



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.

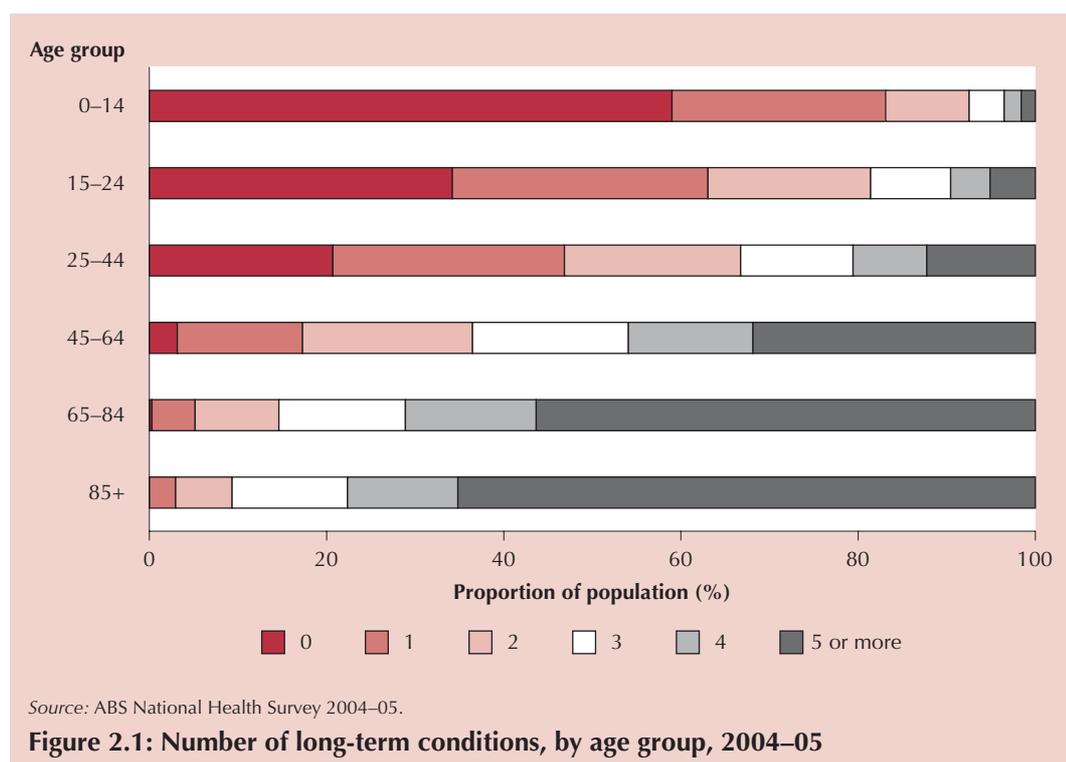


Statistics presented in this chapter show that, although major chronic diseases may affect people at all ages, their impact is generally greatest among the older age groups. An important point to consider throughout the chapter is the possibility that what may be, in part, age-related effects may simply 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.

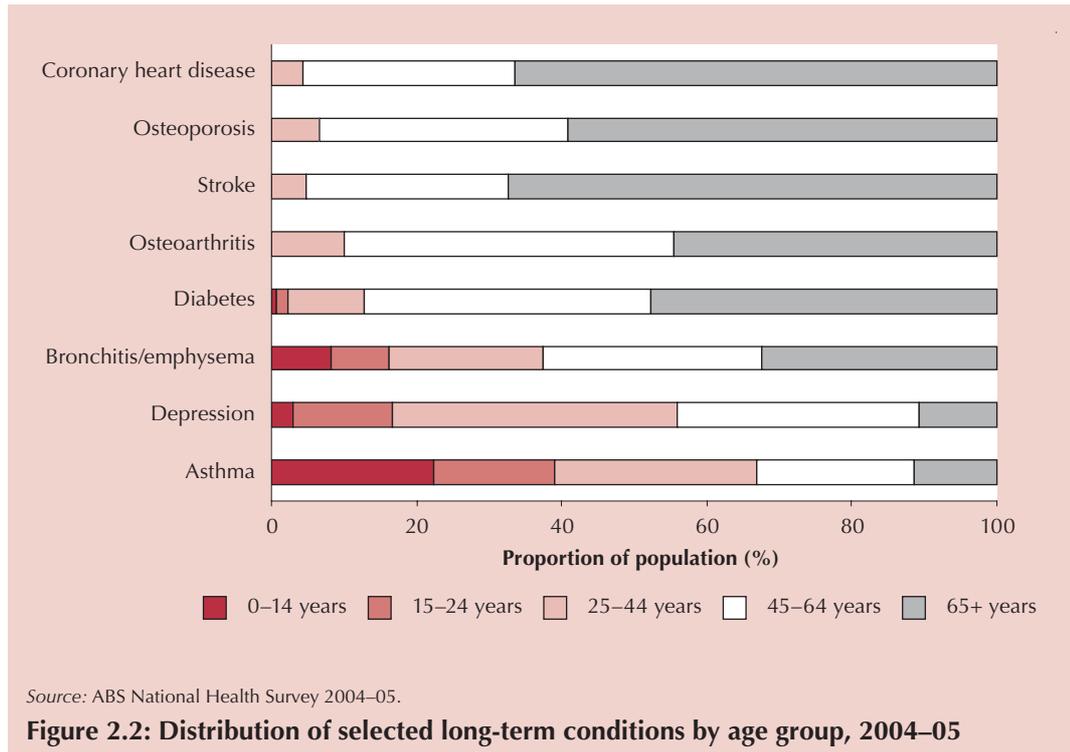
Prevalence of chronic diseases across the life course

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

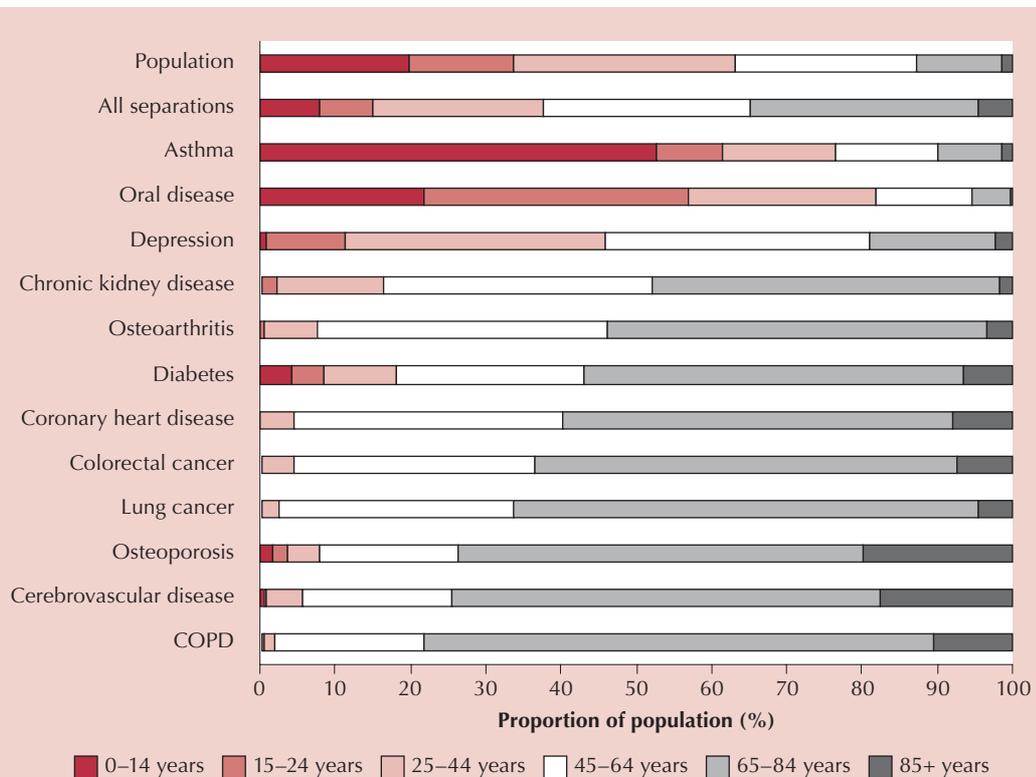
Disease	Number of separations	Average age at separation (years)
Chronic kidney disease	784,926	60.7
Coronary heart disease	164,225	67.3
Oral disease	128,235	27.8
Depression	80,111	47.6
Osteoarthritis	70,702	64.5
Diabetes	60,281	62.0
Chronic obstructive pulmonary disease ^(a)	54,281	72.1
Cerebrovascular 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.

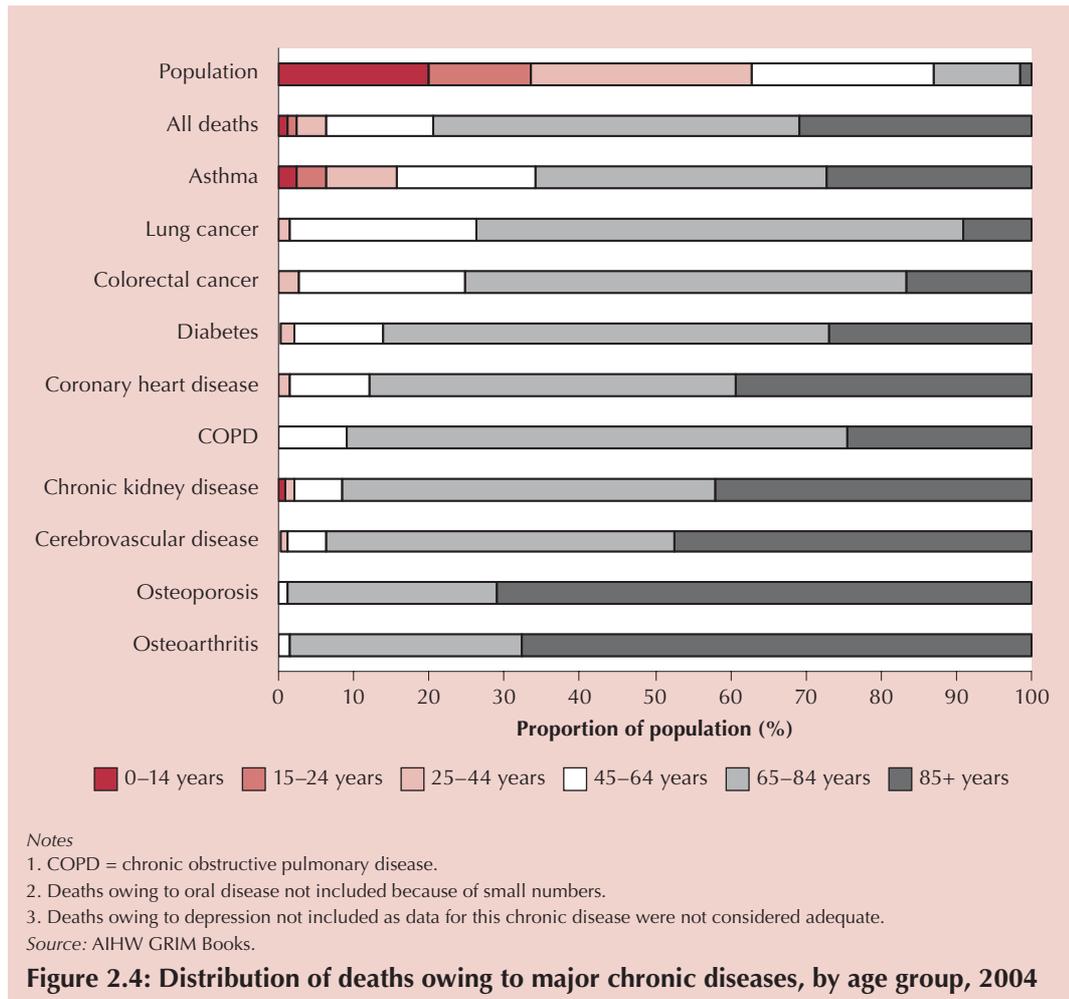
Source: AIHW GRIM Books.

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.*