depression not included as data for this chronic disease was not considered adequate.

Source: AIHW GRIM Books.

Table 2.6: Change in age-specific death rates for major chronic diseases, age 45 years and over, 1999 to 2004

Disease	Age group (years)		
	45–64	65–84	85 and over
	(per cent change in rate since 1999)		
Asthma	–46.3	–36.1	–20.1
Cerebrovascular disease	–24.8	–16.8	–13.1
Chronic kidney disease	–26.6	–13.9	–5.3
Colorectal cancer	–26.8	–18.7	–20.0
COPD	–16.3	–17.8	–10.8
Coronary heart disease	–24.6	–28.6	–13.4
Diabetes	–18.0	10.3	14.9
Lung cancer	–6.3	–5.4	1.3
Osteoarthritis	n.a.	–37.6	2.1
Osteoporosis	n.a.	–12.8	32.9

Notes

1. The rates for the younger age groups were too low to yield meaningful results.
2. Per cent change in rate = (2004 rate – 1999 rate)/1999 rate x 100.
3. COPD = chronic obstructive pulmonary disease.
4. Deaths owing to oral disease not included because of small numbers.
5. Deaths owing to depression not included as data for this chronic disease were not considered adequate.

Source: AIHW GRIM Books.



Highlights: chronic diseases across the life course

- *In 2004–05, more than 90% of coronary heart disease and osteoporosis, and over 80% of diabetes and arthritis, were reported for people aged 45 years and over.*
- *The majority of asthma (67%) and depression (56%) cases were reported in people aged under 45 years.*
- *In 2003–04, the vast majority of hospital separations for most chronic diseases were for those aged 45–84 years.*
- *Age-specific hospitalisation rates show that for the majority of chronic diseases — excluding asthma, oral disease and chronic kidney disease — hospital separation rates are highest for those in the two oldest age groups (that is, 65–84 years and 85 years and over).*
- *In 2003–04, asthma separation rates were highest in those under 15 years of age, oral disease separation rates were highest in those aged 15–24 years and separation rates for chronic kidney disease were highest for those aged 45–64 years.*
- *In 2004, 11 major chronic diseases accounted for 50% of all deaths in Australia.*
- *The average age of death for many of the chronic diseases is close to the average life expectancy in Australia.*
- *Deaths from chronic diseases tend to occur later in life (that is, 65 years and beyond). Only asthma and the three cancers listed had more than 20% of deaths occurring in people aged under 65 years.*



Introduction

Risk factors are characteristics that are associated with an increased risk of developing a particular disease or condition. These can be demographic, behavioural, biomedical, genetic, environmental, social or other factors, which can act independently or in combination (Table 3.1). Increasing life expectancy, the reduction in communicable diseases, and the high prevalence of risk factors mean that chronic diseases are prominent in Australia.

Table 3.1: Risk factors and determinants for chronic diseases

Modifiable risk factors		Broad influences (may or may not be modifiable)	Non-modifiable factors
<i>Behavioural</i>	<i>Biomedical</i>		
Tobacco smoking	Excess weight	Socio-environmental factors	Age
Excess alcohol use	High blood pressure	Psychosocial factors	Gender
Physical inactivity	High blood cholesterol	Early life factors	Indigenous status
Poor diet	Other	Political factors	Ethnic background
Other			Family history
			Genetic makeup

The National Public Health Partnership's strategic framework for preventing chronic disease (NPHP 2001) places a strong emphasis on health promotion, acknowledging that the prevention and management of risk factors is a key aspect of preventing chronic disease. The framework takes a life course perspective on prevention, which highlights the importance of healthy behaviour and management of risk factors for primary prevention of chronic diseases, as well as throughout the course of established diseases.

The chronic diseases highlighted in this report are considered to be preventable, since many of the factors which influence them can be avoided or modified. For example, tobacco smoking is the single most important factor in the development of chronic obstructive pulmonary disease, and therefore controlling tobacco use is a major preventive strategy for reducing the burden of this disease (AIHW 2005c). Since most of the modifiable risk factors are associated with several different diseases (Table 3.2), prevention and management of these factors can have substantial benefits.

The various risk factors and determinants listed in Table 3.1 have different roles in the prevention of chronic diseases. Behavioural and biomedical risk factors are often able to be modified at the individual level by changes in behaviour or through medical intervention. For the broader influences on health, interventions at a community or population level may be required to produce change, such as strategies to promote immunisation of young children, or town planning policies incorporating more open spaces for recreational activity. Non-modifiable factors — that is, a person's individual characteristics such as their age or ethnicity — can help in identifying groups at risk. These characteristics are important factors to consider when developing prevention and management strategies, not only to highlight the differing risk factor profiles in different population groups, but also to ensure the strategies developed are culturally and linguistically appropriate.



Table 3.2: Relationships between selected chronic diseases/conditions and modifiable risk factors

Chronic disease/ condition	Behavioural risk factors				Biomedical risk factors		
	Poor diet	Physical inactivity	Tobacco smoking	Excess alcohol use	Excess weight	High blood pressure	High blood cholesterol
Coronary heart disease	✓	✓	✓	✓	✓	✓	✓
Cerebrovascular disease	✓	✓	✓	✓	✓	✓	✓
Lung cancer			✓				
Colorectal cancer	✓	✓		✓	✓		
Depression				✓	✓		
Diabetes	✓	✓			✓		
Asthma			✓		✓		
COPD ^(a)			✓				
Chronic kidney disease	✓		✓		✓	✓	
Oral diseases	✓		✓	✓			
Osteoarthritis		✓			✓		
Osteoporosis	✓	✓	✓	✓			

(a) Chronic obstructive pulmonary disease

Source: AIHW 2002a.

Trends in the prevalence of the main behavioural and biomedical risk factors for chronic diseases are not always consistent with the trends in these diseases most affected by them. Risk factors may be present for many years before a disease manifests, leading to lags between changes in risk factor prevalence and resulting changes in disease incidence or prevalence. Therefore it is necessary to continue identifying and monitoring the variety of risk factors affecting chronic diseases.

This chapter provides information on risk factors at different stages of life. The first section covers a selection of early life factors that can create a predisposition to chronic disease in later life. The second and third sections then deal in turn with prevalence and trends in risk factors among children and adolescents, and among adults. The focus in these sections is on behavioural and biomedical risk factors: smoking, physical inactivity, excessive alcohol use, poor diet (indicated by inadequate fruit and vegetable consumption), excess weight (also referred to as 'overweight and obesity'), high blood pressure and high cholesterol. The chapter concludes with some additional information on multiple risk factors in adults.

Early life factors

Risk factors encountered very early in life, including during gestation, may lead to increased risk of chronic diseases in later life. Although the person affected has little or no control over his or her exposure to these risks, action by parents, carers and the community can limit the exposure of infants and children to factors that could have a negative impact on their future health status, and promote practices that have a positive impact on health. This section describes the risk factors of low birthweight and breastfeeding.

Low birthweight

A baby born with a low birthweight has an increased risk of developing chronic diseases such as coronary heart disease, cerebrovascular disease, high blood pressure, Type 2 diabetes, kidney damage and obstructive lung disease (United Nations Sub-Committee on Nutrition 2000). A birthweight less than 2,500 grams is considered low. A very low birthweight is less than 1,500 grams, whereas an extremely low birthweight is less than 1,000 grams.

In 2002, the average birthweight in Australia was 3,371 grams (Laws & Sullivan 2004). Boys (3,431 grams) were, on average, heavier than girls (3,308 grams). Birthweights of under 2,500 grams represented 6.4% of live births. The vast majority of live births in 2002 (91.8%) were between 2,500 and 4,499 grams.

Low birthweight is associated with a number of factors, including the size and age of the mother and the number of previous births (Laws & Sullivan 2004). However, according to the United Nations Sub-Committee on Nutrition (2000), low birthweight in industrialised countries is mostly associated with prematurity, or preterm birth (birth before 37 weeks of gestation), which is commonly attributed to tobacco smoking during pregnancy (United States Department of Health and Human Services 2004). About 8% of births in Australia in 2002 were preterm (Laws & Sullivan 2004).

Intrauterine growth retardation can also be associated with low birthweight. It is largely attributed to pre-eclampsia (a complication of pregnancy characterised by high blood pressure and protein in the urine) and tobacco smoking during pregnancy, as well as alcohol intake during pregnancy (United Nations Sub-Committee on Nutrition 2000). There were 6,713 hospital separations for pre-eclampsia in 2002–03, with an average age at separation of 28.8 years.

In addition to preterm births and intrauterine growth retardation, smoking during pregnancy can lead to various complications, including placental problems, spontaneous abortion and stillbirth (United States Department of Health and Human Services 2004).

Based on data from five states and territories, 17.3% of mothers who gave birth in 2003 reported to have smoked tobacco during pregnancy (Laws & Sullivan 2004). Mothers who smoked during pregnancy tended to be younger than those who did not, with 42.1% of teenage mothers smoking during pregnancy compared with 10.9% of mothers aged 35 years and over.

According to the 2004 National Drug Strategy Household Survey, 20% of women reported smoking tobacco and 47% reported consuming alcohol while pregnant and/or breastfeeding in the previous 12 months (AIHW 2005d). In contrast, 22% of all women aged 14–49 years reported that they smoked in the last 12 months, and 85% reported that they consumed alcohol.



Breastfeeding

Besides the psychological benefits derived from mother–infant bonding, breastfeeding contributes to the health and development of the infant, and may also influence adult health. Antibodies in breast milk protect the infant from bacterial and viral infections (NHMRC 2003). Breastfeeding lowers the risk of sudden infant death syndrome and may also lower the risk of some cancers, such as childhood leukaemia (NHMRC 2003; United States Breastfeeding Committee 2002).

Recent research has found that exclusive breastfeeding (infant consumes breast milk only) for 4–6 months protects the infant against the early development of wheezing (a symptom of asthma) and atopic dermatitis (often referred to as eczema). However, the evidence for long-term protective effects is not clear (Arshad 2005; Friedman & Zeiger 2005).

National data on exclusive breastfeeding are not available (AIHW 2005a). The National Health Survey, however, provides data on the proportion of infants ‘fully’ breastfed (receive only breast milk on a regular basis). Self-reported information from the 2001 National Health Survey revealed that:

- 83% of infants aged 0–3 years were breastfed when first taken home from hospital
- 48% of infants were receiving some breast milk by 6 months of age, but no infants at 6 months old were being fully breastfed
- 87% of infants had received some breast milk by 3 years of age
- 54% of infants aged 3 months or less were fully breastfed
- 32% of infants aged 6 months or less were fully breastfed
- problems in producing adequate milk was the most common reason for stopping breastfeeding (ABS 2003).

Risk factors in children and adolescents

Children’s health needs differ from those of adults, and therefore definitions of some risk factors in children and adolescents are different from those in adults. Although the risks associated with tobacco smoking and excessive alcohol consumption are similar in people of any age and can be measured in a similar fashion, this is not the case for other risk factors. As children grow and develop, their requirements for food and activity and their ‘healthy’ weight range change. For this reason, recommendations relating to health risk factors may be different for children and adolescents at different ages.

Data on risk factor trends in children are sparse. Although the regular national and jurisdictional health surveys gather data on risk factors in adults and health conditions at all ages, surveys that collect information about children’s health-related behaviours are irregular and often do not produce comparable data. This makes it difficult to monitor changes in the risk factor profile of Australia’s children and adolescents.

Australian recommendations and relevant data on risk factors in children and adolescents are outlined below along with available data on trends for smoking, risky alcohol consumption, fruit and vegetable consumption and body weight.

Childhood infections

In general, vaccine-preventable diseases in childhood, such as tetanus and meningococcal disease, are of an acute nature. However, some vaccine-preventable diseases can cause long-term consequences for the developing child. Diphtheria, for example, can damage the heart and kidneys. A number of chronic diseases may also arise from infections that are either not vaccine-preventable or for which population ('herd') immunity is poor. For example, kidney and heart damage can result from group A streptococcal infections (Cunningham 2000).

Programs exist in Australia for widespread immunisation against a large number of communicable diseases: whooping cough (pertussis), tetanus, diphtheria, polio, measles, mumps, rubella, *Haemophilus influenzae* type b (Hib), meningococcal C, invasive pneumococcal disease (IPD), hepatitis B and chicken pox (varicella). According to the National Immunisation Program, children born after 1 January 2005 should be immunised against these 12 diseases by 4 years of age.

The Australian Childhood Immunisation Register provides estimates of the coverage of vaccination of children under 7 years of age (Health Insurance Commission 2005). As at 31 December 2005, 90.2% of children aged 12 months to under 15 months, 92.1% of children aged 24 months to under 27 months, and 83.8% of children aged 72 months to under 75 months were fully immunised. According to Lister et al. (1999:156), vaccination coverage of at least 90% is required to 'achieve and maintain the levels of herd immunity needed to interrupt transmission of vaccine preventable diseases in Australia'.

For several of the vaccine-preventable diseases, there has been a dramatic reduction in the number of notified cases since the introduction of immunisation strategies in the 1990s (Table 3.3). Other diseases, such as diphtheria and poliomyelitis, have become rare in Australian children.

Table 3.3: Notifications of vaccine-preventable diseases, children 0–14 years, 1999 to 2004

Disease	1999 and 2000	2001 and 2002	2003 and 2004
Pertussis	3,936	5,913	3,956
Meningococcal disease	572	610	419
Measles	168	51	38
Mumps	145	58	30
Hib	40	33	25
Hepatitis B (acute)	11	15	16
Rubella	201	47	10
Tetanus	1	0	0
Diphtheria	0	0	0
Poliomyelitis	0	0	0

Note: Invasive pneumococcal disease was not notifiable before 2001, and chicken pox is not notifiable.
Source: Communicable Diseases Australia, National Notifiable Diseases Surveillance System.



Environmental tobacco smoke

Environmental tobacco smoke (ETS) is a combination of exhaled smoke and smoke from the burning end of a cigarette. It contains basically the same carcinogens and toxic agents that are inhaled directly by smokers. Although ETS can lead to serious health consequences for both adults and children, children are particularly susceptible. About 8% of childhood asthma has been attributed to ETS (NHMRC 1997). Exposure to ETS, 'or passive smoking', can also exacerbate existing asthma in children and increase the chance of developing other chronic respiratory diseases and impaired lung function (United States Environmental Protection Agency 1999). Some research suggests that people who have never smoked but who live with smokers are also more likely to develop lung cancer or coronary heart disease than if they lived with non-smokers (NHMRC 1997).

There has been a marked decline over the last decade in the proportion of children exposed to environmental tobacco smoke. This is reflected in the overall decline in tobacco smoking in the Australian population as well as a sharp decline in the proportion of households with dependent children in which someone smokes indoors (Table 3.4).

Table 3.4: Smoking status of households with dependent children, 1995 to 2004

Household smoking status	1995	1998	2001	2004
	(per cent)			
Smokes inside the home	31.3	22.6	19.7	12.3
Only smokes outside the home	16.7	21.5	24.9	28.1
No one at home regularly smokes	52.0	55.9	55.4	59.6

Notes

1. Household smoking status as reported by respondents aged 14 years and over.

2. Households contain dependent children aged 14 years or under.

Sources: National Drug Strategy Household Surveys 1995, 1998, 2001, 2004.

Smoking and alcohol

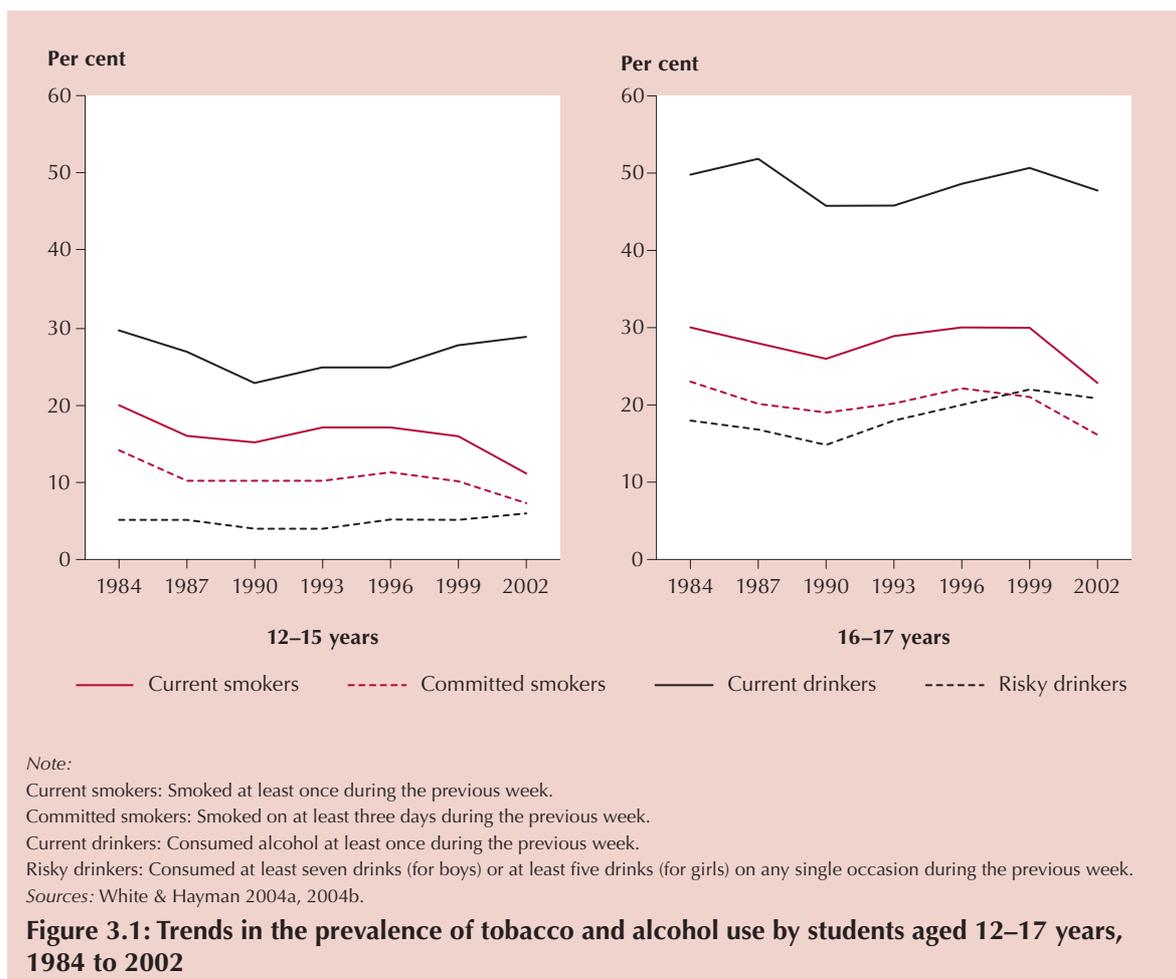
Data from the 2002 Australian Secondary Schools' Alcohol and Drug survey (ASSAD) show that around 14% of participants aged 12–17 years were 'current smokers' — that is, they reported smoking tobacco at least once during the previous week (White & Hayman 2004a). Around two-thirds of these young people (9%) were 'committed smokers' — that is, they smoked on at least three of the seven days before the survey. The proportion who were committed smokers increased with age, from 3% of 12-year-olds to 17% of 17-year-olds, and was higher in girls than boys at all ages.

Results from the ASSAD surveys also show that the proportion of those aged 12–17 years who were current or committed smokers declined between 1984 and 2002. Among those aged 12–15 years, the proportions of current and committed smokers halved, and reductions of around 20–30% were seen among those aged 16–17 years (Figure 3.1).

The ASSAD surveys also collect data on alcohol consumption among students aged 12–17 years. In 2002, 34% of students reported that they had consumed alcohol in the previous week, with a greater proportion among boys (37%) than girls (31%) (White & Hayman 2004b).

A particular concern relating to alcohol use in young people is 'binge drinking' — that is, drinking heavily over a short period of time, or drinking continuously over a number of days or weeks. This is associated with harm in the short term, such as injury, interpersonal violence, accidental death, self-harm and anti-social behaviour (NHMRC 2001). The Australian Alcohol Guidelines define short-term risky alcohol use in adults as consuming seven or more standard drinks (for males) or five or more drinks (for females) on any one day (NHMRC 2001). Of students participating in the 2002 ASSAD, 10% survey reported consuming alcohol at these levels at least once during the previous week, with this proportion increasing from 2% among 12-year-olds to 22% among 17-year-olds (White & Hayman 2004b).

The proportion of students aged 12–17 years who reported consuming alcohol during the week before the survey, and the proportion who drank at levels that could lead to short-term harm, were similar in ASSAD surveys of 2002 and 1984 (Figure 3.1) Levels of both current and risky drinking fell between 1984 and 1990 but then increased again up to 2002 (White & Hayman 2004b).



Physical inactivity

National physical activity recommendations for Australian children and adolescents recommend at least 1 hour of moderate to vigorous physical activity each day, with no more than 2 hours each day using electronic media (for example, TV/video, computer games, internet) for entertainment, particularly during daylight hours (DoHA 2004a, 2004b).

Although there are no recent national data on the physical activity patterns of Australian children and adolescents, a recent survey conducted in New South Wales found that three-quarters of children and adolescents reported meeting the physical activity recommendations. Boys reported more activity than girls, but for both sexes participation decreased with age (Booth et al. 2006).

The 2003 Western Australian Child and Adolescent Physical Activity and Nutrition Survey (CAPANS) found that less than one in seven primary school children (aged 7–12 years) reported no participation in sport, exercise or dance activities (Hands et al. 2004). Among secondary school students (aged 13–16 years), one in four males and one in three females reported undertaking no physical activity outside of school. Two-thirds of secondary students and over half of all primary students reported watching television for more than 2 hours each week day. In addition, boys reported an average of 15–17 hours each week using a computer or video game machine in their leisure time, with girls reporting an average of 11–15 hours per week (Hands et al. 2004). This suggests that a large proportion of children and adolescents may spend more than the recommended 2 hours each day using electronic media for entertainment.

Fruit and vegetable consumption

The *Australian guide to healthy eating* (DHFS 1998) recommends that adolescents aged 12–18 years eat a minimum of 300 grams of fruit and 300 grams of vegetables (including legumes and potatoes) each day, with a daily minimum of 300 grams of fruit and 225 grams of vegetables recommended for children aged 8–11 years. The size of an average apple or a small salad is 100g. Younger children should eat 150 grams of fruit and 150 grams of vegetables each day (DHFS 1998).

The 1995 National Nutrition Survey provides the most recent national data on fruit and vegetable consumption in children and adolescents. This survey showed that average consumption of fruit and vegetables among people aged 2–18 years was well below recommended levels in most age groups (Table 3.5). Notably, consumption of vegetables and legumes in those aged 12–18 years was much higher among boys than girls.

More recently, information from CAPANS in Western Australia revealed that almost half of participants aged 8–15 years usually ate less than the recommended amount of fruit, and two-thirds of those aged 8–11 years and almost all aged 12–15 years usually ate less than the recommended amount of vegetables (Hands et al. 2004).

Comparable data on fruit and vegetable consumption are available for children and adolescents aged 10–15 years from the 1985 National Dietary Survey of Schoolchildren and the 1995 National Nutrition Survey. Cook et al. (2001) report that the proportion

of boys and girls consuming fruit products and dishes decreased over the period, but the average amount consumed per day increased slightly. The proportion of boys consuming vegetable products and dishes decreased between 1985 and 1995; the proportion of girls consuming these foods was constant. The average amount of vegetables consumed per day by those aged 10–15 years showed a slight but non-significant increase over the period (Cook et al. 2001).

Table 3.5: Average daily intake of fruit, vegetables and legumes in children and adolescents, by age group, 1995

Age group	Fruit products and dishes		Vegetable products and dishes		Legumes and pulse products and dishes	
	Boys	Girls	Boys	Girls	Boys	Girls
	(grams per person)					
2–3 years	153.8	137.0	92.6	88.8	7.1	6.7
4–7 years	146.1	141.3	102.2	114.2	8.9	5.6
8–11 years	131.4	115.5	157.5	156.7	5.3	2.8
12–15 years	122.0	130.6	219.9	185.7	13.6	6.7
16–18 years	97.1	118.0	282.6	192.8	16.2	9.0

Source: ABS 1999.

Body weight

As children develop, their body size and shape can change rapidly, meaning that a single BMI value indicating excess weight (as used in adults) is not appropriate for girls and boys at different ages. The International Obesity Task Force (IOTF) has developed specific BMI cut-off points that are appropriate for use in people aged 2–17 years (Cole et al. 2000).

There is a lack of recent national data regarding overweight and obesity among children and adolescents. The most recent national data come from the 1995 National Nutrition Survey, in which the height and weight of all participants over the age of 2 years were measured. Using the cut-off points developed by the IOTF, 15–24% of boys and 15–23% of girls were found to have excess weight (Figure 3.2). Depending on age, 2–6% of boys and 3–7% of girls were found to be obese.

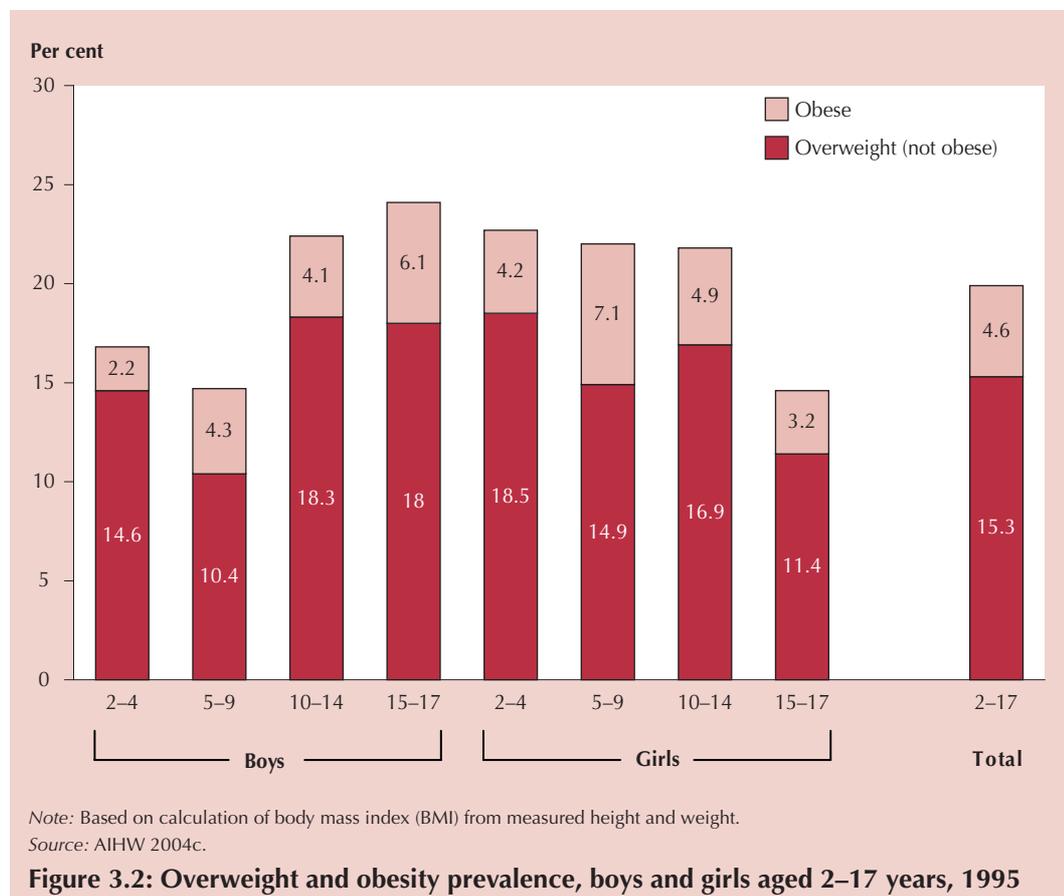
More recently, the NSW Schools Physical Activity and Nutrition Survey found that the measured prevalence of overweight and obesity combined among young people in New South Wales (in Kindergarten to Year 10) has risen from 20% in 1997 to 25% in 2004. Overall the prevalence of obesity among boys was 7.7% and among girls was 6.1% (Booth et al. 2006).

Similarly, CAPANS in Western Australia found that the prevalence of overweight and obesity in students aged 7–15 years increased from 9.3% of males and 10.6% of females in 1985 to 21.7% of males and 27.8% of females in 2003 (Hands et al. 2004).

As in adults, rates of overweight and obesity in children and adolescents have increased substantially in recent years. Comparison of data from the 1985 Australian Health and Fitness Survey and the 1995 National Nutrition Survey shows increases in the prevalence



of obesity, from 1.4% to 4.5% among boys aged 7–15 years and from 1.2% to 5.3% among girls aged 7–15 years (Magarey et al. 2001). The proportion of children of this age who were overweight but not obese also rose, from 9.3% to 15.3% among boys and from 10.6% to 16% among girls



Risk factors in adults

Information on the prevalence of risk factors in adults is available from a variety of sources. This section presents data from the National Health Survey series and state computer-assisted telephone interviewing (CATI) surveys, using the definitions presented in Table 3.6. These surveys are conducted regularly and collect self-reported data on health risk factors, health conditions, use of medications and health service use. More information on these data sources can be found in Appendix 2.

Results from the 2004–05 National Health Survey (NHS) indicate that the most common risk factors were those relating to diet and weight, with 86% of adults having inadequate vegetable consumption, almost half (46%) having inadequate fruit consumption, and more than half being overweight or obese (54%) (Table 3.7). The other behavioural risk factors were also common — nearly 5.1 million people (34% of people aged 18 years and over) were found to be undertaking very low levels of physical activity, and approximately 3.2 million people were daily smokers. Overall, nearly 97% of adults had at least one of the risk factors reported.

Comparing the 2004–05 NHS with the previous two surveys conducted in 2001 and 1995 shows that although some behavioural risk factors have remained relatively stable in those aged 18 years and over, others have increased over time. The proportion of people who were current smokers increased slightly between 1995 and 2001, and then decreased slightly in 2004–05 back to those levels observed in 1995 (23%). The proportion of people who were physically inactive decreased from 35% in 1995 to 32% in 2001 and then increased to 34% in 2004–05. There has been a steady increase in the proportion of risky alcohol consumption and obesity over the period 1995 to 2004–05. Risky alcohol consumption has increased significantly, with 8% of people drinking at risky levels in 1995 compared with 13% in 2004–05. The proportion of people aged 18 years and over who carry excess weight (based on their self-reported height and weight) has increased from 35% in 1995 to 54% in 2004–05. The proportion of adults falling within the obese category has also increased over this period from 11% to 16%.

Table 3.6: Risk factor definitions for adults (for self-reported data)

Risk factor	Definition
Smoking	Current daily smoking of tobacco products
Risky alcohol consumption ^(a)	Average daily consumption of more than four standard drinks for men and more than two standard drinks for women
Physical inactivity	Very low levels of leisure-time exercise (less than 100 minutes over the past 2 weeks)
Poor diet	Inadequate fruit consumption: usual daily intake of one serve or less Inadequate vegetable consumption: usual daily intake of four serves or less
Excess weight	Body mass index ^(b) (BMI) of 25.0 kg/m ² or more, calculated from self-reported height and weight (Note: 'obese' refers to people with a BMI of 30.0 or more)
High blood pressure	People who have been told by a doctor or nurse that they have high blood pressure, and who currently have this condition or whose current normal blood pressure is a result of medication
High blood cholesterol	People who have been told by a doctor or nurse that they have high cholesterol, and who currently have this condition

(a) See Appendix 3 for a complete set of the Australian Alcohol Guidelines.

(b) BMI is calculated as a person's weight (in kilograms) divided by the square of their height (in metres).

Table 3.7: Prevalence of risk factors, Australians aged 18 years and over, 2004–05

Risk factor	Number			Per cent		
	Males	Females	Persons	Males	Females	Persons
Smoking	1,782,500	1,397,600	3,180,100	24.2	18.4	21.3
Risky alcohol consumption	1,134,600	886,200	2,020,900	15.4	11.7	13.5
Physical inactivity	2,461,000	2,633,500	5,094,500	33.4	34.6	34.0
Inadequate fruit consumption	3,855,000	3,034,800	6,889,800	52.4	39.9	46.0
Inadequate vegetable consumption	6,448,400	6,365,300	12,813,600	87.6	83.7	85.6
Excess weight	4,555,400	3,418,100	8,009,700	61.9	45.0	53.5
High blood pressure	993,300	1,097,200	2,090,500	13.5	14.4	14.0
High blood cholesterol	684,000	649,100	1,333,100	9.3	8.5	8.9
<i>At least one of the above</i>	<i>7,190,100</i>	<i>7,260,600</i>	<i>14,450,700</i>	<i>97.7</i>	<i>95.5</i>	<i>96.6</i>
Total population 18 years and over	7,359,400	7,603,700	14,963,100	100.0	100.0	100.0

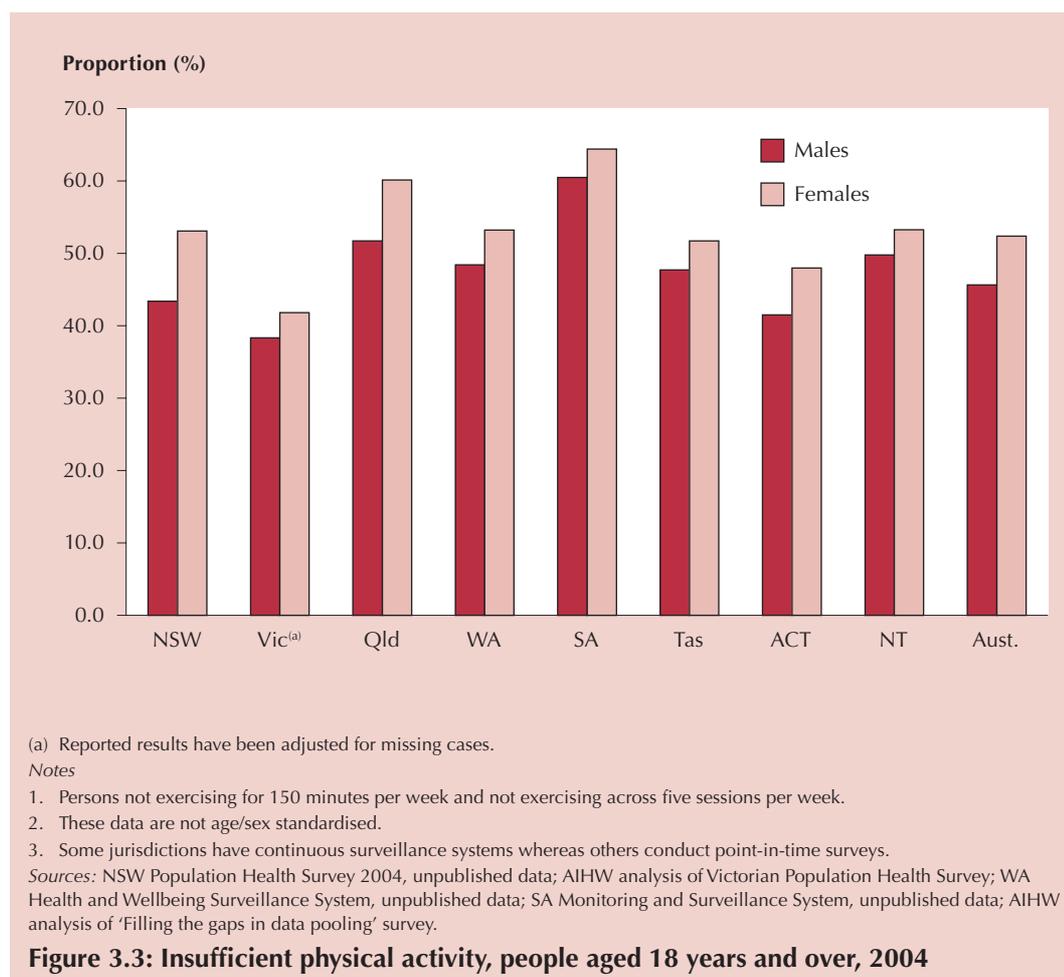
Note: Estimates are based on self-reported data.

Source: AIHW analysis of 2004–05 National Health Survey.



State CATI surveys are another source of data available on the prevalence of risk factors in Australia. Small differences in these results compared with the NHS may be due to differences in methods of data collection; for example, the CATI surveys are conducted by telephone, whereas the NHS is conducted using face-to-face interviews.

Estimates from the 2004 state and territory CATI surveys — which use a different measure of physical activity — suggest that around 50% of adults are not undertaking sufficient physical activity (Figure 3.3). Females consistently reported higher levels of inactivity.



Self-reported height and weight are also collected as part of state and territory CATI surveys, with results relatively consistent with those obtained from the NHS (Table 3.8).

Results from the state and territory CATI surveys also confirm the high proportion of the population who do not consume adequate amounts of fruit and vegetables, with estimates indicating that 91% of the adult population consume inadequate amounts of vegetables and 51% consume inadequate amounts of fruit (Table 3.9).

Table 3.8: Self-reported prevalence of overweight and obesity, people aged 18 years and over, 2004–05

Measure	NSW	Vic ^(a)	Qld	WA	SA	Tas	ACT	NT	Aust ^(b)
	(per cent)								
From 2004 state surveys	Males								
Overweight but not obese ^(c)	41.0	42.9	40.5	46.0	44.1	43.0	39.5	42.6	42.1
Obese ^(d)	16.3	14.7	20.0	14.1	18.5	15.1	14.8	18.3	16.5
Overweight or obese	57.3	57.6	60.5	60.1	62.6	58.1	54.2	60.9	58.6
	Females								
Overweight but not obese	26.0	25.3	26.5	27.2	28.9	25.8	26.2	24.0	26.3
Obese	15.4	16.0	16.5	17.0	19.4	17.5	15.9	15.9	16.3
Overweight or obese	41.4	41.3	43.1	44.2	48.3	43.3	42.1	39.9	42.5
	Persons								
Overweight but not obese	33.7	34.1	33.6	36.3	36.4	34.2	32.9	34.3	34.2
Obese	15.8	15.3	18.3	15.5	18.9	16.3	15.3	17.2	16.4
Overweight or obese	49.5	49.4	51.8	51.8	55.3	50.6	48.2	51.5	50.6
	From 2004–05 NHS^(a)								
	Persons								
Overweight but not obese	35.8	36.3	34.2	35.4	35.8	36.2	34.6	n.a.	35.5
Obese	18.0	17.0	18.7	17.3	19.6	19.5	18.2	n.a.	18.0
Overweight or obese	53.8	53.3	52.9	52.8	55.4	55.7	52.8	n.a.	53.6

(a) Reported results have been adjusted for missing cases.

(b) Derived from a weighted average of the state and territory estimates; for NHS result, as reported (incorporates the Northern Territory result) and adjusted for missing cases.

(c) Body mass index greater than or equal to 25.0 and less than 30.0.

(d) Body mass index greater than or equal to 30.0.

Notes

1. These data are not age/sex-standardised.

2. Some jurisdictions have continuous surveillance systems whereas others conduct point-in-time surveys.

Sources: AIHW analysis of 2004–05 National Health Survey; NSW Population Health Survey 2004, unpublished data; AIHW analysis of Victorian Population Health Survey; WA Health and Wellbeing Surveillance System, unpublished data; SA Monitoring and Surveillance System, unpublished data; AIHW analysis of 'Filling the gaps in data pooling' survey.

Table 3.9: Inadequate consumption of vegetables/fruit, people aged 18 years and over, 2004–05

Measure	NSW	Vic ^(a)	Qld	WA	SA	Tas	ACT	NT	Aust ^(b)
	(per cent)								
From 2004 state surveys	Males								
Inadequate vegetables ^(c)	93.9	96.4	91.3	87.3	93.0	84.6	90.6	91.5	93.0
Inadequate fruit ^(d)	59.7	57.0	56.1	52.0	67.5	58.1	55.3	64.8	58.1
	Females								
Inadequate vegetables	89.7	89.9	88.6	83.0	90.1	84.1	89.0	90.5	88.8
Inadequate fruit	46.7	39.6	42.2	41.4	52.9	47.9	43.1	52.7	44.0
	Persons								
Inadequate vegetables	91.8	93.0	90.1	85.1	91.5	84.3	89.7	91.1	90.9
Inadequate fruit	53.1	48.0	49.0	46.9	60.0	52.8	49.1	59.3	50.9
	From 2004–05 NHS								
	Persons								
Inadequate vegetables	88.0	84.6	84.7	80.2	87.9	79.4	89.8	n.a.	85.7
Inadequate fruit	46.0	44.0	47.3	44.6	50.0	46.3	46.5	n.a.	46.0

(a) Reported results have been adjusted for missing cases.

(b) Derived from a weighted average of the state and territory estimates; for NHS result, as reported (incorporates the Northern Territory result) and adjusted for missing cases.

(c) Consumption of less than 5 serves of vegetables.

(d) Consumption of less than 2 serves of fruit.

Notes

1. These data are not age/sex standardised.

2. Some jurisdictions have continuous surveillance systems while others conduct point in time surveys.

Sources: AIHW analysis of 2004–05 National Health Survey; NSW Population Health Survey 2004, unpublished data; AIHW analysis of Victorian Population Health Survey; WA Health and Wellbeing Surveillance System, unpublished data; SA Monitoring and Surveillance System, unpublished data; AIHW analysis of 'Filling the gaps in data pooling' survey.



Variations by age and sex

Most risk factors are not evenly distributed throughout the population, with substantial variation existing across the ages. Some, such as high blood pressure, high cholesterol and overweight/obesity, are more likely to be reported by older people, whereas others, such as smoking and inadequate fruit and vegetable consumption, are more common in younger people (Table 3.10). In most cases risk factor prevalence is higher among males than females; however, high blood pressure is more common in females in the older age groups.

Table 3.10: Prevalence of risk factors by age and sex, people aged 18 years and over, 2004–05

Risk factor		Age group					All ages 18+
		18–24	25–44	45–64	65–84	85+	
		(per cent)					
Smoking	Males	30.3	29.6	22.5	9.4	2.0	24.2
	Females	23.4	23.3	17.3	5.7	7.2	18.4
	Persons	26.9	26.4	19.9	7.4	5.0	21.3
Risky alcohol consumption	Males	15.4	15.8	18.0	9.3	2.7	15.4
	Females	12.5	12.0	13.2	7.7	5.4	11.7
	Persons	14.0	13.9	15.6	8.4	4.3	13.5
Physical inactivity	Males	24.9	30.4	37.4	38.4	58.1	33.4
	Females	32.3	30.8	32.3	46.7	75.5	34.6
	Persons	28.6	30.6	34.8	42.9	68.0	34.0
Inadequate fruit consumption	Males	61.4	59.0	47.3	39.2	34.4	52.4
	Females	49.9	45.2	34.7	30.6	35.4	39.9
	Persons	55.7	52.0	40.9	34.6	35.0	46.0
Inadequate vegetable consumption	Males	92.1	90.3	85.3	81.4	88.2	87.6
	Females	90.8	86.0	79.2	81.6	87.8	83.7
	Persons	91.4	88.1	82.2	81.5	88.0	85.6
Excess weight	Males	36.0	64.8	70.9	57.9	38.1	61.9
	Females	27.7	40.9	53.9	51.3	33.2	45.0
	Persons	31.9	53.0	62.6	54.5	35.5	53.5
High blood pressure	Males	0.5	3.9	19.4	36.6	35.6	13.5
	Females	0.6	2.8	18.8	42.2	37.0	14.4
	Persons	0.6	3.3	19.1	39.6	36.4	14.0
High blood cholesterol	Males	0.6	3.1	13.4	24.6	14.2	9.3
	Females	0.3	1.9	12.2	23.3	11.4	8.5
	Persons	0.5	2.5	12.8	23.9	12.6	8.9

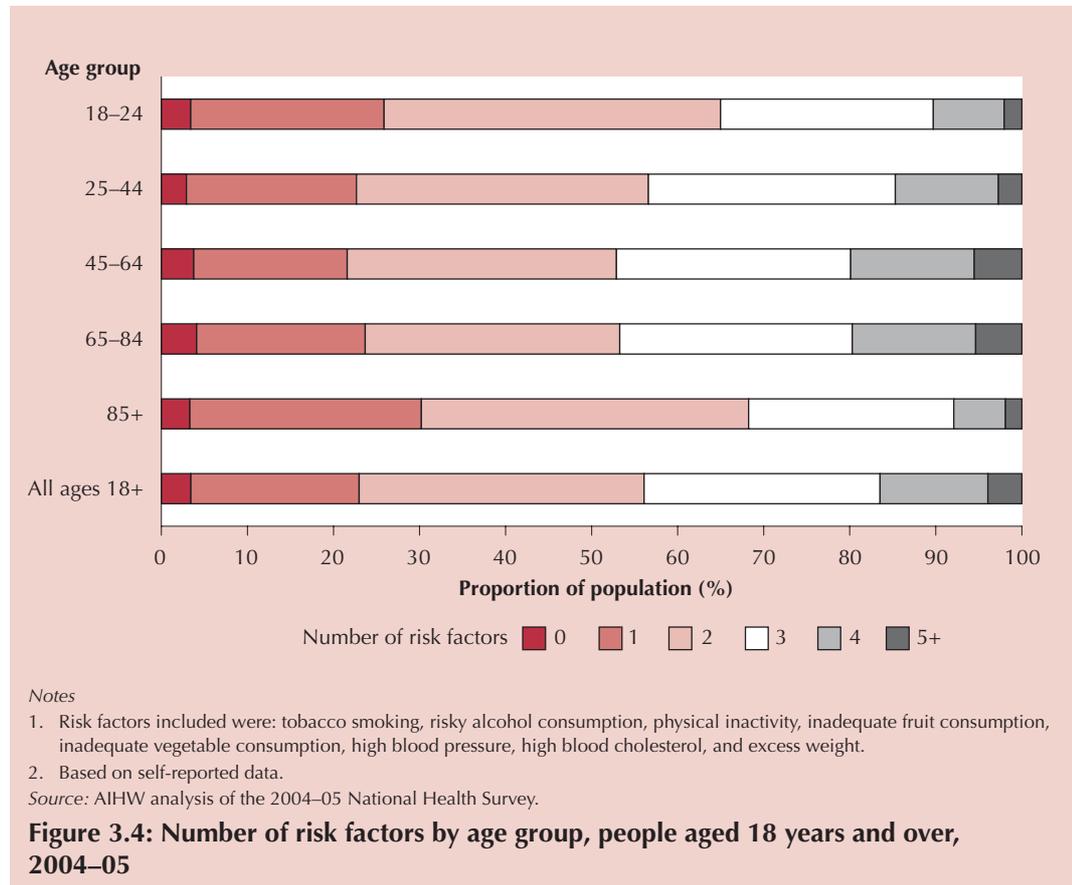
Note: Estimates are based on self-reported data.

Source: AIHW analysis of the 2004–05 National Health Survey.

Multiple risk factors

Generally, as the number of risk factors a person has for a particular condition increases, so does his or her risk of developing that condition. Monitoring multiple risk factors can help establish people at greater risk and thereby indicate those who might benefit most from early intervention. Some Australian guidelines and consensus statements relating to chronic disease detection refer to combinations of risk factors as ways of identifying high-risk groups for screening purposes (ANZSN & KHA 2004; Diabetes Australia Guideline Development Consortium 2001).

Results of the 2004–05 NHS show that 44% of Australians aged 18 years and over (6.6 million people) have at least three of the eight modifiable risk factors described above (Figure 3.4). The proportion of people with no risk factors was fairly consistent across the age groups, whereas the proportion with five or more risk factors was highest in the 45–64 and 65–84 years age groups.



Metabolic syndrome

Sets of risk factors which are often found together are sometimes referred to as a cluster. Because of the complex interactions between risk factors, sometimes the increased risk from a cluster of risk factors might be greater than the sum of the risks of the individual factors. Metabolic syndrome is one such cluster, and is a marker of increased risk of cardiovascular disease, Type 2 diabetes and kidney disease.

Metabolic syndrome is typically characterised by excess abdominal weight, insulin resistance, and blood pressure and/or lipid abnormalities. People who have metabolic syndrome are two to three times as likely to have a heart attack or stroke and five times as likely to develop Type 2 diabetes compared with those who do not (Dekker et al. 2005; Stern et al. 2004). People with Type 2 diabetes who also have metabolic syndrome are more likely to develop complications such as cardiovascular disease and kidney problems (Isomaa et al. 2001).



The definition of metabolic syndrome has been much debated. Several definitions have been proposed, two of which are most commonly used in practice (ATP III 2001; WHO 1999). The definitions are similar in the risk factors included but differ in the central component and the levels at which a person is considered to have each of the factors. The most recent definition — published by the International Diabetes Federation (IDF) in 2005 — builds on the previous definitions, and is intended to be easily applicable in clinical practice (Box 3.1).

Box 3.1: Metabolic syndrome

For people to be defined as having metabolic syndrome they must have:

- *excess abdominal weight (waist circumference ≥ 94 cm for Caucasian men and ≥ 80 cm for Caucasian women — ethnicity-specific values apply for other groups)*
- *plus any two of the following:*
 - *raised triglyceride level (≥ 1.7 mmol/L) or receiving treatment for raised triglycerides*
 - *reduced HDL cholesterol (< 1.03 mmol/L in males and < 1.29 mmol/L in females) or receiving treatment for reduced HDL cholesterol*
 - *raised blood pressure (systolic blood pressure ≥ 130 mmHg or diastolic blood pressure ≥ 85 mmHg) or receiving treatment for previously diagnosed high blood pressure*
 - *raised fasting plasma glucose (≥ 5.6 mmol/L) or previously diagnosed Type 2 diabetes.*

Source: Adapted from IDF 2005.

Results from the 1999–00 Australian Diabetes, Obesity and Lifestyle (AusDiab) study suggest that 29.1% of Australians aged 25 years and over have metabolic syndrome (based on the IDF definition) (Zimmet et al. 2005). In comparison, using the ATP III criteria in the AusDiab sample results in a prevalence estimate of 19% (Zimmet et al. 2005). International estimates of metabolic syndrome prevalence vary depending on which definition is used, but worldwide around 20–25% of adults are believed to be affected (IDF 2005).

Highlights: risk factors across the life course

Early life risk factors for chronic disease

- In 2002, low birthweights represented 6.4% of live births.
- In 2004, 20% of women reported smoking tobacco and 47% reported drinking alcohol during pregnancy or breastfeeding in the past 12 months.
- In 2001, 83% of infants aged 0–3 years were breastfed when first taken home.
- In 2001, 48% of infants were receiving some breastmilk by 6 months of age, but no infants at age six months were being fully breastfed.

Chronic disease risk factors in children and adolescents

- The proportion of children exposed to environmental tobacco smoke decreased over the last decade: 12.3% of households with dependent children included someone who smoked inside the home in 2004, compared with 31.3% in 1995.
- Survey findings from 2002 suggest that 14% of those aged 12–17 years had used tobacco over the past week and 34% had consumed alcohol.
- There are no national data available on physical activity for children and adolescents; however, approximately three-quarters of the children and adolescents in New South Wales reported meeting the physical activity requirements in 2005.
- In 1995 the average consumption of fruit and vegetables among people aged 2–18 years was well below recommended levels for most age groups.
- There is a lack of recent national data on the prevalence of obesity and overweight in children and adolescents. However, recent findings in New South Wales indicate the prevalence of overweight and obesity has increased from 20% in 1997 to 25% in 2004 among those in Kindergarten to Year 10.

Chronic disease risk factors in adults

- More than nine in ten adults had at least one chronic disease risk factor in 2004–05, with 44% having at least three modifiable risk factors.
- In 2004–05, 86% of adults reported inadequate vegetable consumption, almost 46% reported inadequate fruit consumption, 54% reported being overweight or obese, 34% were sedentary, 21% reported they were daily smokers and 13% that they drank alcohol at risky levels.
- The proportion of adults who carry excess weight increased from 35% in 1995 to 54% in 2004–05, and the proportion of adults falling into the obese category increased from 11% in 1995 to 16% in 2004–05.
- Risky alcohol consumption increased from 8% in 1995 to 13% in 2004–05.





Introduction

The prevention, management and treatment of chronic diseases impose a considerable burden on the health system. There are a number of reasons for this.

- ✦ Chronic diseases are widespread in the population (AIHW 2002b).
- ✦ Chronic diseases can begin early in the life cycle without symptoms and then cause considerable illness and disability in later years. This indicates the need to manage not only the diseases but also the risk factors, both behavioural and biomedical, that precede them.
- ✦ Some people have one or more chronic diseases that remain unresolved throughout their life.
- ✦ Although the outcomes of chronic diseases (illness, disability, pain and death) are often thought to affect mainly the elderly, people in other age groups (as noted in Chapter 3) also are affected by these diseases.
- ✦ For some individuals, these problems result in the need to manage the diseases and their sequelae for many decades. A 'whole of life' approach to the prevention and management of chronic diseases is therefore required.

This chapter focuses on a 'whole of health system' strategy for managing chronic diseases (NPHP 2001:35–6). Such a strategy combines the 'continuum of prevention and care' for chronic diseases with the 'whole of life' approach, as discussed in the earlier chapters. Under this model, primary, secondary and tertiary prevention are important components along the disease continuum:

- ✦ primary — to prevent movement of the 'well' to the 'at risk' population
- ✦ secondary — to prevent progression from 'at risk' to 'established' disease state
- ✦ tertiary — to prevent and/or delay progression to complications from the disease.

A range of health services operate within this continuum, some across the spectrum and others focusing at specific points. For example, public health services have a key role in the first two stages in promoting healthy behaviours and healthy environments. The primary health care sector (for example, general practitioners (GPs) and dentists) is important at all stages to promote good health and provide early interventions and general treatment.

People with established chronic diseases require a range of health services. Included among these are GPs, dentists, specialist medical and dental services, counselling services, hospital services, allied health care services, pharmacy services, disability support services and aged care services. The types of services required vary according to the type and severity of the disease. For example, elderly people with restricted mobility or mental functions often need aged care services, whereas those suffering from depression may be treated by GPs, counselling services, or community mental health services.



However, data for monitoring the use of these services by people with chronic diseases are not comprehensive. The two main services for which use data can be linked to chronic diseases are general practice and hospital statistics; this information is reported in the next two sections of this chapter. The approach used is to examine the data from the most recent year and then compare that with data from an earlier base year. The third section describes some of the other health services used by people with chronic diseases and the limited information on these services.

Health system expenditure on chronic diseases is a summary measure of the impact of chronic diseases on health services. Estimates of expenditure are available according to the type of service. This information forms the fourth section of this chapter, again with comparisons between the most recent and an earlier year.

General practitioner services

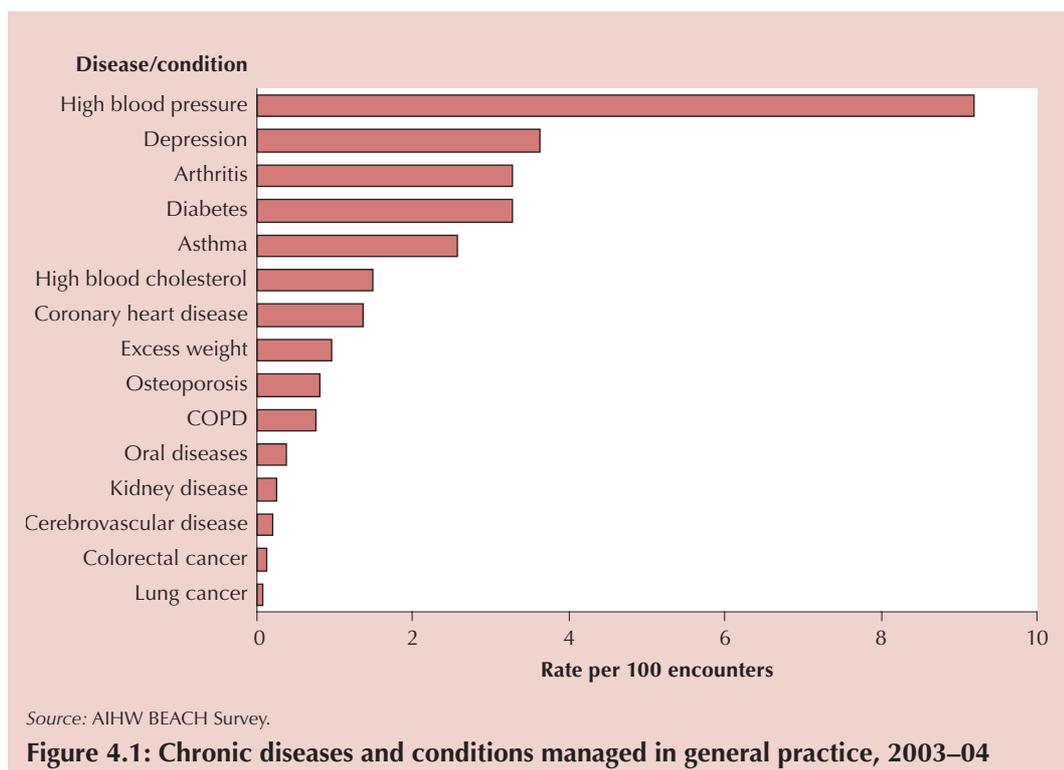
GPs are one part of the health system for preventing and managing chronic diseases, and often the first part of the system to diagnose a chronic disease. GPs manage chronic diseases by providing counselling, prescriptions for pharmaceuticals and referrals to other health services, and by encouraging effective self-management of chronic diseases. They also help with prevention of chronic diseases by monitoring the biomedical risk factors and giving advice on ways to modify the behavioural risk factors.

In Australia, GP service use is monitored by the BEACH (Bettering the Evaluation and Care of Health) survey, which involves an ever-changing random sample of GPs who report on 100 consecutive encounters. In 2003–04, the sample included 98,877 patient encounters. Information was recorded on 144,674 problems managed in these encounters, an average rate of 146.3 problems managed per 100 encounters (AIHW: Britt et al. 2004).

O'Halloran et al. (2004) identified chronic diseases and conditions arising in the 2003–04 BEACH data. Their list is based on conditions that have a duration (or expected duration) of at least 6 months; have a pattern of recurrence or deterioration; have a poor prognosis; and produce consequences that affect the individual's quality of life. Using these criteria, they found 147 conditions that could be classified as chronic or partially chronic. In 2003–04, over one-third (34.7%) of all problems managed were in this group of conditions. At least one of these chronic problems was managed in 39.2% of all encounters, and these chronic problems were managed at an average rate of 50.8 per 100 encounters (AIHW: Britt et al. 2004).

The chronic diseases covered in this report are limited to those having a large impact and which are amenable to prevention, and the list is therefore much narrower than those identified by O'Halloran et al. (2004). Still, the 12 chronic diseases highlighted here, along with three of the biomedical risk factors (high blood pressure, high blood cholesterol, excess weight), accounted for nearly one-fifth (19.2%) of all problems managed by GPs in 2003–04, a rate of 28.3 per 100 encounters (Figure 4.1).

High blood pressure (defined in the BEACH data as diagnosed hypertension) was the most common individual problem managed by GPs, at a rate of 9.2 per 100 encounters.



Other chronic diseases and conditions with high rates of GP management (around 3 per 100 encounters) were depression, arthritis, diabetes and asthma.

Chronic diseases with low rates of GP management included oral diseases, cerebrovascular disease, colorectal cancer, lung cancer and kidney disease. In the case of oral diseases, which are highly prevalent in the population, most of these problems are managed by dentists rather than GPs. For the others, the low rates of GP management reflect only partly their lower prevalence relative to those diseases with high rates of GP management. Their low rates are also because such diseases are less amenable to GP management. For most of them, once they have been identified, it is likely that the patients will receive further treatment in specialists' clinics which are not included in the BEACH survey.

In contrast, those diseases and risk factors that require regular and frequent monitoring tend to have higher rates of GP use. In the case of asthma, incentives are available for GPs to provide written action plans for patients in order to improve the management of this disease specifically in GP settings. Similarly, two of the four key components of the National Integrated Diabetes Program focus on general practice (Veale 2003).

BEACH data have been available since 1998–99. In that year, these 12 chronic diseases and risk factors comprised 17.6% of all problems managed, a rate of 25.6 per 100 encounters. Over the 5-year period from 1998–99 to 2003–04, statistically significant increases in the rates of problems managed were recorded for high blood pressure (8.2 to 9.2 per 100 encounters), arthritis (2.7 to 3.3) and diabetes (2.6 to 3.3), whereas for asthma (3.2 to 2.6) there was a significant decrease.



The BEACH survey also provides information on the ways GPs manage specific chronic diseases. Types of management provided in GP surgeries include prescription of medications, testing, advice and counselling, and referrals for pathology, imaging and other health services.

For patients with coronary heart disease (CHD), an analysis of the 1998–99 data found that GPs prescribed medications at a rate of 129.4 per 100 CHD problems managed (indicating that some patients need a combination of medications to control their disease). GPs also ordered pathology tests at a rate of 22.2 per 100 CHD problems managed, and made referrals to other health professionals and services at a rate of 11.6 per 100 CHD problems managed (AIHW: Senes & Britt 2001).

The same study found the following types of management for Type 2 diabetes (with rates per 100 Type 2 diabetes problems managed): prescription of medications (75.6), nutrition and weight advice (15.0), glucose testing in the GP's surgery (8.7), pathology tests ordered (48.5) and referrals to other health professionals and services (7.6) (AIHW: Senes & Britt 2001).

Arthritis is also commonly managed by GPs (Figure 4.1). However, the type and rate of management varies greatly between the two main forms of arthritis. The rate is quite low for rheumatoid arthritis, because these patients are more likely to be referred to rheumatology clinics. On the other hand, GPs often manage patients with osteoarthritis, usually by prescribing medications or ordering imaging tests (AIHW 2005e).

Chronic kidney disease is rarely detected in the BEACH data (Figure 4.1), but GPs are an important component of early detection efforts. In 2002–03, of the many consultations for high blood pressure (the most frequently managed problem by GPs), around 13% had a pathology test ordered which could be used to detect kidney damage. Similarly, tests that could be used to detect kidney damage were ordered in around 16% of diabetes encounters. Other high-risk individuals are patients with vascular diseases, including atherosclerosis, peripheral vascular disease, atrial fibrillation or flutter, cerebrovascular disease, coronary heart disease, heart failure and high blood cholesterol or lipid disorders. These diseases accounted for about 4% of problems managed by GPs in 2002–03. Tests that could be used to detect kidney damage were ordered in about 9% of these cases (AIHW 2005b).

Hospital services

Hospitals provide a range of services for people suffering from chronic diseases. For some of these diseases, frequent but short visits to hospitals are required for treatment and monitoring beyond what is available from GPs. For others, an extended stay in hospital may be needed to provide relief from pain, for palliative care, or for a surgical procedure and subsequent recovery.

Three measures are used here to gauge the impact of chronic diseases on hospital services:

- number of hospital admissions (which are counted when the patient 'separates' from the hospital (that is, is discharged, transferred or dies))

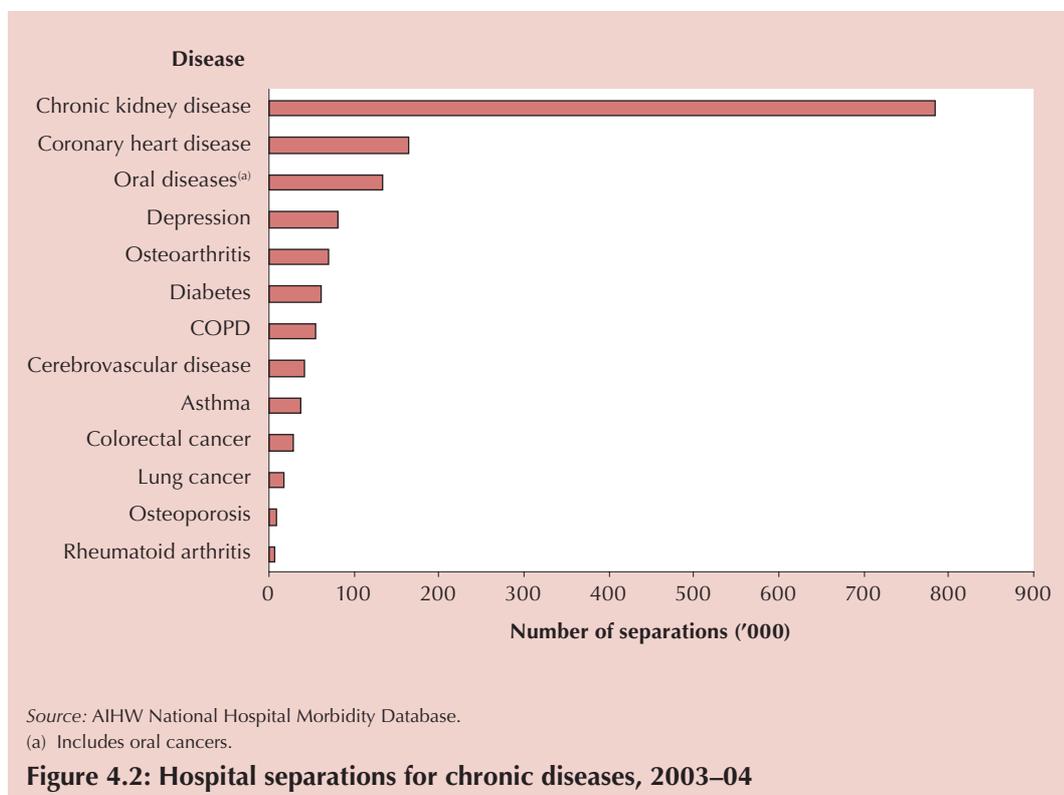
- number of days of stay in hospital (termed ‘patient days’)
- average length of stay in hospital (calculated by dividing number of patient days by number of separations).

Separations

In 2003–04 there were 6.8 million hospital separations in Australia, with 21.6% of these (1.5 million) listing one of the 12 chronic diseases that are highlighted in this report as the ‘principal diagnosis’ or ‘main procedure’. Chronic kidney disease (CKD), with over 780,000 separations, was by far the largest contributor to this total (Figure 4.2).

A major component (97%) of CKD separations was the procedure ‘care involving dialysis’, and this was also the single greatest reason for hospital use (11.1% of all separations). Other chronic diseases causing more than 100,000 separations were CHD and oral diseases. Diabetes was the principal diagnosis for over 60,000 separations in 2003–04, but was listed as an additional diagnosis in a further 397,000 separations.

Although CKD is not as prevalent as CHD, it causes more episodes of hospital care because people who reach the end stage of CKD require frequent dialysis treatments, usually three times per week, and most of these treatments are carried out in hospitals or hospital-managed services. At the other extreme, there are relatively few separations coded to osteoporosis, as the principal diagnosis for people with this disease in hospital is usually a fracture.



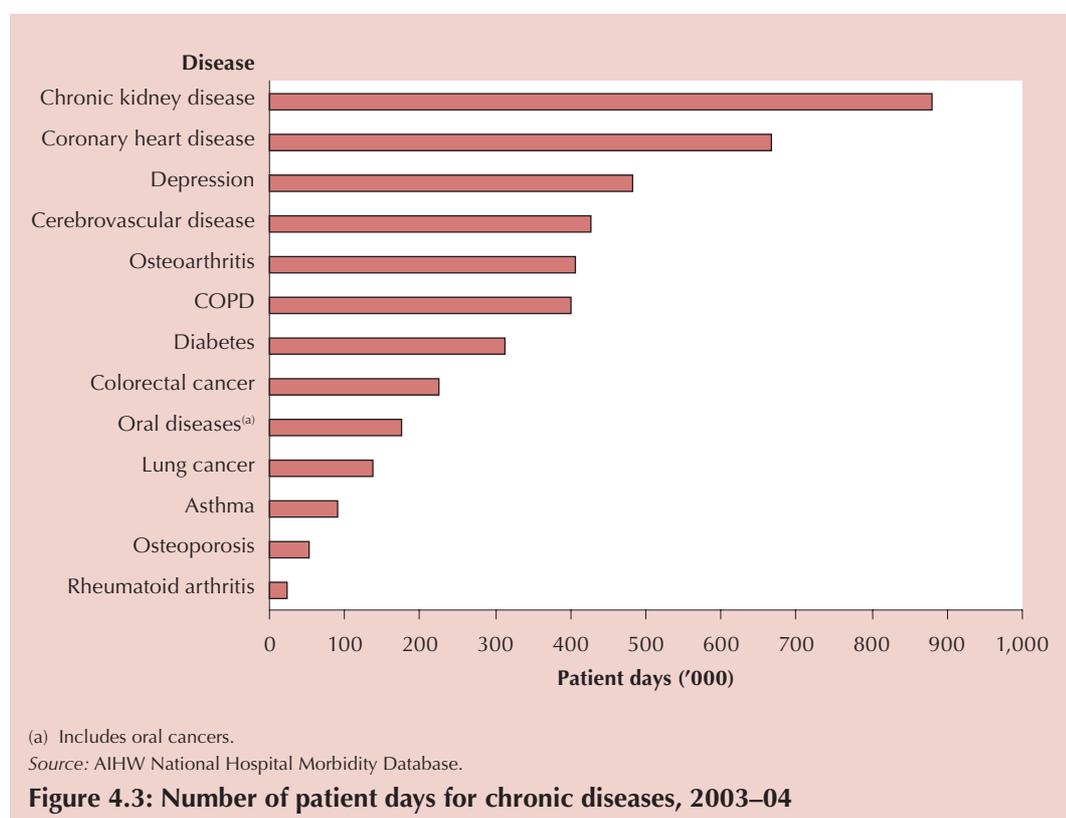
OPERATIONS AND OTHER PROCEDURES

For some chronic diseases, a major reason for patients to use hospital services is for a procedure to treat their condition. Prime examples are procedures to treat coronary heart disease, osteoarthritis and chronic kidney disease. Hospital data for 2003–04 show the following numbers for various procedures:

- ♦ over 32,000 coronary angioplasties (the opening of arteries which have narrowed), a major hospital procedure for people with coronary heart disease
- ♦ approximately 555,000 major joint replacements (including hip and knee replacements), a frequent hospital procedure for people with osteoarthritis
- ♦ around 771,000 hemodialysis procedures (involving the use of a special filter that removes wastes and extra fluids from the blood), the main procedure for people with chronic kidney disease.

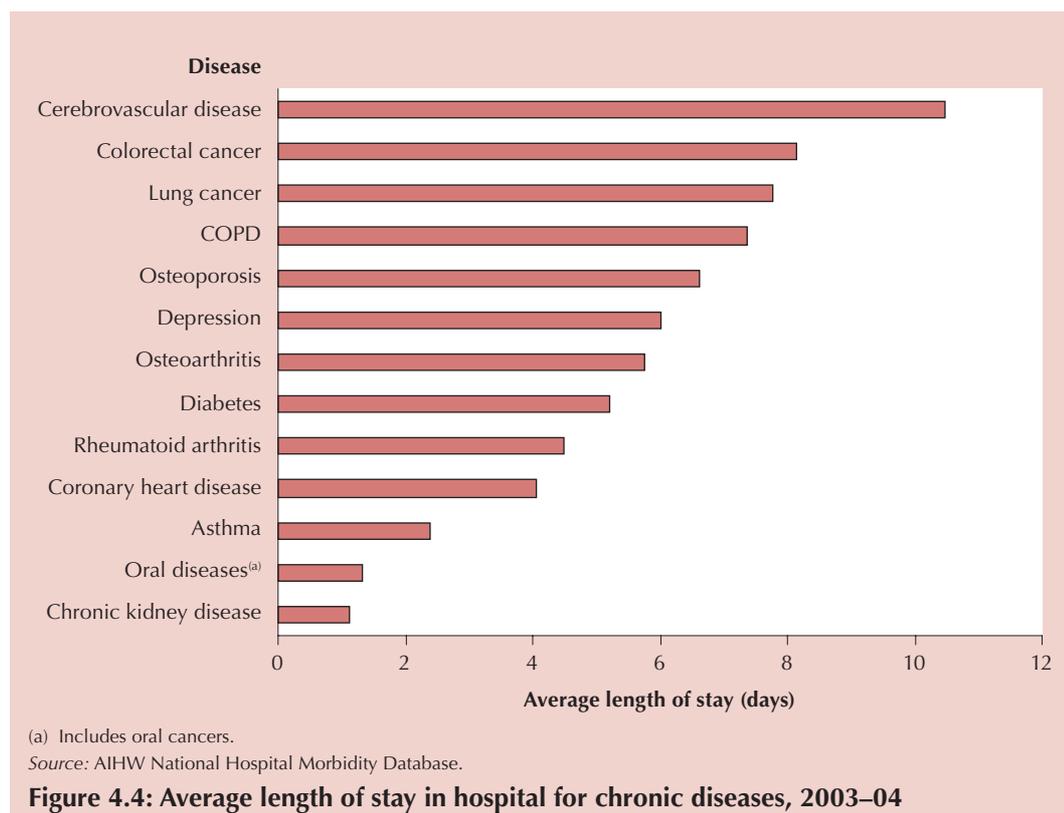
Patient days

The number and rate of separations gives some indication of the impact of the various chronic diseases on the hospital system, but the weight of these diseases on the system is more accurately gauged by the amount of time people suffering from them have to spend in hospital. Over 23.5 million patient days of stay in Australian hospitals were recorded in 2003–04, of which 18% (4.2 million) were attributed to the 12 chronic diseases covered here. As with number of separations, CKD led this list with nearly 880,000 patient days, followed by CHD with 665,000 patient days. Other chronic diseases with over 400,000 patient days were depression, cerebrovascular disease, chronic obstructive pulmonary disease (COPD) and osteoarthritis (Figure 4.3).



Average length of stay

In contrast to the separations and patient days data, the average length of stay (ALOS) in hospital for CKD in 2003–04 was the shortest, at 1.1 days, of the 12 chronic diseases covered here (Figure 4.4). This is because most of the separations for CKD were ‘care involving dialysis’, which is usually a ‘same day procedure’ and thus recorded as a single patient day. Similarly, ALOS for oral diseases, which ranked third in terms of number of separations, was relatively short (1.3 days), as most of these are for same-day dental procedures. At the other end of the scale, cerebrovascular disease, colorectal cancer, lung cancer and COPD each had an average length of stay of more than 7 days.



Trends in hospital services

Over the past 5 years — the period for which comparable codes for these diseases exist, with the exception of diabetes — the age-standardised separation rates for CKD have increased by over 55%, for oral diseases by more than 30%, and for depression by more than 25% (Table 4.1). Osteoporosis separations have also increased, but from a low base. Separation rates for CHD, cerebrovascular disease (mainly stroke) and asthma have declined over this period. The rates for diabetes cannot be compared, because significant changes have been made in this period to the coding standards (AIHW: Phillips 2003).

With the exception of lung cancer, the ALOS for all these diseases declined over the 5 years from 1998–99 to 2003–04 (Table 4.1). For depression and osteoporosis, the declines in ALOS were over 20%, and for rheumatoid arthritis it was over 30%. The two diseases with the highest ALOS, cerebrovascular disease and colorectal cancer, had declines of around 5% and 9% respectively.



Table 4.1: Change in hospital separation rates, patient days and average length of stay for chronic diseases, 1998–99 to 2003–04 (per cent)

Disease	Per cent change in		
	Age-standardised separation rate	Patient days	Average length of stay
Chronic kidney disease	55.6	46.9	-6.1
Coronary heart disease	-8.8	-9.7	-13.0
Oral diseases ^(a)	30.2	19.5	-12.4
Depression	25.6	4.6	-23.4
Osteoarthritis	16.9	11.6	-15.2
COPD	1.5	7.6	-7.0
Cerebrovascular disease	-12.1	-3.5	-4.7
Asthma	-32.0	-38.5	-12.7
Colorectal cancer	11.7	15.7	-8.9
Lung cancer	-5.7	9.2	2.5
Osteoporosis	62.0	46.9	-22.1
Rheumatoid arthritis	-6.0	-30.6	-34.4

(a) Includes oral cancers.

Note: Changes not available for diabetes, because of variations in the coding standards.

Source: AIHW National Hospital Morbidity Database.

Other health services for people with chronic diseases

Although GP encounters and hospital admissions are the two most universal types of health services used by people with chronic diseases, there are a number of other services which are also important in the effort to manage these diseases. However, the available information on these services is patchy and it is often difficult to ascribe such service uses to a particular disease. Some examples where it is possible to analyse the available data for a particular disease are cited below.

Mental health services

Several data sources are available to gauge the use of mental health services other than services offered by GPs and hospital admitted patient care. Although these data do not identify which types of mental health problems are included in non-hospital and non-GP services, it can be inferred that depression is one of them. Also, as with all data on services, the data are for services rendered, not for individuals, with some individuals requiring multiple service episodes.

The National Hospital Morbidity Database contains information on non-admitted occasions of service (also termed outpatient services) for public acute and psychiatric hospitals. In 2003–04, public acute hospitals recorded nearly 1.8 million 'individual occasions of service' for mental health provided outside hospitals, and 33,605 'group sessions'. Public psychiatric hospitals recorded over 168,000 individual outpatient or emergency sessions, 3,068 individual outreach sessions, and 6,236 group sessions (AIHW 2005e).

Changes over the past decade have seen a shift of mental health services to community settings. In 2001–02, over 4.2 million service contacts between clients and staff were reported by community mental health care services to the AIHW National Community

Mental Health Establishments Database. A principal diagnosis was reported in about two-thirds of these contacts, and of that number nearly 25% (690,000) were for mood (affective) disorders, including depression (AIHW 2004a).

Services by psychiatrists in private practice can be gauged by Medicare data, which show that in 2002–03 there were over 2 million funded services, with about 90% of these being patient attendances in consulting rooms and the remainder in hospitals and group settings (AIHW 2004a).

Dental services

The use of dental services is measured through the National Dental Telephone Interview Survey, the most recent being in 2002. The survey found that in the preceding 12 months nearly 82% of Australian children aged 5–14 years made a dental visit. Using the most recent visit as the reference, the majority of visits were for a check-up, but about one-quarter (21% overall) were for pain or other problems, such as fillings and orthodontic care. Among adults (15 years and over) with at least one natural tooth, over half (58%) had made a dental visit in the previous 12 months, with about half of the most recent visits (28% overall) being for pain or other problems (AIHW 2004a).

Asthma

Some of the chronic diseases considered here may have acute episodes requiring care in hospital emergency departments (EDs). The Australian Centre for Asthma Monitoring (ACAM) has analysed the data on emergency presentations for asthma in New South Wales and Victoria during the period 1999–2004. This study found ‘marked month-to-month fluctuations in rates of visits to EDs for asthma, most notably in children under the age of 15 years. The peak visit rate in children was in late summer, whereas for adults it was late autumn and winter’ (ACAM 2005:86).

Diabetes

Diabetes is a good example of a chronic disease that requires ongoing management by GPs and other health services. Diabetes complications may affect a number of the body’s organs, necessitating treatment by specialists in areas such as endocrinology, cardiology, nephrology and ophthalmology. In addition, GPs also refer patients with diabetes to dietitians, podiatrists and diabetes clinics. There are about 80 of these clinics in Australia, often referred to as diabetes ambulatory care centres, and they provide services such as diabetes education, nutrition advice and complications assessment (AIHW 2002a).

People with diabetes are also major users of pathology services, usually on referral from their GP. The more common pathology tests include glucose tolerance test (to assess absorption of glucose), glycosylated haemoglobin (HbA1c) and fructosamine (to monitor glucose control), microalbuminuria (to assess the amount of the protein in the urine) and blood lipids (cholesterol and triglycerides) tests. The 1998–99 BEACH survey of general practice activity found that GPs ordered pathology tests for Type 1 and Type 2 diabetes patients (37.3 and 48.5 tests per 100 diabetes problems respectively — Table 5.2) at a much higher rate than the average of 17.0 per 100 for all problems managed by GPs (AIHW 2002a).



Table 4.2: Pathology tests (rates per 100 diabetes problems managed) ordered by GPs, 1998–99

Pathology test	Diabetes patients	
	Type 1	Type 2
Glucose control (HbA1c)	11.9	13.5
Glucose tolerance	7.2	12.7
Electrolytes/urea/creatinine	4.2	3.8
Blood lipids (cholesterol, triglycerides)	3.8	6.6
All tests	37.3	48.5

Source: AIHW 2002a.

Another service for people with diabetes is the National Diabetes Services Scheme, which subsidises the supply of insulin syringes, special injection system needles and diagnostic reagents (blood and urine testing strips) to registered persons with diabetes. Over 700,000 persons with diabetes were registered with the scheme as at 30 June 2005 (Diabetes Australia 2005).

Health system expenditure on chronic diseases

Although the data to accurately measure the use of the health system by individuals with particular diseases are lacking, it is possible to estimate expenditure on the various services provided by the health system. This estimate is based on the satellite national accounts, in which non-monetary data sources are linked to the monetary accounting system (AIHW 2004d). The methodology produces estimates for the various services in the system and allows the expenditure to be allocated to specific diseases. The expenditure estimates for the chronic diseases covered in this report are used here as a summary measure of the overall impact of those diseases on the health system.

The term 'health expenditure' refers to the funding by government and non-government sources (including health insurance funds and individuals) for the costs incurred to prevent, diagnose, treat and manage disease. The AIHW has estimated that in 2000–01 a total of \$50.1 billion can be allocated as recurrent expenditure on various diseases and conditions. This estimate accounts for 87.5% of the total recurrent health expenditure in 2000–01 (AIHW 2004d).

The National Chronic Disease Strategy (NHPAC 2005) reports that 70% of allocated health expenditure in 2000–01 was accounted for by the top disease groupings, including cardiovascular disease, nervous system disorders, musculoskeletal conditions, injuries, respiratory diseases, mental disorders, oral health, neoplasms and diabetes. The majority of these diseases are long-term conditions. Injuries are not generally considered to be long-term conditions and if these were removed from this list then these diseases would account for almost 60% of all allocated health expenditure in this year. In 2000–01 the chronic diseases covered in this report accounted for \$10.9 billion, or 22% of the total allocated expenditure.

Oral health expenditures were the highest of the 12 chronic diseases outlined here, at \$3.4 billion, or 6.7% of the total allocated expenditure. Coronary heart disease (CHD)

accounted for 2.9% of the total, osteoarthritis 2.4% and depression 2.0% (Table 4.3). Note that expenditures reported here differ from those outlined in the National Chronic Disease Strategy (NCDS) because of differences in the grouping of diseases. For example, the NCDS reports that cardiovascular disease has the greatest expenditure of the chronic diseases (10.9%). However, this report separates diseases into single conditions (for example, CHD and cerebrovascular disease), and reports only on 12 single chronic diseases.

Table 4.3: Health system expenditure on chronic diseases, 2000–01

Disease	Expenditure (\$ million)	Per cent of total expenditure
Oral health	3,372	6.7
Coronary heart disease	1,465	2.9
Osteoarthritis	1,183	2.4
Depression	1,003	2.0
Cerebrovascular disease	894	1.8
Diabetes	812	1.6
Asthma	692	1.4
Kidney disease	484	1.0
Chronic obstructive pulmonary disease	432	0.9
Colorectal cancer	235	0.5
Osteoporosis	221	0.4
Lung cancer	136	0.3
Total	10,929	21.8
All allocated health expenditure	50,146	100.0

Note: Kidney disease includes both acute and chronic kidney diseases covering the following categories: glomerular diseases, renal tubulo-interstitial diseases, renal failure, hypertensive renal disease, and part of hypertensive heart and renal disease.

Source: AIHW Disease Expenditure Database.

Health system expenditure can be divided into the following areas: hospital services, out-of-hospital services (mainly GP and dental services), pharmaceuticals, allied health services (including community care), aged care homes and research. In 2000–01, out-of-hospital services for these 12 chronic diseases accounted for \$4.1 billion (8.1% of all allocated health expenditure), hospital services were \$4.0 billion (8.0%) and pharmaceuticals were \$1.6 billion (3.2%) (Table 4.4).

Table 4.4: Health system expenditure on selected chronic diseases, by major area of expenditure, 2000–01

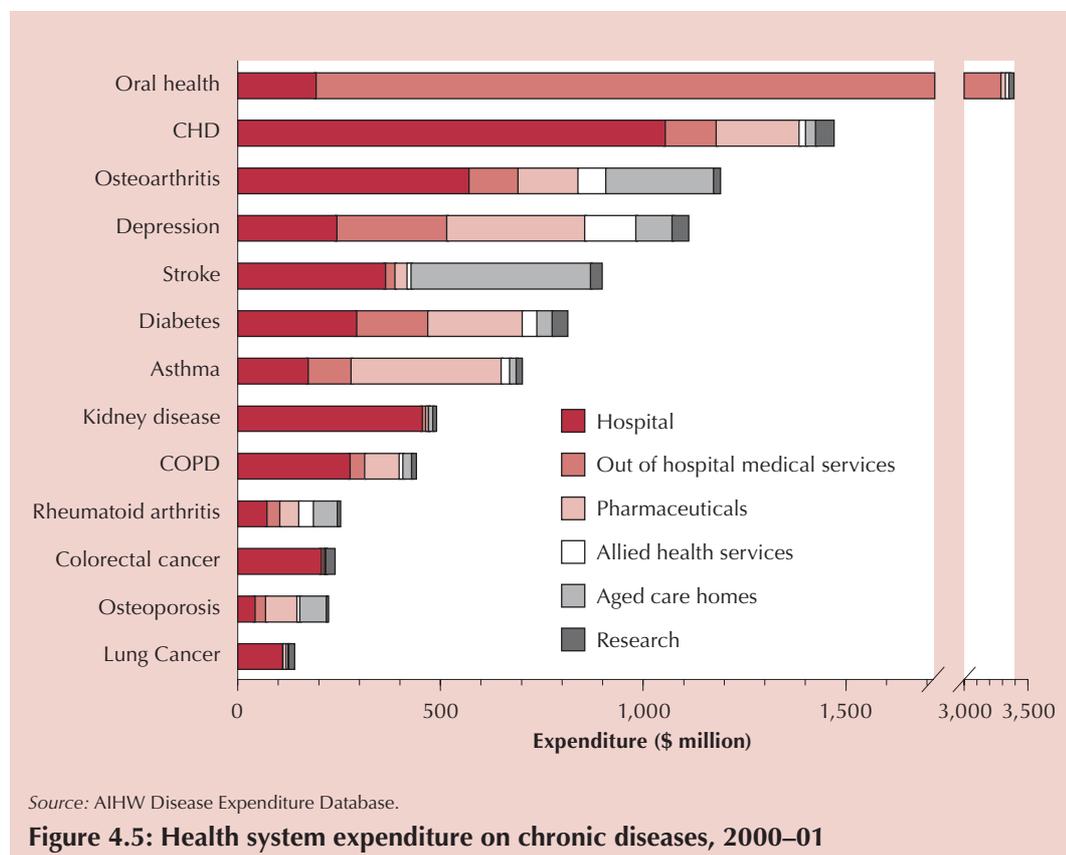
Area	Expenditure (\$ million)	Percent of total expenditure
Hospital	4,004	8.0
Out of hospital medical services:		
Dental services	3,084	6.2
Other	994	2.0
Pharmaceuticals	1,592	3.2
Aged care homes	1,033	2.1
Allied health services	244	0.5
Research	227	0.5
Total	11,175	22.3
All allocated health expenditure	50,146	100.0

Note: Columns may not add to totals due to rounding.

Source: AIHW Disease Expenditure Database.



Most of the expenditure on oral health was for out-of-hospital services, mainly dental services (Figure 4.5). Other chronic diseases for which out-of-hospital services were a significant proportion of their total expenditure were depression, asthma and Type 2 diabetes. For these diseases, GP services were the main component of out-of-hospital services.



Hospital services were a major component of the expenditure on CHD, osteoarthritis, kidney disease, COPD, colorectal cancer and lung cancer. Pharmaceuticals were an important area of expenditure for CHD, depression and asthma, whereas aged care homes were significant for osteoarthritis, cerebrovascular disease (mainly stroke) and osteoporosis.

Estimates of health system expenditure are also available for 1993-94, including estimates for 9 of the 12 chronic diseases covered here. These estimates on a per capita basis can be compared with those for 2000-01 after adjusting for inflation in health prices of 20% (Table 4.5).

Total health system expenditure allocated to all diseases (after adjusting for inflation) in 1993-94 was \$36.0 billion, or \$2,018 per person, whereas in 2000-01 it was \$2,534 per person, an increase of about 25% over the 7-year period. Among the chronic diseases for which comparable expenditure data are available for the two reference years, per capita expenditure on osteoarthritis grew by over 50% and expenditure for depression, colorectal cancer and oral health each grew by about 40%. In contrast, per capita expenditure on CHD was static.

Table 4.5: Change in per capita expenditure on chronic diseases, 1993–94 to 2000–01

Chronic disease	Per capita expenditure (\$)		
	1993–94	2000–01	% change
Oral health	124.7	173.8	39
Coronary heart disease	73.7	75.5	2
Osteoarthritis	40.2	60.9	52
Depression	36.5	51.7	41
Cerebrovascular disease	40.6	46.1	13
Diabetes	n.a.	41.7	n.a.
Asthma	29.5	35.6	21
Kidney disease	n.a.	24.9	n.a.
Chronic obstructive pulmonary disease	19.3	22.3	15
Rheumatoid arthritis	11.3	12.7	12
Colorectal cancer	8.7	12.1	39
Osteoporosis	n.a.	11.4	n.a.
Lung Cancer	5.9	7.0	19

Note: 1993–94 data for diabetes, kidney disease and osteoporosis are not comparable to 2000–01 data because of coding changes and thus are not included here.

Source: AIHW disease expenditure database.

There are a number of factors involved in these changes, and they vary greatly for each specific disease. Population ageing over the period and associated changes in overall prevalence of each disease are important factors. Changes in treatments and pharmaceuticals also need to be considered. In some cases, increasing costs in one area of expenditure for a particular disease may be negated by decreasing costs in another area. For example, although expenditure on cardiovascular diseases (CVD), including heart disease and stroke, grew over this period at rates similar to those for the whole health system, CVD expenditure for aged care homes declined by 25% compared with an increase of 23% for the whole health system. Most of the decline in CVD expenditure on aged care homes was due to a reduction in the number of strokes over the period (AIHW 2004e).



Highlights: Chronic diseases and health system resources

- *In 2003–04, the 12 chronic diseases outlined in this report, along with 3 of the biomedical risk factors (high blood pressure, high blood cholesterol, excess weight) accounted for nearly one-fifth of all problems managed by GPs.*
- *High blood pressure was the most common individual problem managed by GPs (9.2 per 100 encounters).*
- *Over the 5-year period 1998–99 to 2003–04, significant increases in problems managed by GPs were recorded for high blood pressure, arthritis and diabetes, whereas for asthma there was a significant decrease.*
- *In 2003–04, 21.6% (1.5 million) of all hospital separations listed one of the 12 chronic diseases outlined in this report as the principal diagnosis or main procedure.*
- *In 2003–04, chronic kidney disease was the single largest contributor to hospital separations (over 780,000 separations), because of the need for frequent dialysis procedures.*
- *Other chronic diseases causing over 100,000 separations in 2003–04 were coronary heart disease and oral disease.*
- *Chronic kidney disease was also responsible for the most patient days in hospital in 2003–04 (880,000) followed by coronary heart disease (665,000). Other chronic diseases with over 400,000 patient days were depression, cerebrovascular disease, chronic obstructive pulmonary disease and osteoarthritis.*
- *Over one-fifth (\$11 billion) of all health system expenditure in 2001 was taken up by the 12 chronic diseases highlighted in this report. Of this, over one-third was for out-of-hospital medical services (mainly dental and GP services), one-third was for hospital services, and most of the remainder was for pharmaceuticals and aged care homes.*
- *6.7% of all health system expenditure was for oral health, 2.9% was for coronary heart disease, 2.4% was for osteoarthritis and 2.0% was for depression.*
- *Depression, asthma and Type 2 diabetes were chronic diseases for which out-of-hospital services made up a significant proportion of expenditure, the majority of these being GP services. In contrast, hospital services were a major component of expenditure for coronary heart disease, osteoarthritis, kidney disease, chronic obstructive pulmonary disease, colorectal cancer and lung cancer.*



Introduction

Chronic diseases and their risk factors show significant variation across population groups in terms of their incidence, prevalence, prevention, management and associated health outcomes. Regular comparisons provide insights into not only the nature of these problems but also what has been achieved and what works in different settings.

Indigenous Australians are known to have a higher burden of chronic diseases. These diseases are also more frequently reported in regional Australia (in part because of a higher representation of Indigenous people in these areas) and among those who are socioeconomically disadvantaged.

Although there are shortcomings in the available data and difficulties in using them to determine these differentials, the information currently available can be examined to help answer questions such as:

- ♦ which chronic diseases and risk factors particularly affect Australians living in regional areas?
- ♦ how does the distribution of chronic diseases and risk factors vary according to socioeconomic status in Australia?
- ♦ to what extent do Indigenous Australians experience higher rates of chronic diseases and risk factors compared with other Australians?
- ♦ how much of the high mortality of Indigenous Australians is attributable to chronic diseases?

Regional variations in chronic diseases and risk factors

Despite the perceived health advantages of living in rural areas (clean air, less traffic, more relaxed lifestyle), people living in rural and remote areas of Australia have poorer health outcomes compared with those living in urban areas. In addition, people in rural and remote areas experience higher levels of health risk factors.

However, rurality itself is not the main factor in producing poorer health among people outside major cities. Rather, the factors associated with rurality are the causes of comparative health disadvantage in those areas. Such factors include:

- ♦ socioeconomic disadvantages (including lower incomes and education levels)
- ♦ geographic isolation and attendant difficulties with access to health care
- ♦ shortage of health care providers and services
- ♦ greater exposure to injury
- ♦ greater difficulties in transport and communications
- ♦ sparsely distributed populations leading to diseconomies of scale.



Many of these factors are further compounded by the higher representation in rural and remote areas of Indigenous people, who experience much poorer health than other Australians.

The focus in this section is on regional differences in the prevalence of the risk factors for chronic diseases and measures of morbidity and mortality owing to chronic diseases. Whereas mortality can be reasonably well reported for each of the regions in Australia, information on the prevalence of risk factors and diseases is largely based on survey data, and therefore the reporting of this information is limited to those risk factors and diseases that are adequately captured in self-reports provided in surveys.

Population distribution across Australia

The current standard for reporting health and other population features in Australia according to regions is the Australian Standard Geographical Classification of Remoteness Areas developed by the Australian Bureau of Statistics, which includes major cities, inner regional areas, outer regional areas, remote areas and very remote areas. Nearly two-thirds of the population in 2001 lived in major cities, defined as the least remote area, compared with 2% and 1% in remote and very remote areas respectively (Table 5.1). Note that the major cities category does not include the capital cities of Hobart and Darwin, as their populations are below the threshold of 250,000 for that category.

Table 5.1: Australian population by remoteness areas, 2001

Area	Population (millions)	Per cent
Major cities	12.9	66
Inner regional	4.0	21
Outer regional	2.0	10
Remote	0.3	2
Very remote	0.2	1
Migratory	<0.1	
Total Australia	19.5	100

Source: AIHW 2004f.

Regional variation in the prevalence of lifestyle risk factors

Indicator measures for three of the four main behavioural risk factors for chronic diseases — smoking, risky alcohol consumption and physical inactivity — were in the 2001 National Health Survey (NHS). Information on the fourth risk factor, poor nutrition, was not included in this analysis as there is no single measure for this risk factor and it was decided that the NHS nutritional data did not lend itself to regional analysis.

The three biomedical risk factors for chronic diseases have also been measured in the NHS. However, self-reported information on high blood pressure and high blood cholesterol is not considered to be accurate enough for inclusion here. Biomedical surveys have been conducted which directly measure blood pressure and cholesterol levels, but these have been restricted mainly to urban areas. The only biomedical risk factor that can be reported from the NHS across regions therefore is excess weight, using the body mass index values from self-reported weight and height.

A further limitation arises from the sample size and coverage of the NHS. The sample was about 26,000 persons, resulting in large confidence intervals in the rates for small subgroups. The survey also did not cover sparsely settled areas, and therefore rates can be reported for only three of the five remoteness regions — major cities, inner regional and outer regional — and not for the remote or very remote regions.

The 2001 NHS found that half of Australian adults had excess weight (overweight or obese), one-third were sedentary (no leisure time exercise), one-quarter were current smokers, and 1 in 10 consumed alcohol at risky levels (Table 5.2). People in regional areas were more likely than those in the major cities to have each of these risk factors. For example, the rate of risky alcohol use in regional areas was 1.22 times the rate in major cities. For smoking, the rate ratio was 1.11, for excess weight 1.07, and for being sedentary 1.05.

The results of the 2001 NHS can be compared with those from the 1995 NHS to gauge trends in the prevalence of these risk factors (Table 5.3). These comparisons indicate that:

- ♦ there were significant declines in smoking in major cities for both males and females, but not in regional areas
- ♦ there were significant increases in all areas for both males and females in levels of risky alcohol consumption
- ♦ there were significant declines in most areas for both males and females in levels of being sedentary, indicating some increases in leisure-time physical activity
- ♦ despite these increased levels of exercise, there were significant increases in most areas for both males and females in levels of excess weight.



Table 5.2: Prevalence of selected health risk factors by remoteness categories, 2001

Risk factor (ages covered)		Rate (%)		Rate ratio ^(a)			
		Total population	Major cities	Major cities	Inner regional	Outer regional	Inner + outer regional
Current smoker (18+)	Males	28	28	1.00	0.98	1.18*	1.05
	Females	21	20	1.00	1.15*	1.27*	1.19*
	Persons	24	24	1.00	1.05	1.22*	1.11*
Risky alcohol consumption (18+)	Males	13	12	1.00	1.30*	1.39*	1.33*
	Females	8	8	1.00	1.06	1.09	1.07
	Persons	11	10	1.00	1.20*	1.27*	1.22*
Physical inactivity (15+)	Males	30	29	1.00	1.06	1.15*	1.09*
	Females	32	32	1.00	0.96	1.11	1.01
	Persons	31	30	1.00	1.01	1.13*	1.05*
Overweight or obese (15+) ^(b)	Males	56	54	1.00	1.03	1.08	1.05*
	Females	41	39	1.00	1.10*	1.09	1.10*
	Persons	48	46	1.00	1.06*	1.08*	1.07*

* Indicates a rate significantly different (p < .005) from the comparable rate in major cities.

(a) Ratio of the observed number of people with the risk factor in the region compared with the number expected if the age-specific rates in major cities were to apply to the population in that region.

(b) Rates for excess weight (the overweight plus obese categories) calculated after removing 'not stated' (6% of males, 10% of females) from total.

Source: ABS National Health Survey 2001, as reported in ABS 2002b (for total population) and AIHW 2005g (for regions).

Table 5.3: Changes in risk factor prevalence by remoteness categories, 1995 to 2001

Risk factor		Major cities	Ratio of 2001 to 1995 ^(a)		
			Inner regional	Outer regional	Inner + outer regional
Current smoker	Males	0.95*	0.96	1.01	0.98
	Females	0.93*	1.03	1.12	1.06
	Persons	0.94*	0.99	1.06	1.02
Risky alcohol consumption	Males	1.26*	1.36*	1.22*	1.31*
	Females	1.36*	1.35*	1.69*	1.45*
	Persons	1.30*	1.36*	1.35*	1.36*
Physical inactivity	Males	0.90*	0.88*	0.89*	0.89*
	Females	0.91*	0.93*	0.99	0.95
	Persons	0.91*	0.91*	0.94*	0.92*
Overweight or obese	Males	1.10	1.14*	1.13*	1.14*
	Females	1.18*	1.20*	1.09	1.16*
	Persons	1.13*	1.16*	1.12*	1.15*

* Indicates a 2001 rate significantly different (p < 0.05) from the comparable rate in 1995.

(a) Ratio of the observed number of people with the risk factor in 2001 compared with the number expected if the 1995 age-specific rates in each area were to apply to the 2001 population in that area.

Source: ABS National Health Surveys 1995 and 2001, as reported in AIHW 2005g.

Regional variation in the prevalence of chronic disease

Only 4 of the 12 major chronic diseases are prevalent at levels high enough to allow for analysis at the regional level (Table 5.4). Of these, arthritis was more likely to be reported in inner and outer regional areas than in major cities. In contrast, males in major cities were more likely to report asthma and diabetes than their counterparts in the regional areas.

Table 5.4: Prevalence of selected chronic diseases by remoteness categories, 2001

Disease		Rate (%)		Rate ratio			
		Total population	Major cities	Major cities	Inner regional	Outer regional	Inner + outer regional
Arthritis	Males	11	10	1.00	1.19*	1.14	1.17*
	Females	16	15	1.00	1.14*	1.11	1.13*
	Persons	14	13	1.00	1.16*	1.11*	1.14*
Asthma	Males	11	11	1.00	0.88*	0.91	0.89*
	Females	13	12	1.00	1.05	1.08	1.06
	Persons	12	12	1.00	0.97	1.00	0.98
COPD	Males	3	3	1.00	0.89	0.81	0.86
	Females	4	4	1.00	1.02	0.70*	0.90
	Persons	4	4	1.00	0.96	0.75*	0.88
Diabetes	Males	3	3	1.00	0.71*	0.75	0.72*
	Females	3	3	1.00	1.00	1.14	1.05
	Persons	3	3	1.00	0.85	0.93	0.88

* Indicates a rate significantly different ($p < 0.05$) from the comparable rate in major cities.

Source: ABS National Health Survey 2001, as reported in ABS 2002b and AIHW 2005g.

Regional variation in mortality from chronic diseases

Mortality data are able to show regional differences in the effects of chronic diseases more clearly than the self-reported prevalence data from sample surveys. Because of the small sizes of the populations in remote areas, it is more appropriate to use standardised mortality ratios (SMRs) rather than death rates to compare mortality levels between the regions. An SMR is the ratio of the number of deaths observed in a particular region compared with the number of deaths expected if that region experienced the same age-specific death rates as the population in major cities. It is also necessary to combine the two smallest categories, remote and very remote, and several years of data (2001 to 2003 in this case) to have sufficient numbers of cases in each category for analysis.

These data show that for some of these diseases there is a strong relationship between remoteness and death rates (Table 5.5). Mortality for coronary heart disease (CHD), diabetes and COPD tends to increase for both males and females with increasing remoteness. For chronic kidney disease, the relationship also is evident for females. The contrast between major cities and the two remote categories (remote and very remote) is most striking for diabetes, with the rates for males in the remote areas double those for males in the major cities, the rates for females in the remote areas triple those for females in major cities. For cerebrovascular disease, lung cancer and colorectal cancer, the relationship is weak or non-existent.



Table 5.5: Standardised mortality ratios for chronic diseases by remoteness categories, 2001 to 2003

Disease		Major cities	Inner regional	Outer regional	Remote + very remote
CHD	Males	1.00	1.10*	1.16*	1.22*
	Females	1.00	1.07*	1.08*	1.21*
Cerebrovascular disease	Males	1.00	1.02	1.03	1.06
	Females	1.00	1.02	1.00	0.92
Lung cancer	Males	1.00	1.05	1.12*	1.11
	Females	1.00	1.02	1.11	1.20
Colorectal cancer	Males	1.00	1.08	1.11	0.86
	Females	1.00	1.13*	1.12	0.91
Diabetes	Males	1.00	1.05	1.31*	2.13*
	Females	1.00	1.09	1.38*	3.52*
COPD	Males	1.00	1.20*	1.43*	1.76*
	Females	1.00	1.11*	1.12	1.57*
Chronic kidney disease	Males	1.00	0.99	1.10	1.44
	Females	1.00	1.14*	1.21*	2.22*

* Indicates a rate significantly different ($p < 0.05$) than the major cities rate.

Source: AIHW National Mortality Database.

Socioeconomic variation in chronic diseases and risk factors

A person's position in society — socioeconomic status (SES) — is a strong predictor of health and risk of injury. It is well established (Kaplan 1999) that:

- ♦ the risk of adverse health outcomes increases with a decreasing level of socioeconomic position
- ♦ the relationship is widespread, being found in many industrialised nations and during most periods of time
- ♦ the relationship is apparent for all age groups
- ♦ the strength of the association varies between groups and places over time.

With some exceptions, the lower a person's SES, the shorter his or her life expectancy and the more prone he or she is to a wide range of chronic diseases and conditions. The link between SES and health begins at birth and continues through life, but the strength of the relationship varies at different life stages.

There is a strong, but indirect, two-way association in which SES affects health and health affects SES (Ostrove & Adler 1998). The multiple components of SES, their impact on health, and the mechanisms and pathways by which this impact occurs are not fully understood. A comprehensive analysis includes macroeconomic contexts and social factors as well as more immediate social environments, individual psychological and

behavioural factors, and biological predispositions and processes. Some factors that can lead to SES effects on health include (Adler & Ostrove 1999):

- ✦ differential access to high-quality health care
- ✦ individual factors such as smoking, exercise, nutrition, stress and depression
- ✦ environmental factors such as pollution and overcrowding
- ✦ social environments such as neighbourhoods, work, interpersonal support or conflict, and violence and discrimination.

Other factors contributing to the association between SES and health include the long-term effects of prenatal and early childhood environmental factors (Barker 1997), the cumulative biologic effects of prolonged exposures to individual stressful events (McEwen 1998), reactions to societal factors such as rising levels of income inequality or unemployment (Wilkinson 1996), and discrimination (Krieger 1999). However, the mechanisms behind these associations are still being determined, and further research is needed to enhance our understanding of the pathways by which socioeconomic factors affect the health of individuals and their communities (Pearce & Davey Smith 2003; Marmot 1999).

Socioeconomic variation in the prevalence of behavioural risk factors, chronic diseases and chronic disease mortality is highlighted below through examining differences across quintiles of relative socioeconomic disadvantage. This method involves dividing the population into fifths ('quintiles') based on certain characteristics (for example, levels of education and unemployment) of their area of residence.

Box 5.1: Limitations of area-based measures of socioeconomic status (SES)

Area-based measures of SES are likely to understate health inequalities because of socioeconomic factors. Owing to misclassification error (that is, ascribing area SES to individuals), estimates of difference across the quintiles will be smaller than if data on individual-level measures of SES were used (Hyndman et al. 1995). In addition, the exclusion of the 'sparsely settled' areas of Australia from the NHS sampling frame results in the omission of data from a high percentage of Indigenous people, who are the population group with the poorest health, high levels of disadvantage and high rates of many chronic conditions. Thus, socioeconomic inequalities in chronic disease among the wider population are likely to be larger than those reported here.



Socioeconomic variation in the prevalence of lifestyle risk factors

Data on a number of risk factors collected in the 2001 NHS show a striking association with socioeconomic status, in particular for people who are smokers and those who did not exercise, with continuous gradients and significantly elevated rates among those in the more disadvantaged areas, as shown by the rate ratios (Table 5.6). The differences in male and female rates are also of interest. For high-risk alcohol consumption among females, the socioeconomic gradient was reversed, with the highest rates found among those living in the least disadvantaged areas.

Table 5.6: Prevalence of selected health risk factors by quintile of socioeconomic disadvantage, people aged 18–64 years, 2001

Risk factor	Sex	Rate ^(a)	Rate ratio				
			Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
Tobacco smoking	Males	305.8	1.00	1.40*	1.55*	1.71*	1.95*
	Females	240.1	1.00	1.29*	1.34*	1.48*	2.00*
	Persons	272.8	1.00	1.35*	1.45*	1.61*	1.96*
High-risk alcohol consumption ^(b)	Males	69.8	1.00	1.09	1.26*	1.26*	1.45*
	Females	21.3	1.00	0.59*	0.94	0.76	0.87
	Persons	45.4	1.00	0.93	1.16	1.12	1.22*
Physical inactivity	Males	287.7	1.00	1.20*	1.36*	1.52*	1.68*
	Females	282.2	1.00	1.19*	1.29*	1.35*	1.65*
	Persons	284.9	1.00	1.20*	1.32*	1.43*	1.66*
Overweight	Males	394.6	1.00	1.03	1.08	0.99	0.86*
	Females	217.4	1.00	0.95	1.07	0.98	0.89
	Persons	305.5	1.00	1.00	1.07*	0.99	0.86*
Obesity	Males	152.4	1.00	1.27*	1.19*	1.21*	1.44*
	Females	152.6	1.00	1.39*	1.50*	1.53*	1.72*
	Persons	152.5	1.00	1.32*	1.33*	1.35*	1.57*

* Indicates the rate in this quintile is statistically significantly different from the rate in Quintile 1.

(a) Rate per 1,000 population for all quintiles combined, age-standardised to the Australian population at 30 June 2001.

(b) Average daily consumption of seven or more standard drinks for males and five or more standard drinks for females.

Notes

1. Based on self-reported information.
2. Respondents could report more than one risk factor.
3. Quintile 1 represents the least disadvantaged areas; Quintile 5 represents the most disadvantaged areas.
4. The rate ratio for each quintile is calculated as the rate in that quintile divided by the rate in Quintile 1.

Source: Glover et al. 2004.

Socioeconomic variation in the prevalence of chronic diseases

Significant socioeconomic inequalities are evident for many of the major chronic diseases (Table 5.7). For many diseases there is a strong, continuous socioeconomic gradient in the rates, with the steepest gradient being for diabetes among those aged 25–64 years. The socioeconomic variation generally exists only among the adult age groups; few significant differences appear among children and young people.

Table 5.7: Prevalence of selected chronic diseases by age group and quintile of socioeconomic disadvantage, 2001

Age group and chronic disease	Rate ^(a)	Rate ratio				
		Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
0–14 years						
Mental and behavioural problems ^(b)	66.0	1.00	1.04	1.10	1.12	1.52*
Respiratory system	218.1	1.00	1.07	1.05	1.11	0.99
Asthma	133.6	1.00	1.10	1.12	1.25*	1.12
15–24 years						
Mental and behavioural problems ^(b)	102.8	1.00	1.02	0.97	1.08	1.28
Respiratory system	333.7	1.00	1.04	1.12	1.09	1.00
Asthma	162.6	1.00	0.82	1.14	1.02	1.00
Bronchitis/emphysema	17.0	1.00 ^(c)	1.32 ^(c)	1.66 ^(c)	1.94 ^(c)	1.97 ^(c)
Musculoskeletal system ^(d)	190.9	1.00	1.11	1.00	1.08	0.94
25–64 years						
Diabetes mellitus	22.3	1.00	1.37	1.67*	1.72*	2.28*
Mental and behavioural problems ^(b)	110.9	1.00	1.05	1.20*	1.36*	1.67*
Circulatory system	174.9	1.00	1.04	0.97	1.15*	1.28*
Hypertensive disease	97.5	1.00	1.12	1.01	1.24*	1.54*
Respiratory system	329.6	1.00	1.00	0.99	0.99	1.01
Asthma	103.9	1.00	1.10	0.99	1.19*	1.14
Bronchitis/emphysema	34.3	1.00	0.97	1.14	1.55*	1.70*
Digestive system	80.7	1.00	1.03	1.07	1.12	1.37*
Musculoskeletal system ^(d)	398.4	1.00	1.10*	1.16*	1.16*	1.22*
Arthritis	146.2	1.00	1.18*	1.32*	1.24*	1.56*
65 years and over						
Diabetes mellitus	89.8	1.00	1.13	1.14	1.52*	1.56*
Mental and behavioural problems ^(b)	72.2	1.00	1.21	1.62*	1.67*	1.56*
Circulatory system	565.9	1.00	1.09	1.06	1.10	1.19*
Respiratory system	314.4	1.00	1.03	0.87	0.95	1.22*
Musculoskeletal system ^(d)	636.7	1.00	1.02	1.06	1.03	1.08
Arthritis	465.7	1.00	0.98*	1.10*	1.00	1.14*

* Indicates the rate in this quintile is statistically significantly different from the rate in Quintile 1.

(a) Rate per 1,000 population.

(b) May include self-diagnosed mental and behavioural problems as well as problems diagnosed by a medical practitioner.

(c) Based on rates with a standard error of between 25% and 50%. These results should be used with caution.

(d) Includes diseases of the connective tissue.

Notes

1. Based on self-reported information. Information for children aged 0–14 years was obtained by parental report.

2. Respondents could report more than one chronic disease.

3. Quintile 1 represents the least disadvantaged areas; Quintile 5 represents the most disadvantaged areas.

4. The rate ratio for each quintile is calculated as the rate in that quintile divided by the rate in Quintile 1.

Source: Glover et al. 2004.



Socioeconomic variation in mortality from chronic diseases

There are notable differences in mortality in Australia when analysed by socioeconomic status, with the lowest mortality rates in the least disadvantaged areas and the highest in the most disadvantaged areas (Glover et al 2004). Deaths with a chronic disease as the underlying cause of death also show a strong relationship with socioeconomic status (Table 5.8), a relationship that is substantially stronger for premature deaths.

Table 5.8: Mortality from selected chronic diseases by quintile of socioeconomic disadvantage, all ages, 2001 to 2003

Underlying cause of death	Sex	Rate ^(a)	Standardised mortality ratio (SMR)				
			Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
Coronary heart disease	Males	179.2	1.00	1.09*	1.24*	1.25*	1.38*
	Females	103.5	1.00	1.32*	1.71*	1.87*	2.13*
Cerebrovascular disease	Males	66.8	1.00	1.03	1.08*	1.09*	1.16*
	Females	61.3	1.00	0.99	0.99	1.02	1.01
Lung cancer	Males	52.8	1.00	1.21*	1.36*	1.45*	1.56*
	Females	23.2	1.00	1.10*	1.28*	1.18*	1.32*
Colorectal cancer	Males	29.3	1.00	1.08*	1.15*	1.10*	1.07
	Females	19.5	1.00	1.12*	1.11*	1.07	1.07
Diabetes	Males	21.6	1.00	1.28*	1.37*	1.34*	1.78*
	Females	13.4	1.00	1.42*	1.50*	1.51*	2.08*
COPD ^(b)	Males	40.1	1.00	1.23*	1.37*	1.45*	1.71*
	Females	19.3	1.00	1.10*	1.25*	1.23*	1.40*
Chronic kidney disease	Males	14.9	1.00	1.15*	1.15*	1.14*	1.32*
	Females	10.8	1.00	1.26*	1.16*	1.30*	1.56*

* Indicates the rate in this quintile is statistically significantly different from the rate in Quintile 1.

(a) Rate per 100,000 population, age-standardised to the Australian population at 30 June 2001.

(b) COPD = chronic obstructive pulmonary disease.

Notes

1. Quintile 1 represents the least disadvantaged areas; Quintile 5 represents the most disadvantaged areas.
2. The SMR for each quintile is a ratio of the number of deaths that were observed in that quintile compared with the number of deaths that would be expected if people in that quintile experienced the same mortality rates as people in Quintile 1.

Source: AIHW National Mortality Database.

Using coronary heart disease (CHD) as an example, there is a notable differential (38%) in male mortality rates at all ages between the most disadvantaged and the least disadvantaged areas (Table 5.9). The differential increases to 75% when deaths before age 75 are considered, and to 98% for male deaths before age 65. For females of all ages, the differential in CHD mortality rates between the most disadvantaged and least disadvantaged areas is 24%. This increases to 113% for deaths before age 75, and a substantial 186% for deaths before age 65.

The approximately 7,700 male and 1,900 female deaths from CHD before age 65 are clearly premature, and represent a considerable loss of productive life. The burden of premature CHD mortality substantially increases in the lowest socioeconomic group. This socioeconomic variation in premature mortality (deaths before 65 years of age) exists for several chronic diseases including cerebrovascular disease, lung cancer, COPD, diabetes and kidney disease (Table 5.10).

Table 5.9: Mortality from coronary heart disease (underlying cause of death) by quintile of socioeconomic disadvantage, 2001 to 2003

Age at death	Deaths		Standardised mortality ratio (SMR)				
	Number	Rate ^(a)	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
Males							
All ages	41,277	179.2	1.00	1.09*	1.24*	1.25*	1.38*
< 75 years	16,517	61.3	1.00	1.22*	1.44*	1.54*	1.75*
< 65 years	7,721	30.1	1.00	1.24*	1.54*	1.71*	1.98*
Females							
All ages	36,438	103.5	1.00	1.07*	1.14*	1.13*	1.24*
< 75 years	5,663	20.3	1.00	1.32*	1.71*	1.87*	2.13*
< 65 years	1,872	7.4	1.00	1.36*	2.18*	2.38*	2.86*

* Indicates the rate in this quintile is statistically significantly different from the rate in Quintile 1.

(a) Rate per 100,000 population, age-standardised to the Australian population at 30 June 2001.

Notes

1. Quintile 1 represents the least disadvantaged areas; Quintile 5 represents the most disadvantaged areas.
2. The SMR for each quintile is the ratio of the number of deaths that were observed in that quintile compared with the number of deaths that would be expected if people in that quintile experienced the same mortality rates as people in Quintile 1.

Source: AIHW National Mortality Database.

Table 5.10: Premature mortality from selected chronic diseases by quintile of socioeconomic disadvantage, deaths before 65 years of age, 2001 to 2003

Underlying cause of death	Sex	Rate ^(a)	Standardised mortality ratio (SMR)				
			Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
Coronary heart disease	Males	30.1	1.00	1.24*	1.54*	1.71*	1.98*
	Females	7.4	1.00	1.36*	2.18*	2.38*	2.86*
Cerebrovascular disease	Males	5.8	1.00	1.13	1.27*	1.36*	1.60*
	Females	12.2	1.00	1.28*	1.47*	1.60*	1.93*
Lung cancer	Males	13.6	1.00	1.38*	1.76*	1.90*	2.09*
	Females	8.2	1.00	1.25*	1.53*	1.38*	1.65*
Colorectal cancer	Males	8.1	1.00	1.12	1.20*	1.28*	1.19*
	Females	5.7	1.00	1.16	1.23*	1.20*	1.08
Diabetes	Males	4.0	1.00	1.42*	1.80*	1.78*	2.56*
	Females	2.0	1.00	1.20*	1.89*	2.26*	3.37*
COPD ^(b)	Males	3.2	1.00	1.74*	2.18*	2.23*	2.69*
	Females	2.7	1.00	1.60*	2.12*	2.53*	2.97*
Chronic kidney disease	Males	1.5	1.00	1.04	1.32*	1.49*	1.89*
	Females	1.0	1.00	1.90*	2.01*	2.56*	3.69*

* Indicates the rate in this quintile is statistically significantly different from the rate in Quintile 1.

(a) Rate per 100,000 population, age-standardised to the Australian population at 30 June 2001.

(b) COPD = chronic obstructive pulmonary disease.

Notes

1. Quintile 1 represents the least disadvantaged areas; Quintile 5 represents the most disadvantaged areas.
2. The SMR for each quintile is the ratio of the number of deaths that were observed in that quintile compared with the number of deaths that would be expected if people in that quintile experienced the same mortality rates as people in Quintile 1.

Source: AIHW National Mortality Database.



Chronic diseases and risk factors among Indigenous Australians

Many reports have highlighted the poor health status of Aboriginal and Torres Strait Islander peoples (AIHW 2004a; AMA 2005; ABS & AIHW 2005). A frequently used indicator of poor health is life expectancy at birth, with the latest ABS estimates indicating a gap of 17 years between Indigenous people and other Australians, for both males (59.4 years compared with 76.6 years) and females (64.8 years compared with 82.0 years). This gap is reflected in a higher standardised mortality ratio for all causes of death of 2.8 for both Indigenous males and females in 1999 to 2003 (ABS & AIHW 2005).

Some of this burden of ill health is attributable to higher death rates from infectious diseases and from injuries and poisonings, with Indigenous males having SMRs of 5.3 and 3.0 respectively for these causes of death; for females the ratios are 5.4 and 2.9. But Indigenous Australians also suffer disproportionately from the main chronic diseases, including those that are the major causes of death. For example, the SMRs for diseases of the circulatory system (including CHD and stroke) are 2.9 for males and 2.5 for females; for neoplasms (including cancers) the ratios are 1.5 for both sexes; for respiratory system diseases (including COPD) they are 4.0 and 3.5; and for endocrine, nutritional and metabolic diseases (including diabetes) they are 7.5 and 10.5 (ABS & AIHW 2005).

Indigenous Australians also experience higher levels of disability than do other Australians. In 2002, 36% of Indigenous people aged 15 years and over had a disability or long-term health condition, including 8% with a profound or severe core activity limitation, meaning that they always or sometimes needed assistance with core activities of daily living (self-care, mobility and communication). Although not strictly comparable to similar estimates for the general Australian population, these figures indicate that Indigenous peoples were at least twice as likely to have a profound or severe core activity limitation as other Australians (ABS & AIHW 2005).

Explanations for the high levels of ill health among Indigenous Australians often begin with adverse socioeconomic conditions compared with general Australian standards, including lower incomes, poorer educational outcomes and lower rates of home ownership. Other factors that have also been identified as contributing to this situation include poor housing, exposure to violence, and 'the extent of control and perceptions of mastery in the workplace and wider society' (AIHW 2004a:195). In addition, Indigenous people experience higher exposure to 'life stressors' such as the death of a family member or close friend, overcrowding at home, alcohol and other drug problems, serious illness or disability, and not being able to get a job (ABS & AIHW 2005).

These social, psychological and environmental factors often affect health status and outcomes. This is particularly the case for chronic diseases, for which these risk factors have well-established connections.

Variations in the prevalence of lifestyle risk factors by Indigenous status

Information on the self-reported prevalence of risk factors among Indigenous Australians is available from the National Health Surveys for the behavioural risk factors, including smoking, risky alcohol consumption, poor nutrition and lack of exercise. Self-reported excess weight is also collected in these surveys. However, data on the prevalence of the biomedical risk factors high blood pressure and high blood cholesterol are not available nationally.

The 2001 NHS found that Indigenous Australians had poorer profiles than did other Australians for nearly all of these risk factors (Table 5.11). A major example is tobacco smoking, which contributes to most chronic diseases. Smoking had declined among the non-Indigenous population to 22% by 2001, but nearly half (49%) of Indigenous Australians aged 18 and over were current daily smokers.

Table 5.11: Age-standardised prevalence of selected health risk factors by Indigenous status, persons aged 18 years and over, 2001

Risk factor	Indigenous Australians	Other Australians
	(per cent)	
Current daily smoker	49	22
Alcohol consumption		
High risk	7	4
Risky or high risk	12	11
Exercise level ^(a)		
Sedentary	43	30
Sedentary or low	73	69
Body mass index		
Obese	31	16
Overweight or obese	63	50
Inadequate fruit intake ^(a)	59	47
Inadequate vegetable intake ^{(a)(b)}	63	70

(a) Data collected for non-remote areas only.

(b) Daily intake of vegetables of three serves or less (the current standard measure of four serves or less could not be reported from the 2001 NHS).

Source: ABS 2002b.

In the 2001 NHS, over half (58%) of the Indigenous peoples reported that they did not consume alcohol in the week before the interview, compared with 38% of other Australians (ABS 2002b). The levels of risky alcohol consumption (five or more standard drinks per day for males, three or more standard drinks per day for females) were similar for both Indigenous (12%) and other Australians (11%). However, Indigenous Australians were more likely to consume alcohol at 'high risk' levels (seven or more standard drinks per day for males, five or more standard drinks per day for females), 7% compared with 4% for other Australians.

A major health problem for all Australians and particularly for Indigenous peoples is the nexus of diabetes, CHD, cerebrovascular disease and kidney disease. Major contributors to these diseases are high blood pressure and high blood cholesterol, for which little data from the Indigenous population are available. Another cause of these diseases is



excess weight, which itself is often a function of lack of exercise and poor diet, and some indication of these risk factors is available from the NHS.

Half of all Australian adults reported in the 2001 NHS that they carried excess weight (BMI of 25 and above). Among Indigenous adults, this figure was 63%. At the higher end of the BMI scale, 31% of Indigenous adults and 16% of other Australian adults were rated as obese (BMI of 30 and above). Similarly, low levels of exercise were reported by the vast majority (nearly 70%) of *all* Australian adults. However, very low levels ('sedentary') were more likely to be reported by Indigenous adults, 43% compared with 30% of other Australian adults.

Over half (59%) of Indigenous adults and nearly half (47%) of other Australian adults reported inadequate consumption of fruit. Even higher proportions reported inadequate consumption of vegetables (defined here three serves or less, not four serves or less as in other chapters): 63% of Indigenous adults and 70% of other Australian adults.

Other information from the 2001 NHS, on types of milk consumed and addition of salt to food after cooking, indicates that poor diet is a factor in contributing to the higher levels of excess weight in the Indigenous population (ABS 2002b).

Variations in the prevalence of chronic diseases by Indigenous status

Information on the prevalence of specific chronic diseases from the National Health Surveys is limited because of the small sample sizes used, restricting most analyses to major disease groupings. The figures for these groupings from the 2001 NHS indicate that Indigenous people were more likely to report most of the major groupings of chronic diseases, the one exception being eye and vision problems. However, the differences between the two populations were not very large for most diseases (Table 5.12).

Table 5.12: Age-standardised prevalence of selected chronic diseases by Indigenous status, persons aged 18 and over, 2001

Disease/condition	Indigenous Australians	Other Australians
	(per cent)	
Eye/sight problems	46	51
Musculoskeletal diseases	35	32
Arthritis	16	7
Diseases of the respiratory system	33	30
Asthma	17	12
Circulatory problems/diseases	19	17
Ear/hearing problems	18	14
Endocrine, nutritional and metabolic conditions	15	9
Diabetes mellitus	11	3
Diseases of the nervous system:	10	8
Digestive diseases	7	7

Note: Age-standardised to the Australian population at 30 June 2001.

Source: ABS & AIHW 2005.

The 2001 NHS found that three specific chronic diseases that are highly prevalent in Australia — asthma, arthritis and diabetes — were more commonly reported by Indigenous Australians. The difference was greatest for arthritis, with 16% of Indigenous adults reporting this condition compared with only 7% of other Australians. A significant difference was also observed for diabetes, with 11% of Indigenous Australians and only 3% of other Australians having this condition. Other studies suggest that the prevalence of diabetes may be as high as 30% in some Aboriginal communities (AIHW 2002a).

Asthma — one of the most commonly reported diseases in the NHS — affects 17% of Indigenous adults compared with 12% of other Australian adults. Among Indigenous adults, the prevalence of asthma was much higher among females than among males. It was also significantly higher for Indigenous women compared with other Australian women. In fact, among Indigenous women, the prevalence was higher in older adults than in children, an age distribution of asthma that was markedly different from the age distribution in other Australian women (AIHW: ACAM 2005). Asthma was more prevalent among Indigenous children, but the differences between Indigenous and non-Indigenous children were significant only in the youngest age group, 0–2 years, an age at which the diagnosis of asthma is uncertain (AIHW: ACAM 2005).

Chronic kidney disease (CKD) has been highlighted as a particular health concern for Indigenous Australians (ABS & AIHW 1999; AIHW 2005b). Although no national data on chronic kidney disease in Indigenous Australians are available, several studies have discovered high rates of CKD and indicators of kidney damage among Indigenous communities (AIHW 2005b). One study found that 12% of adults in a remote Aboriginal community in the Northern Territory had reduced kidney function and a further 36% had evidence of kidney damage (McDonald et al. 2003).

In addition to the risk factors noted above, diabetes and preventable infections are also common in many Indigenous communities and have been associated with kidney impairment in this population. This, along with their poorer socioeconomic status and often remote location leading to poor access to health services, contributes to the increased rates of CKD and other chronic diseases among Indigenous Australians. In particular, it is believed that the high incidence of streptococcal skin and throat infections among Indigenous Australians contributes to increased risk of glomerulonephritis, one of the main causes of CKD (Chadban & Atkins 2005). Low birthweight is also common among Indigenous Australians, and there is evidence that this may be associated with greater risk of kidney disease, independent of other risk factors (Hoy et al. 1998).

Variations in chronic disease mortality by Indigenous status

The analysis of mortality data for the Indigenous population of Australia is limited to the death records from Western Australia, South Australia, the Northern Territory and Queensland. This is because only these jurisdictions have a sufficient quality of identification of Indigenous status in their death records (ABS & AIHW 2003). Furthermore, because of the small populations involved, it is necessary to combine the records from the most recent three years (2001 to 2003), and to use standardised mortality ratios (SMRs) to compare the death rates with those of other Australians.



Indigenous Australians have much higher death rates compared to non-Indigenous Australians, with the SMR for males being 2.9 and for females 2.6. Among the major chronic diseases that cause large numbers of deaths, the SMRs are all greater than these figures, with the exception of colorectal cancer (Table 5.13), indicating that chronic diseases are an even greater problem among Indigenous Australians than among other Australians.

Table 5.13: Standardised mortality ratios for chronic diseases, Indigenous Australians compared with other Australians, 2001 to 2003

Cause of death	Males	Females	Persons
Coronary heart disease	4.8	5.3	5.0
Cerebrovascular disease	4.3	4.3	4.3
Lung cancer	3.4	4.0	3.6
Colorectal cancer	1.7	1.7	1.7
Diabetes	11.9	16.5	13.9
COPD	5.9	5.7	5.8
Chronic kidney disease	7.2	8.1	7.7

Notes

1. Standardised mortality ratios (SMRs) are the comparison of the number of observed Indigenous deaths and the number of deaths expected if they experienced the same rates as the non-Indigenous population.
2. Data are limited to Western Australia, South Australia, Northern Territory and Queensland.
3. All the SMRs in this table are statistically significant ($p < 0.05$).

Source: AIHW National Mortality Database.

These mortality data indicate that the nexus mentioned earlier — of diabetes, CHD, cerebrovascular disease and chronic kidney disease — is a particularly major health issue for Indigenous Australians. The SMR for diabetes is 13.9, indicating that the death rate from this disease for Indigenous Australians is nearly 14 times greater than for other Australians. Chronic kidney disease is also a disproportionately large problem, with an SMR of 7.7. The major diseases of the circulatory system — CHD and cerebrovascular disease — have SMRs of 5.0 and 4.3 respectively.

Indigenous females appear to be more disadvantaged in terms of chronic disease mortality than Indigenous males. This is not because Indigenous females have higher death rates from chronic diseases than Indigenous males; rather it is because the gap between Indigenous and other Australian females is wider than it is for males. Most striking are the Indigenous female SMRs for diabetes (16.5) and chronic kidney disease (8.1).

The effect on Indigenous peoples of higher mortality from chronic diseases can also be seen in their higher levels of premature mortality, as measured by years of life lost (YLL) for each chronic disease (Table 5.14). The YLL for each of these diseases are higher for Indigenous people, both males and females, particularly for chronic kidney disease and CHD, for which the gaps between Indigenous and other Australians are around 10 to 15 years. This indicates that not only are Indigenous people more likely to die from these diseases, but also they are more likely to die at younger ages than are other Australians.

Table 5.14: Average years of life lost because of chronic diseases, Indigenous and other Australians, 2001 to 2003

Cause of death	Males		Females	
	Indigenous Australians	Other Australians	Indigenous Australians	Other Australians
Coronary heart disease	21.2	12.1	18.6	8.6
Cerebrovascular disease	15.0	10.0	13.7	8.8
Lung cancer	19.0	14.2	24.0	16.9
Colorectal cancer	16.3	14.7	20.6	15.2
Diabetes	22.9	19.7	14.2	11.2
COPD	15.0	10.0	18.9	12.0
Chronic kidney disease	26.7	9.8	25.3	9.2

Notes

1. Years of life lost = the expected years of life remaining at age of death for males and females in the general Australian population.
2. Data are limited to Western Australia, South Australia, Northern Territory and Queensland.

Source: AIHW National Mortality Database.

Highlights: Regional, socioeconomic and indigenous differences

Geographical location

- In 2001, the rate of risky alcohol use of people living in regional areas was 22% higher than the rate in major cities.
- Compared with major cities, rates were also higher in regional areas for smoking (11% higher), excess weight (7% higher) and being sedentary (5% higher).
- Arthritis is more likely to be reported in inner and outer regional areas than in major cities.
- Males in major cities are more likely to report asthma and diabetes than males in regional areas.
- Mortality rates for coronary heart disease, COPD and diabetes tend to increase with increasing remoteness for both sexes.

Socioeconomic status (SES)

- In 2001, when compared with least disadvantaged areas, persons living in more disadvantaged areas had significantly higher levels of tobacco smoking, physical inactivity and obesity. For males significantly higher levels of risky alcohol consumption were evident in the most disadvantaged areas than in the least disadvantaged areas.

continued...



Highlights (cont'd): Regional, socioeconomic and indigenous differences

- *Compared with those living in least disadvantaged areas, significantly higher prevalence of diabetes, mental and behavioural problems, diseases of the circulatory system, asthma, bronchitis/emphysema and arthritis can all be observed in the more disadvantaged areas.*
- *In 2001, there was significantly higher mortality for coronary heart disease, lung cancer, diabetes, COPD, chronic kidney disease and male cerebrovascular disease for those in more disadvantaged areas than in the least disadvantaged areas.*

Indigenous status

- *In 2001, 49% of Indigenous adults reported smoking compared with 22% of other Australian adults.*
- *Indigenous adults were also more likely to drink alcohol at high-risk levels (7%) compared with other Australian adults (4%).*
- *Although excess weight is an issue for half of all Australians, this figure increased to 63% for Indigenous Australians in 2001.*
- *Inadequate fruit consumption was prevalent for both Indigenous (59%) and other (47%) Australians, as was consumption of fewer than four serves of vegetables (63% for Indigenous Australians and 70% for other Australians (note that in Chapter 3 the measure is four serves or less)).*
- *In 2001, asthma, arthritis and diabetes were more commonly reported for Indigenous than other Australians.*
- *Large differences in mortality by Indigenous status can be observed for diabetes (14 times the rate for other Australians), chronic kidney disease (8 times), COPD (6 times) and coronary heart disease (5 times).*

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APPENDIX 1: METHODS

Statistical definitions and methods

Age-specific rates

Age-specific rates were calculated by dividing the number of events (such as deaths, disease cases or hospital separations) in each specified age group by the estimated resident population (ERP) for the corresponding age group. The rates are generally expressed as events per 1,000 population.

Age standardisation

This is a method of removing the influence of age when comparing populations with different age structures. For this report, the Australian ERP as at 30 June 2001 was used as the standard population. The same population was used for males and females to allow valid comparison of age-standardised rates between the sexes.

DIRECT AGE STANDARDISATION

Direct age standardisation is the most common method of age standardisation, and is used in this report for prevalence, hospitalisations and most deaths data. This method is generally used when the populations under study are large and the age-specific rates are reliable. The calculation of direct age-standardised rates has three steps:

- Step 1: Calculate the age-specific rate for each age group.
- Step 2: Calculate the expected number of cases in each age group by multiplying the age-specific rate by the corresponding standard population for each age group.
- Step 3: Sum the expected number of cases in each age group and divide this sum by the total of the standard population to give the age-standardised rate.

INDIRECT AGE STANDARDISATION

In situations where populations are small or where there is some uncertainty about the stability of age-specific rates, indirect standardisation is used. This effectively removes the influence of different age structures, but does not provide a measure of prevalence or mortality in terms of a rate. Rather, the summary measure is a ratio of the number of observed cases compared with the number that would be expected if the age-specific rates of the standard population applied in the population under study. Indirect standardisation is used in this report for prevalence and mortality by area of residence, socioeconomic status and Indigenous status. Calculation of these ratios has the following steps:

- Step 1: Calculate the age-specific rates for each age group in the standard population.

Step 2: Apply these age-specific rates to the number of people in each age group of the population under study, and sum these to derive the total expected number of cases in that population.

Step 3: Sum the observed cases in the population under study and divide this number by the expected number derived in step 2. This is the standardised mortality/prevalence ratio (SMR or SPR).

An SMR/SPR of 1 indicates the same number of observed cases as were expected, suggesting rates in the two populations are similar. An SMR/SPR greater than 1 indicates more cases were observed than were expected, suggesting rates in the population under study are higher than in the standard population.

ICD-10 mortality and ICD-10-AM morbidity codes

The following codes were used when reporting on mortality and hospital morbidity.

ICD-10 mortality codes

Asthma: J45, J46

Cerebrovascular disease: I60–69

Chronic obstructive pulmonary disease: J41–44

Colorectal cancer: C18–21

Coronary heart disease: I20–25

Diabetes: E10–14

Lung cancer: C33, C34

Osteoarthritis: M15–19

Osteoporosis: M80–82

Chronic kidney disease: B520, D593, E102, E112, E122, E132, E142, E851, I12, I13, I150, I151, N00, N01, N02, N03, N04, N05, N06, N07, N11, N12, N14, N15, N18, N19, N25, N26, N27, N28, N391, N392, Q60, Q61, Q62, Q63.

ICD-10-AM hospital morbidity codes

As above for asthma, cerebrovascular disease, chronic obstructive pulmonary disease, colorectal cancer, coronary heart disease, diabetes, lung cancer, osteoarthritis, osteoporosis.

Depression: F32, F33

Oral disease: K00–K14

Chronic kidney disease: as above, less B520, D593, E851, plus N16, T824, T861, Z490, Z491, Z492, Z940, Z992.



APPENDIX 2: DATA SOURCES

The information on mortality, health services use and health expenditure in this report is drawn from administrative databases. Information on the prevalence of risk factors and chronic diseases is drawn from various surveys. The major data sources used in this report are briefly described below.

Administrative data sources

AIHW Disease Expenditure Database

This database contains information on direct health expenditure in 2000–01 for around 200 different disease and injury categories. Estimates are available by age group, sex and area of expenditure — hospitals, high-level residential aged care, medical services, other professional services, pharmaceuticals and research. Capital expenditures, expenditure on community health (except community mental health), public health programs (except cancer screening), health administration and health aids and appliances were not allocated by disease group.

AIHW National Hospital Morbidity Database

This database contains demographic, diagnostic, procedural and duration-of-stay information on episodes of care for patients admitted to hospital. The data collection is maintained by the AIHW using data supplied by state and territory health authorities. The database is episode-based and it is not possible to count patients individually. In this report, disease data relate to the principal diagnosis reported for hospitalisations unless otherwise specified.

AIHW National Mortality Database

This database contains information on the cause of death supplied by the medical practitioner certifying the death or by a coroner. Registration of deaths is the responsibility of the state and territory registrars of births, deaths and marriages. Registrars provide the information to the ABS for coding of cause of death and the data is then provided to the AIHW. In this report, unless otherwise specified, death data relate only to the underlying cause of death.

Survey data sources

Australian Secondary Students' Alcohol and Drug (ASSAD) Survey

The ASSAD Survey has been conducted Australia-wide under the umbrella of the National Cancer Council. The most recent results published — from the 2002 survey — included information on substance use from over 23,000 students aged 12–17 years from 363 schools.

BEACH (Bettering the Evaluation and Care of Health) Survey of General Practice

The BEACH survey is an ongoing national survey looking at aspects of general practice in Australia, and is conducted by the Australian General Practice Statistics and Classification Centre (an AIHW collaborating unit within the Family Medicine Research Centre, University of Sydney). BEACH began in April 1998 and involves an ever changing random sample of GPs, each of whom records details regarding 100 consecutive patient encounters.

Child and Adolescent Physical Activity and Nutrition Survey (CAPANS)

CAPANS is a survey conducted in Western Australia by the Physical Activity Taskforce. It was undertaken from late August to early December in 2003 and collected information from 2,800 students from years 3 to 11 from 32 primary and secondary schools. Students were asked about their physical activity and nutritional intake via a questionnaire. A 24-hour food diary and objective measures of physical activity (for example, pedometers), along with height, weight and waist circumference measurements were also used.

National Drug Strategy Household Survey (2004)

The last National Drug Strategy Household Survey was conducted between July and November 2004 and includes data on almost 30,000 Australians aged 12 years and over. This was the eighth survey in a series that began in 1985. Respondents were asked about their knowledge of drugs, their attitudes towards drugs, their drug consumption histories and related behaviours.

State and territory computer-assisted telephone interview (CATI) surveys

The Australian Government and several state and territory governments have conducted computer-assisted telephone interview (CATI) surveys since the 1990s, with the aim of examining the health behaviours and health outcomes of Australians. As a result of this work, between 1993 and 2001 five states (New South Wales, Victoria, Queensland, Western Australia and South Australia) have introduced regular state-based survey programs to conduct surveillance of the health behaviours and outcomes of their populations. These five states represent almost 95% of the Australian population.

The results included in this report also draw on a 'gaps' survey conducted at the end of 2004 in the four states and territories that did not have comparable data available at the time.

National Health Survey (NHS) 2001

The 2001 NHS conducted by the ABS included around 26,900 people of all ages. Collection occurred between February and November 2001 across urban and rural areas of Australia. Non-private dwellings (for example, hospitals, nursing homes, hotels and boarding houses) were excluded. The survey collected information on long-term health conditions, use of health services, and health risk factors and behaviours.



National Health Survey (NHS) 2004–05

The 2004–05 NHS was conducted by the ABS between August 2004 and June 2005. Almost 26,000 people of all ages were surveyed. Non-private dwellings (for example, hospitals, nursing homes, hotels and boarding houses) were excluded. The survey collected information on long-term health conditions, use of health services, and health risk factors and behaviours.

National Nutrition Survey (1995)

The National Nutrition Survey was last conducted by the ABS in 1995 and was the largest and most comprehensive Australian survey of food and nutrient intake, dietary habits and body measurements. The survey collected information from a subsample of respondents from the 1995 National Health Survey: approximately 13,800 people from urban and rural areas of Australia. The National Nutrition Survey was conducted over a 13-month period from February 1995 to March 1996.

NSW Schools Physical Activity and Nutrition Survey (SPANS)

SPANS was a study funded by NSW Health and conducted by the NSW Centre for Overweight and Obesity. It surveyed 8,000 students in Term 1 of 2004 and collected information on children's sociodemographics, physical activity, nutrition, dieting and weight loss beliefs, and perceptions of aspects of the social and physical environments relevant to physical activity participation and food consumption. Direct measurements (for example, height and weight) cardiorespiratory endurance, and fundamental movement skill proficiency were also measured.

APPENDIX 3: AUSTRALIAN ALCOHOL GUIDELINES

Risk of alcohol-related harm in the long term

Sex/period	Low risk (standard drinks)	Risky (standard drinks)	High Risk (standard drinks)
Males			
On an average day	Up to 4 per day	5 to 6 per day	7 or more per day
Overall weekly level	Up to 28 per week	29 to 42 per week	43 or more per week
Females			
On an average day	Up to 2 per day	3 to 4 per day	5 or more per day
Overall weekly level	Up to 14 per week	15 to 28 per week	29 or more per week

Source: NHMRC 2001.

Risk of alcohol-related harm in the short term

Sex/period	Low risk (standard drinks)	Risky (standard drinks)	High Risk (standard drinks)
Males			
(On any one day)	Up to 6 On any day, no more than 3 days per week	7 to 10 On any one day	11 or more On any one day
Females			
(On any one day)	Up to 4 On any day, no more than 3 days per week	5 to 6 On any one day	7 or more On any one day

Source: NHMRC 2001.



GLOSSARY

angina: Temporary chest pain or discomfort when the heart's own blood supply is inadequate to meet extra needs, as in exercise.

arthritis: Group of disorders in which there is inflammation of the joints which can become stiff, painful, swollen or deformed. The two main types of arthritis are *osteoarthritis* and *rheumatoid arthritis*.

asthma: Inflammatory disease of the air passages that makes them prone to narrow too easily and too much in response to 'triggers', causing episodes of shortness of breath and wheezing or coughing. The triggers include exercise, pollen, dust mites, cold weather, throat and chest infections, tobacco smoke and other factors.

atherosclerosis: Process that gradually clogs arteries, through fatty and fibre-like deposits building up on the inner walls of the arteries; can lead to *cardiovascular disease*.

atrial fibrillation: Disorder of heart rate and rhythm in which the upper heart chambers (atria) are stimulated to contract in a very rapid and/or disorganised manner.

blood cholesterol: Fatty substance produced by the liver and carried by the blood to supply the rest of the body. Its normal function is to provide material for cell walls and for steroid hormones, but if levels in the blood are too high it can lead to *atherosclerosis*.

blood pressure: Force exerted by blood against the walls of the arteries. The force is created by the pumping action of the heart, at contraction (systolic) and at relaxation (diastolic).

body mass index (BMI): Commonly used method of assessing whether a person is a healthy weight for his or her height. Calculated by dividing the person's weight (in kilograms) by their height (in metres) squared, that is, kg/m².

bronchitis: Respiratory disease in which the membranes of the bronchi (main air passages in the lungs) are irritated and inflamed. This causes the tiny airways in the lungs to narrow or shut off, resulting in coughing spells accompanied by thick phlegm and breathlessness.

cardiovascular disease: Any disease of the heart or blood vessels, including *heart attack*, *angina*, *stroke* and *peripheral vascular disease*.

cause of death: The disease or factor contributing to the death. When used technically, this term is usually applied to the 'underlying cause' listed on the medical certificate issued at death. The *underlying cause of death* is defined as the main disease that initiated the train of events leading directly to death, as distinct from *associated causes of death* which are conditions, diseases or injuries that contributed to the death, directly or indirectly.

cerebrovascular disease: Group of disorders of the blood vessels supplying the brain or its covering membranes. A major form is stroke, in which a vessel is either blocked or bleeds, causing part of the brain to be deprived of oxygen. This can result in paralysis or loss of other bodily functions.

chronic bronchitis: Long-term condition with inflammation of the bronchi, the main air passages of the lungs, causing frequent coughing attacks and coughing up of mucus.

chronic disease: Term applied to a diverse group of diseases that tend to be long-lasting and persistent in their symptoms or development. Although these features apply to some infectious (communicable) diseases, the term is usually confined to non-communicable diseases.

chronic obstructive pulmonary disease (COPD): A progressive disease of the lungs and airways resulting in worsening shortness of breath on exertion. The main underlying disease process is *emphysema*, and this is normally coupled with *chronic bronchitis*.

comorbidity: The existence of two or more health problems at the same time in one person.

complications: Secondary condition or illness resulting directly or indirectly from another disease (or its treatment).

coronary heart disease (CHD): *Heart attack* and *angina* (chest pain). Also known as *ischaemic heart disease*.

dementia: General and worsening loss of brain functions such as memory, understanding and reasoning.

dental caries: Tooth decay.

depression: Mood disorder with prolonged feelings of hopelessness and being sad, low and inadequate, with a loss of interest or pleasure in activities and often with suicidal thoughts or self-blame.

dialysis: Method of removing excess waste substances from the blood when the kidneys are unable to work effectively.

diphtheria: Bacterial infection that usually starts with soreness of the throat and tonsils but which can also affect other parts of the body and become severe enough to block breathing. It is preventable by vaccine.

disability: Multidimensioned concept relating to impairment in body structure or function, limitation in activities (such as mobility), restriction in participation (such as work or education), and the affected person's environment.

eczema: Common, typically long-term, skin condition marked by an itchy rash and often found among people with allergies.

emphysema: Chronic lung disease where overexpansion or destruction of the lung tissue blocks oxygen intake, leading to shortness of breath and other problems.

encounter (general practitioner): Any professional interchange between a patient and a general practitioner.

gestational diabetes: Diabetes which is first diagnosed during pregnancy (gestation). It may disappear after pregnancy but signals a high risk of diabetes occurring later on.



glomerulonephritis: Inflammation in the primary filtration units of the kidney (the glomeruli); frequently follows infections, especially those of the skin and upper respiratory tract caused by particular strains of bacteria.

glucose: Main sugar the body uses for energy. Glucose comes from the breakdown of carbohydrates in the diet as well as from the breakdown of glycogen (the storage form of glucose) in the liver.

HDL cholesterol: Cholesterol packaged in high-density lipoprotein particles.

health risk factor: Any factor that represents a greater risk of a health disorder or other unwanted condition. Some risk factors are regarded as causes of disease, others are regarded as mere contributors.

heart attack: Life-threatening emergency that occurs when a vessel supplying blood to the heart muscle is suddenly blocked completely. The event may lead to the death of a part of the heart muscle. The medical term commonly used for a heart attack is myocardial infarction.

heart failure: When the heart cannot pump strongly enough to keep the blood circulating around the body at an adequate rate.

hepatitis: Inflammation of the liver, which can be due to certain viral infections, excess alcohol, or a range of other causes.

Hib (Haemophilus influenzae type b): Bacterial infection of infants and children that can cause meningitis, pneumonia and other serious effects. It is preventable by vaccine.

hospital separation: Formal process by which a hospital records the completion of treatment and/or care for an admitted patient. The episode of care may be completed by the patient's discharge, death, transfer to another hospital, or change in type of care.

hypertensive disease: Long-term high *blood pressure*; may damage the vessels of the heart, brain or kidneys.

immunisation: Inducing immunity against infection by the use of an antigen to stimulate the body to produce its own antibodies. See *vaccination*.

impairment: Any loss or abnormality of psychological, physiological or anatomical structure or function.

incidence: Number of new cases (of a disease, condition or event) occurring during a given period. Compare with *prevalence*.

indicator: Statistic chosen to describe (indicate) a situation concisely, help assess progress and performance, and act as a guide to decision making. It may have an indirect meaning as well as a direct one; for example, Australia's overall death rate is a direct measure of mortality but is often used as a major indicator of population health.

Indigenous: Person of Aboriginal and/or Torres Strait Islander descent who identifies as an Aboriginal and/or Torres Strait Islander and is accepted as such by the community with which he or she is associated.

inflammation: Local response to injury or infection, marked by local redness, heat, swelling and pain. Can also occur when there is no clear external cause and the body reacts against itself, as in auto-immune diseases.

insulin: Hormone produced in the pancreas that helps *glucose* to enter body cells for energy metabolism.

insulin resistance: Condition in which *insulin* works inefficiently and the body compensates by producing an excess supply.

International Classification of Diseases (ICD): Internationally accepted statistical classification of disease and injury, produced by the World Health Organization.

intervention (for health): Any action taken by society or an individual which 'steps in' (intervenes) to improve health, such as medical treatment and preventive campaigns.

ischaemic heart disease: See *coronary heart disease*.

life expectancy: Indication of how long a person can expect to live. Technically it is the number of years of life remaining to a person at a particular age if death rates do not change.

measles: Highly contagious infection, usually of children, that causes flu-like symptoms, fever, a typical rash and sometimes serious secondary problems such as brain damage. It is preventable by vaccine.

Medicare: A national, government-funded scheme that subsidises the cost of personal medical services for all Australians and aims at helping them afford medical care. Administrative data from the scheme are useful for analysing patterns of care.

metabolic syndrome (also called Syndrome X): Symptom cluster associated with a high risk of coronary heart disease and stroke. Central to metabolic syndrome is *insulin resistance*. Other common signs are impaired glucose tolerance, excessively high blood insulin levels, high blood pressure, abnormal blood cholesterol levels (specifically high levels of triglycerides and low levels of HDL cholesterol), increased uric acid, and excessive abdominal body fat.

morbidity: Term referring to ill health in an individual and to levels of ill health in a population or group.

mortality: Death.

mumps: Contagious viral disease marked by acute and painful swelling of the saliva-producing glands, often similarly affecting the testicles and sometimes other parts.

musculoskeletal: Relating to the muscles, joints and bones.

neoplasm: Abnormal ('neo', new) growth of tissue. Can be 'benign' (not a cancer) or 'malignant' (a cancer). Same as a *tumour*.

obesity: Increased adiposity or fat mass, associated with several chronic diseases and their risk factors. Typically defined as *body mass index* > 30, or waist circumference > 102 cm for males or > 88 cm for females.



ophthalmology: Medical specialty dealing with eye diseases.

osteoarthritis: Most common form of arthritis, associated with a breakdown of cartilage in joints and commonly occurs in the hips, knees and spine.

osteoporosis: Reduction in bone mass caused by the loss of calcium from the bones, making them weaker and thus more prone to fractures.

pathology: General term for the study of disease, but often used more specifically for diagnostic services which examine specimens, such as samples of blood or tissue.

periodontal: Refers to the supporting structures of the teeth, including the gums, connective tissue and bone.

peripheral vascular disease: Pain in the legs because of an inadequate blood supply to them.

pertussis (whooping cough): Highly infectious bacterial disease of the air passages marked by explosive fits of coughing and often a whooping sound on breathing in. It is preventable by vaccine.

poliomyelitis (polio): Disease involving muscle paralysis, wasting and deformity of limbs after infection by a common virus (poliovirus) that can damage the so-called motor nerves in the spinal cord. It is preventable by vaccine.

polyps: Projecting growths from a mucous surface such as the inside of the bowel; may be benign (non-cancerous) or able to develop into a cancerous growth.

prevalence: Number or proportion (of cases, instances, etc.) present in a population at a given time. Compare with *incidence*.

prevention (of disease): Action to reduce or eliminate the onset, causes, complications or recurrence of disease.

primary prevention: Limiting the incidence of disease and disability in the population by actions that eliminate or reduce causes or determinants of departures from good health, control exposure to risk and promote factors that are protective of health.

principal diagnosis: Diagnosis established after study to be chiefly responsible for occasioning the patient's episode of care in hospital (or attendance at the health care facility).

quintile: Group derived by ranking the population according to specified criteria and dividing it into five equal parts.

rheumatoid arthritis: Chronic inflammatory disease where the person's immune system attacks his or her own body tissues (an auto-immune condition) causing destruction of the joints.

risk factor: See *health risk factor*.

rubella (German measles): Contagious viral disease of children and young adults which has mild symptoms but which often causes serious birth defects if it occurs in a mother during the first three months of pregnancy. It is preventable by vaccine.

secondary prevention: Reducing progression of disease through early detection, usually by screening at an asymptomatic stage, and early intervention.

separation: See *hospital separation*.

stroke: Major form of *cerebrovascular disease* in which an artery supplying blood to the brain suddenly becomes blocked or bleeds, often causing paralysis of parts of the body or speech problems.

suicide: Deliberately ending one's own life.

symptom: Any indication of a disorder that is apparent to the person affected; compare with 'sign', which is apparent to an observer.

tertiary prevention: Improving functioning and minimising the impact of established disease — and preventing or delaying complications — through effective management and rehabilitation.

tetanus: Serious infection with a bacterial nerve poison causing spasm of the jaw muscles (lockjaw) and body muscles generally, from a bacterium entering through a wound. The disease is preventable by vaccine.

triglycerides: Hydrophobic, neutral lipid, packaged with proteins and cholesterol in various lipoprotein particles.

Type 1 diabetes: Form of diabetes usually arising in childhood or youth ('juvenile onset'), marked by a complete lack of insulin and needing insulin replacement for survival.

Type 2 diabetes: Most common form of diabetes, occurring mostly in people aged 40 years and over and marked by reduced production or less effective use of insulin.

underlying cause of death: Main disease or injury initiating the sequence of events leading directly to death. See *cause of death*.

uric acid: Substance present in small amounts in human urine, and also found in the joints in gout.

vaccination: Process of administering a vaccine to a person to produce immunity against infection. See *immunisation*.



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