

The widespread reductions in death rates, especially for persons in older age groups, hail significant increases in life expectancy at all ages. For example, life expectancy at birth across all OECD countries increased by 8.7 years between 1960 and 2000, from 68.5 to 77.2 years. Premature mortality (that is, death before age 70) has fallen by half in OECD countries since the early 1960s, assisted by the downward trend in infant mortality and declines in deaths from heart disease. Only modest reductions in premature mortality have occurred in some Central and Eastern European countries, due to persistently high mortality from cardiovascular disease and liver disease, particularly cirrhosis. These slow trends reflect continuing higher rates of tobacco and alcohol consumption by males in these countries. In comparison, high rates of premature mortality in the United States are due to deaths from external causes, such as accidents, suicide and homicide (OECD 2003b).

## 2.6 Non-communicable diseases

The bulk of ill health, disability and premature death in Australia today arises from non-communicable diseases. Prominent among these are cardiovascular diseases, cancers, mental problems and disorders, diabetes, asthma, arthritis, nervous system disorders and kidney diseases. Most of these diseases are chronic (long-term) in nature.

The non-communicable diseases vary considerably in the nature and extent of their community impact. While some diseases are large contributors to premature mortality, others contribute more to disability. Illness associated with these diseases also varies considerably, and the intermittent nature of several diseases makes it somewhat difficult to assess their full impact.

Surveillance and monitoring of diseases has traditionally been disease-specific. Although this approach does not enable an integrated account of these diseases and their risk factors, it persists in light of available data sources.

To generate profiles of individual non-communicable diseases, information has been extracted from a variety of sources, in particular from mortality and hospitalisation data sets, population surveys and other health-related collections. The varying emphasis in the choice and use of information depends upon the nature and progression of the disease. State-based information has been used where national data are not available.

A summary statistic, disability-adjusted life year (DALY), has also been used to describe the burden of disease associated with each major disorder. The DALY statistic takes into account premature mortality caused by a disease, the amount of disability it causes, and its prevalence. DALY is a measure of the years of healthy life lost due to illness or injury – one DALY is one year of ‘healthy’ life lost. It is a combination of years of life lost due to premature mortality (YLL) and the equivalent years of ‘healthy’ life lost due to poor health or disability (YLD). The AIHW estimated that the total burden of disease and injury in Australia in 1996 was 2.5 million DALYs, 54% of which were YLL and 46% YLD.

Some of the non-communicable diseases covered in this section receive special attention under the National Health Priority Areas initiative (see the Appendix). The priority areas covered in this section relate to cardiovascular health, cancer control, mental health, diabetes, asthma, and arthritis and musculoskeletal conditions. Several other diseases covered in this section are also significant contributors to the burden of disease in Australia.

Much of the burden of non-communicable diseases is avoidable because several different factors that contribute to their development and progression are highly preventable. It is therefore important that information is also provided on the underlying risk factors for non-communicable diseases. Detailed information on a range of these risk factors is given in Chapter 3. Further information about the impact of non-communicable diseases on different population groups may be found in Chapter 4.

## Cardiovascular disease

The term ‘cardiovascular disease’ (also known as ‘circulatory disease’ or ‘heart, stroke and vascular diseases’) covers all diseases and conditions of the heart and blood vessels. Coronary heart disease (CHD), stroke, heart failure and peripheral vascular disease are major contributors to the disease burden among adults. Congenital heart and vascular diseases constitute one of the leading causes of death in the first year of life. Rheumatic fever and chronic rheumatic heart disease are additional major conditions among Aboriginal and Torres Strait Islander peoples.

The main underlying causal mechanism in cardiovascular disease is atherosclerosis, a process marked by abnormal build-ups of fat, cholesterol and other substances in the inner lining of the arteries. It is most serious when it affects the blood supply to the heart (causing angina or heart attack) or to the brain (causing a stroke).

The major, preventable risk factors for cardiovascular disease are tobacco smoking, high blood pressure, high blood cholesterol, insufficient physical activity, overweight and obesity, poor nutrition and diabetes. Atrial fibrillation, transient ischaemic attack and a high intake of alcohol also increase the risk of stroke.

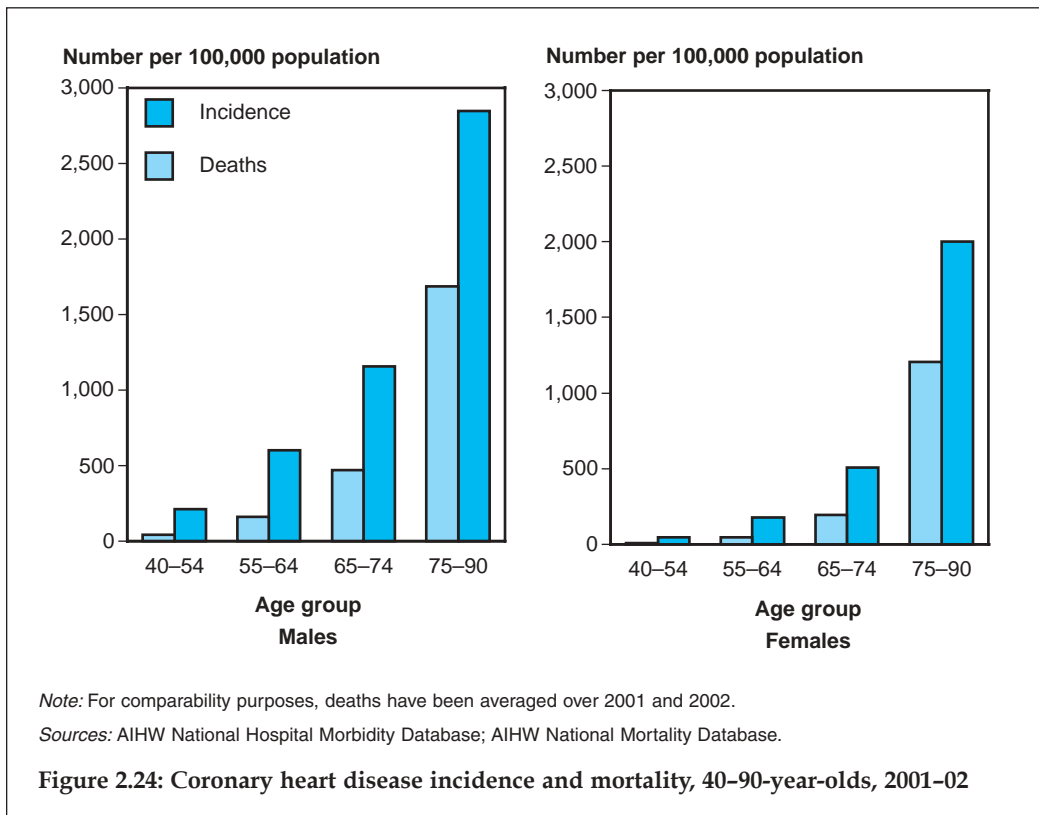
Cardiovascular problems include conditions such as high blood pressure and high blood cholesterol as well as the diseases mentioned above. Together they constitute Australia’s leading health issue. About 19.4% of the 2001 National Health Survey respondents, corresponding to 3.7 million Australians, reported cardiovascular problems. They are also one of the leading causes of disability, with around 1.1 million Australians affected by one or more disabling conditions attributed to these problems. Cardiovascular diseases accounted for 50,294 deaths in 2002.

### Coronary heart disease

CHD, also known as ischaemic heart disease, is the most common form of heart disease. There are two major clinical forms, heart attack (acute myocardial infarction) and angina. (For further descriptions of atherosclerosis, angina and heart attack, see Glossary.)

In the 2001 National Health Survey, 1.9% of respondents indicated they had CHD, which corresponds to around 355,600 Australians affected. Around three-quarters of this group reported experiencing angina, and around one-third reported having had a heart attack. Based on these self-reports, CHD prevalence was higher among males than females: 2.4% and 1.6%, respectively. Its prevalence increases rapidly with age, from around 4% among 55–64-year-olds to 8% in 65–74-year-olds, and rising to 13% among those aged 75 and over. Almost two-thirds of those reporting CHD were aged 65 and over.

It is difficult to estimate the incidence of coronary heart disease. However, Jamrozik et al. (2001) have developed a method for determining the incidence from mortality and non-fatal hospitalisation episodes. Using this method, about 48,700 coronary events (either heart attack or unstable angina) are estimated to have occurred in Australia in 2001–02 among 40–90-year-olds. Slightly less than one-half of these events (22,400 cases) proved fatal. The estimated incidence among males was twice the rate among females (Figure 2.24).



The estimated incidence of coronary events has declined considerably over the last several years, falling by around a quarter between 1993–94 and 2001–02. The proportion of fatal events is also on the decline.

In the 1998 Disability, Ageing and Carers Survey, 1.2% of the respondents reported one or more disabling conditions associated with CHD. This corresponds to about 224,400 Australians. Of these, 59% needed assistance or had difficulties with self-care, mobility or communication, and another 31% had no difficulty with these activities but used aids or equipment because of their disability.

CHD is the largest single cause of death in Australia, accounting for 26,063 deaths (19% of all deaths) in 2002. Acute myocardial infarction (heart attack) accounted for 55% of these deaths. CHD deaths increase in frequency dramatically with age, with

around 72% of all these deaths occurring among those aged 75 and over, compared with around 5% among those aged under 55. The male death rate in 2002 was almost twice as high as the female rate.

## **Stroke**

Stroke (cerebrovascular disease) occurs when a blood vessel to the brain is suddenly blocked or bleeds. This may result in part of the brain dying due to the lack of blood, leading to a loss of brain function or impairment in any or all of a range of activities including movement, vision, planning, communication and swallowing. Blockage is the most common cause of stroke and there can also be temporary strokes (where symptoms disappear within 24 hours) known as transient ischaemic attacks.

An estimated 1% of respondents to the 2001 National Health Survey, corresponding to about 217,500 Australians, reported that they had had a stroke sometime in their lives. The prevalence was higher among males than females: 1.4% versus 1.0%. Less than one out of five who reported a stroke was younger than 55.

An estimated 40,000 to 48,000 stroke events occur in Australia every year—one every 11–13 minutes. The majority of these, around 70%, are first-ever strokes (AIHW 2004). More females than males have a stroke; however, the age-standardised incidence is higher among males as they tend to have a stroke at younger ages.

Stroke is a large cause of disability. Based on self-reports from the 1998 Disability, Ageing and Carers Survey, 1.2% of respondents (corresponding to 230,300 Australians affected) had one or more disabling conditions associated with stroke. Over three-quarters of these persons needed assistance or had difficulties with self-care, mobility or communication; another 19% had no difficulties with these activities but used aids or equipment. People disabled by a stroke are twice as likely to need ongoing assistance with these activities in comparison to those whose disability is caused by CHD (42% compared with 22% in 1998).

Stroke accounted for 12,533 deaths (9% of all deaths) in 2002. Most of the stroke deaths (82%) occur among those aged 75 and over. More females than males (7,564 compared with 4,969) died of stroke. However, the age-standardised death rate was slightly higher among males, reflecting high fatality among males in younger age groups.

## **Heart failure**

Heart failure occurs when the heart functions less effectively in pumping blood around the body. It can result from a variety of diseases and conditions that impair or overload the heart, notably heart attack, high blood pressure or a damaged heart valve. People with mild heart failure may have few symptoms but in more severe cases it can result in chronic tiredness, reduced capacity to undertake physical activity and shortness of breath.

There are no national data on the incidence or prevalence of heart failure in Australia. Based on overseas findings, however, it is estimated that at least 300,000 Australians aged 45 and over have some degree of chronic heart failure (about 4% of the population), with around 30,000 new cases diagnosed each year (AIHW: Field 2003).

Heart failure accounted for 2,729 deaths in 2002, with 90% of these occurring among people aged 75 and over. More females than males (1,696 compared with 1,033) died of heart failure, but the death rate among males was higher than in females in the younger age groups. Heart failure is more likely to be listed on death certificates as an associated cause of death than as the underlying cause. It is listed more frequently as an associated cause when the underlying cause of death is renal failure (29% of deaths), CHD (24%), diabetes (19%) or chronic lower respiratory disease (17%).

### Acute rheumatic fever and chronic rheumatic heart disease

Acute rheumatic fever is a delayed complication of untreated throat infection with Group A streptococcus bacteria, but may also follow streptococcal skin sores. The condition frequently includes fever, joint pain and swelling, and skin rashes. The infection and illness occur mainly in children and young adults, and may affect the heart valves, the heart muscle and its lining (leading to rheumatic heart disease), the joints and the brain. Recurrences of rheumatic fever may lead to cumulative heart damage but can be prevented by strict follow-up.

Indigenous Australians have one of the highest levels of rheumatic fever and rheumatic heart disease in the world (AIHW: Field forthcoming). Two registers of people with known or suspected cases of rheumatic fever and rheumatic heart disease operate in the Top End of the Northern Territory and in Central Australia to capture the nature and extent of the problem.

In 2002, there were 58 registrations of people with acute rheumatic fever in the Top End of the Northern Territory and 27 in Central Australia – all Aboriginal and Torres Strait Islander peoples. In the Top End, most of the cases (83%) required hospitalisation and 35% were recurrences; in Central Australia 30% were recurrences. Children aged 5–14 accounted for around 55% of all cases of acute rheumatic fever (Table 2.19).

On the two registers in 2002, there were 696 people with chronic rheumatic heart disease in the Top End of the Northern Territory and 283 people in Central Australia. Almost all (92–94%) of these were Aboriginal or Torres Strait Islander peoples. In the Top End of the Northern Territory, 92% of those registered with the disease were aged 15 and over; in Central Australia over two-thirds of cases occurred in the 15–44 age group.

Acute rheumatic fever and chronic rheumatic heart disease accounted for 274 deaths in 2002. The death rate was almost twice as high among females as in males. Around 73% of deaths occurred in those aged 65 and above.

**Table 2.19: Incidence of acute rheumatic fever and prevalence of chronic rheumatic heart disease, selected regions, 2002**

Region	Acute rheumatic fever (5–14-year-olds)		Chronic rheumatic heart disease (all ages)	
	Incidence	Incidence rate (per 100,000 population)	Number	Prevalence rate (per 100,000 population)
Top End of the Northern Territory	32	346	696	17
Central Australia	15	365	283	13

Sources: Top End Rheumatic Heart Disease Register and Central Australian Rheumatic Heart Disease Register.

## Health service use

The treatment and care of people with cardiovascular disease covers a variety of settings and phases of care. This section presents data on primary care provided by GPs and on hospitalisation for cardiovascular disease.

### GP visits

Cardiovascular diseases and conditions constitute one of the most common problems treated by GPs, accounting for 11% of all problems seen in general practice in 2002–03 (AIHW: Britt et al. 2003). Overall, GPs managed cardiovascular problems at 16 per 100 encounters. High blood pressure was the most frequently managed problem, at a rate of 8.9 per 100 encounters, accounting for over half of all cardiovascular problems managed. Lipid disorders (abnormal levels of cholesterol or related substances in the blood) were managed at a rate of 3.0 per 100 encounters. Other relatively common cardiovascular problems managed by GPs were CHD, cardiac check-ups, heart failure, and atrial fibrillation or flutter. For 62% of encounters for cardiovascular problems, at least one medication was prescribed, advised or given in 1998–00. At least one non-pharmacological treatment (mainly advice and counselling) was also provided by GPs in 16% of these encounters.

### Hospitalisation

Cardiovascular disease was the principal diagnosis for 441,002 hospital separations (7% of all separations) in 2001–02. Of these, 36% were due to CHD, 12% to heart rhythm disorders, 9% to heart failure, 9% to stroke, 6% to peripheral vascular disease and 0.5% due to acute rheumatic fever and chronic rheumatic heart diseases. When both principal and additional diagnoses were considered, cardiovascular disease was listed in 10% of all hospital separations.

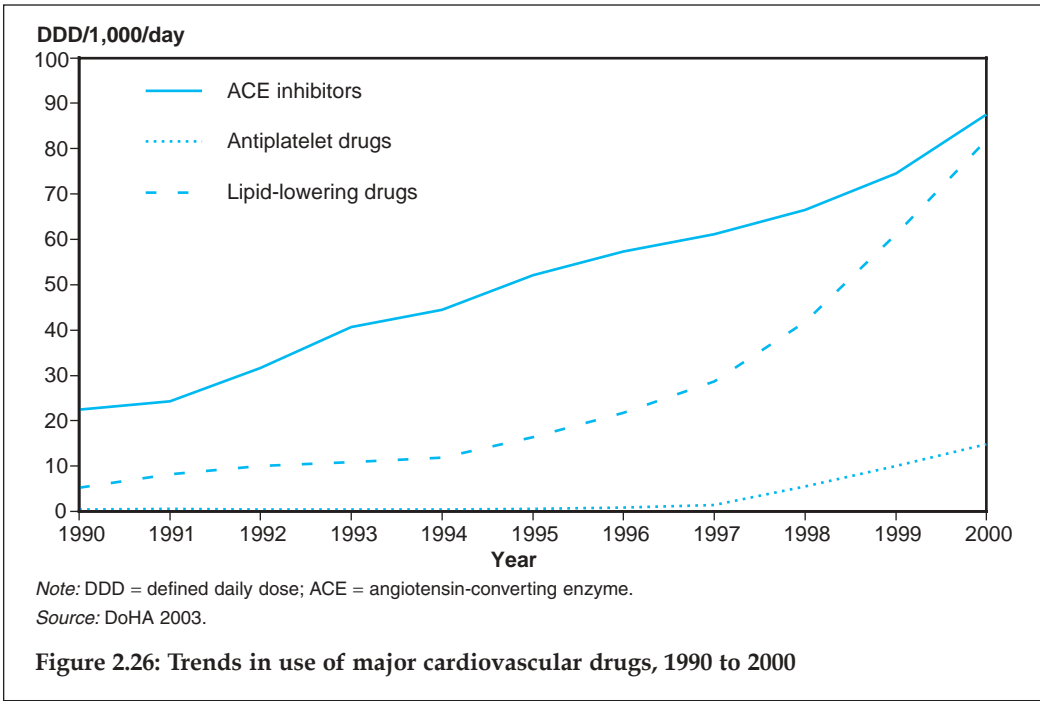
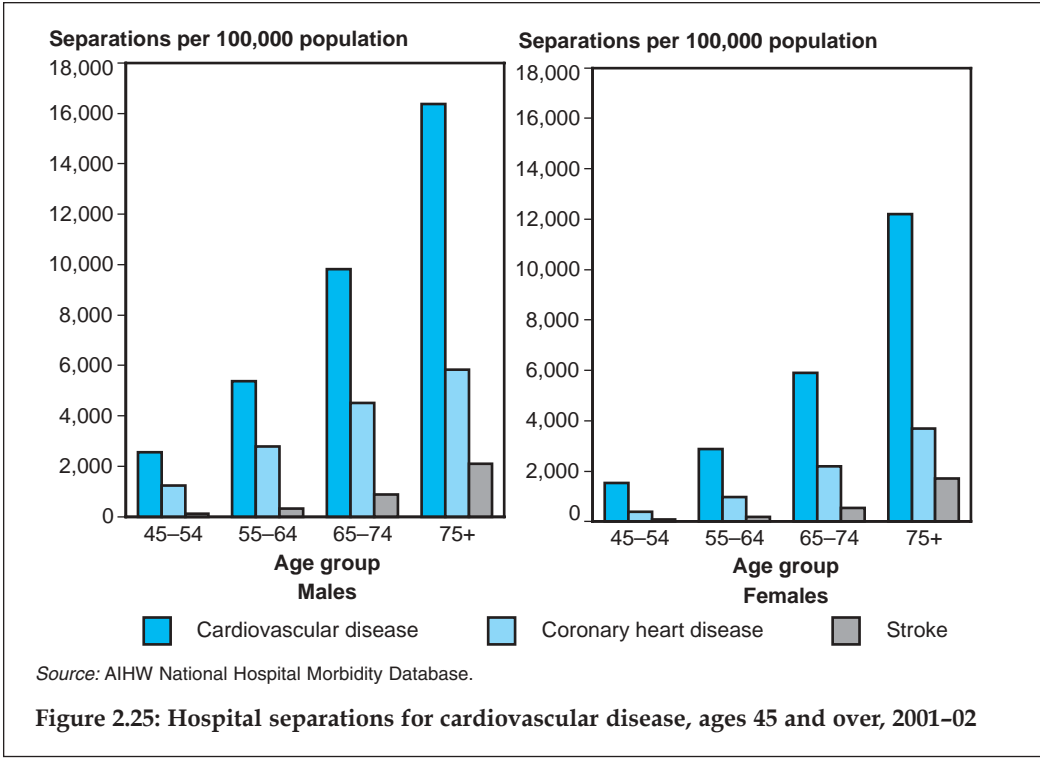
Males were more likely to be hospitalised for cardiovascular disease than females, with male CHD and peripheral vascular disease separation rates being twice as high. Hospitalisation for cardiovascular disease increases rapidly with age, with those aged 55 and above accounting for 77% of separations (Figure 2.25).

For those hospitalised for at least one night in 2001–02, the average length of stay was 8.1 days, a substantial reduction from 9.8 days in 1993–94. The average length of stay for stroke, peripheral vascular disease, rheumatic fever and rheumatic heart disease was at least twice as long as that for CHD. Females had a longer average length of stay than males.

## Treatment and procedures

### Drug treatment

The range and quality of drugs available for preventing or treating cardiovascular disease have improved considerably over the last 10 to 15 years. The use of blood cholesterol-lowering drugs almost quadrupled between 1996 and 2000, and they are now one of the most widely dispensed drug types. Similarly, angiotensin-converting enzyme (ACE) inhibitors, used to treat people with high blood pressure or heart failure, have become one of the most popular classes of blood pressure-lowering drugs. Their use has increased steadily, by 53% over the same period. The use of antiplatelet drugs such as aspirin, which reduce the formation of blood clots, has also risen markedly (Figure 2.26).





The cardiovascular health of Australians has improved considerably in recent years with substantial and continuing falls in death rates, reduction in the levels of certain risk factors, and major advances in treatment and care. Much of existing cardiovascular disease is potentially preventable through changes in physical activity, tobacco smoking, overweight and obesity, nutrition and alcohol consumption (see Chapter 3 for further discussion).

## Cardiovascular disease burden

Cardiovascular disease was estimated to account for 22% of the disease burden in Australia in 1996, 33% of years of life lost due to premature mortality and 9% of years of 'healthy' life lost due to poor health or disability (AIHW: Mathers et al. 1999).

## Cancer

Cancer is a diverse group of diseases in which some of the body's cells become defective, begin to multiply out of control, can invade and damage the tissue around them, and may also spread (metastasise) to other parts of the body to cause further damage. This section describes the incidence and mortality of cancer in Australia, discusses some of the risk factors for developing cancer, and describes the ages at which cancer is commonly diagnosed. Some international comparisons of cancer incidence and mortality are also provided.

### Incidence

Information on new cases of cancer is collected by state and territory cancer registries, and compiled by the National Cancer Statistics Clearing House (see Box 2.5). Data for cancer incidence are currently available to the year 2000 and mortality data to 2002.

#### **Box 2.5: Cancer surveillance and monitoring in Australia**

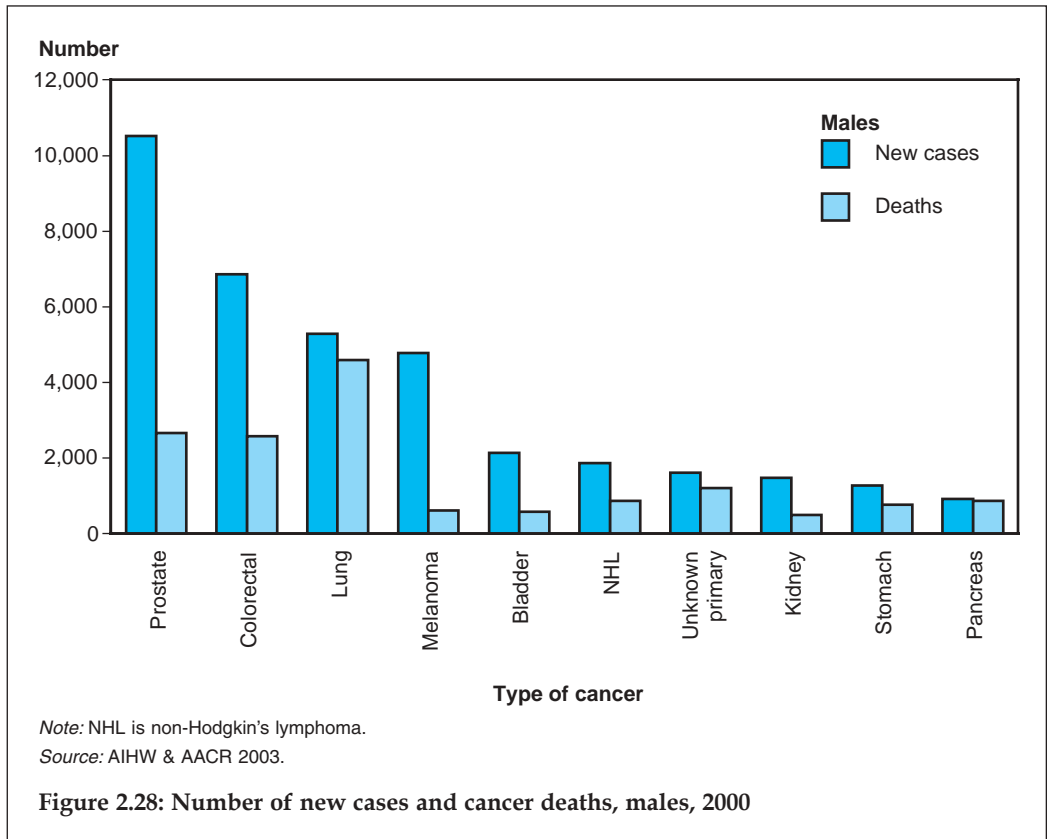
*The registration of cancer is required by law in each of the states and territories, usually under the Public Health Acts, where the data are collated by cancer registries. These registries collect clinical and demographic information about people with newly diagnosed cancer from hospitals, pathologists, radiation oncologists (cancer specialists), cancer treatment centres and nursing homes.*

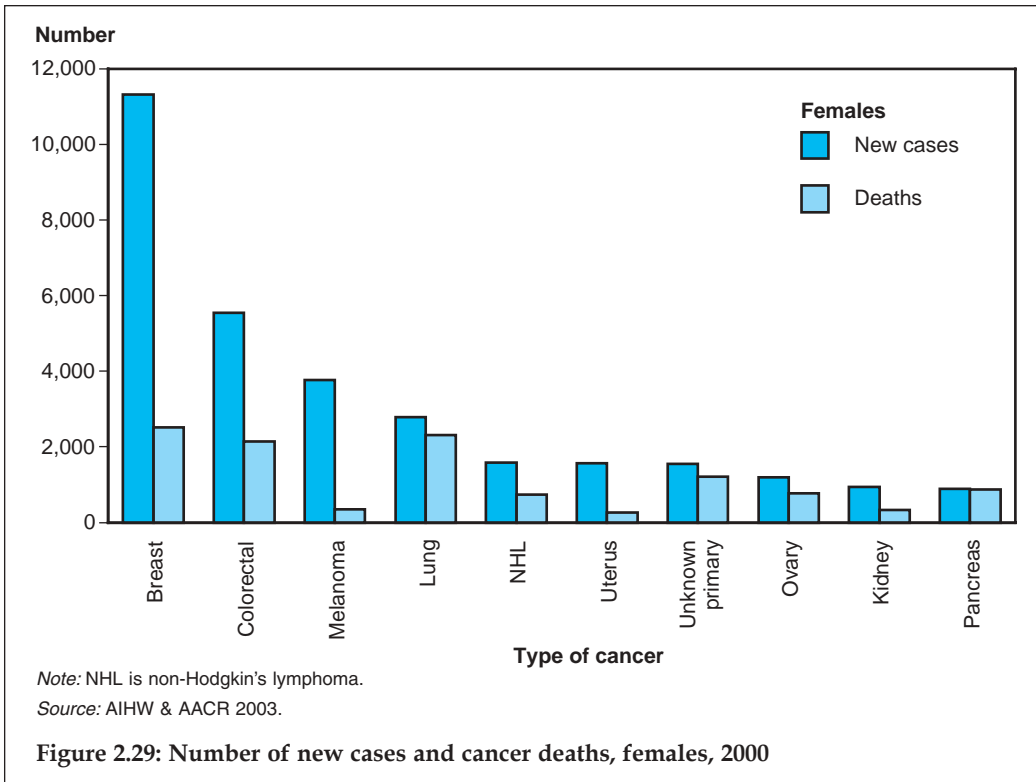
*Agreement was reached in 1990 for all state and territory cancer registries to supply records of all new cases of cancer from 1982 onwards, excluding non-melanoma skin cancer, to the National Cancer Statistics Clearing House (NCSCCH). The NCSCCH is operated by the AIHW under the supervision of the Australasian Association of Cancer Registries (AACR). Both the AIHW Act and Commonwealth privacy law provide for the protection of confidentiality of records supplied to the clearing house. In addition to generating national statistics, the NCSCCH enables data to be released to researchers after a strict scientific and ethical review process that involves the AACR Executive, the AIHW Ethics Committee, and state and territory cancer registries.*

It has been estimated that approximately 459,000 new cases of cancer were diagnosed in Australia in 2000, a large proportion of which, about 374,000, were non-melanoma skin cancers (NMSC). If treated early, NMSC are much less life-threatening than other cancers. Most of the registries in Australia do not keep details of NMSC as the cases are not confirmed by histology or are not reported; these skin cancers are often self-detected and usually removed in a doctor's surgery.

Excluding NMSC, there were 45,935 new cases of cancers in males and 39,296 in females, with age-standardised rates of 536 per 100,000 males and 297 per 100,000 females. If the current age-specific incidence continues to apply, then one in three male and one in four female Australians are expected to be diagnosed with cancer in the first 75 years of their life (AIHW & AACR 2003).

Prostate cancer was the most common registered cancer in males, with 10,512 cases diagnosed in 2000, followed by colorectal (bowel) cancer (6,863), lung cancer (5,278) and melanoma (4,770). Together, the four cancers accounted for 60% of all newly registered cancers in males (Figure 2.28). In females, breast cancer (11,314 cases) was the most commonly registered cancer in 2000, followed by colorectal cancer (5,542), melanoma (3,761) and lung cancer (2,782), these four again accounting for 60% of all newly registered cancers (Figure 2.29).





The incidence of all cancers combined (except NMSC) increased among males by an average of 4.4% per year between 1990 and 1994, and then declined by an average of 2.1% per year to 2000. Among females, the incidence increased by an annual average of 1.9% until 1995, and then fluctuated around that level through to 2000.

Cancers in males that increased in incidence between 1990 and 2000 include melanoma (2.4% per year on average), testis (2.3%), kidney (1.8%) and prostate (0.4%). The incidence of prostate cancer rose dramatically between 1990 and 1994, due mainly to increased detection by prostate-specific antigen testing, followed by a sharp fall until 1998, after which the incidence levelled off. Lung cancer, on the other hand, has declined in incidence since 1990, with an average annual decline of 1.9% for the period 1990 to 2000. Other cancers in males recording declines during that period were stomach (2.2% per year on average), unknown primary (2.0%) and pancreas (0.5%).

Among females, the cancers showing an increase in incidence between 1990 and 2000 were breast cancer (1.7% per year on average), non-Hodgkin's lymphoma (1.7%), and cancers of the lung (1.3%) and kidney (1.2%). On the other hand, cervical cancer (5.7% per year on average) and stomach cancer (3.2%) declined in incidence.

Changes in the incidence of cervical cancer can be attributed to the National Cervical Screening Program introduced in the early 1990s. This program has achieved detection and treatment of pre-cancerous cervical conditions in many women, reducing the numbers of those who go on to develop cancer.

## Age at first diagnosis of cancer

The average age of first diagnosis for cancer is 66 years in males and 64 years in females. However, cancer is not a disease of older ages only; 0.7% of all cancers occur in children aged under 15.

The average age of first diagnosis of cancer increased by one year in both sexes, from 65 to 66 years in males and from 63 to 64 years in females, during the decade 1990 to 2000. The corresponding median age at first diagnosis also increased from 67 to 69 years in males but stayed at 65 years in females.

New cases of cancer in Australia are increasing faster than projected from the underlying population growth. There was a 36% increase in new cases, compared with a 12% increase in the size of the Australian population, between 1990 and 2000. Much of this discrepancy is explained by the ageing of the population; screening and early diagnosis have also contributed to the increase.

In 2000, individual cancers showed much variation in the average age of first diagnosis, from 59 years for melanoma to 71 years for prostate among males, and from 53 years for cancer of the cervix to 74 years for cancer of the pancreas among females (Table 2.20).

**Table 2.20: Average age at first diagnosis, selected cancers, 1990 and 2000**

Cancer site	Males		Females	
	1990	2000	1990	2000
Cervix	..	..	50	53
Melanoma	56	59	54	56
Breast	66	66	60	60
Ovary	..	..	62	63
Uterus	..	..	65	64
Non-Hodgkin's lymphoma	60	62	64	66
Kidney	64	64	65	67
Lung	68	70	67	69
Colorectal	67	68	68	70
Stomach	68	69	71	70
Bladder	69	71	69	73
Pancreas	69	69	72	74
Unknown primary	68	70	71	74
Prostate	73	71	..	..
<b>All cancers<sup>(a)</sup></b>	<b>67</b>	<b>68</b>	<b>68</b>	<b>70</b>

.. Not applicable.

(a) Excludes non-melanoma skin cancer.

Source: National Cancer Statistics Clearing House.

## Mortality from cancer

In 2002, there were 21,041 male and 16,581 female deaths from cancer (by year of registration), with age-standardised rates of 241 per 100,000 males and 150 per 100,000 females. Lung cancer accounted for 22.0% of all cancer deaths among males, followed by prostate cancer (13.3%) and colorectal cancer (11.4%). Breast cancer (16.0%) was the leading cause of cancer deaths in females, followed by lung cancer (15.0%) and colorectal cancer (13.0%).

Older people now make up a higher proportion of those dying from cancer. In 1983, approximately 31% of all cancer deaths occurred in persons aged 75 and above, but by 2002 this proportion had increased to 47%.

Between 1992 and 2002, total cancer death rates declined among both males and females by an annual average of 1.4% and 0.7% respectively. These reductions may be attributed to improvements in earlier detection and treatment of many cancers, the effect of screening programs, and a decline in the prevalence of smoking. For cervical and breast cancers, the cancers for which there are national screening programs, the declines in average annual mortality in that period were 5.7% and 1.6% per year respectively.

### **Cancer as an additional cause of death**

The statistics above are based on data where cancer is recorded on death certificates as the underlying cause of death. However, the presence and development of cancer can also raise a person's risk of death from other causes.

A cancer was listed on 42,448 death certificates in 2002. Of these, it was the underlying cause in 37,622 (88.6%) deaths. In 4,826 deaths, the person had cancer but it was not the underlying cause of death. Cancer was listed as an additional cause of death most often with coronary heart disease, stroke and chronic obstructive pulmonary disease.

### **Risk factors for cancer**

Numerous factors increase a person's risk of cancer and statistics relating to two important causes are given below.

#### **Tobacco smoking**

Cigarette smoking is estimated to have directly caused 10,807 new cases of cancer (57.2 per 100,000 persons) and 7,650 deaths (40.5 per 100,000 persons) in 2000 (AIHW & AACR 2003). Cancers attributable to smoking are estimated to account for 16.8% of all new cases in males and 7.9% of all new cases in females. This difference is mainly due to higher rates of smoking among males over the last several decades.

Between 1990 and 2000, the incidence of smoking-related cancers among males fell by an annual average of 1.4%, while the rate among females rose by 0.7%. Over the same period, the death rate for these cancers fell among males (1.9% per year) but rose among females (2.9% per year).

If the 1990 death rates attributable to smoking were applied, there would have been an additional 2,093 male cancer deaths in 2000 due to smoking. This illustrates the reduction in cancer mortality achieved by the declines in tobacco smoking among males. In contrast, the cancer deaths attributable to smoking have increased among females since 1990; there would have been 498 fewer deaths in 2000 if the 1990 rates applied (AIHW & AACR 2003). These trends reflect the dominant position of lung cancer in smoking-related cancers, the decades-long time lag between the starting of smoking and the onset of lung cancer, and the fact that female smoking rates began declining after those in males.

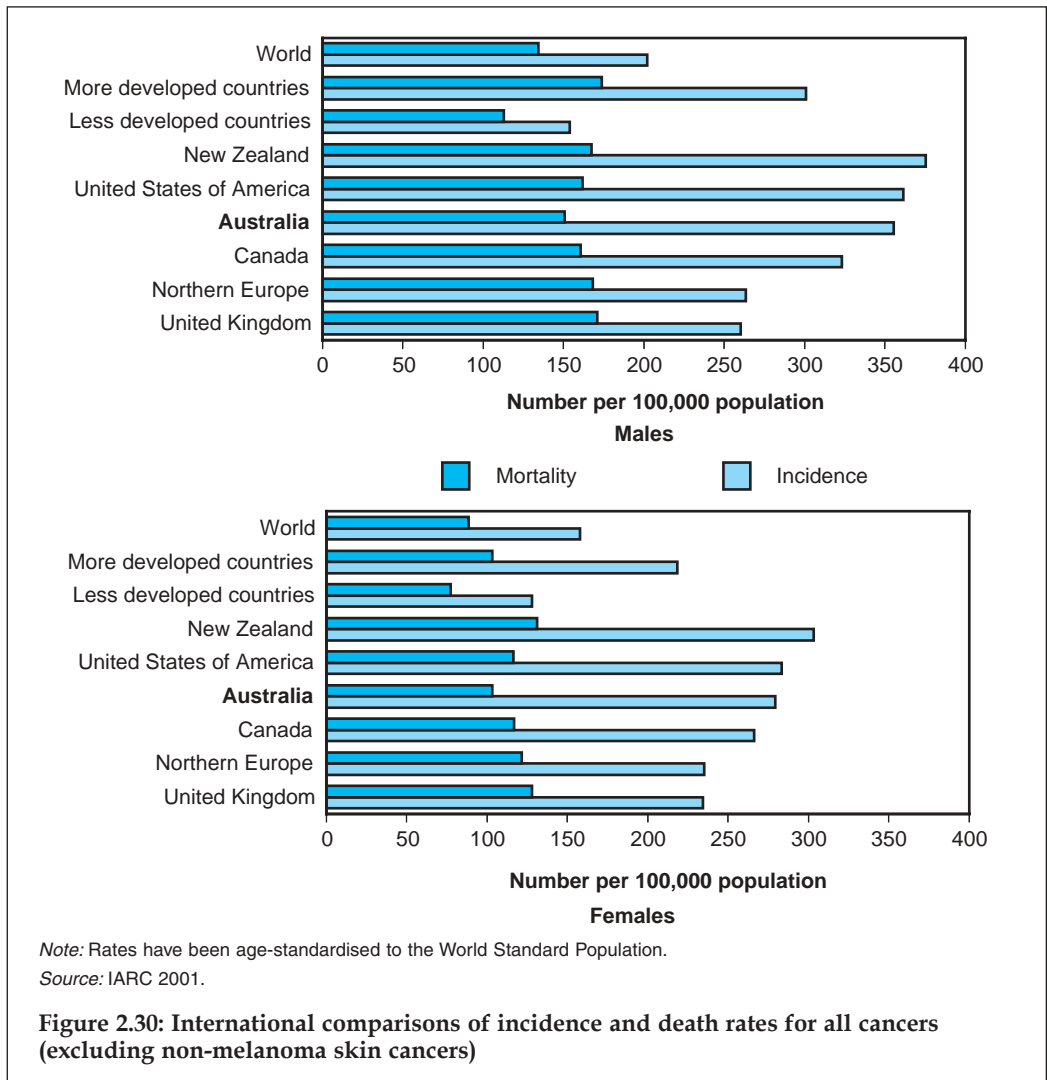
#### **Alcohol consumption**

Alcohol is another major factor in the development of certain forms of cancer. In 2000, 2,697 new cases of cancer were directly attributable to alcohol consumption, at a rate of 14.3 per 100,000 persons. Alcohol consumption was also responsible for 1,227 deaths, at

a rate of 6.5 per 100,000 persons. The lifetime risk of cancers attributable to alcohol is 1 in 94 for males and 1 in 76 for females. Between 1990 and 2000, the incidence of cancers attributable to alcohol consumption in females increased by an average of 1.5% per year, but the male rate decreased by an average of 0.2% per year.

### International comparisons

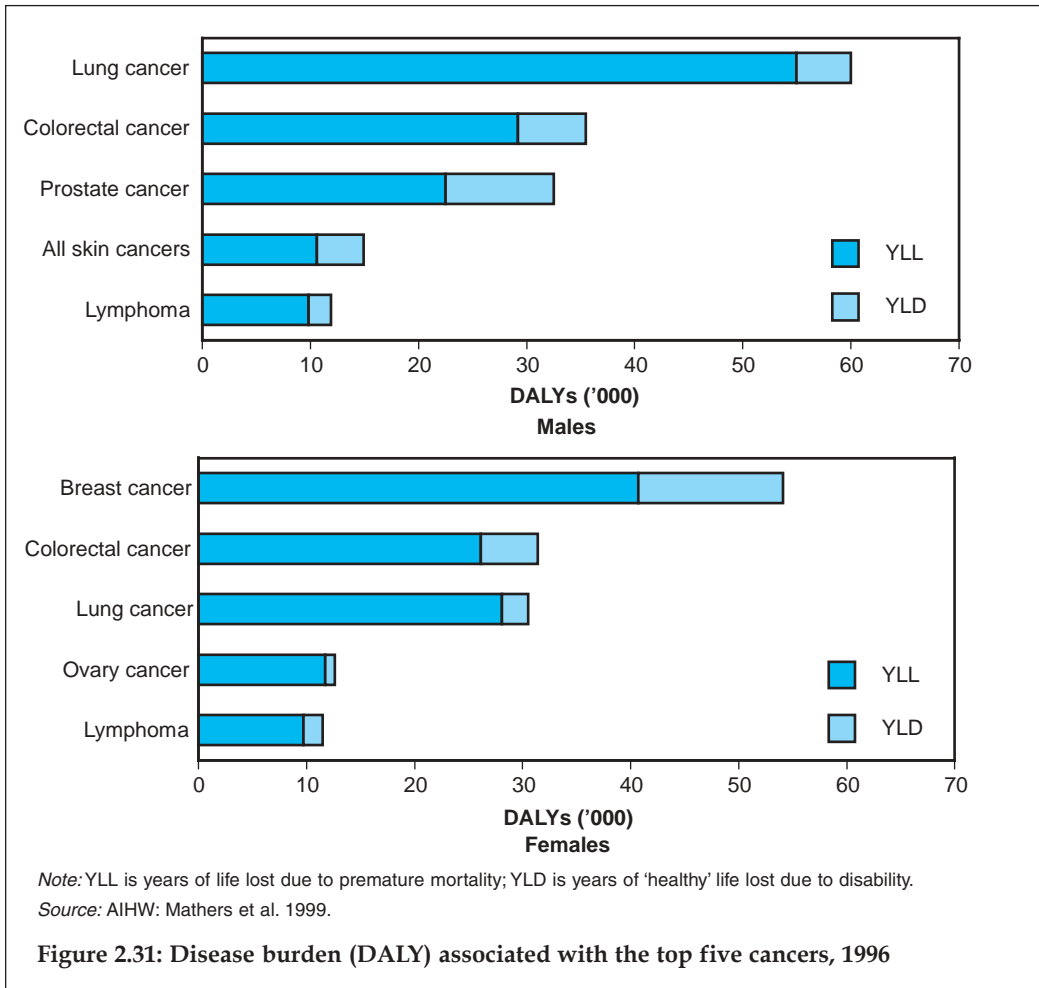
Australia has the fourth highest cancer incidence in males, behind Hungary, New Zealand and the United States of America; and in females, behind New Zealand, Denmark and the United States of America (IARC 2001). However, Australia’s cancer death rates rank lower than its incidence; Australia is 46th out of 173 countries for males and 58th for females. Figure 2.30 presents a comparison of Australian cancer incidence and death rates with selected regions and countries.



Australia has high incidences of some cancers by world standards. It has the highest incidence of melanoma among males and the second highest (after New Zealand) among females. The majority of these cases can be attributed to excessive exposure to the sun.

### Cancer burden

Cancers were estimated to account for 19% of the disease burden in Australia in 1996, 30% of years of life lost due to premature mortality (YLL) and 7% of years of ‘healthy’ life lost due to poor health or disability (YLD) (AIHW: Mathers et al. 1999). DALYs for the top five cancers in 1996 are presented in Figure 2.31. Together, the top five cancers accounted for 61% of the cancer burden in males and 62% among females.



Lung cancer was the leading contributor to the cancer burden in males in 1996, accounting for 24% of DALYs in males, followed by colorectal cancer (14%), prostate cancer (13%), skin cancer (melanoma and non-melanoma skin cancer – 6%) and lymphoma (5%). The burden associated with lung cancer was primarily through YLL, reflecting both the high case

fatality rate and short survival time. In contrast, the burden associated with prostate cancer has a high component (around one-third) of YLD, reflecting the slow progression of the disease and the general loss of wellbeing over long periods.

Breast cancer constitutes the leading cause of cancer burden among females, accounting for 24% of that burden in 1996. Colorectal cancer (14%), lung cancer (13%), cancer of the ovary (6%) and lymphoma (5%) were other major contributors. As with males, the burden associated with lung cancer in females is mainly due to YLL. In contrast, YLD comprises around one-quarter of the burden associated with breast cancer. This again reflects the longer average time gap between diagnosis and death, and the loss of wellbeing associated with the treatment of breast cancer.

## Mental health problems and disorders

Mental health problems and disorders range from short-term anxiety and depression to longer term conditions such as chronic depression and schizophrenia.

Mental ill health is one of the leading causes of non-fatal burden of disease and injury in Australia, and is associated with increased exposure to health risk factors, poorer physical health, and higher rates of death from many causes including suicide.

In view of its impact on the health of the Australian population and the possible reduction in disease burden with prevention and treatment, mental health has been declared a National Health Priority Area.

### Prevalence

The prevalence of mental disorders in adults can be reported using a range of different measures. The most commonly quoted figure is that one in five Australian adults will experience a mental illness at some time in their life. This figure is from the adult component of the National Survey of Mental Health and Wellbeing, conducted in 1997 by the ABS. Approximately 10,600 people aged 18 and above participated in the survey. An estimated 18% of Australian adults had experienced a mental disorder in the 12 months before the interview (ABS 1998). The prevalence of mental disorders decreased with age, with the highest prevalence reported for adults aged 18–24 (27%), reflecting a relatively high rate of substance use disorders. The prevalence was lowest, at 6%, for those aged 65 and above.

The 2001 National Health Survey provides the latest estimates of the prevalence of mental health conditions in Australia (Table 2.21). Unlike the 1997 Survey of Mental Health and Wellbeing, which used a computerised version of the Composite International Diagnostic Interview for diagnosis, the National Health Survey estimates are based on self-reports.

Almost 9.6% of respondents (equivalent to 1,812,600 Australians) reported a long-term mental or behavioural problem (ABS 2004). Mood (affective) and anxiety problems were the most commonly reported concerns (each affecting approximately 4.5% of the population). In both cases, more females (5.5%) than males (3.4%) reported these problems.

A person may also exhibit psychological distress with or without mental and behavioural problems. The 2001 National Health Survey measured such distress using

the Kessler Psychological Distress Scale. Very high (3.6%) or high (9.0%) levels of current psychological distress were recorded by 12.6% of respondents. About 1.7% of the adult respondents without mental and behavioural problems recorded very high levels of psychological distress (indicating a need for professional assistance); a further 6.6% recorded high levels. In total, about 18% of adult respondents reported a mental or behavioural problem and/or had a very high or high level of psychological distress, with 12% reporting both a mental or behavioural problem and a very high level of psychological distress.

**Table 2.21: Prevalence of mental and behavioural problems, and psychological distress, 2001 (per cent of age and sex group)**

Age group (years)	Mental and behavioural problems			Level of psychological distress					
				Very high			High		
	Males	Females	Persons	Males	Females	Persons	Males	Females	Persons
0–17	8.0	6.0	7.0	.. <sup>(a)</sup>	.. <sup>(a)</sup>	.. <sup>(a)</sup>	.. <sup>(a)</sup>	.. <sup>(a)</sup>	.. <sup>(a)</sup>
18–24	8.1	14.1	11.0	2.7	5.4	4.1	8.3	16.6	12.4
25–34	8.6	14.2	11.4	2.1	4.6	3.4	8.4	11.2	9.8
35–44	10.0	11.5	10.8	2.5	4.2	3.4	7.8	11.3	9.6
45–54	9.3	13.8	11.6	3.7	5.5	4.6	6.1	10.0	8.0
55–64	9.4	11.4	10.4	3.6	3.6	3.6	6.9	9.3	8.1
65–74	6.8	8.9	7.9	1.9	3.4	2.7	5.8	7.0	6.4
75 and above	5.2	7.2	6.4	1.9	3.0	2.5	4.6	9.1	7.2
<b>All age groups</b>	<b>8.5</b>	<b>10.6</b>	<b>9.6</b>	<b>2.7</b>	<b>4.4</b>	<b>3.6</b>	<b>7.2</b>	<b>10.9</b>	<b>9.0</b>

(a) The Kessler Psychological Distress Scale was administered to adult respondents only.

Source: ABS 2001 National Health Survey.

Comorbidity, involving more than one mental disorder – or at least one mental disorder and one or more physical disorders – is common among the mentally ill. In the National Survey of Mental Health and Wellbeing, approximately one in four persons with an anxiety, affective or substance use disorder also had at least one other mental disorder (Hall et al. 2001). Among persons with psychotic disorders, 30% had a medical history of alcohol abuse or dependence, 25.1% of cannabis abuse and 13.2% of other substance abuse or dependence (Jablensky et al. 1999).

The prevalence of other National Health Priority Area diseases and conditions was higher among persons reporting a long-term mental or behavioural problem than among those without such problems (ABS 2004). The conditions were: diseases of the musculoskeletal system and connective tissue (47.7% compared with 30.4%), diseases of the circulatory system (21.2% compared with 16.4%), asthma (17% compared with 11%), and an injury event in the last month resulting in some remedial health action being taken (16.8% compared with 11.7%). The prevalences of diabetes and cancer were similar in both groups.

Other physical conditions with higher prevalence among those reporting a long-term mental or behavioural problem were: migraine (12.9% compared with 5.5%), bronchitis and emphysema (7.2% compared with 3.1%), and stomach, duodenal or gastrointestinal ulcer (5.6% compared with 2.4%).

## Use of health services

### Hospital separations

People with mental and behavioural problems are more likely to be hospitalised than those without these problems. According to the 2001 National Health Survey, the proportion of such persons admitted to hospital in the two weeks before the survey was nearly twice that of people without such problems (19.1% compared with 11.5%). Those with very high levels of psychological distress (28.9%) were also more than twice as likely to be admitted to hospital as those with low levels (11.7%).

There were 284,839 hospital separations with either a mental health-related principal diagnosis or a record of specialised psychiatric care in 2001–02, a rate of 1,458 separations per 100,000 population. These separations accounted for 3,175,747 patient days (Table 2.22). Although comprising 4.5% of all separations, mental health-related separations accounted for 13.6% of total days spent by patients in hospital.

**Table 2.22: Mental health-related hospital separations<sup>(a)</sup>, 2001–02**

ICD-10-AM code	Principal diagnosis	Separations	Patient days
F00–F03	Dementia	6,586	248,183
F04–F09	Other organic mental disorders	4,766	86,385
F10	Mental, behavioural disorders due to alcohol	29,194	150,342
F11–F19	Mental, behavioural disorders due to other psychoactive substances use	13,864	82,708
F20	Schizophrenia	27,813	865,363
F21–F29	Other schizophrenic, schizotypal, delusional disorders	17,731	237,174
F30	Manic episode	1,258	13,192
F31	Bipolar affective disorders	15,943	206,045
F32–F33	Depressive disorders	68,450	452,224
F34–F39	Other mood (affective) disorders	4,379	24,307
F40–F48	Neurotic, stress-related and somatoform disorders	49,415	210,115
F50	Eating disorders	6,003	48,909
F51–F59	Other behavioural syndromes associated with physiological disturbances, physical factors	3,237	15,670
F60–F69	Disorders of adult personality and behaviour	9,201	47,917
F70–F79	Mental retardation	339	28,810
F80–F89	Disorders of psychological development	1,065	6,881
F90–F98	Disorders onset usually occurring in childhood, adolescence	4,910	14,104
F99	Mental disorder not otherwise specified	288	3,950
	Other mental health-related diagnosis <sup>(b)</sup>	13,245	132,047
	Other <sup>(c)</sup>	7,152	301,421
<b>Total</b>		<b>284,839</b>	<b>3,175,747</b>

(a) Includes separations which reported either specialised psychiatric care days and/or a mental health-related principal diagnosis.

(b) Includes mental health-related diagnoses other than those in the Mental and Behavioural Disorders chapter of IC-10-AM, as detailed in AIHW 2003e.

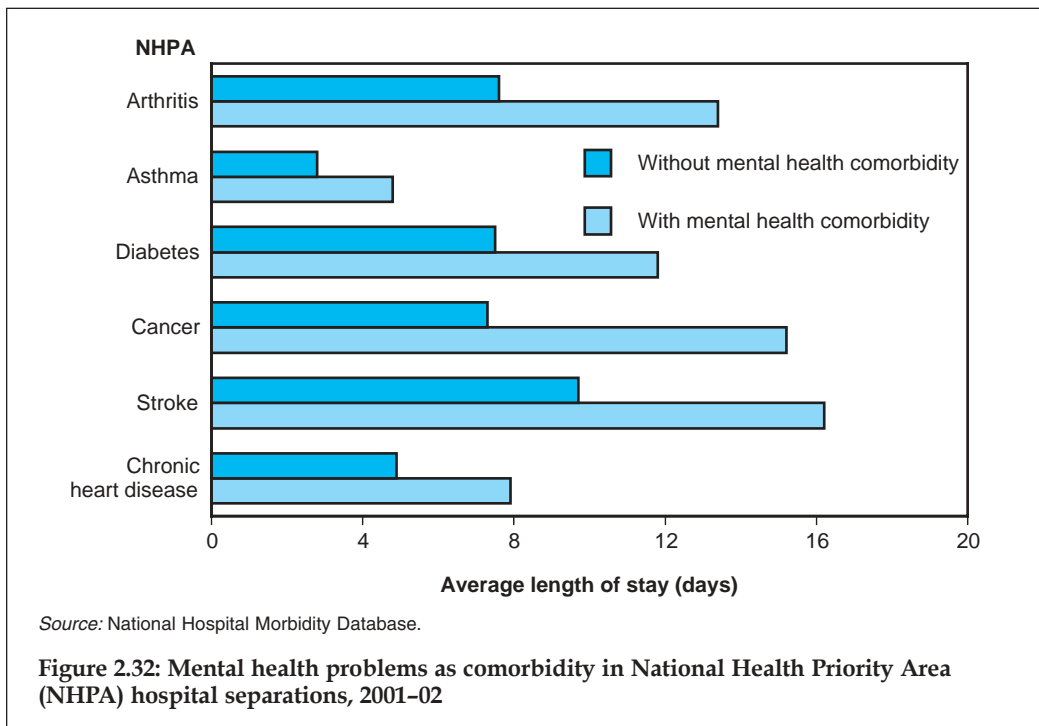
(c) Includes separations for which specialised psychiatric care was provided without a mental health-related principal diagnosis being recorded.

Source: AIHW Hospital Morbidity Database 2001–02.

Principal diagnoses of depressive disorders (24.0%), neurotic and stress-related disorders (17.3%), mental and behavioural disorders due to alcohol (10.2%), and schizophrenia (9.8%) accounted for the largest proportions of mental health-related separations. Schizophrenia accounted for the largest proportion of patient days (30.1%).

In 2001–02, there were a further 263,034 hospital separations for which a mental health-related diagnosis was reported as an additional diagnosis with a non-mental health principal diagnosis. These separations accounted for 2,725,457 patient days.

The average length of overnight stay in hospital for patients with a National Health Priority Area principal diagnosis was higher when there was an additional mental health diagnosis (Figure 2.32).



### GP visits

The proportion of 2001 National Health Survey (ABS 2004) respondents with mental and behavioural problems who reported consulting a GP in the two weeks before the survey was higher (33.3%) than those without such problems (20.5%). The proportion was also much higher among those with very high levels of psychological distress (48.0%) than those with low levels of distress (20.1%).

Mental health problems are estimated to have accounted for 10.7% (approximately 10.3 million) of all GP attendances in 2002–03, and constituted the third most common problem group in general practice (353 per 1,000 encounters). Medications related to psychological problems were the fifth most commonly prescribed drugs.

## Disability

The prevalence of psychiatric disabling conditions was estimated at 4.1% of the Australian population in 1998, around 768,900 people, based on the 1998 National Survey of Disability, Ageing and Carers (AIHW 2003a). Psychiatric disability is also associated with other disabling conditions. Additional disabilities were reported by 79% of those with a psychiatric disabling condition and by 66% of those whose main disabling condition was psychiatric in nature (AIHW 2003a).

The disabling effects of mental ill health are profound at the severe end of spectrum. Almost half (47%) of the people with psychotic disorders were rated as seriously impaired or worse off in their ability to function in social and occupational domains in the National Survey of Mental Health and Wellbeing (Jablensky et al. 1999). Levels of disability were also higher among those with concurrent mental health problems and disorders (Andrews & Slade 2001).

As at June 2003, there were 166,040 people receiving a disability support pension with a psychological or psychiatric condition as their primary medical condition. They comprised the second largest group of disability support recipients in Australia (25%) (FACS 2003). There were 2,018 sickness allowance recipients with a psychological or psychiatric condition as their primary medical condition, representing 23% of all sickness allowance recipients (FACS Disability Payment Section, personal communication).

The proportion of anxiety, depressive and substance abuse disorders was significantly higher among those receiving income support payments (30.4% of Australians of work force age) than those not receiving income support (18.6%) (Butterworth 2003).

## Mortality

A mental or behavioural disorder was listed as the underlying cause in 3,172 deaths in 2002. The age-standardised rate was 15.6 per 100,000 population, down from the peak years of 1994 to 1996 (Figure 2.33). These statistics do not include suicides, reported separately in Section 2.4, usually attributed to a mental health problem.

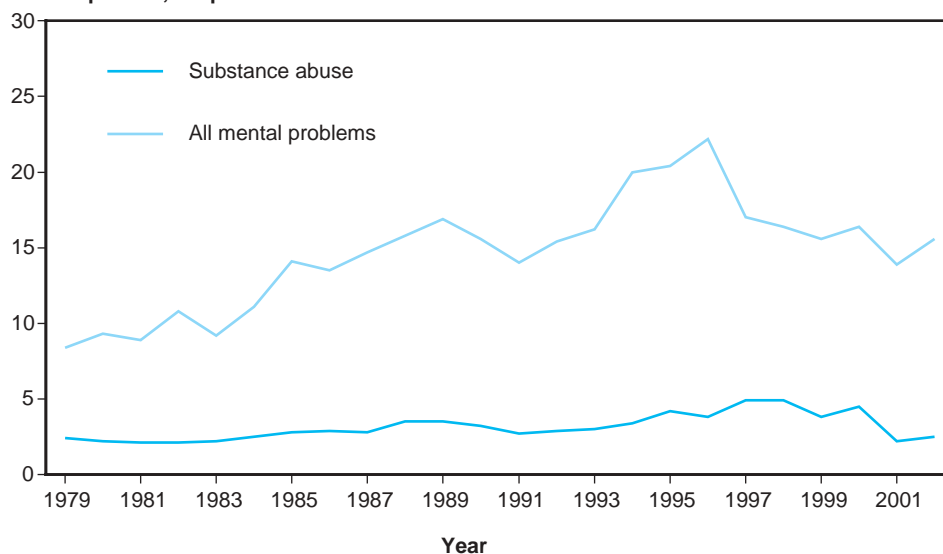
Most of the deaths with a mental or behavioural disorder as the underlying cause of death are attributable to dementia (79.2% in 2002). An additional 15.6% (494 deaths) in 2002 were attributed to mental and behavioural disorders due to abuse of psychoactive substances such as alcohol or heroin.

Deaths attributed to mental and behavioural disorders due to psychoactive substance abuse were lower in 2001 (2.2 per 100,000 persons) and 2002 (2.5 per 100,000 persons), compared with the period from 1995 to 2000, when the rate averaged 4.3 per 100,000 persons (Figure 2.33).

## Mental health problems and disorders burden

Mental health problems and disorders were estimated to account for 13% of the disease burden in Australia in 1996, 1% of years of life lost due to premature mortality and 27% of years of 'healthy' life lost due to poor health or disability (AIHW: Mathers et al. 1999).

### Deaths per 100,000 persons



Notes: ICD-10 codes: all mental and behavioural disorders, F00–F99; psychoactive substance abuse, F10–F19.

Source: AIHW National Mortality Database.

Figure 2.33: Death rates for mental and behavioural disorders, 1979 to 2002

## Respiratory diseases

Obstructive airways diseases—asthma and chronic obstructive pulmonary disease (COPD)—are the two major respiratory diseases contributing to ill health in Australia.

### Asthma

Asthma is a chronic inflammatory disease causing episodes of wheezing, breathlessness and chest tightness due to widespread narrowing of the airways within the lungs and obstruction of airflow. The symptoms are usually reversible, either spontaneously or with treatment (AIHW: Australian Centre for Asthma Monitoring 2003).

While asthma's underlying causes are still not known, environmental and other related factors, such as diet and lifestyle, may affect the risk of acquiring asthma, change the course of the disease, or trigger attacks of airway narrowing and symptoms. A wide range of factors trigger airway narrowing and symptoms in people with asthma, including exercise, viral infections, irritants (for example, smoking and indoor and outdoor air pollutants), specific allergens (house dust mites and mould spores) and some food preservatives.

### Prevalence

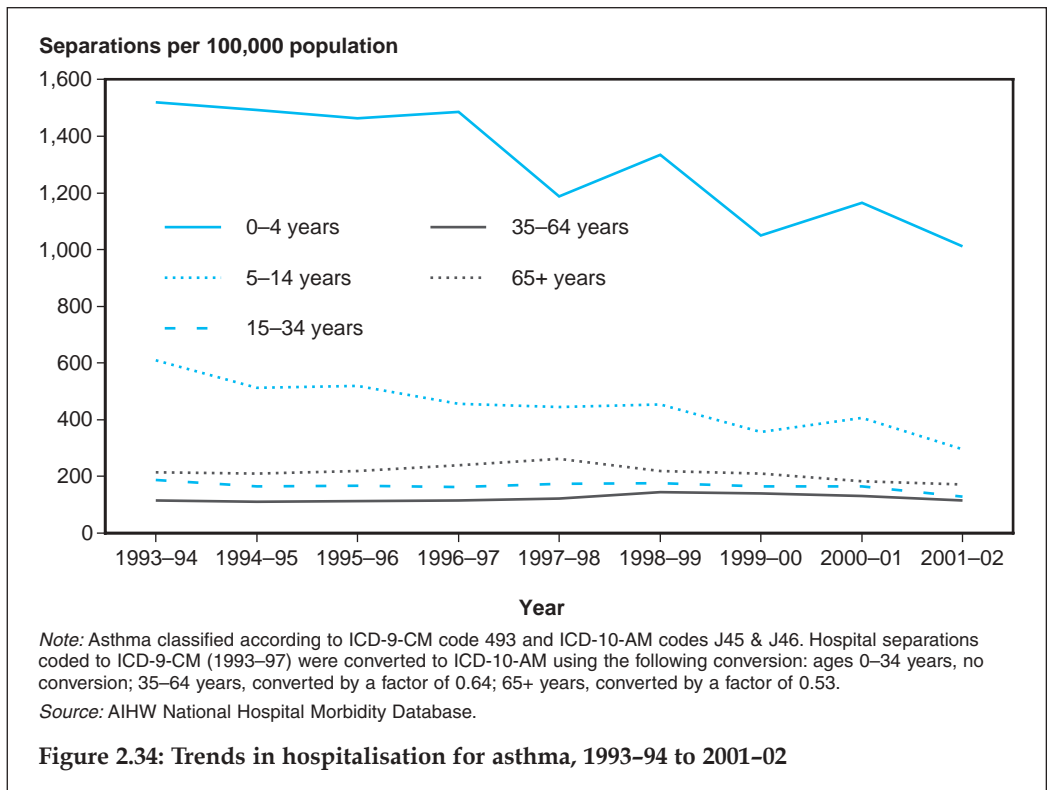
Recent surveys show that 14–16% of children and 10–12% of adults have asthma as a current problem. A higher proportion (20–30%) say that they have had wheezing in

the last year (AIHW: Australian Centre for Asthma Monitoring 2003). More boys than girls have asthma, but after the teenage years it is more common in women than in men.

There was an increase in the proportion of children with asthma in the 1980s and early 1990s. Recent studies in Melbourne (Robertson et al. 2004) and Belmont, New South Wales (Toelle et al. 2004), suggest there has been no further increase since that time. There has been little change in the prevalence of asthma among adults over the last 20 years.

### Hospitalisation

Children, particularly those aged less than 5, have higher rates of hospitalisation for asthma than adults. However, the rate among children has declined since 1993. There has been little change in the hospitalisation rates for asthma among adults over the same period (Figure 2.34).



The hospitalisation rates among the elderly (aged 65 and over) are highest during winter, whereas among children the peaks occur in February and May.

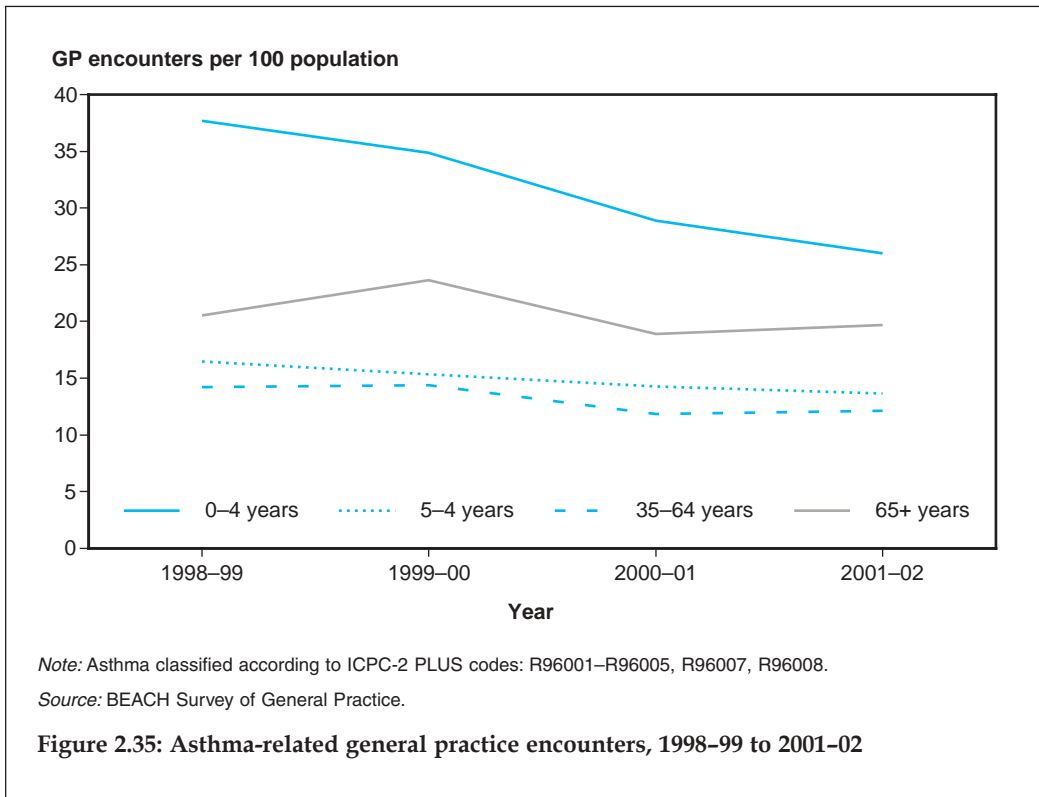
Boys have higher rates of hospitalisation for asthma than girls, in keeping with the disease's higher prevalence among boys. However, the pattern reverses after the age of 15 when more females than males are hospitalised for asthma.

## GP visits

During the period 1998–99 to 2001–02, the average annual rate of GP encounters at which asthma was managed was 16 per 100 population. This represents 3% of all GP encounters over that period. The rate fell by almost one-third in the youngest age group (0–4) between 1998–99 and 2001–02 (Figure 2.35).

## Mortality

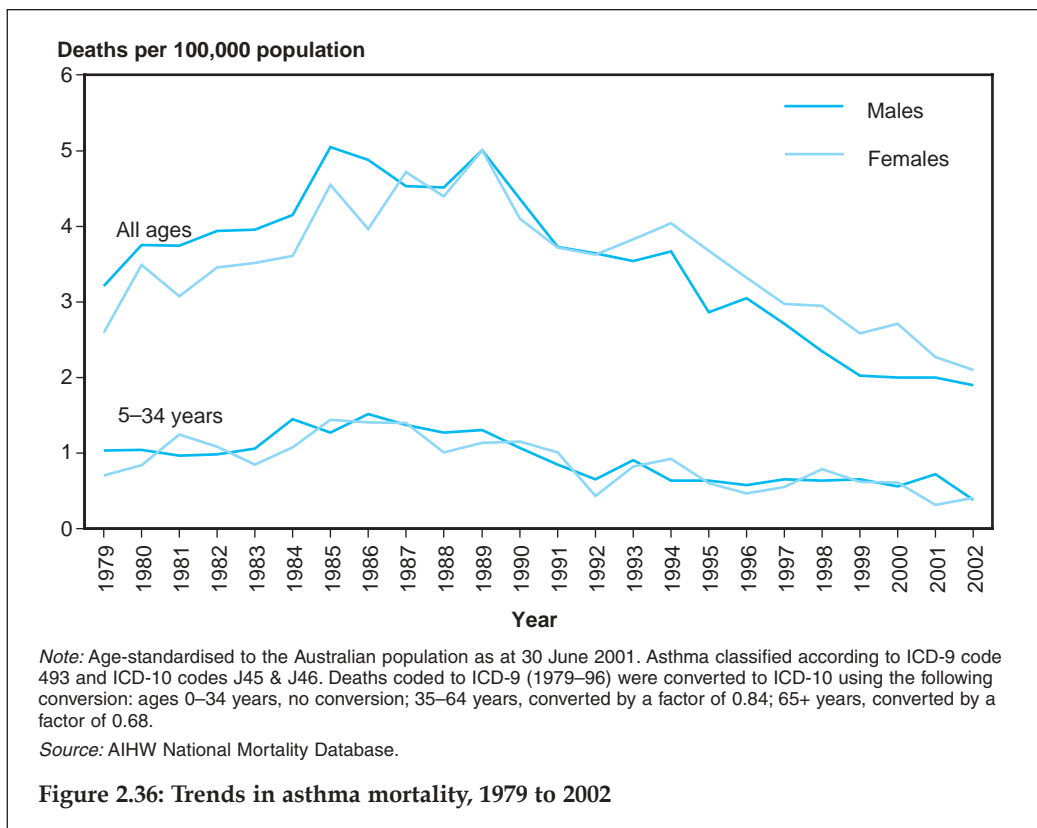
Asthma is not a large cause of mortality but the death rates in Australia are high by international standards. The risk of dying from asthma increases with age and the majority of deaths occur in people aged 65 and over, particularly during the winter months.



There was an increase in the number of deaths from asthma during the 1980s. Since 1989, there has been a decline in asthma deaths. This is evident across all ages, and in particular among people aged 5 to 34, in whom the attribution of death to asthma is more specific (Figure 2.36).

## Asthma burden

Asthma was estimated to account for 3% of the disease burden in Australia in 1996, 1% of years of life lost due to premature mortality and 5% of years of 'healthy' life lost due to poor health or disability (AIHW: Mathers et al. 1999).



## Chronic obstructive pulmonary disease

COPD is a serious and progressive long-term lung disease where damage to the lungs, usually due to both emphysema and chronic bronchitis, obstructs oxygen intake and causes increasing shortness of breath. Chronic bronchitis and emphysema can each occur on their own in a person with COPD, but they usually coexist in an individual (GOLD 2001).

The main symptom of COPD is shortness of breath on exertion and cough with sputum (phlegm). A condition very similar to COPD may occur in some patients whose underlying disease is chronic asthma. In many cases the underlying disease cannot be accurately identified in routine clinical practice. COPD is a cause of substantial morbidity and mortality in Australia.

### Risk factors

Tobacco smoking is the most important risk factor for COPD. Passive exposure to tobacco smoke may also contribute to respiratory symptoms and the development of COPD (de Marco et al. 2004). Exposure to other environmental agents, including indoor and outdoor air pollutants (Tashkin et al. 1994), and occupational dusts and chemicals (Kauffmann et al. 1982; Viegi et al. 1991), is also a known risk factor. Genetic factors in COPD are uncommon (Silverman et al. 1998).

## Comorbidity

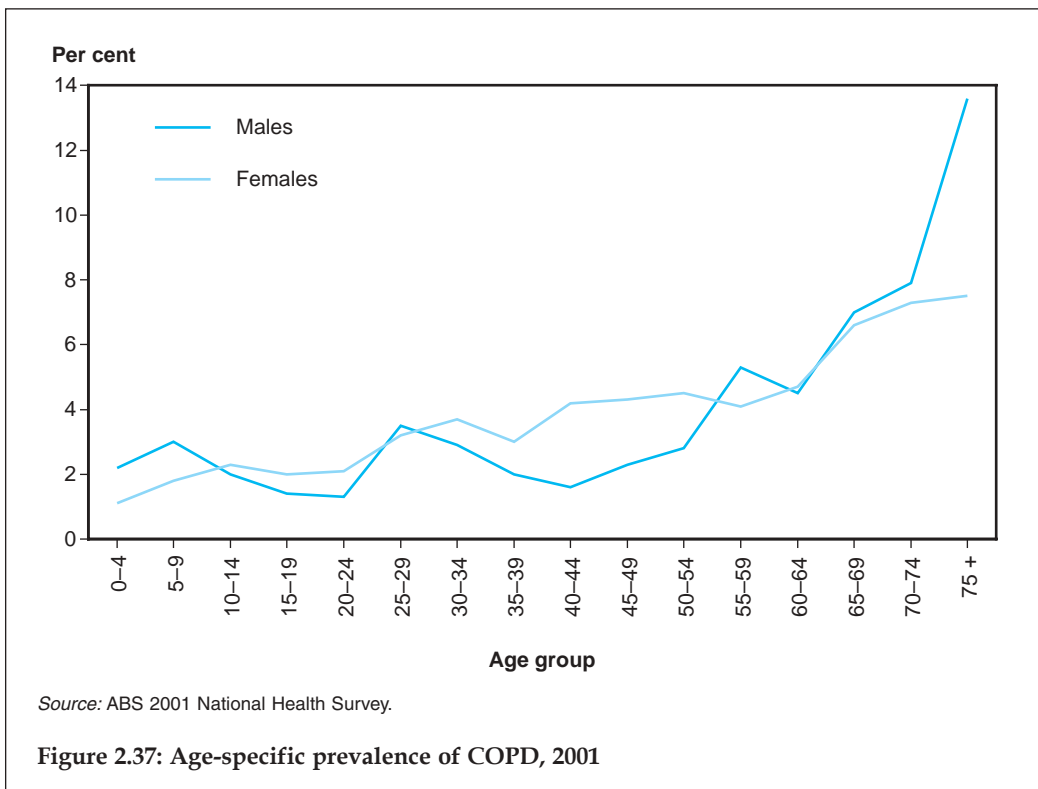
The major comorbidities associated with COPD are other smoking-related chronic diseases: vascular disease, in particular coronary artery disease, and lung cancer. Other common diseases in the middle-aged and older person, such as diabetes and obstructive sleep apnoea, often complicate COPD management.

The major complication of COPD is a worsening due to infection, resulting in an acute fall in the lungs' air capacity, an increase in symptoms and, often, the need for hospitalisation.

## Prevalence

Based on the 2001 National Health Survey, about 665,000 persons had COPD that year, representing about 3.5% of the Australian population. These are probably underestimates because self-reports of COPD are not fully reliable. More accurate prevalence data for COPD, based on lung function measures, are not available in Australia.

Self-reported COPD increased with age (Figure 2.37) and was more common in 2001 among males (3.7%) than females (3.4%). These findings are consistent with hospitalisation and mortality data (see opposite) as well as self-reported COPD-related symptoms (Abramson et al. 2002).



## Hospitalisation

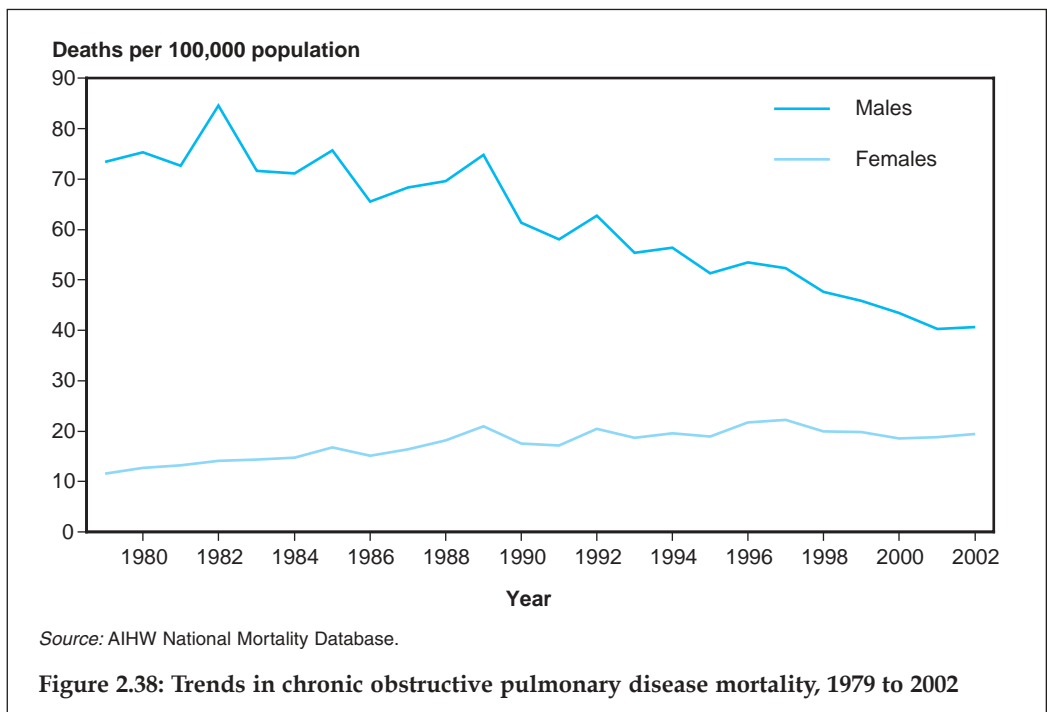
COPD is a major reason for hospitalisation in Australia. In 2001–02, there were 51,621 hospitalisations where the principal diagnosis was COPD (accounting for 0.8% of all hospitalisations), with an average length of stay of 7.5 days.

Hospitalisation for COPD occurs mainly among the elderly, with those aged 65 and above accounting for more than 77% of all COPD separations. Males were more likely to be hospitalised for COPD than females (344 separations per 100,000 males compared with 206 separations per 100,000 females).

## Mortality

COPD is a major cause of death, reflecting the end result of a progressive decline in lung function. In 2002, COPD was the underlying cause of 5,599 deaths (4.2% of all deaths). More males died of COPD than females, with age-standardised death rates of 40.6 per 100,000 and 19.5 per 100,000 respectively.

The death rate for COPD has declined over the last three decades (Figure 2.38) with the majority of the decrease attributable to a decline in male deaths. Possible explanations for this decline include improved medical care, a higher proportion of people with established COPD who quit smoking, and improved overall smoking trends. In contrast to the encouraging trend among males, the COPD death rate in females increased between 1970 and 1990 and has remained steady thereafter. The increase in female deaths may be the delayed result of an increase in the proportion of female smokers since the late 1970s.



## **Chronic obstructive pulmonary disease burden**

COPD was estimated to account for 4% of the disease burden in Australia in 1996, 4% of years of life lost due to premature mortality and 3% of years of 'healthy' life lost due to poor health or disability (AIHW: Mathers et al. 1999).

## **Diabetes**

Diabetes is a metabolic disease in which high blood glucose levels result from defects in insulin secretion, insulin action or both (WHO 1999; Dunstan et al. 2001). Insulin is a hormone produced by the pancreas that helps the body use glucose for energy.

Diabetes contributes to significant illness, disability, poor quality of life and premature mortality, especially if undetected or poorly controlled. In 2002, it was the ninth and tenth leading cause of death in Australia among males and females respectively. Over the course of the disease, diabetes can lead to long-term damage to various parts of the body, especially the heart and blood vessels, eyes, kidneys and nerves. Diabetes also contributes to many pregnancy-related complications both before and after birth, and for both the mother and the baby.

### **Types of diabetes**

There are several types of diabetes, with different causal mechanisms and clinical histories. The three main types are Type 1, Type 2 and gestational diabetes.

Type 1 diabetes is marked by a total or near-total lack of insulin and results from the destruction of insulin-producing cells in the pancreas. People with this form of diabetes require daily insulin therapy to survive. It is the most common cause of childhood diabetes and accounts for 10–15% of all diabetes in Australia.

Type 2 diabetes is marked by reduced levels of insulin or the inability of the body to use insulin properly (insulin resistance). The disease is more common among people aged 45 and above and accounts for 85–90% of all those with diabetes. Many people with this form of diabetes need insulin therapy to control their blood glucose levels.

Gestational diabetes occurs during pregnancy in about 3–8% of females not previously diagnosed with diabetes. Some women with this type of diabetes need insulin therapy to control their blood glucose levels. It is a transient form of diabetes and usually disappears after the baby is born. However, it is a marker of increased risk of developing Type 2 diabetes later in life.

### **Risk factors for diabetes**

Both genetic and environmental factors contribute to the onset of diabetes. Type 1 diabetes is believed to be caused by particular biological interactions and exposure to environmental triggers in people genetically predisposed to diabetes. In addition to ageing and genetic predisposition, the risk of developing Type 2 diabetes increases with body fatness. Regular physical activity, however, plays a protective role against the development of Type 2 diabetes (Tuomilehto et al. 2001; Diabetes Prevention Program Research Group 2002). The risk factors for gestational diabetes are mostly similar to those for Type 2 diabetes and include the age of the mother, body fatness and ethnicity. Diabetes shares several of the risk factors with, and is itself a risk factor for, cardiovascular disease.

## Incidence and prevalence

### Incidence

There is limited information on the incidence of diabetes in Australia, and most of the data that exist are for Type 1 diabetes. The National Diabetes Register is the only source of national incidence data for diabetes. The register holds data on people with insulin-treated diabetes, including Type 1, Type 2 and gestational diabetes (see Box 2.6 for more detail).

Coverage of new cases of insulin-treated diabetes in children aged 0–14 is considered to be close to 100% in the register. Over the 2000–2002 period, around 2,400 new cases of Type 1 diabetes in children aged under 15 were recorded. This equates to an average annual incidence of around 20 new cases per 100,000 population in this age group.

In Australia, previous survey-based estimates of the incidence of Type 1 diabetes in the 0–14 age group have ranged from 12.3 per 100,000 in 1983 (Glatthaar et al. 1988) to 17.8 per 100,000 in 1990–1996 (Craig et al. 2000). Thus the latest incidence data from the National Diabetes Register support recent reports suggesting that the incidence of Type 1 diabetes is increasing among children aged 0–14 years.

### Box 2.6: National Diabetes Register

*The National Diabetes Register was established in 1999, as part of the National Diabetes Strategy, to collect information about Australians who have insulin-treated diabetes. The register is operated by the AIHW using data from the National Diabetes Services Scheme and the Australasian Paediatric Endocrine Group.*

*The National Diabetes Register aims to collect information about all people who have diabetes for which insulin treatment was begun on or after 1 January 1999. If the register can 'capture' all its target population, therefore, it should completely monitor the incidence of Type 1 diabetes from 1999 onwards. It would also provide a guide to the onset of the more severe (insulin-requiring) cases of Type 2 and gestational diabetes. Researchers are now able to use the register as an important source of information for clinical and epidemiological studies of the causes and complications of diabetes.*

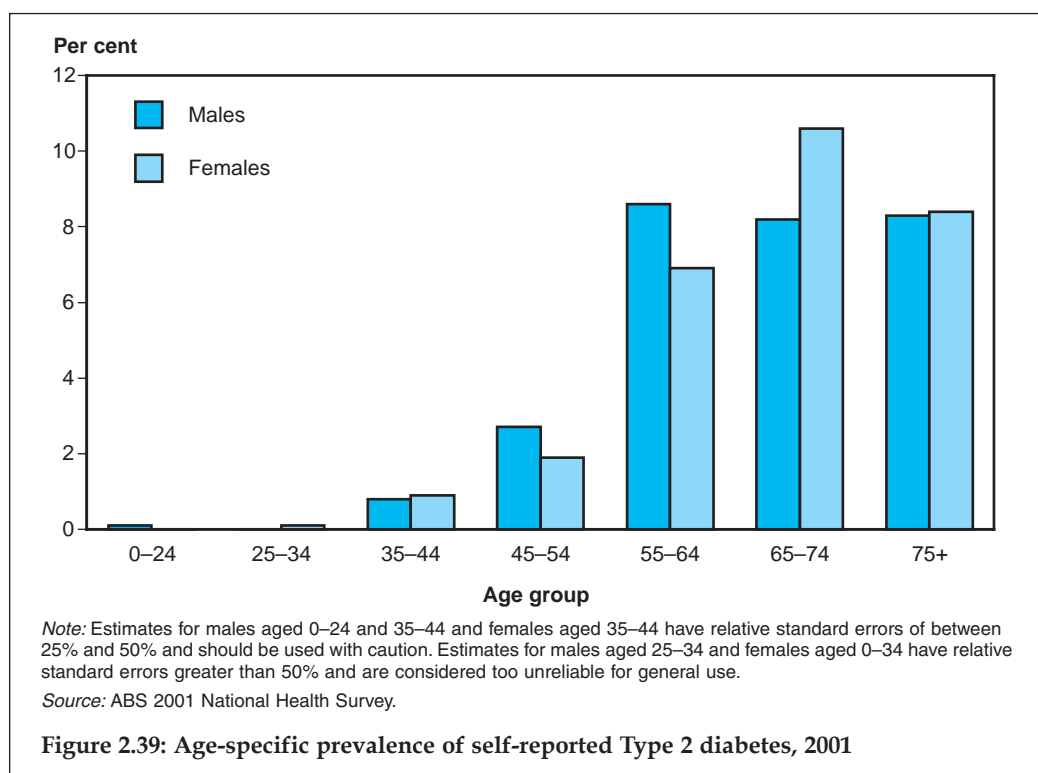
*Around 32,600 people were registered on the National Diabetes Register between 1999 and 2002. Around 60% of registrants were found to have Type 2 diabetes, 28% Type 1 diabetes and 9% gestational diabetes. At diagnosis, 48% of registrants were aged 45 and above and 11% were aged between 0 and 14.*

### Prevalence

There are two main sources of national prevalence data for diabetes—the 1999–2000 Australian Diabetes, Obesity and Lifestyle (AusDiab) Study and the ABS National Health Surveys. In AusDiab, the prevalence of diabetes was estimated on the basis of measured blood glucose levels whereas in the National Health Surveys it is based on self-report.

Based on data from AusDiab, it is estimated that almost one million Australian adults aged 25 and above had diabetes in 2001, 7.6% of the population. About half these people were not aware that they had diabetes (Dunstan et al. 2002). With the addition of the number of people aged under 25 who have Type 1 diabetes, it is likely that more than one million people in Australia have diabetes.

More recent estimates of the prevalence of diabetes come from the ABS 2001 National Health Survey. These estimates are based on self-reported data, which are known to underestimate the true prevalence of diabetes as they do not include people who do not know they have diabetes. In the 2001 National Health Survey, 0.5% of respondents reported having Type 1 diabetes, while 2.3% of respondents reported having Type 2 diabetes. A further 0.1% reported having diabetes but did not know which type. Among people aged less than 75, the prevalence of Type 2 diabetes increased with age, rising from less than 1% in those aged under 45 to around 10% in those aged 65–74 (Figure 2.39).



Aboriginal and Torres Strait Islander peoples have significantly higher rates of diabetes, especially Type 2 diabetes, than other Australians. In 2001, the age-standardised prevalence of self-reported diabetes among Indigenous Australians was almost four times as high as that reported by non-Indigenous Australians (11% compared with 3%) (ABS 2002d). Further, Indigenous Australians from remote areas were almost twice as likely as those from non-remote areas to report having diabetes (16% compared with 9%).

People born in some overseas regions have a higher prevalence of diabetes than people born in Australia (AIHW: Holdenson et al. 2003). It is thought that this difference is due to a combination of genetic, biological, behavioural and environmental risk factors. In 2001, men born in the Middle East and North Africa were 3.6 times as likely to report having diabetes as Australian-born men; and women born in Southern and Eastern Europe and Central Asia were 1.5 times as likely to report diabetes as Australian-born women (Table 2.23).

The prevalence of diabetes among Australian adults has more than doubled since the early 1980s. In 1999–2000, the age-standardised prevalence of diabetes was 7.2% compared with 3.4% in 1981 (Dunstan et al. 2002). An ageing population, early detection and underlying trends in risk factors such as obesity, physical inactivity and impaired glucose tolerance have contributed to an increase in the incidence, and hence prevalence, of Type 2 diabetes in Australia. Better management may have also contributed to the current increases in its prevalence because people with diabetes may now be surviving longer.

**Table 2.23: Self-reported diabetes prevalence ratios by region of birth, 2001**

Region of birth	Prevalence ratios <sup>(a)</sup>	
	Males	Females
UK & Ireland	1.2	0.7
North & West Europe	1.3	0.6
Southern & Eastern Europe, & Central Asia	0.9	<sup>(b)</sup> 1.5
Middle East & North Africa	<sup>(b)</sup> 3.6	2.4
South-East Asia & Southern Asia	<sup>(b)</sup> 1.9	1.5
All other countries	1.6	0.6

(a) Australian-born rate set at 1.00.

(b) Different from Australian-born rate at the 5% level of significance.

Note: Ratios were calculated using the indirect method of age-standardisation (AIHW: Holdenson et al. 2003).

Source: AIHW: Holdenson et al. 2003.

## Diabetes-related complications

Diabetes can lead to a range of complications, including diseases of the large blood vessels (macrovascular disease) such as coronary heart disease, stroke and peripheral vascular disease as well as diseases of the small blood vessels (microvascular disease) such as kidney disease and retinopathy.

All types of diabetes are known to be associated with complications in pregnancy and childbirth. Poorly managed diabetes in pregnancy can lead to spontaneous abortions, stillbirths or difficult births.

Several factors contribute to the risk of developing complications in diabetes. In addition to poorly controlled glucose levels, duration of the disease and age, other risk factors include obesity, high blood pressure, high blood cholesterol, tobacco smoking and genetic predisposition. Avoiding or reducing risk-increasing behaviours and conditions can delay the onset or slow down the progression of complications.

Among adults attending specialist diabetes services (diabetes centres and specialist endocrinologists in private practice) in 2002, 26.0% had peripheral neuropathy (nerve damage), 13.5% had peripheral vascular disease, and 2.2% had a current foot ulcer (NADC 2003). In addition, in the last 12 months, 4.2% had a severe hypoglycaemic episode, 3.3% suffered a heart attack, 2.1% had a stroke, 0.7% had a lower limb amputation, 0.8% suffered new blindness, just under 0.1% suffered end-stage renal disease, and 3.9% of males had erectile dysfunction. However, it should be noted that specialist diabetes clinics are likely to see more patients with complications than would be observed among people with diabetes generally.

Data from the Australia and New Zealand Dialysis and Transplant Registry show that in Australia in 2001, diabetic kidney disease (diabetic nephropathy) was the second most common cause of kidney failure, accounting for one in four kidney failure registrants (McDonald & Russ 2002).

The 2001 National Health Survey self-reports also reveal a higher prevalence of complications among persons with diabetes. Their reports of current angina, heart attack or stroke were double the rates reported by persons without diabetes (Table 2.24). They were also over twice as likely as people without diabetes to report eye disorders such as blindness, glaucoma and cataracts.

**Table 2.24: Self-reported prevalence of diabetes-related complications, 2001 (per cent)**

Complication	Persons with diabetes	Persons without diabetes
Angina	4.4	2.0
Heart attack	2.7	1.1
Stroke	1.8	0.8
Partial or complete blindness	2.7	1.2
Glaucoma	3.0	1.4
Cataracts	7.0	2.9

*Notes*

1. Age-standardised to the Australian population at 30 June 2001.
2. Persons aged 25 and over.

Source: ABS 2001 National Health Survey.

## Health service use

People with diabetes are more likely to consult health professionals or use hospital services than those without diabetes. This is related to treatment for blood glucose control, as well as for complications associated with diabetes.

### GP visits

According to the 2002–03 BEACH survey, diabetes represented 2.0% of all problems managed by GPs, at a rate of 2.9 per 100 encounters (AIHW: Britt et al. 2003). For persons being managed for diabetes, high blood pressure and lipid disorders were the other main problems managed. Coronary heart disease was a common disease managed in males with diabetes, whereas osteoarthritis was the most commonly managed problem among females with diabetes.

## Hospital separations

Diabetes was the principal diagnosis in 53,224 (0.8%) hospital separations in 2001–02. It was reported more often as an additional diagnosis, particularly in association with the primary diagnoses of coronary heart disease, stroke and kidney disease. When separations for diabetes as both principal and additional diagnosis are combined, the total number of such separations rises to 389,940, or 6.1% of all hospital separations. This higher number better reflects the extent of diabetes-related morbidity in the population, and its management in a hospital setting.

As well as accounting for a large proportion of hospital episodes, the average length of stay for persons with diabetes who are hospitalised for at least one night was longer than the overall average: 10 days for diabetes as the principal diagnosis compared with 9 days for all other diagnoses. When separations for diabetes as an additional diagnosis were also taken into account, the average length of stay was 11 days.

## Mortality

In 2002, diabetes was the underlying cause of 3,329 deaths, or 2.5% of all deaths in that year. In addition, it was listed as an associated cause in 11,467 deaths.

Diabetes is rarely the only cause of death recorded on death certificates (1.7% of cases). Where it is an underlying cause of death, conditions listed as associated causes included coronary heart disease (in 50% of cases), stroke (22%) and renal failure (15%). When diabetes was listed as an associated cause, coronary heart disease was the underlying cause of death in 24% of cases and stroke was the underlying cause in 8% of cases.

The death rate for diabetes (as an underlying cause) has shown an increase in recent years among males, with an average annual increase of 1.2% between 1989 and 2002. There has been no notable trend among females.

## Diabetes burden

Diabetes was estimated to account for 3% of the disease burden in Australia in 1996, 2% of years of life lost due to premature mortality and 4% of years of 'healthy' life lost due to poor health or disability (AIHW: Mathers et al. 1999). In addition, diabetes leads to increased heart disease and stroke. These effects increased the diabetes burden to 4.9% of total burden in 1996.

## Arthritis and musculoskeletal conditions

Arthritis is a musculoskeletal condition marked by inflammation of the joints, causing pain, stiffness, disability and deformity. Other musculoskeletal conditions include other joint problems and disorders of the bones, muscles and their attachments to each other.

Arthritis and musculoskeletal conditions are highly prevalent and large contributors to illness, pain and disability. They place a significant burden on the community, both economic and personal, including the use of hospital and primary care services, disruptions to daily life and lost productivity through disability. In view of this burden, arthritis and musculoskeletal conditions were declared a National Health Priority Area in July 2002 by the Australian health ministers. The initial focus in this priority area is on osteoarthritis, rheumatoid arthritis and osteoporosis.

There are more than 100 forms of arthritis and musculoskeletal conditions, which may result from congenital anomalies, metabolic or biochemical abnormalities, infections, inflammatory conditions, cancer and trauma. Brief descriptions follow of five prominent arthritis and musculoskeletal conditions, namely back pain, osteoporosis, osteoarthritis, rheumatoid arthritis and gout.

### **Back pain**

Back pain is a common condition whose causes include the displacement of an intervertebral disc and muscle strain. Most back problems and complaints are transitory and short term, but in some cases they can become chronic.

- In the 2001 National Health Survey, 20.9% of respondents reported back pain, with similar prevalence in the two sexes. Back pain was mostly reported by people in middle and older age groups, particularly those aged 55–64 years.
- The hospital separation rates for back pain in 2001–02 were higher among females (210 per 100,000) than males (184 per 100,000). The separation rates increased with age, most rapidly from age 55–64 onwards, and highest at age 85 and above.
- Back complaints were the ninth most frequent reason for GP visits, and the most common reason for which imaging was ordered by GPs in 2001–02.

### **Osteoporosis**

Osteoporosis is the thinning and weakening of the bone substance with a resulting risk of fracture. It occurs more frequently in older persons, especially women, as bone tissue is progressively lost with ageing, although the rate of deterioration varies widely between individuals.

- In the 2001 National Health Survey, 1.6% of respondents reported having osteoporosis. The prevalence was 10.5% for females aged 65–74, increasing to 12.3% among female respondents aged 75 and above. Comparable rates among males were 1.2% and 1.5% respectively.
- In 2001–02, 39 per 100,000 persons were hospitalised with a principal diagnosis of osteoporosis, with 56% of these hospitalisations being due to pathological fractures. Hospitalisation was highest in females aged 65 and over.
- Only a small number of deaths are recorded as being caused directly by osteoporosis. In 2002, the death rate for osteoporosis was 0.8 per 100,000 persons (1.1 per 100,000 females and 0.3 per 100,000 males).

### **Osteoarthritis**

Osteoarthritis, the most common form of arthritis, is a degenerative condition due mainly to accumulated wear that affects mostly the hands, spine and weight-bearing joints such as hips, knees and ankles. The disease begins in cartilage overlaying the ends of joint bones, and is caused and accelerated by mechanical forces, disrupting the normal function of the joint. Pain is initially felt in the joints during and after activity, but as degeneration progresses it may occur with only minimal movement or even during rest.

- Osteoarthritis is more common among females. In the 2001 National Health Survey, 9.2% of the females surveyed reported having osteoarthritis, compared with 5.7% of the males. The prevalence increases with age, and is highest among those aged 65 and above.

- Osteoarthritis was the tenth most frequently managed problem in general practice, and the third most common problem for which imaging was ordered by GPs.
- The number of hospital separations for osteoarthritis has increased by 63% over the past nine years, from 39,186 in 1993–94 to 64,044 in 2001–02, with an average length of stay of 5.9 days.

### **Rheumatoid arthritis**

Rheumatoid arthritis is a chronic auto-immune disease involving inflammation of the joints, most often affecting the hand joints in symmetrical fashion, and often producing deformities.

- Rheumatoid arthritis is more common among females. In the 2001 National Health Survey, 2.7% of the females reported having rheumatoid arthritis compared with 2.0% of the males. The prevalence of rheumatoid arthritis increases sharply with age, and is greater in females at nearly all ages.
- There are far fewer hospital separations for rheumatoid arthritis compared with other musculoskeletal conditions, and these have declined from 6,179 to 4,609 over the nine-year period from 1993–94 to 2001–02.

### **Gout**

Gout is a painful musculoskeletal disease involving deposits of uric acid crystals in the joint spaces, connective tissue or both. The first attack generally occurs between the ages of 40 and 50, although gout can occur at any age and is more common among males. Gout among females usually develops after menopause.

- In the 2001 National Health Survey, 1.4% of respondents had gout. The prevalence in males was more than five times that in females (2.2% compared to 0.4%).
- There are few hospital separations for gout. In 2001–02, 15 per 100,000 persons were hospitalised with a principal diagnosis of gout. Separation rates were higher among males (25 per 100,000) than females (6 per 100,000), and among those aged 65 and over.

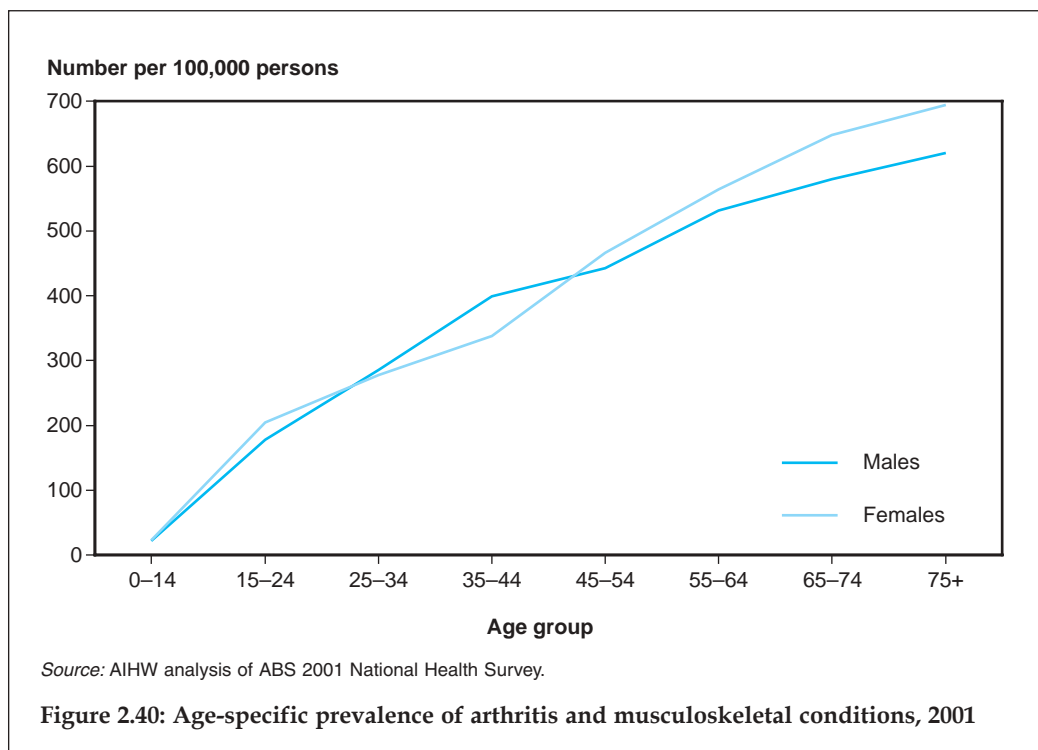
The non-fatal and recurrent nature of arthritis and musculoskeletal conditions makes it difficult to fully assess and report on their health outcomes. The remainder of this section discusses these conditions generally in terms of prevalence, use of health services, and indicators of function, disability and quality of life.

### **Prevalence**

Based on the 2001 National Health Survey, more than six million Australians (323 out of 1,000 persons) are estimated to have had arthritis and musculoskeletal conditions that year. This included some type of swelling in their joints, limitations in their motion or pain when they moved. Similar rates of occurrence were reported by both sexes; however, certain disorders were more prevalent either in males or in females. Increasing age is a strong risk factor for arthritis and musculoskeletal conditions, as shown in Figure 2.40.

The most commonly reported conditions in the 2001 National Health Survey were back pain (20.9% of respondents) and arthritis (13.9% of respondents). While the former was more common in males, the latter was reported more often by females.

About 83% of those with disability due to arthritis and related conditions reported at least one core activity restriction. These restrictions were mainly in mobility, followed by self-care, and in both cases the restriction was higher among females than males.



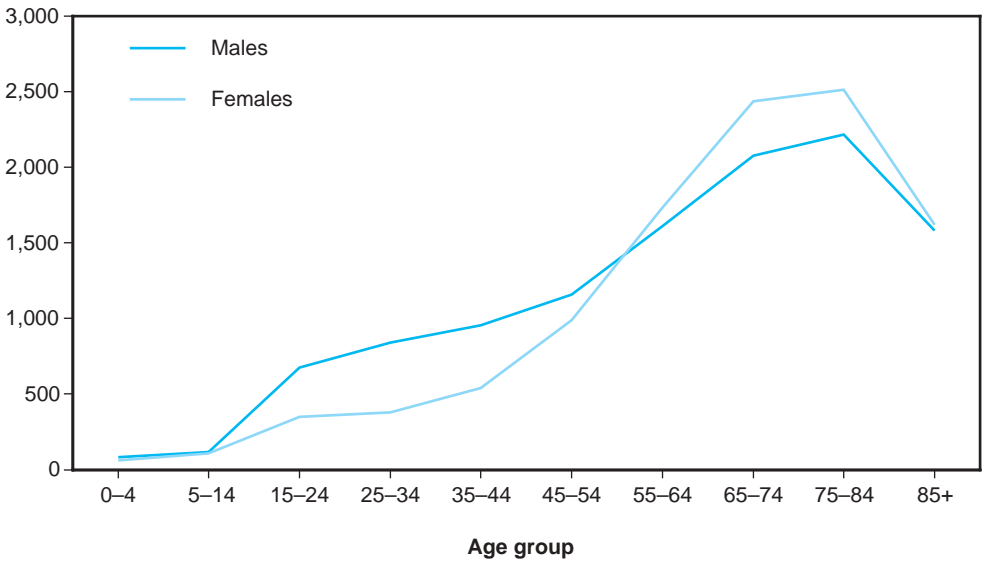
The high prevalence of arthritis and musculoskeletal conditions is also reflected in visits to GPs, other specialists and health professionals, and short-stay hospital separations. Arthritis and musculoskeletal conditions were the second most frequently managed problem (18 per 100 encounters) by GPs in 2001-02, accounting for 12% of problems managed that year. Back complaint was the most common musculoskeletal condition managed in general practice, followed by osteoarthritis.

Hospitalisation for arthritis and musculoskeletal conditions is less frequent and of shorter duration than for most other conditions. The hospital separation rate was 1,791 per 100,000 in 2001-02, with an average length of stay of 3.6 days. The separation rate was slightly higher in males than in females (Figure 2.41).

## Disability

Arthritis and musculoskeletal conditions cause more disability than any other medical condition. From self-reports in the Survey of Disability, Ageing and Carers, around 1.2 million Australians (about 34% of all persons with a disability) had a disability due to these conditions in 1998, with 55% of these being females. Disability was particularly marked in the 45-64 age group (Figure 2.42).

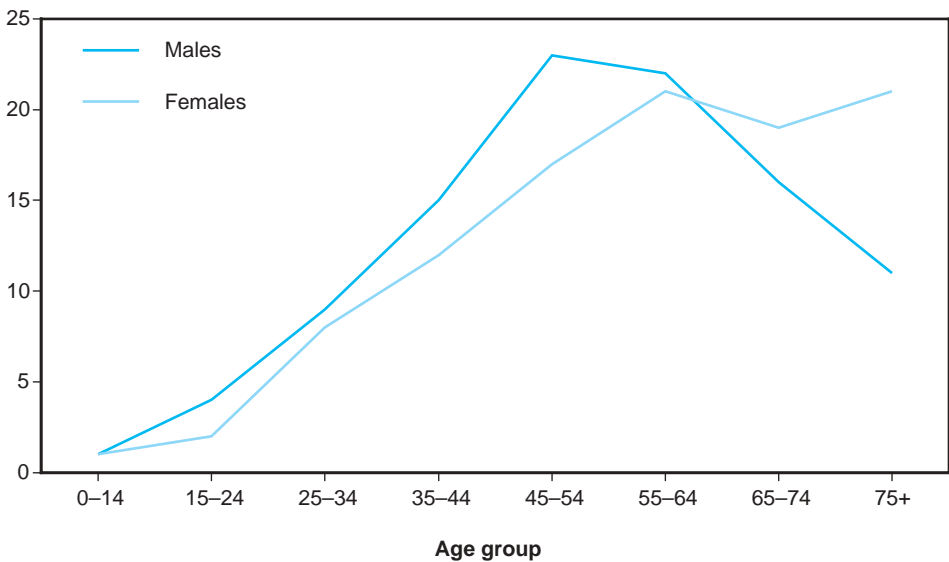
**Separations per 100,000 population**



Source: AIHW National Hospital Morbidity Database.

**Figure 2.41: Age-specific hospital separation rates for arthritis and diseases of the musculoskeletal system, 2001-02**

**Per cent**



Source: AIHW analysis of ABS 1998 Survey of Disability, Ageing and Carers.

**Figure 2.42: Age-specific prevalence of disability due to arthritis and related conditions, 1998**

## Mortality

Although death is not a common outcome of arthritis and musculoskeletal conditions, 5 deaths per 100,000 in Australia were recorded as being due to these conditions in 2002. Of these, about 2 deaths per 100,000 were attributed to arthritis.

## Arthritis and musculoskeletal disorders burden

Arthritis and musculoskeletal disorders were estimated to account for 4% of the disease burden in Australia in 1996, 1% of years of life lost due to premature mortality (YLL) and 7% of years of 'healthy' life lost due to poor health or disability (YLD) (AIHW: Mathers et al. 1999).

## Chronic renal disease

The kidneys act as a filter to help regulate the body's balance of water and a range of other substances in the blood. If the kidneys' functions are impaired or fail, waste products and toxins will build up in the blood, which may be lethal.

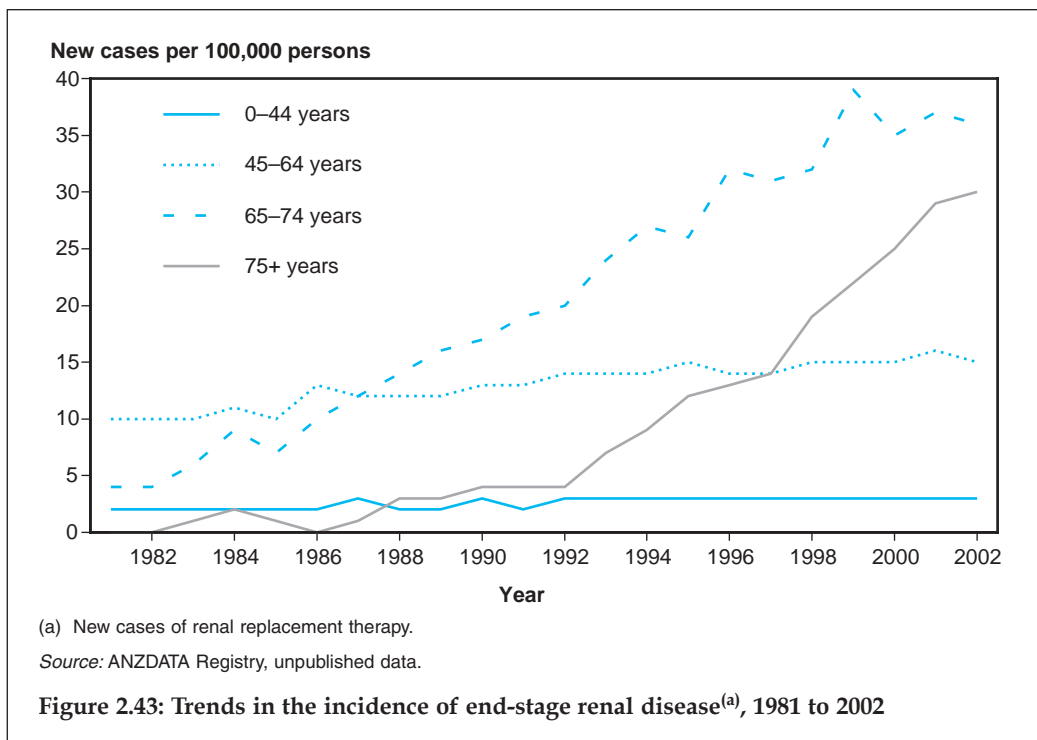
Chronic renal (kidney) disease is marked by long-term and irreversible loss of kidney function. Typically, the onset of symptoms is slow, with kidney function often deteriorating substantially before detection. The disease can affect all the organ systems in the body, but common problems include fluid retention, high blood pressure, anaemia and loss of appetite. The condition reaches end-stage renal disease (ESRD) when approximately 90% of the kidney function has been lost. Dialysis or transplantation is then required to sustain life.

Kidney disease contributes substantially to mortality and disability in Australia, especially in the Indigenous population. However, its overall impact is difficult to assess, due to the limited and disparate nature of the data. While mortality and hospitalisation data provide some useful information, reliable data on incidence and prevalence are limited to ESRD. ESRD data are compiled by the Australian and New Zealand Dialysis and Transplantation Registry (ANZDATA) from all persons undertaking renal replacement therapy, that is, persons on dialysis or living with a kidney transplant.

## Incidence of ESRD

According to ANZDATA, 1,855 persons (1,117 males and 738 females) began treatment for ESRD in 2002, compared with 556 in 1981. The average age of patients beginning treatment in 2002 was 59.3 years (McDonald & Russ 2003), well above the average of 42.3 years in 1981.

The incidence of ESRD below the age of 45 was stable between 1981 and 2002 but for the age group 45–64 the incidence increased by 50% (from 10 to 15 per 100,000 population). During this period, incidence in the age group 65–74 increased to ninefold (from 4 to 36 per 100,000). For the oldest age group (75 and above), the reported incidence of ESRD, low until 1992, was 30 per 100,000 in 2002 (Figure 2.43). The increasing prevalence of diabetes is a major contributor to this rise in ESRD incidence.



## Prevalence of ESRD

At the end of 2002, a total of 12,960 persons registered with ANZDATA were receiving renal replacement therapy (dialysis or transplantation), an age-standardised rate of 65 per 100,000 persons. The prevalence was higher in males (78 per 100,000) than in females (53 per 100,000). ESRD prevalence increases rapidly with age, being the highest (193 per 100,000) among persons aged 65–74 in 2002.

The prevalence of ESRD has almost tripled since 1981 (Figure 2.44). While some of this increase may be attributed to a higher incidence of kidney failure, improved management of other illnesses and new technologies are also likely to have contributed to these numbers by keeping people alive.

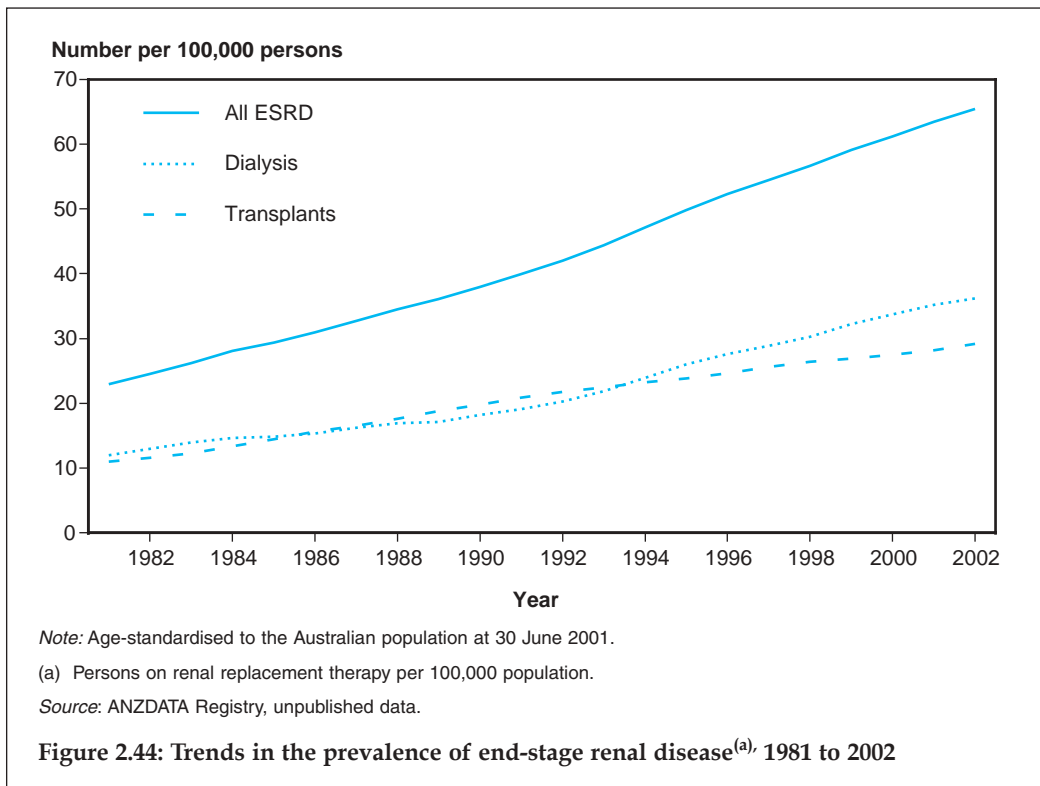
Up to 1994, about half of those receiving renal replacement therapy were undergoing dialysis and the rest were living with a kidney transplant. Since then, the proportion of those on dialysis has increased rapidly. By 2002, 56% of persons registered with ANZDATA were undergoing dialysis and 44% had transplants. The higher average age of persons on renal replacement therapy is one factor contributing to this shift, as older persons are less likely to opt for or be accepted for transplantation. Another factor is the low growth in the availability of donor organs.

## Risk factors

A variety of risk factors contribute to the development of renal disease. A leading underlying cause (especially among younger people) is glomerulonephritis. This is a

group of diseases marked by inflammation of the filters (glomeruli) of the kidney. There are several causes of glomerulonephritis, including some infections, but most cases are due to other diseases where the body attacks these filtering units. Diabetes is another major risk factor that affects kidney function by damaging blood vessels, leading to diabetic nephropathy. High blood pressure (hypertension) also causes a narrowing and thickening of vessels in the kidneys, impairing the kidneys' filtering ability. Individuals with both diabetes and high blood pressure are at much higher risk of kidney disease.

Over one-quarter (27%) of new ESRD cases in 2002 were due to glomerulonephritis. Diabetic nephropathy was the second most common cause (26%), followed by hypertension-induced kidney damage (16%). The fourth major cause of ESRD, polycystic kidney disease (6%), is an inherited condition in which many cysts form in the kidney and can slowly replace the mass of the kidneys, leading to renal failure (McDonald & Russ 2003).



## Use of health services

'Care involving dialysis' was the leading cause of hospital separations in Australia, with a total 636,010 separations (367,861 males and 268,149 females) in 2001–02, almost 10% of separations in that year and an increase of 10% from the previous year. These high numbers reflect the need for persons undergoing dialysis to receive treatment three to

four times per week. The dialysis separation rates were markedly higher in older age groups, peaking among those aged 65–74 at 39.2 per 1,000 males and 26.5 per 1,000 females.

There were another 11,601 hospital separations in 2001–02 with a principal diagnosis of kidney failure. Males (56%) were more likely to have such a separation than females (44%). The average length of stay for this diagnosis was 7.7 days for males and 8.4 days for females.

## **Mortality and comorbidity**

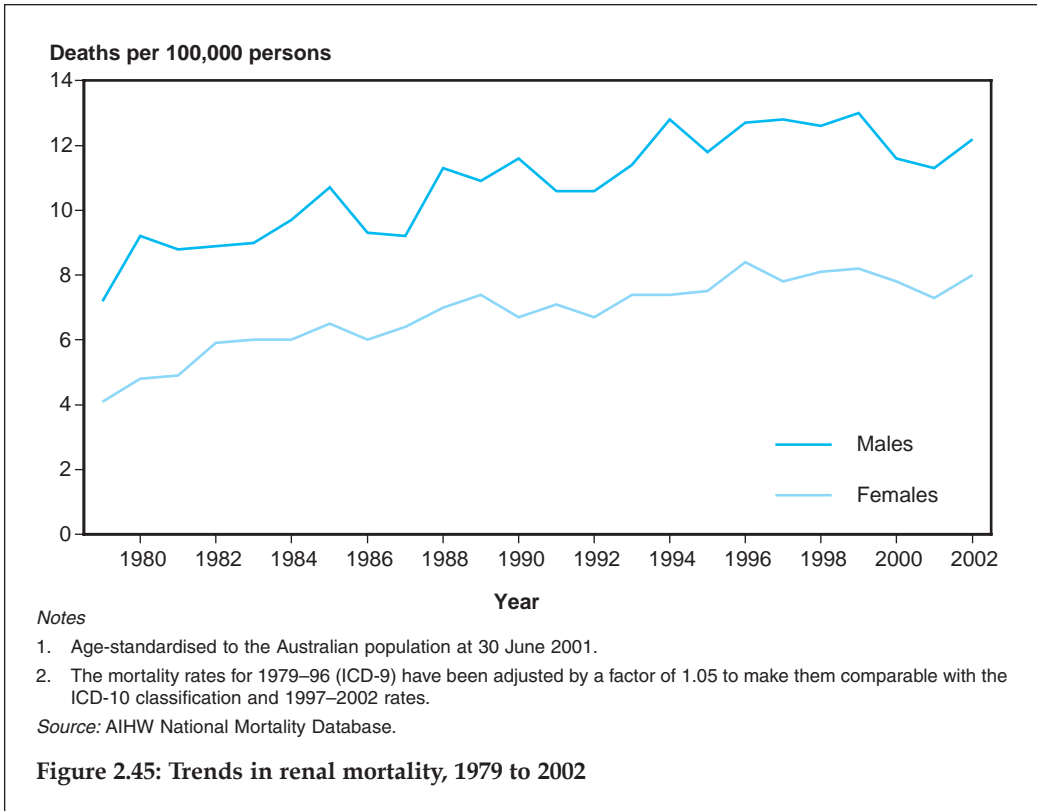
Kidney failure is a common cause of death, responsible for 1,925 deaths in 2002 (1.4% of all deaths in Australia in that year). In addition, kidney failure was listed on death certificates as an additional cause in a further 13,361 deaths. While ranked twelfth as an underlying cause of death in 2002, it was ranked seventh by the ABS as the leading cause of death if all death certificate listings were taken into consideration. The proportion of kidney failure as an underlying cause of death to all listings of kidney failure was 14.4%, a low number in comparison with other major chronic diseases (ABS 2003c). There is also likely to be underreporting of kidney disease on death certificates (Li et al. 2003).

Kidney failure also leads to a variety of complications, especially heart disease. Multiple cause of death data reveal that in only 7.0% of the cases where kidney failure was listed as the underlying cause of death, no other condition was listed. In all remaining cases, one or more associated causes were given. Heart failure and coronary heart disease were the most prominent associated conditions, listed in 28.6% and 26.1% of cases, respectively. Of the cases where kidney failure was the underlying cause of death, influenza and pneumonia, septicaemia, stroke and diabetes were the other prominent causes listed.

Kidney failure was listed as an associated cause in 23.6% of deaths where diabetes was the underlying cause of death, and in 19.5% of deaths due to heart failure. Of the 13,361 deaths in 2002 for which kidney failure was listed as an associated cause of death, coronary heart disease was the most common underlying cause of death (20.1% of listings). Malignant neoplasms (cancers) were the second most common underlying cause of death (16.3%).

Mortality from kidney failure in Australia increased steadily until the mid-1990s but has fluctuated slightly since then. The age-standardised death rate for kidney failure in 2002 was 12.2 per 100,000 males and 8.0 per 100,000 females (Figure 2.45).

Deaths from kidney failure occur at much higher rates in the Indigenous population than in the non-Indigenous population. In Queensland, Western Australia, South Australia and the Northern Territory (the four jurisdictions with adequate identification of Indigenous status in death registrations), there were 63 Indigenous deaths due to kidney failure in the period 2000–2002. This equates to an age-standardised death rate of 40 per 100,000, about five times the rate of the non-Indigenous population in those jurisdictions.



## Nervous system disorders

The nervous system consists of the brain, spinal cord and peripheral nerves. Damage or disturbance of these tissues are termed nervous system disorders or neurological diseases.

The most familiar of the nervous system disorders are Huntington’s disease, motor neurone disease (MND), Parkinson’s disease, Alzheimer’s disease, multiple sclerosis (MS), epilepsy, carpal tunnel syndrome, muscular dystrophy and cerebral palsy. Bacterial infections of the central nervous system (some forms of meningitis and encephalitis), sleep disorders (including sleep apnoea) and headaches (including migraine) are other common nervous system disorders. Several diseases and conditions, including dementias (ICD-10 codes F01–F03) and viral infections of the central nervous system, for example, Creutzfeldt-Jakob disease or CJD (ICD-10 code A81), are closely related to this group of disorders.

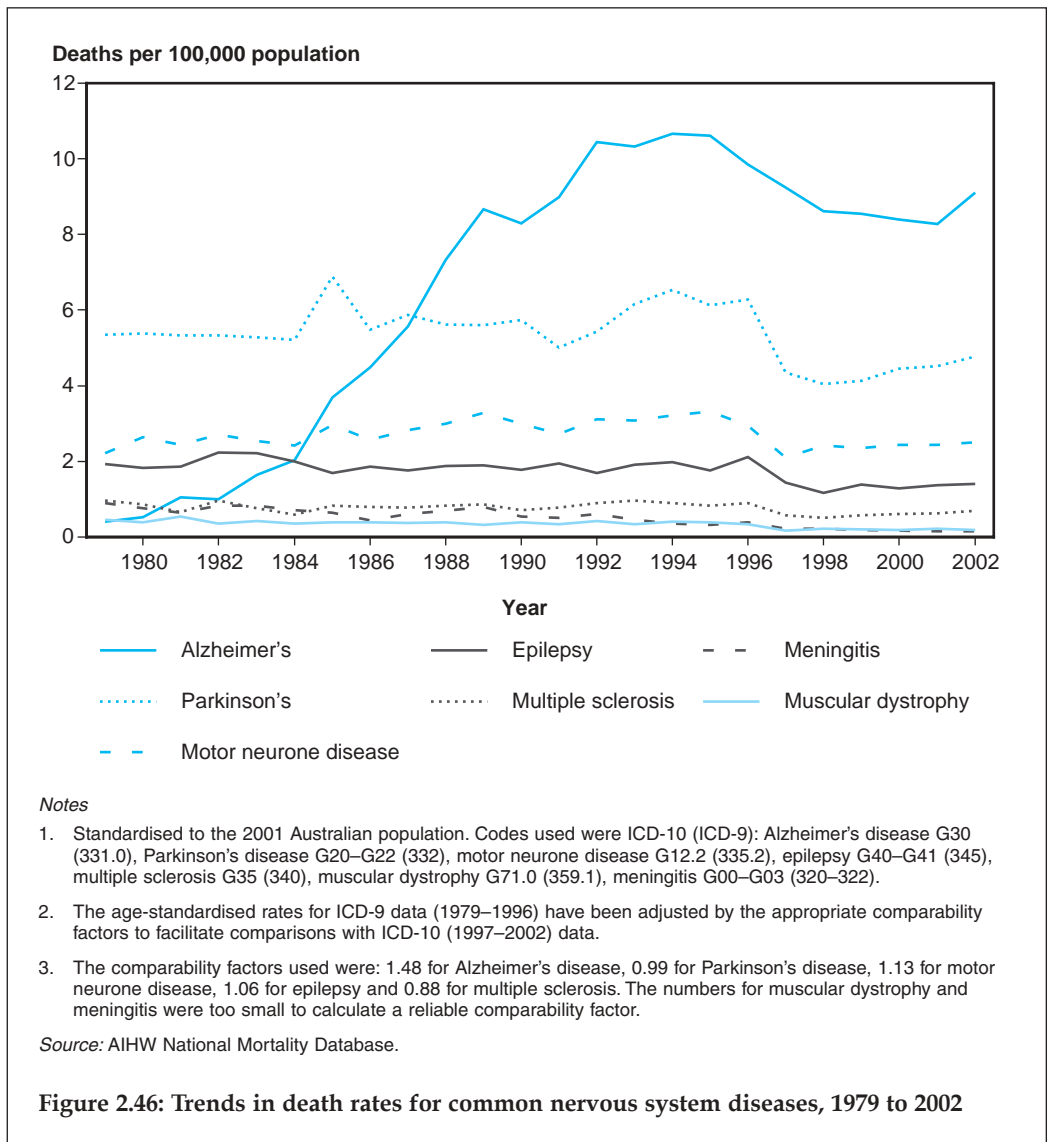
### Prevalence

From self-reports in the 2001 National Health Survey, over 1.4 million Australians had a nervous system disease in that year. More than three-quarters of these (about 1.2 million persons) had migraine, 120,300 had epilepsy, and 170,000 had other diseases of the nervous system (ABS 2002c). No specific prevalence information is available from the National Health Survey on Alzheimer’s disease, a major cause of mortality within this category.

## Mortality

Nervous system disorders were the underlying cause of 4,622 deaths in 2002. Alzheimer's disease accounted for 40% of these deaths, followed by Parkinson's disease (21%) and MND (11%).

There has been a significant increase in the death rate for nervous system disorders over the last several decades. The age-standardised rate increased from 13.3 deaths per 100,000 persons (after adjusting for coding changes) in 1979 to 23.0 deaths per 100,000 persons in 2002. Alzheimer's disease is responsible for much of the increase in death rates for the nervous system (Figure 2.46).



The majority of deaths from nervous system disorders occur in older ages. However, this category is also a leading cause of death at younger ages, although the numbers are small (Table 2.16). Fatal nervous system diseases in the younger age groups include spinal muscular atrophy and infantile cerebral palsy. Epilepsy and muscular dystrophy were major contributors to these deaths among those aged 15–44.

Previous editions of *Australia's Health* (2000 and 2002) have provided specific information on dementias (including Alzheimer's disease), epilepsy, Parkinson's disease and MS. This edition focuses on MND.

## **Motor neurone disease**

MND refers to a group of degenerative diseases affecting the nerves (motor neurones) which transmit instructions from the brain to the spinal cord and from there to the muscles. The disease causes progressive weakness and wasting of the muscles, impairing a wide range of functions such as moving, talking and breathing. Symptoms depend on which groups of motor neurones are affected first.

Those who develop the disease are generally not mentally impaired, their senses are not affected, and they preserve control of bladder, bowel and sexual functions (NINDS 2003; Brown 1998).

The disease progresses rapidly and survival is usually around three to five years, but can be up to 10 years or (in a few cases) more. Death can occur from respiratory failure or cardiac arrhythmia as a result of progressive muscle weakening (ATSDR 2002).

MND is the third largest cause of nervous system mortality after Alzheimer's disease and Parkinson's disease (Figure 2.46). Incidence and prevalence data are not readily available, but because of the rapid progression of the disease, mortality may reasonably reflect patterns of incidence. The cause of MND is unknown and there is currently no cure.

Males are more likely to develop MND than females. This difference is reflected in death rates, 3.2 deaths per 100,000 males and 1.9 deaths per 100,000 females in 2002. Although the disease can affect a person at any age, over 90% of deaths occur in people aged 45 and above.

Mortality from MND has increased significantly in Australia and other western countries since the late 1950s and the reasons for this are not known (ATSDR 2002).

## **Nervous system disorders burden**

Disorders of the nervous system were estimated to account for 9% of the disease burden in Australia in 1996, 4% of years of life lost due to premature mortality (YLL) and 16% of years of 'healthy' life lost due to poor health or disability (YLD) (AIHW: Mathers et al. 1999).

## **Dental problems**

Dental problems are common and there are two main types: dental caries (tooth decay) and periodontal (gum) disease. This section focuses only on dental caries.

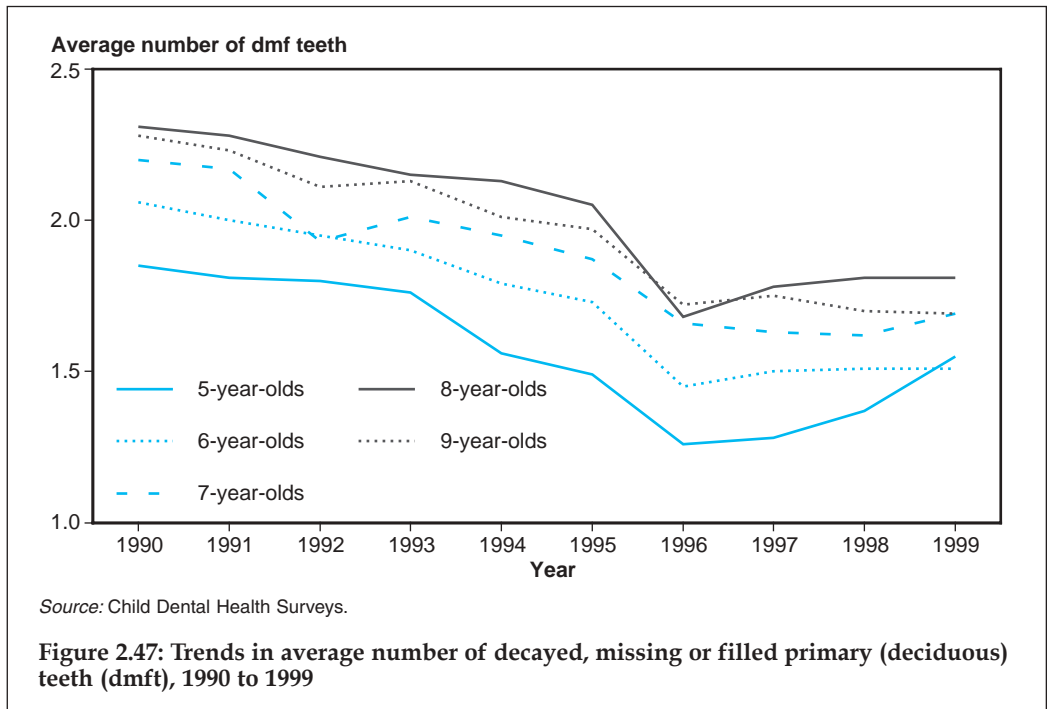
Information about children's dental problems is collected in the Child Dental Health Survey, a surveillance activity undertaken by the AIHW Dental Statistics and Research Unit. This is an annual survey of children examined through the school dental services administered by each state and territory. The data for the Child Dental Health Survey

are derived from the routine examinations of children enrolled in the service. For adults, information on dental problems is available from a number of national surveys.

A useful indicator of tooth decay is the average number of decayed, missing or filled teeth. For 'baby' or primary (deciduous) teeth in children, this number is put into a score known as 'dmft', and for permanent teeth the score is known as 'DMFT'. Because these scores tend to be concentrated at the lower end, dental health levels can also be monitored by focusing on those with a significant degree of tooth decay.

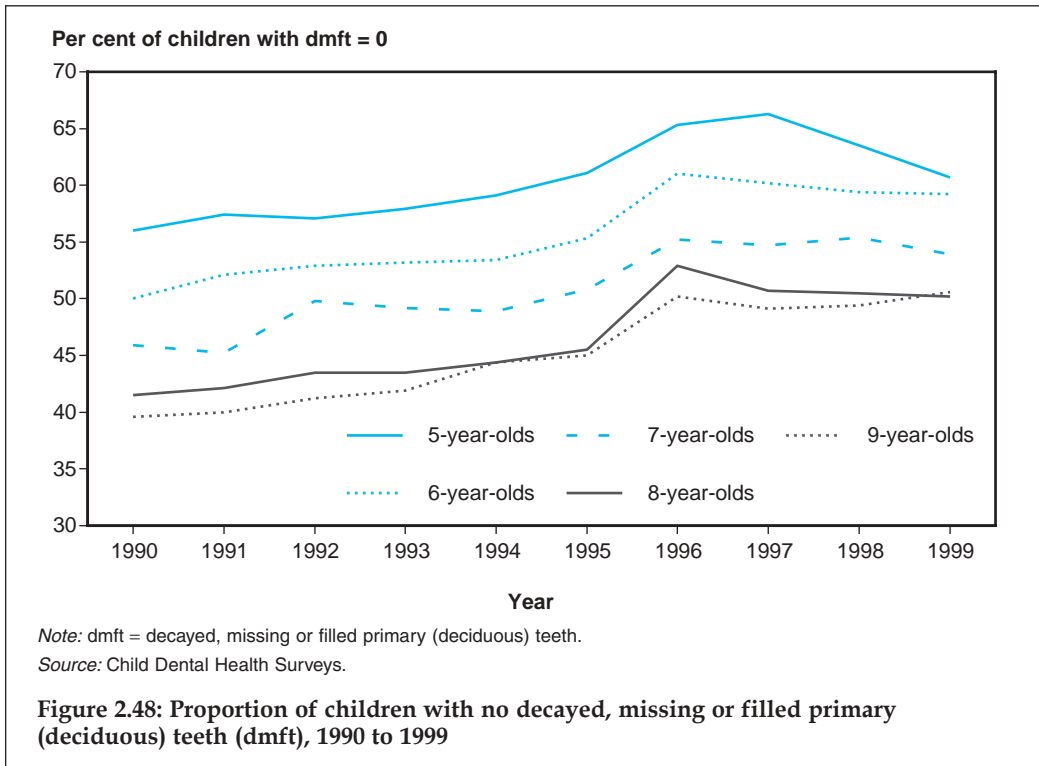
### Decayed, missing and filled teeth

Tooth decay among children has greatly declined over the levels first observed in 1977, but it is now apparent that dental improvements have stalled in older children and that the caries experience of younger children is increasing. For example, the average dmft for 5–9-year-olds improved markedly between 1989 and 1996, but between 1996 and 1999 it increased for all but the 9-year-olds (Figure 2.47). On the other hand, DMFT scores have levelled off in recent years and between 1996 and 1999, only 12- and 13-year-olds showed reductions in decay experience.



The pattern in dmft is mirrored by the underlying trend in the proportion of 5–9-year-old children presenting to school dental services with no current or previous decay in their deciduous teeth, that is, no dmft (Figure 2.48). The proportion increased from 1990, peaking in 1996 for 6–9-year-olds and in 1997 for 5-year-olds, with most of the age groups showing a modest decline after that. The information from Figure 2.47 and Figure 2.48 indicates that the increases in average number of clinically detectable,

untreated, decayed teeth, seen from 1996 onwards, are a result of more children presenting with decay, rather than children with previous decay simply presenting with more. The rates of deciduous caries among Australian children were historically low up to 1996, but the change since then is significant.



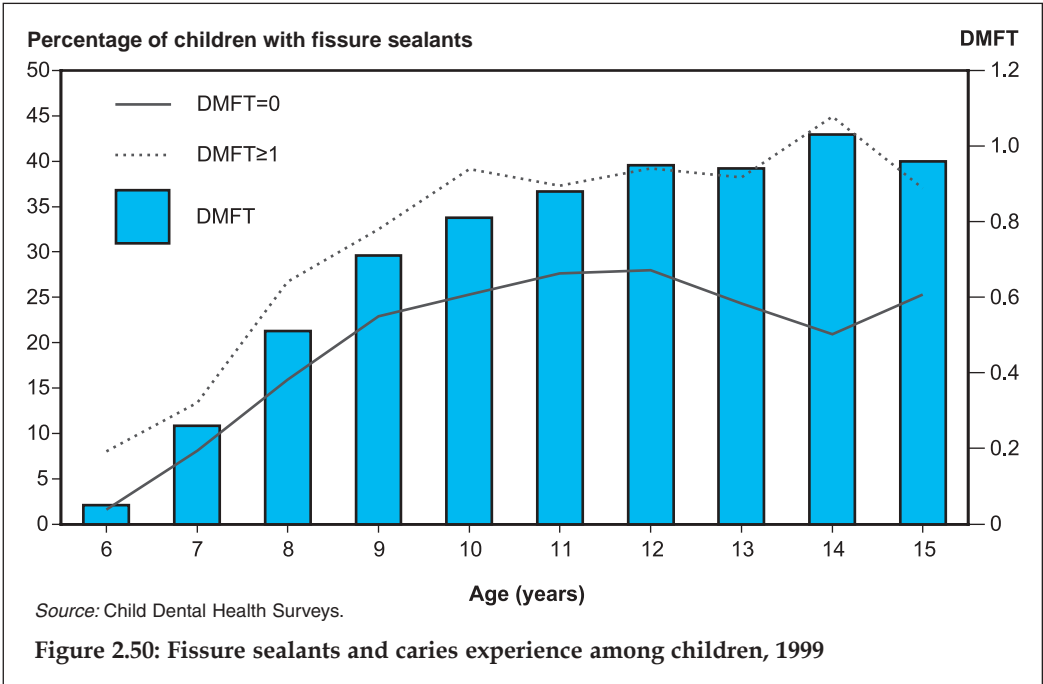
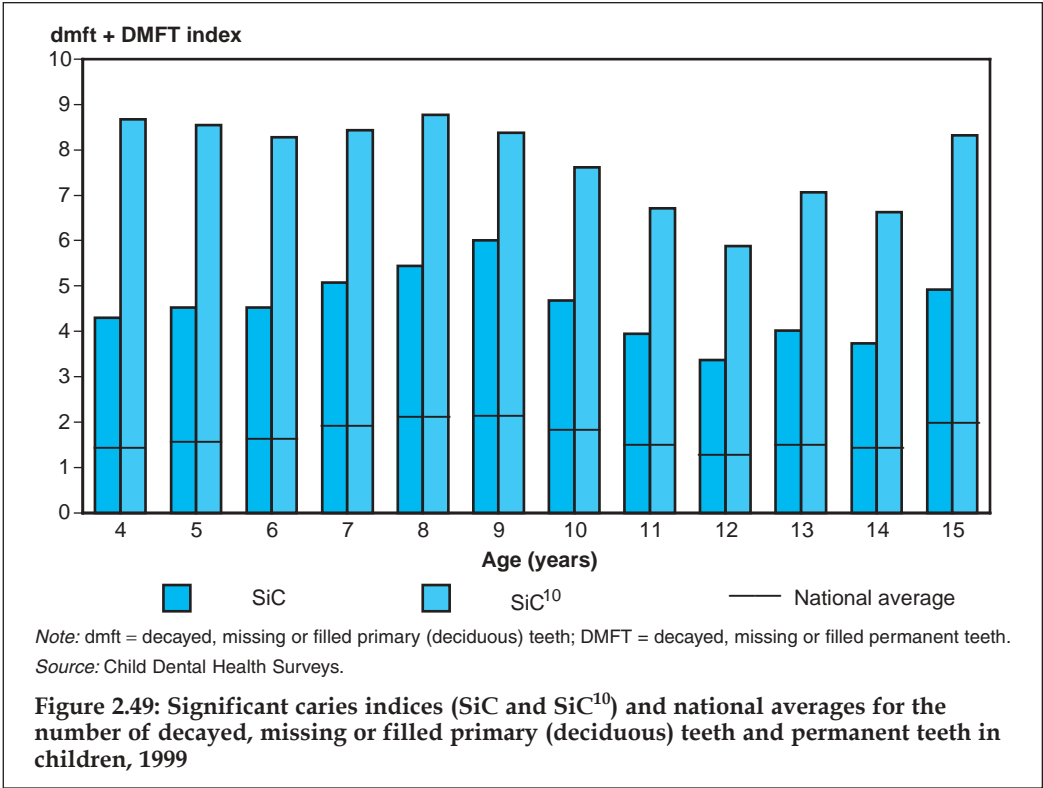
## Significant caries index

A small minority of Australian children experience a considerable caries burden. Their dental burden is illustrated in Figure 2.49 by using the significant caries index (SiC). The index is calculated by averaging dmft or DMFT scores of the one-third of the population with the highest caries experience. A modified index, SiC<sup>10</sup>, based on the 10% of the population with the highest caries experience, draws further attention to the extent of the problem.

The SiC in 1999 ranged between 3.4 and 6.0 affected teeth for the combined deciduous and permanent dentition of 4–15-year-olds (Figure 2.49). The SiC<sup>10</sup> scores range from 5.9 affected teeth (12-year-olds) to almost 8.8 (8-year-olds).

## Prevention of tooth decay

One of the main ways to prevent tooth decay in children is to apply sealant to the fissures of teeth considered to be 'at risk'. The average number of fissure sealants present in Australian children increases with age (see Figure 2.50). In 1999, approximately 32% of 12-year-old children had at least one fissure sealant.

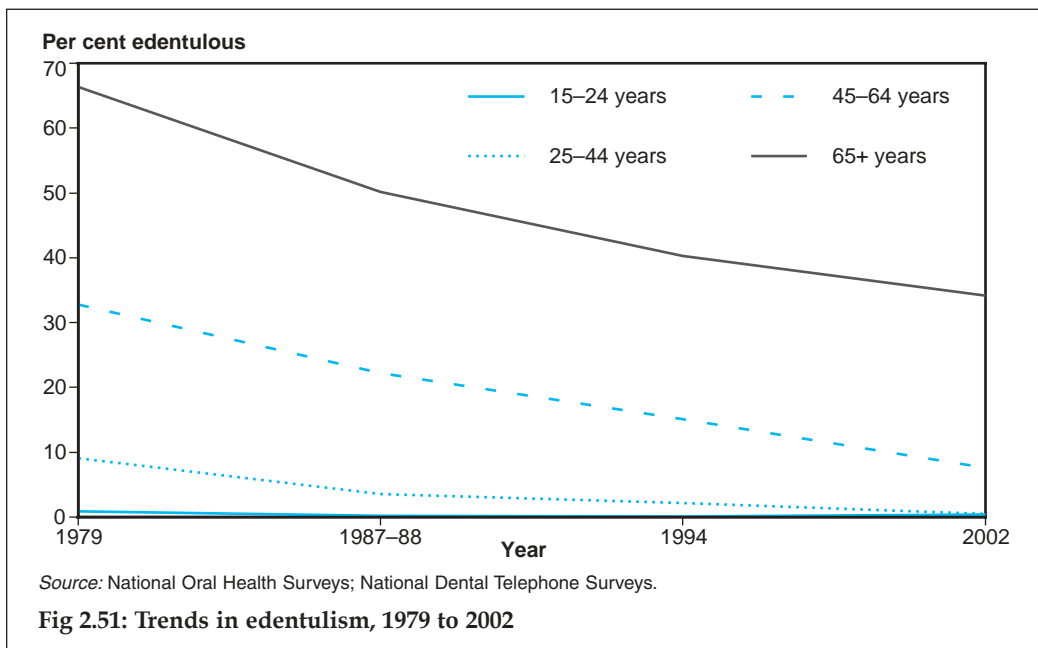


For every age between 6 to 15 years, children with permanent caries experience (DMFT ≥ 1) were considerably more likely to have a fissure sealant than children with no permanent caries experience (DMFT = 0). This reflects the targeting of fissure sealants to children deemed to be more at risk of being affected by future dental decay.

### Trends in edentulism

Edentulism—the loss of all natural teeth—is a fundamental indicator of oral health status. It is both an endpoint of oral disease experienced over the life course and the consequence of its treatment by dental extraction. Hence, it reflects both the underlying trends in oral disease and varying access to dental treatment.

The prevalence of edentulism has rapidly declined in Australia during the last three decades. In 1979, approximately one-fifth (20.5%) of individuals aged 15 or older were edentulous. By the time of the National Oral Health Survey in 1987–88, the prevalence had halved to 11.8%. Subsequent National Dental Telephone Interview Surveys, conducted in 1994 and 2002, revealed continuing declines to 10.7% and 8.7%, respectively. While edentulism was consistently greater in older age groups, downward trends were observed across all age groups (Fig 2.51). Some of this decline is explained by changing dental treatment approaches over the past half-century, during which patients and dentists increasingly chose to treat dental diseases by means other than extraction.



Regardless of the factors driving this reduction, the declining rate of edentulism has important implications for the oral health of the Australian population and the delivery of dental services, particularly among older Australians. For example, as more people retain teeth, those teeth continue to be susceptible to decay and gum disease, with the consequence that a growing number of Australians have an ongoing need for preventive and restorative dental treatment throughout their lifetime.

## 2.7 Communicable diseases

Communicable diseases are illnesses due to specific infectious agents or their toxic products. Bacteria cause diseases such as pertussis (whooping cough) and tuberculosis; viruses cause diseases such as measles, influenza and AIDS; fungi are responsible for conditions such as tinea; protozoan parasites cause a variety of diseases including malaria; and bacterial toxins are responsible for conditions such as some forms of food poisoning. Infestations of larger parasites such as head lice as well as diseases such as transmissible spongiform encephalopathies (TSEs), which are spread through infectious particles, are also regarded as communicable diseases.

The impact or status of communicable diseases may be assessed by measuring a variety of factors such as how commonly they occur, their virulence, transmission rates, herd immunity, recovery rates and survival. However, several of these factors are difficult to measure directly. Therefore, indicators such as disease notifications, hospital separations and cause of death data are used to monitor communicable diseases.

Notification is the surveillance method used in Australia, coordinated under the National Notifiable Diseases Surveillance System (NNDSS). This system compiles information on more than 50 communicable diseases (see Box 2.7). Information on hospital separations and causes of death is available from the National Hospital Morbidity Database and National Mortality Database respectively. Self-reports, visits to GPs, laboratory investigations and special surveys are other useful sources of information but have not been integrated into the communicable diseases surveillance systems.

### **Box 2.7: Disease notification in Australia**

*A disease may be made notifiable to state and territory health authorities depending on its significance to public health. Information on more than 50 notifiable communicable diseases is available from the National Notifiable Diseases Surveillance System.*

*Surveillance of communicable diseases varies between jurisdictions, as each state and territory has specific requirements under their public health legislation for notification by medical practitioners, laboratories and hospitals. The notifiable diseases and the case definitions may also vary between jurisdictions.*

*Newly diagnosed HIV infection and AIDS are notifiable conditions in every state and territory. The National Centre in HIV Epidemiology and Clinical Research compiles HIV/AIDS notifications.*

Following a brief overview of communicable diseases, this section presents detailed information on various communicable diseases according to major modes of transmission. These are respiratory infections, bloodborne diseases, sexually transmitted infections, gastrointestinal infections, vectorborne diseases and other bacterial infections. Vaccine preventable diseases are also discussed, detailing the outcomes of prevention and control of communicable diseases in Australia through vaccination. Finally, Creutzfeldt-Jakob disease (CJD) and similar diseases are discussed, as well as emerging infectious diseases, such as severe acute respiratory syndrome (SARS) and avian influenza subtype H<sub>5</sub>N<sub>1</sub>.

## Trends in communicable diseases

Communicable diseases were responsible for a large proportion of mortality and morbidity in Australia in the early part of the 20th century. Their incidence and associated morbidity and mortality have declined significantly, mainly due to improvements in hygiene (building on advances begun in the 19th century), and the introduction of antibiotics and mass immunisations. However, mortality associated with influenza and pneumonia remains high in the older age groups. The threat of resurgence of communicable diseases also remains.

Disease notifications and mortality data are used to illustrate the status of communicable diseases in Australia.

### Disease notifications

There were 100,684 notifications of communicable diseases to the NNDSS in 2002. Major diseases notified were: bloodborne diseases, gastrointestinal diseases, sexually transmissible diseases, vaccine-preventable diseases, vectorborne diseases and zoonoses. Bacterial infections such as legionellosis, leprosy, meningococcal infection and tuberculosis were also notified.

The category most commonly notified was that of sexually transmissible infections (STIs), followed by gastrointestinal diseases and bloodborne diseases. The number of NNDSS notifications has increased to more than threefold since the establishment of the system in 1990, but some of this increase is due to expansion in the list of notifiable diseases. Reductions in notifications have occurred for several communicable diseases, in particular vaccine-preventable diseases (Table 2.25).

**Table 2.25: Comparisons of maximum and current NNDSS<sup>(a)</sup> notifications of selected communicable diseases in Australia since 1991**

Infection	Maximum (NNDSS)		2002 (NNDSS)	Reduction (%)
	Number	Year		
Measles	4,805	1994	31	99.4
Rubella	5,750	1995	255	95.6
<i>Haemophilus influenzae</i> type b (Hib)	533	1991	29	94.6
Hepatitis A	3,044	1997	388	87.3
Pertussis	10,828	1997	5,388	50.2
Hepatitis C (unspecified)	19,532	2001	15,981	18.2
Hepatitis B	8,413	2001	6,916	17.8
Tuberculosis	1,143	1999	1,028	10.1
Salmonellosis	7,756	2002	7,756	0
Cryptosporidiosis	3,255	2002	3,255	0
Meningococcal infection	684	2002	684	0

(a) NNDSS = National Notifiable Diseases Surveillance System.

Note: Maximum (NNDSS) denotes maximum number of notifications since the establishment of the NNDSS; 2002 (NNDSS) denotes the latest count.

Source: Yohannes et al. 2004.

### Mortality

Almost 5,000 deaths in 2002 (around 3.7% of all deaths in Australia that year) were due to communicable diseases, an age-standardised death rate of 24.5 per 100,000 persons.

Deaths were concentrated in the older age groups, reaching a high of 811 per 100,000 among those aged 85 and above.

## Acute respiratory infections

Acute respiratory infections, or ARIs (ICD-10 codes J00–J22)—including upper and lower respiratory tract infections, influenza and pneumonia—are a large cause of acute illness, hospitalisation and mortality in Australia. Several types of infectious agents cause ARI, such as influenza viruses, *Streptococcus pneumoniae* and respiratory syncytial virus (RSV). People with chronic diseases, children, the elderly and Indigenous Australians are at increased risk for these infections.

Respiratory infections constitute the most frequently managed problem in general practice, with upper respiratory tract infections (URTI) accounting for 4.4% of all problems managed in 2002–03 (AIHW: Britt et al. 2003). This high rate is mainly due to influenza-like illnesses which annually affect between 10% and 20% of the general population. ARIs are also the most frequently managed new problem in primary care (5.1 URTI cases per 100 GP encounters in 2002–03).

A total of 126,075 hospital separations in 2001–02 had ARI listed as the principal diagnosis, a large proportion (42,492 separations) of these being children aged 0–4. Those aged 50 and above accounted for 40% of these separations. Most adult ARI hospitalisations are due to pneumonia and influenza. Other respiratory infections such as RSV and parainfluenza virus are major causes of child hospitalisation.

In 2002, ARIs were the underlying cause of 3,165 deaths (1,395 males, 1,770 females), making this group the leading cause of death from infectious diseases. Most of the ARI deaths are concentrated in older age groups, with an average age at death of 78.8 years for the males and 82.5 years for the females in 2002. The contrast between the age distributions relating to ARI hospital separations and ARI mortality is noteworthy.

The majority (97.4%) of ARI deaths in 2002 were due to influenza and pneumonia (ICD-10 codes J10–J18), with an age-standardised rate of 15.2 per 100,000 persons (Table 2.26). As a single category, influenza and pneumonia ranked ninth for females and eleventh for males among the most common causes of death.

**Table 2.26: Death and hospital separation rates for influenza and pneumonia, 1997 to 2002**

Year	Mortality		Year	Hospital separations	
	Influenza	Pneumonia		Influenza	Pneumonia
1997	1.3	12.4	..	..	..
1998	0.7	11.2	1997–98	21.25	354.32
1999	0.4	10.3	1998–99	15.53	338.92
2000	0.4	15.4	1999–00	13.67	319.94
2001	0.2	13.8	2000–01	12.36	305.93
2002	0.3	14.9	2001–02	9.41	311.59

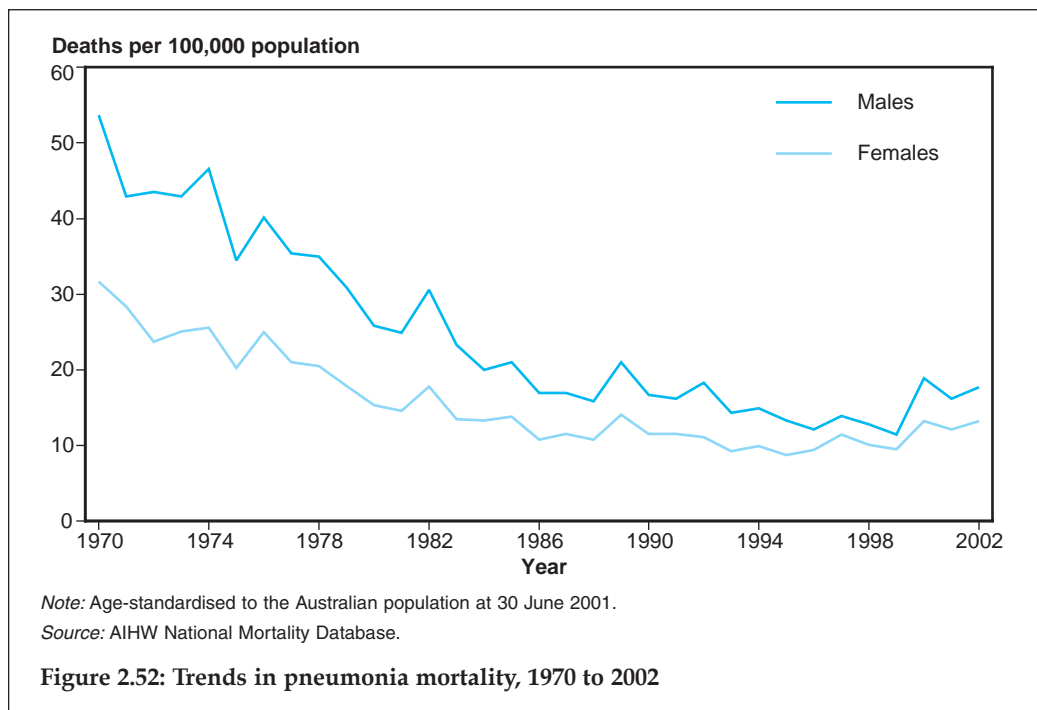
.. Not applicable.

*Note:* Both mortality and hospital separation rates, given as per 100,000 population, are age-standardised to the Australian population at 30 June 2001.

*Sources:* AIHW National Mortality Database; AIHW National Hospital Morbidity Database.

## Trends in pneumonia mortality

Time series since 1970 reveal interesting trends in pneumonia mortality. During the period 1970–86, death rates for pneumonia declined considerably, by almost half, with the decline slowing between 1987 and 1998. There has been some rise between 1999 and 2002, with most of the increase being among males (Figure 2.52).



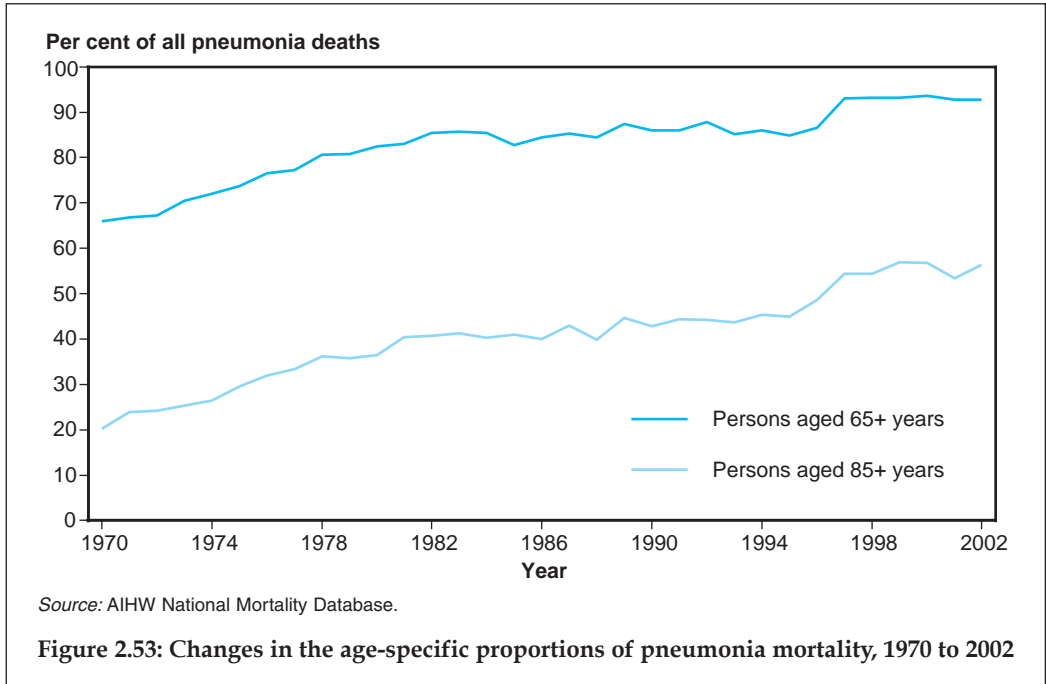
Another noteworthy trend is a shift in the age at which pneumonia deaths most commonly occur. In Australia, most of the pneumonia deaths occur among the elderly. Lately, the number of pneumonia deaths among those younger than 65 has declined to less than 200 deaths annually. At the same time, the proportion of pneumonia deaths that occur among the elderly (aged 85 and over) has increased considerably, from 20.2% in 1970 to 56.3% in 2002 (Figure 2.53). The latter trend is not fully explained by changes in the age structure of the population.

## Vaccination

Vaccination provides a way to prevent some of the many cases of, and complications from, influenza and pneumonia. Annual influenza vaccines, particularly if the vaccine matches the circulating virus strains closely, are helpful in reducing morbidity and, for individuals at high risk of complications, mortality.

In 1999, the Australian Government initiated funding of the Influenza Vaccine Program for Older Australians. The program is designed to remove cost and physical barriers that may prevent older Australians from accessing influenza vaccines. Almost 77% of Australians aged 65 and above were vaccinated against influenza in 2002, a rate similar to that in 2001 (AIHW 2003f).

In October 2001, a vaccine was introduced for children at high risk of invasive pneumococcal disease, for persons of Aboriginal or Torres Strait Islander descent or for individuals with medical conditions predisposing to pneumococcal disease. In September 2003, the recommendation for vaccination was broadened to include all Australian children at 2, 4, and 6 months of age.



## Bloodborne diseases

Bloodborne diseases are caused by infections spread via blood, blood products and body fluids. Although there are other modes of transmission, including sexual contact, blood is an important vehicle for the spread of these diseases, which include HIV/AIDS and viral hepatitis in particular.

### HIV/AIDS

Acquired immune deficiency syndrome (AIDS) is caused by the human immunodeficiency virus (HIV). Through the destruction of key cells of the immune system, untreated HIV reduces human immune function to such a degree that ordinarily harmless pathogens and infections become deadly.

An estimated 13,120 people were living with HIV/AIDS in Australia in 2002. National surveillance indicates an increase in HIV diagnoses lately but the number of AIDS cases has remained relatively stable.

### HIV infection and diagnosis

The number of new diagnoses of HIV infection in Australia (adjusted for multiple reporting) declined from 1,077 in 1993 to 657 in 1998, and then increased to 808 in 2002.

The number of newly acquired cases of HIV infection (the subset of cases of newly diagnosed HIV infection with evidence that it was acquired within the past 12 months) similarly declined to 151 in 1998, but increased to 241 in 2002. Newly acquired HIV infections represent a minimum estimate of rates of HIV transmission.

The vast majority of new HIV diagnoses were among males with a history of homosexual contact; relatively small numbers were attributed to injecting drug use or heterosexual contact. HIV prevalence remained below 1% among each of the following: those attending needle and syringe programs, those entering prison, and those individuals with a history of heterosexual contact only who were seen through sexual health clinics.

### **AIDS prevalence, survival and mortality**

By 31 December 2002, a cumulative total of 9,083 AIDS cases and 6,272 deaths following AIDS had been notified in Australia. Between 1999 and 2002, AIDS incidence remained stable at around 200–250 cases per year.

Survival following AIDS increased from 17.4 months in 1993 to 38.4 months in 1999. Around 52% of people with HIV/AIDS were receiving anti-retroviral treatment in 2002.

HIV/AIDS was the underlying cause of 111 deaths (101 males and 10 females) in 2002. Deaths from HIV/AIDS peaked in 1993, and have since decreased annually by about 18% for males and 10% for females.

### **HIV/AIDS among Indigenous Australians**

The rate of HIV/AIDS diagnosis in the Indigenous population was similar to that in the non-Indigenous population during 1998–2002. However, relatively higher proportions of new HIV diagnoses among Indigenous Australians were attributed to a history of heterosexual contact (37% versus 21% in other Australians) or injecting drug use (20% versus 4%).

### **Chronic viral hepatitis**

Viruses are a significant cause of illness and hepatitis (inflammation of the liver). While some types of viral hepatitis may be cured, others lead to long-term morbidity.

In 2002, 390 cases of newly acquired hepatitis B infection were diagnosed in Australia, at an annual incidence rate of 2.0 per 100,000. The principal cause of morbidity and mortality from hepatitis B is its chronic nature. Chronic infection may lead to cirrhosis of the liver and liver cancer, usually over a prolonged period. The risk of chronic infection is greatest in those infected as infants, particularly in the perinatal period. Preventive efforts in Australia have focused on immunisation of all newborns since 2000.

An estimated 225,000 people were living with hepatitis C in Australia in 2002, with around 16,000 notifications of hepatitis C that year. The high numbers of newly acquired hepatitis C indicate continuing hepatitis C transmission, which occurs through injecting drug use (see also the section on needle and syringe programs in Chapter 6).

Hepatitis C was the underlying cause of 31 deaths (19 males and 12 females) in 2002. It was also the primary cause of liver disease for which 41 people received a liver transplant that year. Only 1% of persons infected with hepatitis C were receiving antiviral treatment in 2002.

## Sexually transmitted infections

STI data are collected by the NNDSS, covering chlamydia, donovanosis, gonococcus and syphilis. There were 31,929 STI notifications in 2002, more than double the number in 1997 (15,335). Chlamydia was the most frequently reported infection, with 24,039 notifications in 2002, an increase of 20% over the previous year. The highest number of gonococcal infections since 1991 were also notified, 6,247 cases. The number of syphilis cases was 1,627 in 2002.

## Gastrointestinal infections

Gastrointestinal infections that are notifiable in Australia include botulism, campylobacteriosis, cryptosporidiosis, haemolytic uraemic syndrome (HUS), hepatitis A and E, listeriosis, salmonellosis, shigellosis, shiga-like toxin-producing *E. coli*/verotoxigenic *E. coli* (SLTEC/VTEC) and typhoid. OzFoodNet, a collaborative effort of the Australian states and territories, undertakes enhanced surveillance of foodborne diseases across Australia.

There were 23,434 notifications of potentially foodborne diseases in 2002, about 7.7% more than the average of 21,761 over the previous four years (OzFoodNet 2003). It is widely recognised, however, that notified cases of gastrointestinal illness represent a small fraction of those that occur in the community.

The majority of gastrointestinal notifications were for campylobacteriosis (14,605) and salmonellosis (7,756). There were also notifications of other serious illnesses, including hepatitis A, listeriosis and HUS. Campylobacteriosis (excluding New South Wales) was notified at a rate of 112 cases per 100,000 persons. Salmonella infections, on the other hand, were notified at a rate of 39 cases per 100,000 persons.

Attributing the mode of gastrointestinal infection to specific sources is difficult due to unknown contributions from various modes of transmission. People may contract gastrointestinal infections via food, water, other people, the environment or animals. Despite the difficulties in identifying the pathways, transmission from food is estimated to account for millions of cases of gastroenteritis each year in Australia (Veitch & Hogg 1997).

## Vectorborne diseases

This section presents NNDSS statistics on vectorborne diseases—most of them transmitted by the mosquito—in Australia. The notifications cover diseases caused by alpha viruses (Barmah Forest virus disease and Ross River virus disease), flaviviruses (dengue, Murray Valley encephalitis, Japanese encephalitis and Kunjin virus disease) and protozoans (malaria caused by *Plasmodium*).

### Ross River virus

Infection with Ross River virus is the most commonly notified vectorborne disease in Australia (Table 2.27), with 1,447 notifications in 2002. Ross River virus infections show a seasonal pattern, with peak notifications in the first two quarters of every year. Crude rates were highest in the Northern Territory, and there was an outbreak of Ross River virus in Tasmania in 2002.

## Barmah Forest virus

There were 896 notifications (a crude rate of 4.6 per 100,000 population) of Barmah Forest virus in 2002, the highest number recorded since 1995. As in previous years, the rates were highest in the Northern Territory and Queensland.

## Malaria

Malaria cases notified in 2002 (a total of 466) were mostly from travellers returning from malaria-prone areas. However, 10 cases of malaria in 2002 were local in origin—the first outbreak of malaria in Australia since 1986 (Yohannes et al. 2004).

## Dengue fever

A total of 219 cases of dengue fever were notified in 2002 (crude rate of 1.1 per 100,000 persons). Dengue is not endemic in Australia despite periodic outbreaks, and only 25 cases were acquired within Australia in 2002, all of them in Northern Queensland (Yohannes et al. 2004).

**Table 2.27: Vectorborne disease notifications, 2002**

Disease/infection	Number	Rate per 100,000
Ross River virus	1447	7.4
Barmah Forest virus	896	4.6
Malaria	466	2.4
Dengue fever	219	1.1

Source: Yohannes et al. 2004.

## Other bacterial infections

Other bacterial infections—legionellosis, leprosy, meningococcal infection and tuberculosis (TB)—are notified to NNDSS as well. Australia has one of the lowest rates for TB, which is one of the leading international causes of death. There has been little change in the profile of TB in Australia over the last 10 years.

In 2002, a total of 1,028 cases of TB were notified in Australia, 80% of which were among persons born overseas (Samaan et al. 2003). There were 1,003 hospital separations with a principal diagnosis of tuberculosis in 2001–02, with slightly more hospital separations among females (53%) than males (47%). There were 70 TB deaths (36 males, 34 females) in 2002, an age-standardised rate of 0.4 per 100,000 persons.

## Vaccine-preventable diseases

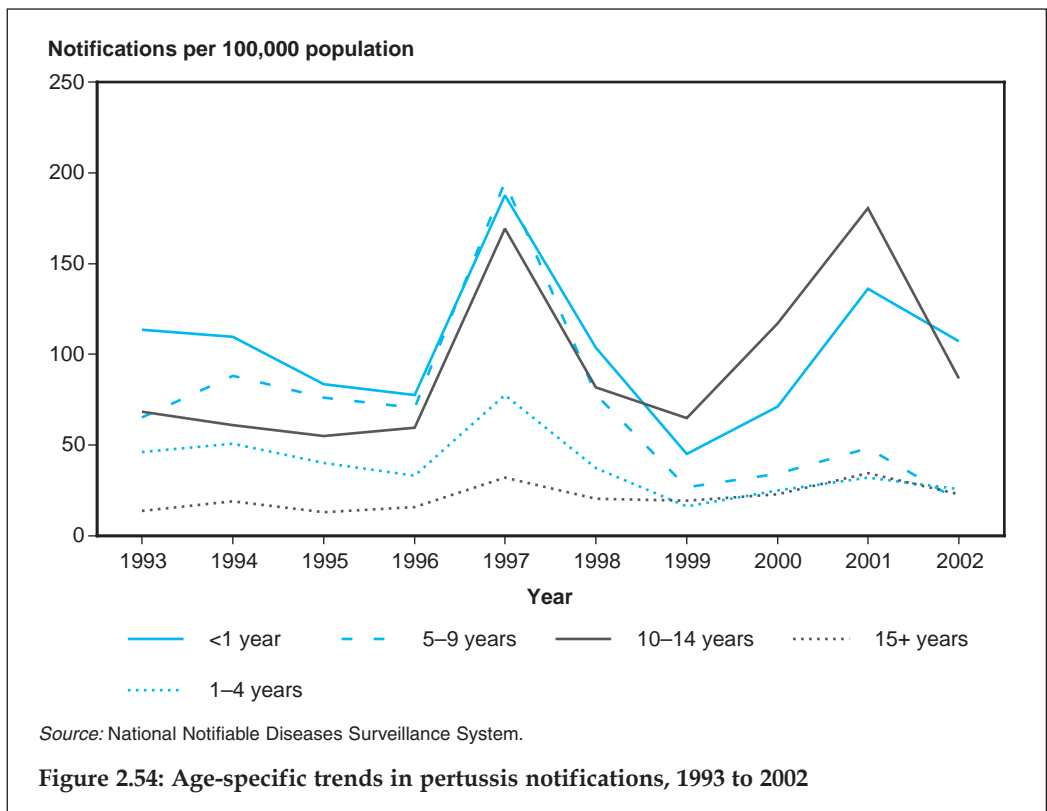
Certain communicable diseases are regarded as ‘vaccine preventable’ and are therefore recommended by the National Health and Medical Research Council (NHMRC) for routine vaccination or immunisation for children in Australia. The resulting Australian Standard Vaccination Schedule is implemented by the National Immunisation Committee. Recent changes which will further reduce the burden of vaccine preventable diseases in Australia occurred in September 2003 when a new schedule was announced. It adds routine meningococcal C vaccination at 12 months of age, amends the administration of diphtheria-tetanus-pertussis vaccine by removing the 18 month dose and requiring one in adolescence, and recommends vaccination for all children against varicella-zoster virus (chickenpox) and invasive pneumococcal disease.

## Whooping cough (pertussis)

Whooping cough is a frequently notified vaccine-preventable disease. Although immunisation is highly effective in children, elimination of pertussis may be difficult. Two groups play an important role in the continuing circulation of the pertussis organism: infants too young to be vaccinated, and adolescents and adults whose protection due to vaccination as children has worn off.

Since 1993, an average of 5,000 cases of pertussis has been notified annually, except in 1997 and 2001. In 2001, an epidemic of pertussis occurred with 9,166 cases notified (48.8 cases per 100,000 persons). A total of 5,388 cases of pertussis were reported by NNDSS in 2002.

During the 2001 epidemic year, the highest incidence (187 cases per 100,000 persons) was among children aged 10–14, a relatively under-immunised group now many years since vaccination. However, in 2002, rates in children less than one year of age (117.4 cases per 100,000) exceeded rates in 10–14-year-old children (85.3 cases per 100,000) for the first time since 1998. This was due to a large fall in notifications in the older age group and a smaller reduction in the infant rate. Most infant notifications (81%) were in children aged less than 6 months of age, with peak notifications occurring in those aged 2 to 4 months (242 cases per 100,000), infants too young to have received more than one dose of vaccine.



The new recommendation for a dose of whooping cough vaccine in adolescence should avert a high future burden of disease in this age group.

Whooping cough was the principal diagnosis in 631 hospital separations in 2001–02. Almost 70% of the separations were of infants. There were four deaths from whooping cough in 2002.

### **Tetanus**

The tetanus toxoid is nearly 100% effective in protecting individuals. Since 1995, less than eight cases of tetanus were notified each year. In 2002, only three cases of tetanus were notified to the NNDSS although the spores of the tetanus organism are present everywhere. All cases occurred in adults aged 64 and above, consistent with the older age distribution of tetanus notifications in recent years.

Tetanus vaccination provides only individual-level protection against the disease, rather than herd (population) immunity, as the bacteria that cause tetanus are not spread from person to person but are widespread in the environment and can enter the body through cuts or abrasions. It is recommended that all Australians, especially older Australians, should be immunised against tetanus and ensure they receive a routine booster dose at age 50.

In the two-year period 2000–02, there were a total of 16 hospital separations with a principal diagnosis of tetanus. There have been less than five deaths from tetanus since 1999. In 2002, there was one death from tetanus.

### **Diphtheria**

The diphtheria toxoid vaccine is highly effective in preventing diphtheria. Maintaining high rates of immunisation against the diphtheria organism is the only way to ensure that diphtheria infection in Australia remains a disease of the past (Gidding et al. 2000). A case of diphtheria infecting the skin in 2001, acquired in East Timor, was the first case reported since 1993 (Blumer et al. 2003).

### **Polio**

Progress toward global eradication of polio has been dramatic. Both inactivated poliovirus vaccine and live attenuated poliovirus vaccines are highly effective in providing protection. There have been no confirmed cases of polio in Australia since 1967.

### **Measles**

Effective surveillance mechanisms and high levels of immunisation have ensured that Australia is now in the World Health Organization's 'elimination phase' of measles control (WHO 2001b). There has been a large decline in the measles notification rate following the introduction of a two-dose vaccination schedule in 1994 (Gidding et al. 2001), the Measles Control Campaign in 1998 (Turnbull et al. 2001), and improved coverage as part of the routine childhood vaccination schedule. In 2001, only 141 cases were notified, with three outbreaks occurring when measles acquired overseas was spread among susceptible contacts in Australia. In 2002, there were 31 notifications of measles (a crude rate of 0.2 per 100,000 persons), the lowest number since national surveillance began in 1991.

All age groups had the lowest rates on record in 2002. Rates were highest in 0–4-year-olds (0.6 cases per 100,000 children), followed by the age group 20–24 (0.5 cases per 100,000 persons) and the age group 15–19 (0.4 cases per 100,000 persons). In 2001 and 2002 respectively, 41% and 35% of the reported cases were aged 20–29, whereas between 1993 and 1998 only 8% of cases were in this age range. Measles in Australia is now mainly acquired in countries where measles remains endemic, then imported here (McIntyre et al. 2000).

Hospital separations for measles are currently in decline, dropping from 61 separations in 1988–89 to 38 in 2001–02. No deaths have been attributed to measles since 1995, when there were five deaths.

### **Hib**

*Haemophilus influenzae* type b (Hib) is a significant cause of morbidity and mortality in children worldwide. Vaccination of infants and young children with Hib conjugate vaccines has had a marked impact on the occurrence of the disease in Australia. Hib notifications in Australia have declined steeply from 533 cases reported in 1991 to 29 cases in 2002. Two deaths were recorded for Hib in 2002.

### **Mumps**

Mumps is generally a mild viral childhood disease but it may rarely cause encephalitis (swelling of the brain), sterility, miscarriages or pancreatitis (Chin 2000). In Australia, there were 69 notifications of mumps in 2002, a rate of 0.4 per 100,000 persons. The highest rate was observed in the age group 0–4 (0.6 per 100,000); however, more than 70% of the notifications in 2002 were persons aged at least 15.

In 2001–02 there were 28 hospital separations with a principal diagnosis of mumps in Australia. There were 18 separations for males and 10 for females, with 43% for persons aged less than 20.

### **Rubella**

A total of 5,750 cases of rubella were notified in Australia in 1995. Since then, the numbers have declined sharply. In 2002, there were 255 notifications (a crude rate of 1.3 per 100,000 persons). About 75% of notifications were for males. The highest rate in 2002 was for young adult males aged 20–24 (a crude rate of 12.9 per 100,000), a group with low rates of vaccination against the disease. There were nine hospital separations for rubella in 2001–02. No rubella deaths were reported in 2001 or 2002.

Rubella infection in pregnancy can lead to foetal death or miscarriage. Other major consequences of this infection are congenital disabilities and deformities including deafness, blindness, cardiovascular abnormalities or mental retardation. One case of congenital rubella infection acquired overseas was identified in 2002 and two similar cases occurred in 2001 (Forrest et al. 2003). In 2003, two cases of locally acquired congenital rubella infection were reported. Since May 1993, a total of 35 cases of congenital rubella infection have been identified among newborns, with 29 children affected by birth defects related to congenital rubella (Forrest et al. 2003).

### **Invasive meningococcal disease**

Invasive meningococcal disease is a bacterial infection involving septicaemia or meningitis. Vaccination against meningococcal C disease was introduced in 2003 for all

Australian children at 12 months of age, with a large catch-up campaign to vaccinate children and adolescents up to age 19 (Cohen 2003).

The meningococcus bacterium occurs as 13 different types, five of which cause disease in humans. The most common forms in Australia are types B and C. There is no vaccination against type B, which accounted for 53.5% of the laboratory-confirmed meningococcal cases in 2002 (Tapsall 2003).

There were 684 notifications of meningococcal disease (a crude annual rate of 3.5 per 100,000 persons) in 2002. Notification rates were the highest in the age groups 0–4 and 15–19, with rates of 13.6 per 100,000 and 10.3 per 100,000 respectively.

In 2001–02, there were 756 hospital separations for meningococcal disease. Cases aged less than 25 accounted for most of these separations (80%). Meningococcal infections accounted for 48 deaths (31 males and 17 females) in 2002.

### **Invasive pneumococcal disease**

Invasive pneumococcal disease (IPD) refers to invasive disease caused by infection with the bacteria *Streptococcus pneumoniae*. While the organism often causes ear infections and respiratory disease, invasive disease causes more serious illness such as septicaemia, meningitis or severe pneumonia.

Vaccination can provide protection against IPD caused by certain strains of the pneumococcal bacteria and routine vaccination is recommended for young children, those aged 65 and above, Indigenous Australians aged 50 and above, smokers and those who have medical conditions which increase the chance of infection.

In 2002, there were 2,271 notifications of IPD in Australia or 11.5 cases per 100,000 persons. The geographical distribution of IPD varied within states and territories, with the highest rates in central and northern Australia. Children aged less than 5 had the highest rates (56.8 cases per 100,000 persons) followed by adults aged more than 85 (51.7 cases per 100,000). In 2001–02, there were 2,393 hospital separations for IPD (12.2 separations per 100,000).

In 2001 and 2002, there were 80 deaths due to pneumonia, sepsis or meningitis attributed to pneumococcal bacteria. The highest rates of death due to pneumonia were in those aged over 60, while for meningitis the highest rates were in children aged less than 5.

## **Transmissible spongiform encephalopathies**

Transmissible spongiform encephalopathies (TSEs) are a group of transmissible diseases in humans and animals, marked by a spongy (spongiform) deterioration of the brain (encephalus), which causes severe neurological symptoms leading to death. The most accepted scientific theory is that TSEs are caused by self-reproducing proteins known as prions.

Three most important forms of TSEs are:

- bovine spongiform encephalopathy (BSE)
- Creutzfeldt-Jakob disease (CJD)
- variant CJD (vCJD).

The Australian National CJD Registry undertakes surveillance and diagnosis of CJD, and monitors other human forms of TSEs. At the time of writing, the registry had recorded 479 cases of CJD since 1970 (Masters et al. 2002).

No cases of vCJD have been reported in Australia and stringent measures have been taken to restrict the import of products that may have been exposed to BSE.

## Emerging infectious diseases

From early 2003, two infectious diseases of global significance have emerged: severe acute respiratory syndrome (SARS) and avian influenza subtype H<sub>5</sub>N<sub>1</sub> ('bird flu'). SARS, caused by a coronavirus, developed into an international outbreak in 2003. During the outbreak, 8,098 cases were identified in numerous countries, a substantial proportion of which were among health care workers. In Australia, six suspected cases (four females, two males) of SARS were identified and reported to the World Health Organization. Only one of these was positive for the SARS coronavirus. All six suspected cases had come from overseas and no secondary transmission occurred. Australia mounted a national response including strengthening laboratory and hospital preparedness, instigating screening at border entry points and disseminating information to the public.

Widespread outbreaks of avian influenza have been reported in several Asian countries since last year. Cases of avian influenza H<sub>5</sub>N<sub>1</sub> in humans were identified in Vietnam in October 2003, and approximately 30 human cases had been identified in Thailand and Vietnam as of March 2004. The outbreak was of public health importance due to the risk of combining genetic components of the avian influenza virus with a human influenza virus, leading to a new human pandemic strain. Australia has responded to the outbreak by strengthening quarantine measures, initiating pandemic influenza responses and monitoring the poultry industry for potential outbreaks.

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