

sources of fluorides, including toothpaste and professionally applied fluoride products, provide further benefits.

Although it helps protect against dental decay, fluoride consumed excessively in early childhood can cause dental fluorosis. This is a developmental disorder of dental enamel, the visible, outer layer of the teeth that creates its hard surface. In its mildest forms, dental fluorosis causes whitening of the enamel surface that is visible only when the tooth is dried. In its most severe forms, dental fluorosis creates a chalky white or brown appearance, and may cause pitting of the enamel surface.

Because dental fluorosis is caused by excessive consumption of fluoride, its severity in populations typically increases with increasing concentration of fluoride in drinking water, and when fluoride from other sources is ingested in early childhood. Examples of the latter include inappropriate consumption of fluoride supplements by children who additionally drink fluoridated water, and inadvertent ingestion of toothpaste containing fluoride.

The potential trade-off between fewer caries and the degree of fluorosis was studied by the AIHW's Dental Statistics and Research Unit in 2002–03. The study asked 677 South Australian children aged 8–13 years and their parents to rate the children's teeth on a scale ranging from 'poor' to 'excellent'. There was also a clinical assessment of caries and dental fluorosis. In addition, the children and their parents were asked various questions directed at their functional, emotional and social 'quality of life' in relation to their oral health, with the answers then compared with the degree of decay and fluorosis.

The study found that fluorosis in its mild and moderate forms was associated with a net benefit in how parents perceived the condition of the children's teeth and in the children's emotional and social dimensions of oral health. Based on these findings, it is evident that the population perceives being free of dental decay as the preferred oral health status, even when it is associated with mild or moderate levels of dental fluorosis. Fluoride programs in Australia seek to strike this balance by improving the oral health of children with a low level of perceived side-effects.

2.3 Morbidity and illness

This section and the rest of this chapter focus on aspects of ill health rather than on health in more general terms.

Information on the levels of ill health, or morbidity, in Australia is limited in scope and quality. There is no single source that can be used to describe the effects of ill health across the spectrum of disease severity. Administrative data sources such as hospital separations and visits to GP can be used to assess those aspects of disease that require medical attention. However, information on a variety of common self-limiting symptoms and minor complaints such as headaches, rashes and troubles with teeth does not easily become available through these sources.

A major source of this type of information in Australia is various health surveys, conducted by the Australian Government (National Health Survey; Survey of Mental Health and Wellbeing; Survey of Disability, Ageing and Carers; and many others), as

well as the computer-assisted telephone interviews undertaken by several states and territories. Most of the information generated through these surveys is based on self-reports (see, for example, Box 2.2). The information can be complemented from other sources such as disease registers.

The profile of morbidity in Australia generated from the NHS, which is private household-based, is quite different from that obtained from the mortality or hospital separations data (see Section 2.5). This is to be expected as self-reports tend to include non-fatal, chronic conditions. Quite often, self-reports also represent the less severe end of the spectrum of the disease, even if the reported diseases and conditions are chronic. This information, therefore, must be used in conjunction with morbidity information gleaned from other data sources.

Box 2.2: The National Health Survey and self-assessed health information

The ABS conducts the NHS regularly to collect information about the health of Australians. The last three surveys were conducted in 1995, 2001 and 2004–05. The 2004–05 NHS was conducted from August 2004 to June 2005. The survey was designed to obtain national benchmarks and provide further trend data on a wide range of health issues that include health status, the use of health services in relation to health, and related aspects of lifestyle and other health risk factors. Personal interviews were conducted with all respondents with the exception of children (aged 15 years and under), for which an adult resident, nominated by the household, was interviewed on that child's behalf.

The 2004–05 NHS collected information on a range of diseases, illnesses, conditions and disorders that the respondent reported had lasted or, were expected to last, for six months or more. These are collectively referred to as 'long-term conditions'.

The NHS estimates may not be true measures of prevalence, because they are based on self-reports, rather than physical examination and medical tests. It may be that some diseases are over-reported because the respondent confused the name of the disease, or a doctor at some time had only raised the possibility of the disease now reported by the respondent, but had not made a diagnosis. Also, heightened community awareness of some conditions may inflate reports. Conversely, under-reporting of some conditions may occur. Many diseases produce few or no symptoms, at least in their early stages, and therefore may not be known to the respondent to report. Similarly, diseases which may be of a sensitive nature (for example, AIDS) may also not be reported by the respondent.

Information from the National Health Survey

Two major aspects of morbidity can be illustrated using the NHS data. The NHS collects information on actions taken for health in the two weeks before interview. The action could be for acute events (such as injury, fever or other medical problems) or for existing chronic conditions. The NHS also collects information on the prevalence of long-term conditions, which by NHS definition are conditions that have lasted for six months or are likely to do so (see Box 2.2). In this report, long-term conditions are treated as chronic conditions.

The actions that have been taken recently by people (or on their behalf) for their health include hospitalisation (as inpatients, emergency/casualty attendance, outpatient consultations and at day clinics), consulting with GPs and specialists, seeking dental care and receiving support from other health professionals. Some of the visits to different professionals, or to the same professional, may be for the same ailment or problem. On the other hand, a person may visit the health professional, particularly the GP, for more than one problem.

Medical care

Information is collected about actions taken in the two-week period before the NHS interview. The information may be projected to annual rates for broad comparisons.

Hospital admissions

From the 2004–05 NHS, more than 151,000 persons are estimated to have been discharged from hospitals in Australia in the two weeks before the NHS interview. That translates to almost 4 million separations each year. The NHS estimate is well short of the number of hospital separations in Australia—more than 6 million separations occurred in 2003–04, as obtained in the AIHW National Hospital Morbidity Database (AIHW 2005a). It is instructive to note that the NHS is a private household-based survey and does not include those living in various institutions. Also, the AIHW National Hospital Morbidity Database is event- rather than person-based, which may lead to overestimates.

Visits to emergency departments, outpatient clinics and day clinics

The number of hospital admissions is only the tip of the morbidity pyramid. According to the 2004–05 NHS, there are many non-admitted hospital episodes—an estimated 178,000 visits to emergency departments, 364,000 outpatient visits, and 488,000 attendances at day clinics within a two-week period. On an annual basis, these estimates exceed 4.6 million, 9.4 million and 12.1 million, respectively. However, it should be noted that some of these presentations, in particular attendance at day clinics, may be for health maintenance and disease prevention, and not for reducing morbidity or illness directly.

Visits to GPs and specialists

An estimated 4.5 million visits are made to GPs and specialists in Australia every two weeks (ABS 2006b). This amounts to an estimated 117 million visits in 2004–05. While a large number of these visits are not for new episodes, the extent of prevalent morbidity in Australia at a particular point of time is well demonstrated by this high number. Almost one-fifth of these visits were made to specialists.

Females are more likely to consult health professionals than males, although this does not necessarily suggest a large difference in disease prevalence. Consultations with health professionals increase greatly with age.

Long-term conditions

In 2004–05, an estimated 77% of Australians had a long-term condition. The proportion increased with age, from 41% of those aged under 15 years to over 95% of persons aged 45 years or over.

Table 2.14 shows that the most common long-term conditions, as reported by Australians in 2004–05, are non-fatal chronic conditions such as sensory impairments and diseases, back pain and disc problems, hay fever and allergic rhinitis, and arthritis.

Both sexes report much the same set of diseases and conditions. The lists of leading long-term conditions for both males and females are broadly similar, with high agreement in the ranking. However, migraine was a condition that females commonly experienced that was not in the top 10 conditions for males. Similarly, high cholesterol was in the top 10 conditions for males but ranked 12th most common for females.

What distinguishes the two sexes in terms of reported long-term conditions is the rates, and not ranks, of various conditions. Of the top 10 conditions, females report more of all conditions except deafness, high cholesterol, and back pain and disk problems.

Table 2.14: Commonly reported long-term conditions, 2004–05

Condition	Males		Females	
	Per cent	Rank	Per cent	Rank
Long-sightedness	24.3	1	29.9	1
Short-sightedness	19.2	2	25.0	2
Back pain and disc problems ^(a)	16.0	3	14.7	4
Hayfever and allergic rhinitis	15.0	4	17.2	3
Deafness	13.3	5	7.2	10
Hypertensive disease	10.2	6	11.1	6
Asthma	9.0	7	11.5	5
Chronic sinusitis	7.5	8	10.9	7
High cholesterol	7.0	9	6.6	12
Osteoarthritis	6.1	10	9.6	8
Migraine	3.8	20	9.3	9

(a) Includes back problems not elsewhere classified.

Source: ABS 2006b.

Age-specific distribution

The types of long-term conditions that people reported varied with age (Table 2.15). For example, respiratory conditions such as asthma and hayfever (and rhinitis) were common in the younger age groups, whereas arthritis and hypertensive diseases (high blood pressure or related conditions) featured as common conditions for those aged 55 years or over. Long- and short-sightedness were common in most age groups. It is of interest that long-term conditions that dominate in certain age groups (for example, arthritis in older groups) are not the conditions that are common causes of death in those age groups.

Comorbidity

A large proportion of the population reports the occurrence of more than one long-term condition, and the mix of conditions varies. There are also different reasons for various groupings of conditions.

Table 2.15: Five most commonly reported long-term conditions, by age group, 2004–05

Age group	Condition	Per cent ^(a)	Age group	Condition	Per cent ^(a)
0–14	Asthma	11.5	45–54	Long-sightedness	52.2
	Hayfever & allergic rhinitis	7.7		Short-sightedness	30.5
	Allergy (undefined)	6.2		Back pain & disc problems ^(b)	22.5
	Long-sightedness	3.7		Arthritis (all types)	20.0
	Short-sightedness	3.5		Hayfever & allergic rhinitis	19.3
15–24	Hayfever & allergic rhinitis	19.4	55–64	Long-sightedness	63.0
	Short-sightedness	17.9		Arthritis (all types)	38.6
	Asthma	12.4		Short-sightedness	36.5
	Back pain & disc problems ^(b)	9.1		Hypertensive diseases	26.4
	Long-sightedness	8.8		Back pain & disc problems ^(b)	26.1
25–34	Short-sightedness	22.3	65–74	Long-sightedness	63.8
	Hayfever & allergic rhinitis	22.0		Arthritis (all types)	49.0
	Back pain & disc problems ^(b)	15.3		Hypertensive diseases	38.0
	Chronic sinusitis	11.3		Short-sightedness	35.7
	Asthma	10.7		Deafness	26.5
35–44	Short-sightedness	21.6	75 or over	Long-sightedness	59.3
	Back pain & disc problems ^(b)	21.6		Arthritis (all types)	49.9
	Hayfever & allergic rhinitis	20.3		Deafness	42.2
	Long-sightedness	14.7		Hypertensive diseases	41.3
	Chronic sinusitis	11.6		Short-sightedness	34.4

(a) The proportion in each age group who reported that long-term condition.

(b) Includes back problems not elsewhere classified.

Source: ABS 2006b.

It may be that some long-term conditions share common causal mechanisms and risk factors. For example, 20% of persons with diabetes also reported the presence of one or more types of ‘heart, stroke or vascular diseases’ (HSVD), as categorised by the ABS. Conversely, 19% of persons with HSVD also reported having diabetes. The connection between diabetes and HSVD is well recognised.

Other comorbidity may be age-related. For example, 52% of those reporting HSVD also reported the coexistence of arthritis (Table 2.16). On the other hand, only 13% of persons with arthritis reported having HSVD. No clear association other than age as the common factor is noted between arthritis and HSVD.

Causes

More than one out of five respondents to the 2004–05 NHS reported the cause of their long-term condition as work-related (ABS 2006b). The proportion was the highest, almost 40%, among those reporting back pain and disc disorders (Table 2.17). Several other musculoskeletal conditions were also considered by respondents to be work-related.

Table 2.16: Comorbidity for selected long-term conditions^(a), 2004–05

Condition	Arthritis	Asthma	Diabetes	HSVD ^(b)	Mental problems ^(c)	Estimated number of persons with the condition
	Per cent (row-wise)					Number ('000)
Arthritis	100.0	13.3	9.4	13.0	13.3	3,020
Asthma	20.0	100.0	4.3	4.7	13.6	2,014
Diabetes	40.8	12.4	100.0	20.4	9.0	700
HSVD ^(b)	52.0	12.5	18.9	100.0	14.3	755
Mental problems ^(c)	23.4	16.0	3.7	6.3	100.0	1,719

(a) As a proportion of those reporting the selected condition.

(b) Heart, stroke and vascular diseases (includes ischaemic heart disease, cerebrovascular disease, oedema and heart failure, and diseases of the arteries, arterioles and capillaries), as operationalised in ABS 2006b.

(c) Mental and behavioural problems (includes mood (affective) problems, anxiety-related problems, and behavioural and emotional problems with usual onset in childhood/adolescence).

Notes

1. Percentages are given across rows. For example, 13.3% of people who reported arthritis also reported asthma, and 20.0% of those who reported asthma also reported arthritis.
2. Rows and columns do not add up to 100%.

Source: ABS 2006b.

About 16% of respondents attributed their long-term condition to injury. The proportion exceeded 31% among those reporting back pain and disc disorders. Again, several musculoskeletal conditions were considered by respondents to be injury-related.

Table 2.17: Causes of selected long-term conditions, persons aged 15 years or over, 2004–05

Condition	Reported cause (per cent)		Estimated number of persons with long-term condition ('000)
	Work-related ^(a)	Resulted from injury	
Back pain and disc disorders	39.0	31.2	2,998
Deafness (complete or partial)	27.4	3.8	1,960
Rheumatism and soft tissue disorders	20.6	15.9	580
Anxiety-related problems	19.4	3.9	878
Mood (affective) problems	15.6	3.3	1,022
Other musculoskeletal system and connective tissue disorders	13.0	14.4	1,632

(a) Conditions reported as work-related that may include work injuries.

Source: ABS 2006b.

Trends in prevalence

The ABS has conducted three National Health Surveys in the 1995–2004 decade. While the methods have varied, reasonable insight into trends in self-reported long-term conditions in Australia can be obtained from these surveys (Table 2.18).

The prevalence of long-sightedness is increasing in Australia. Upward trends are also noted for hay fever and allergic rhinitis, mental and behavioural problems, and diabetes.

Table 2.18: Trends in the prevalence of commonly reported long-term conditions, 1995, 2001 and 2004–05 National Health Surveys (per cent)

Condition	1995	2001	2004–05
Long-sightedness	22.0	22.4	26.3
Short-sightedness	20.9	20.9	21.8
Hayfever and allergic rhinitis	13.9	15.5	16.1
Back pain and disc problems ^(a)	6.4	20.5	15.1
Arthritis	15.7	13.9	14.9
Mental and behavioural problems	5.9	9.6	10.7
Hypertensive disease	11.5	10.3	10.4
Asthma	11.1	11.6	10.2
Deafness (complete or partial)	10.1	10.8	10.1
Diabetes	2.4	3.0	3.5

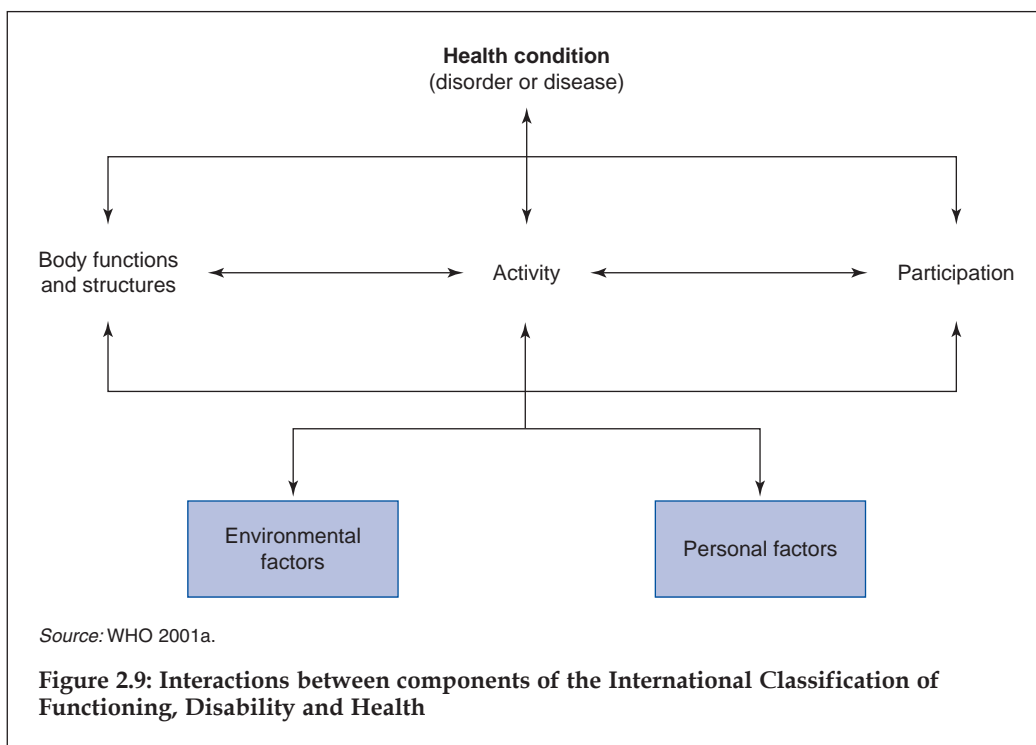
(a) Includes back problems not elsewhere classified.

Note: Percentages were age-standardised to the Australian population as at 30 June 2001.

Source: ABS 2006b.

2.4 Disability

It is estimated that some form of disability affects one in five Australians. Disability may be experienced in terms of impairments of body functions and structures, activity limitations or participation restrictions, and it is crucially influenced by the person's environment (Figure 2.9).



Source: WHO 2001a.

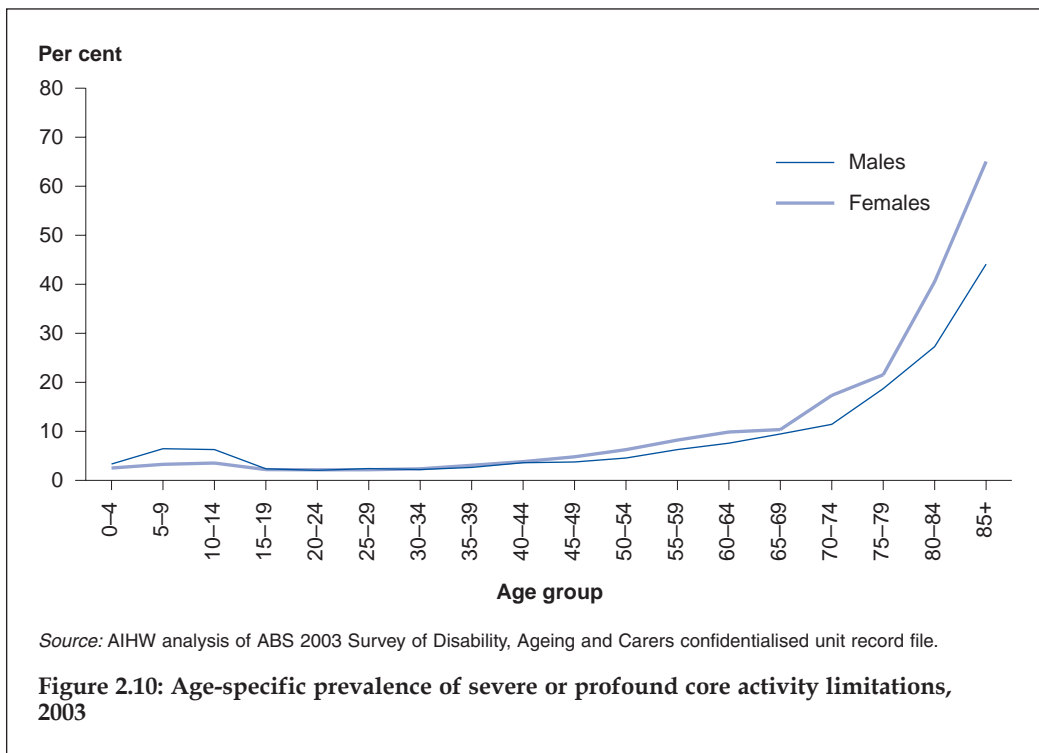
Figure 2.9: Interactions between components of the International Classification of Functioning, Disability and Health

For instance, a person with long-term arthritis may have impaired mobility of joints and bones; limitations in activities such as walking, moving and handling objects; and restrictions in participation in domestic life and recreation. Environmental factors – such as equipment, mobility aids and personal assistance – may all have a crucial effect on the person’s overall level of disability.

A chief source of data on disability in the Australian population is the ABS Survey of Disability, Ageing and Carers (ABS 2004b), which captures a broad scope of disabilities. A key indicator of ‘severe disability’ is the presence of what the survey terms ‘severe or profound core activity limitations’; that is, the need for assistance with self-care, mobility or communication. Such limitations were experienced by 6.3% of the population, about one in 16 people, in 2003. A further 14% were found to have a lesser degree of disability, totalling some 20% of the population.

Disability prevalence and ageing

Disability varies strongly with age (Figure 2.10). The peak in prevalence of severe or profound core activity limitations in early childhood and school years may reflect the environment of family, early intervention services and school, which together may identify a greater proportion of disabilities than at later ages. The prevalence rate in 2003 was lower among adolescents than children, and remained at a rate just under 2.5% among people in their 20s and early 30s.



The prevalence rates begin to climb again for age groups 25 years or over, as new risk factors for disability affect the population. For young adults, particularly males, injury is a relatively high risk. In the middle years people may experience work-related injuries or the onset of musculoskeletal and other conditions such as arthritis and cardiovascular diseases, as well as hearing and psychiatric disabilities.

Disability is not an inevitable part of the experience of ageing. It does, however, become more common at older ages: more illnesses affecting human functioning become prevalent, and the rates of vision, hearing and movement-related disabilities are higher. In the 2003 Survey of Disability, Ageing and Carers, almost one-quarter (23%) of older people reported a severe or profound core activity limitation. Rates were higher for females than for males at all ages over 65 years.

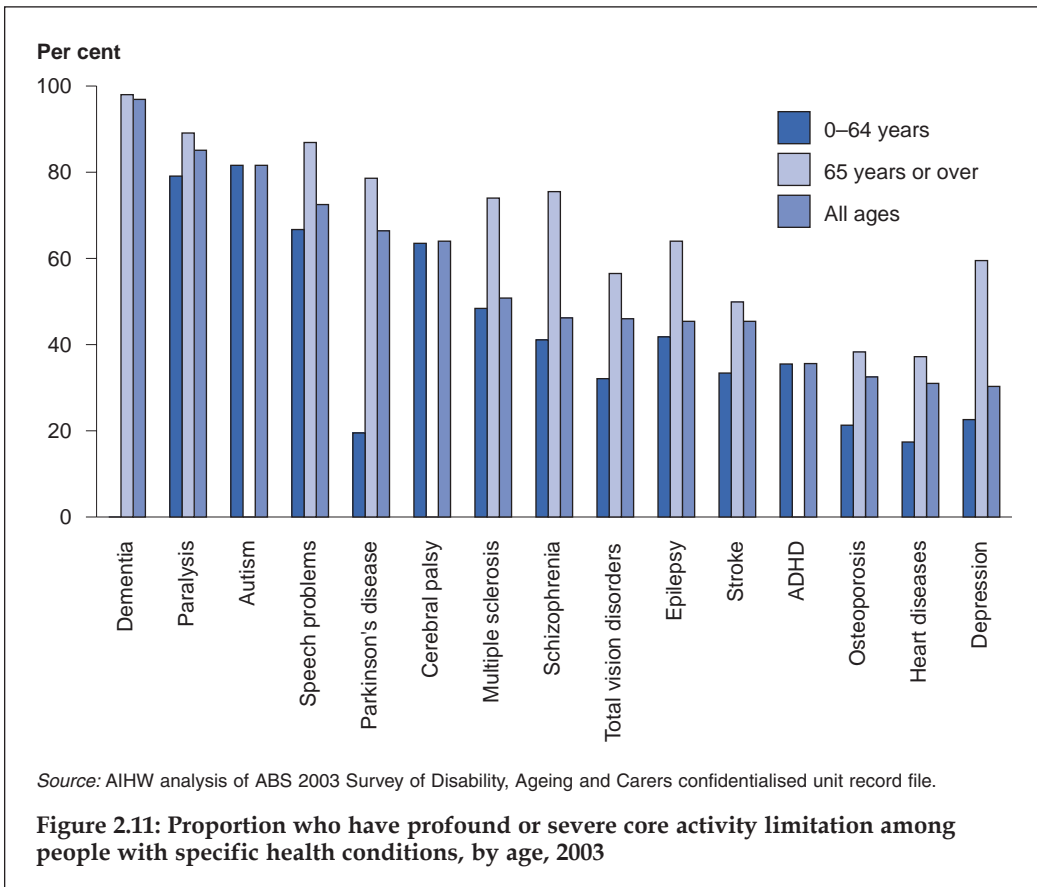
Up to age 69 years, 10% or less of those surveyed reported a severe or profound core activity limitation. As Figure 2.10 illustrates, the prevalence rates started to increase more sharply for people in their 70s (one-fifth of people aged 75–79 years), and rose steeply for those aged 80 years or over; of those aged 85 years or over, 58% had severe disability, with females reporting much higher rates than males (65% compared with 44%). Rates were higher for females than for males at all ages over 65 years. It is important to note that, even at these older ages, about 42% had less severe or no core activity limitations.

Disability and related health conditions

The relationship between health conditions and disability can be viewed in several different ways (AIHW 2005b). One way is by examining health conditions most likely to be associated with profound or severe core activity limitations. Of those health conditions recorded in the ABS Survey of Disability, Ageing and Carers, the 15 most likely to be associated with profound or severe core activity limitations are shown in Figure 2.11. Of people aged under 65 years with autism in 2003, 82% reported such limitations, as did 79% of those with paralysis, 67% of those with speech-related conditions and 64% of those with cerebral palsy. The health condition most likely to be associated with a profound or severe core activity limitation among older people is dementia – 98% of those aged 65 years or over had such a limitation. It was followed by paralysis (89%), speech-related conditions (87%), Parkinson’s disease (79%) and schizophrenia (76%). Most of these conditions are highly age-related.

Another way of looking at the relationship between disability and health conditions is to ask which are the most common conditions associated with profound or severe core activity limitations in the population. This presents a different picture, related to the prevalence of the health conditions themselves.

The leading conditions associated with profound or severe core activity limitations among people aged under 65 years in 2003 were back problems and arthritis – 1.2% of people of this age with a profound or severe core activity limitation reported back problems, and 0.9% reported arthritis (Figure 2.12). For the population as a whole, arthritis, hearing disorders and back problems led the list. Conditions such as attention deficit hyperactivity disorder, autism and dementia, while highly likely to be related to profound or severe core activity limitations (Figure 2.11), were less commonly reported by people because these conditions are generally less prevalent.



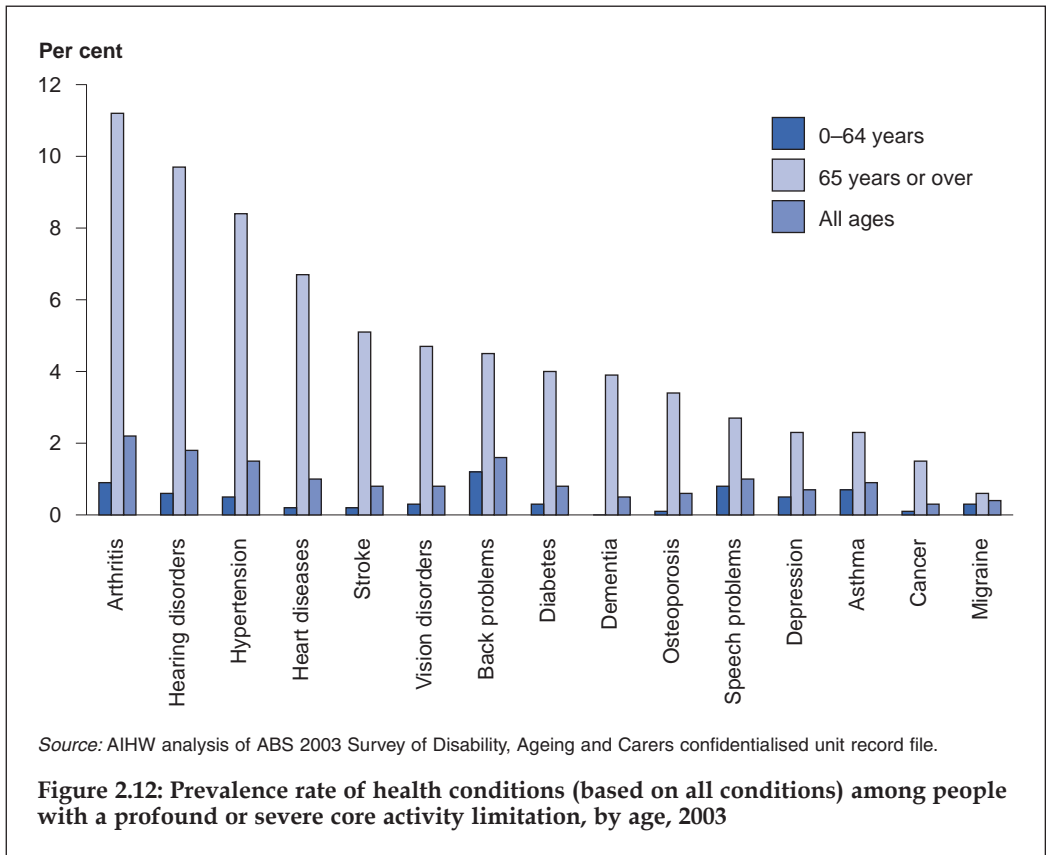
It is not suggested that these conditions and diseases explain or 'account for' most disability in the population. The International Classification of Functioning, Disability and Health model does not suggest direct causal relationships, but rather acknowledges that a health condition is one of several important factors in the creation of disability (see Figure 2.9).

Disability trends, 1981–2003

As the population grows and ages, and as life expectancy increases, there will be more people in Australia at older ages and therefore more people with disabilities. However, there is no evidence that the rates of severe disability are rising for any particular age group (ABS 2004b; AIHW 2000, 2003a). The evidence from the five population disability surveys since 1981 is that:

- the reported age-standardised rates of 'severe disability' in Australia were fairly stable between 1981 and 1993
- there was an increase in rates from 1993 to 1998, mainly attributed to changes in the survey methods, questions and administration
- the 2003 rates were consistent with those of 1998, confirming the earlier pattern of stability. The 2003 survey retained the 1998 survey questions and methods, resulting

in the age-standardised rates for severe or profound core activity limitations of 6.4% in 1998 and 6.3% in 2003.

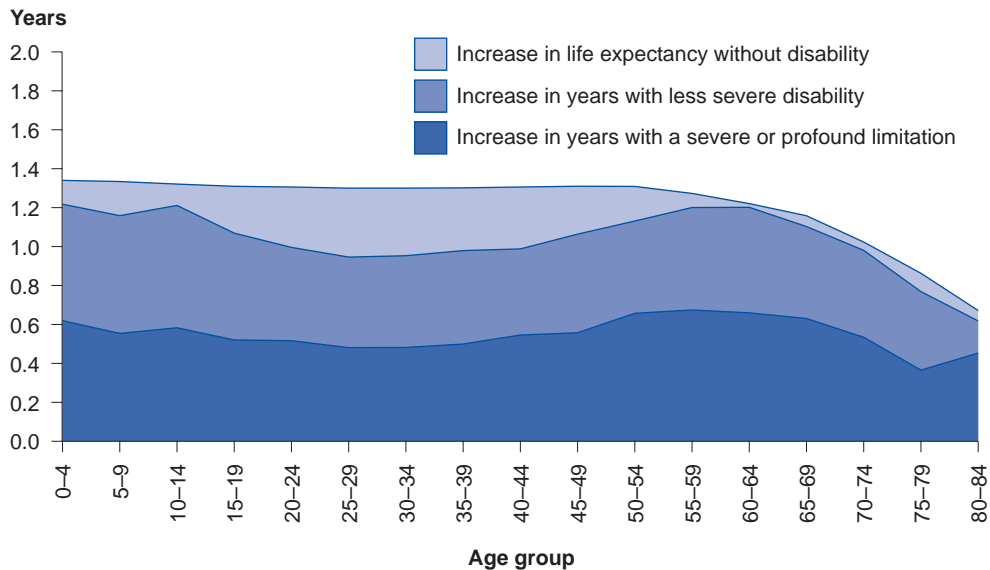


It is concluded that overall there was no change in rates of severe disability between 1981 and 2003. The rise in reported rates in 1998 is attributable to changes in survey methodology rather than population changes.

Disability and life expectancy

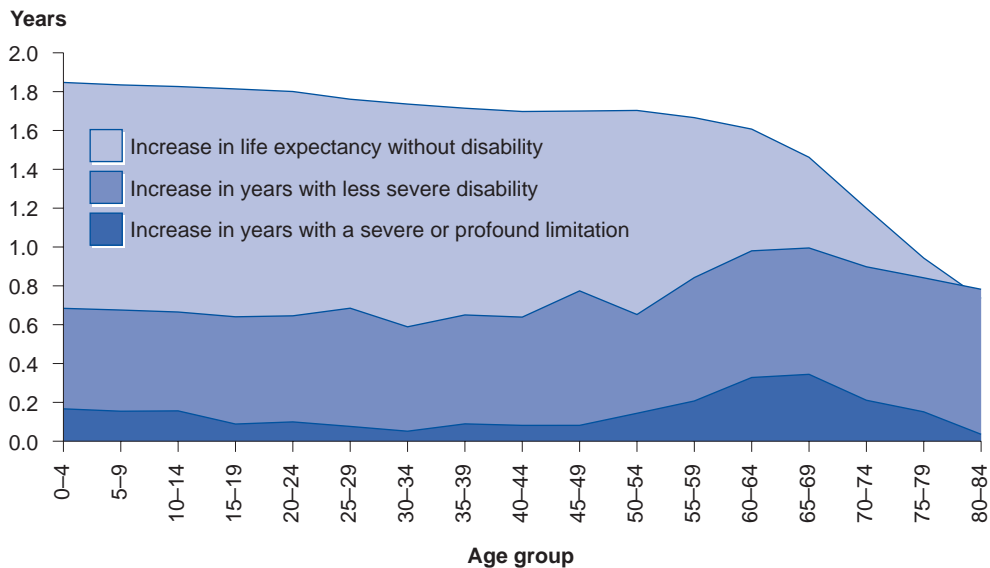
A question of interest in Australia and internationally is whether the years of life lived with disability are increasing along with the gains in life expectancy. In Australia, between 1988–1993 and 1998–2003, gains in life expectancy were accompanied by increases in expected years both with and without disability (AIHW 2006a).

Between 1998 and 2003, life expectancy at birth increased by 1.3 years for females and 1.8 years for males. A large proportion of the gain in female life expectancy at birth was extra years with disability (1.2 of the 1.3 years gained), compared to the proportion for males (0.7 of the 1.8 years). These differences applied across all age groups, and were particularly evident among the older population at age 65 years or over and children aged under 15 years (figures 2.13 and 2.14).



Source: AIHW 2006a.

Figure 2.13: Changes in life expectancy and associated disability, females, 1998 to 2003



Source: AIHW 2006a.

Figure 2.14: Changes in life expectancy and associated disability, males, 1998 to 2003

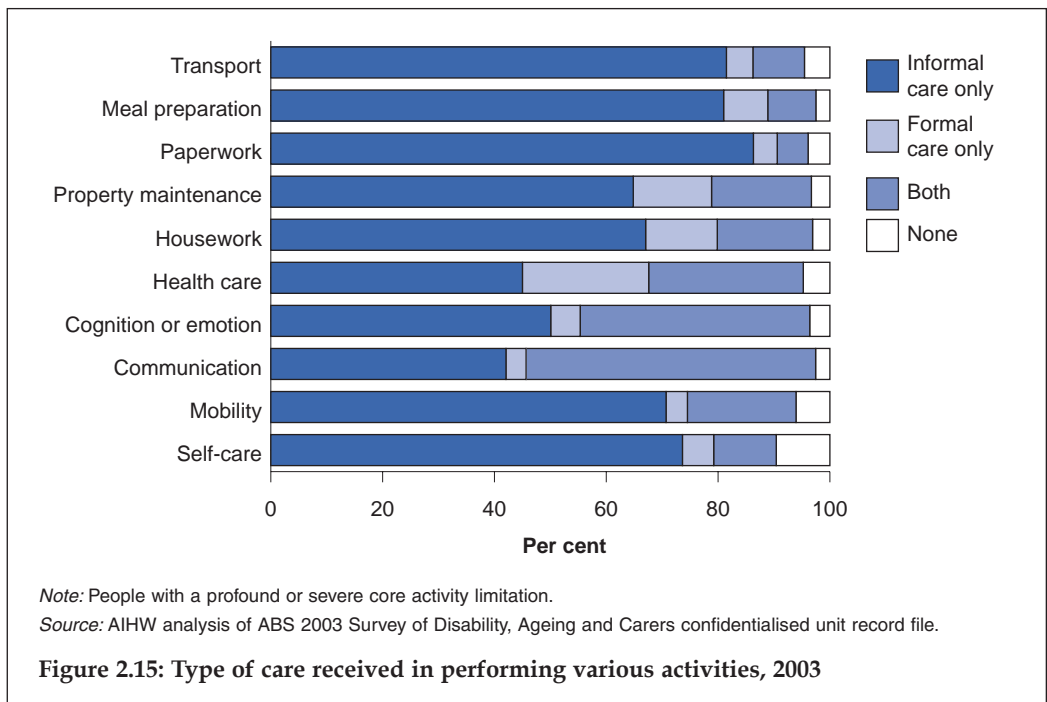
Over this period, the expected years with severe or profound core activity limitations remained approximately the same for males at birth, but increased by 0.7 years (9.2%) for females.

The expected years with disability at age 65 years increased by 1.2 years for females and 1.0 year for males, while small increases in the expected years with a severe or profound core activity limitation were evident for females (0.6 years) and males (0.3 years).

Activity limitations

Activity limitations represent one dimension of disability, but one which is considered important in planning service provision, as well as being a dimension on which population data are of good quality. (By contrast, information on participation restrictions and environmental factors is not as adequate in Australia; see, for instance, AIHW 2005b:256.)

Informal care networks of family, friends and neighbours provided much of the help received by people with severe or profound core activity limitations living in the community; 65% relied entirely on informal assistance with core activities (self-care, mobility and communication) and 39% did so for other activities (Figure 2.15). A combination of both formal and informal care was provided to 24% of people needing help with core activities, and to 55% of those also needing help with other activities. Much smaller percentages of people were entirely reliant on formal care – 4% of those needing assistance with core activities and 5% of those also needing assistance with other activities. People needing assistance with communication (52%) and cognition and emotion (41%) were the most likely to be receiving a mix of formal and informal assistance.



2.5 Causes of death

The 'cause of death' information, gained from death certificates, provides insights into the events that either directly lead to or contribute to death.

Cause of death statistics usually refer to the 'underlying cause', which is the disease or injury that initiated the train of events leading directly to death. In addition, any other condition or event that is not the underlying cause but is still considered to contribute to the death is known as an associated cause. In Australia, the underlying cause is derived from information supplied on death certificates, using an automated process.

The mortality information provided below has been organised to reflect the underlying cause of death in two ways. First, for the population as a whole, the top 20 causes have been listed as specific causes rather than at the broader International Classification of Diseases (ICD) chapter level. Information on cancer deaths, for example, has been provided by individual cancer type rather than for cancer overall. Similarly, information on the ICD chapter of circulatory (cardiovascular) diseases has been categorised to the level of more specific diseases or conditions, such as ischaemic heart disease. Second, the statistics for various age groups are provided at the ICD chapter level, due to the smaller numbers involved.

Leading causes of death

The top 20 specific causes of death given in Table 2.19 were responsible for nearly 74% of all deaths in 2004. Ischaemic heart disease (also known as coronary heart disease: heart attack and related disorders) and cerebrovascular disease (notably stroke) were the two leading specific causes of deaths in that order, and in both sexes, accounting for more than a quarter of all deaths that year.

Lung cancer was the third leading underlying cause of male deaths, followed by 'other heart diseases', a category which includes heart failure. In contrast, 'other heart diseases' was the third leading cause of death among females, followed by dementia and related disorders.

Lung cancer, chronic obstructive pulmonary disease (COPD), colorectal cancer and cancers with an unknown primary site were among the top 10 leading causes of death in both sexes. In females, pneumonia and influenza also constituted a leading cause of death, while diabetes and suicides were prominent among males. Prostate cancer and breast cancer were two prominent sex-specific causes of death.

Although the rankings of various underlying causes of death have not changed significantly since the last edition of *Australia's health* (AIHW 2004b), the overall contribution of 20 leading causes of death dropped by over 1 percentage point from 75% of deaths in 2002 to 74% of deaths in 2004. Most of this decline was due to the reduced number of deaths from ischaemic heart disease. The number of deaths due to unknown primary cancer sites, on the other hand, increased considerably between 2002 and 2004. Deaths from various disorders of the urinary system, mostly due to urinary tract infections, also entered the top 20 leading causes of death in females for the first time.

Table 2.19: Leading causes of death, all ages, 2004

Rank	Males			Females		
	Cause of death	Number of deaths	Per cent of all deaths	Cause of death	Number of deaths	Per cent of all deaths
1	Ischaemic heart disease (I20–I25)	13,152	19.2	Ischaemic heart disease (I20–I25)	11,424	17.8
2	Cerebrovascular disease (I60–I69)	4,826	7.1	Cerebrovascular disease (I60–I69)	7,215	11.3
3	Lung cancer (C33–C34)	4,733	6.9	Other heart diseases (I05–I09, I11, I13, I26, I27, I30–I52)	4,272	6.7
4	Other heart diseases (I05–I09, I11, I13, I26, I27, I30–I52)	3,290	4.8	Dementia and related disorders (F01–F03, G30–G32)	3,253	5.1
5	Chronic obstructive pulmonary disease (J41–J44)	2,986	4.4	Breast cancer (C50)	2,641	4.1
6	Prostate cancer (C61)	2,761	4.0	Lung cancer (C33–C34)	2,531	3.9
7	Colorectal cancer (C18–C21)	2,215	3.2	Chronic obstructive pulmonary disease (J41–J44)	2,213	3.5
8	Diabetes (E10–E14)	1,869	2.7	Colorectal cancer (C18–C21)	1,911	3.0
9	Unknown primary site cancers (C76–C80, C26, C39)	1,793	2.6	Pneumonia and influenza (J10–J18)	1,883	2.9
10	Suicide (X60–X84)	1,661	2.4	Unknown primary site cancers (C76–C80, C26, C39)	1,745	2.7
11	Pneumonia and influenza (J10–J18)	1,498	2.2	Diabetes (E10–E14)	1,730	2.7
12	Dementia and related disorders (F01–F03, G30–G32)	1,468	2.1	Diseases of the arteries, arterioles and capillaries (I7)	1,214	1.9
13	Diseases of the arteries, arterioles and capillaries (I7)	1,263	1.8	Kidney failure (N17–N19)	967	1.5
14	Land transport accidents (V00–V89)	1,160	1.7	Pancreatic cancer (C25)	963	1.5
15	Pancreatic cancer (C25)	1,015	1.5	Ovarian cancer (C56)	851	1.3
16	Liver diseases (K70–K77)	954	1.4	Lymphomas (C81–C85, C96)	739	1.2
17	Kidney failure (N17–N19)	928	1.4	Leukaemia (C91–C95)	606	0.9
18	Leukaemia (C91–C95)	842	1.2	Exposure to unspecified factor (X59)	558	0.9
19	Melanoma (C43)	821	1.2	Septicaemia (A40–A41)	525	0.8
20	Lymphomas (C81–C85, C96)	806	1.2	Other disorders of urinary system ^(a) (N39)	479	0.7
	Total (20 leading causes)	50,041	73.2	Total (20 leading causes)	47,720	74.4
	All deaths	68,395	100.0	All deaths	64,113	100.0

(a) All but one of these deaths are classified as N390, urinary tract infection, site not specified.

Note: Codes refer to the International Classification of Diseases, 10th revision (ICD-10).

Source: AIHW National Mortality Database.

Major causes of death by life stage

The relative contribution of various underlying causes of death differs with age, as shown by the broad (ICD chapter level) causes listed in Table 2.20. Conditions emerging from the perinatal period dominate the infant mortality statistics, followed by congenital anomalies. Similarly, injuries and poisoning are the most common cause of death in the age groups 1–14 years and 15–24 years.

Table 2.20: Leading causes of death^(a), by age group, 2004

Age group	Males		Females	
	Cause of death	Per cent of deaths ^(b)	Cause of death	Per cent of deaths ^(b)
Infants (under one year)	Conditions emerging from the perinatal period	46.9	Conditions emerging from the perinatal period	47.0
	Congenital anomalies	24.2	Congenital anomalies	24.3
	Ill-defined	12.8	Ill-defined	9.5
	Nervous system diseases	3.4	Injury and poisoning	3.8
1–14	Injury and poisoning	37.4	Injury and poisoning	33.2
	Cancer	18.2	Cancer	21.4
	Nervous system diseases	9.7	Nervous system diseases	12.7
	Congenital anomalies	7.9	Congenital anomalies	8.3
15–24	Injury and poisoning	74.7	Injury and poisoning	61.0
	Cancer	8.0	Cancer	11.5
	Ill-defined	4.4	Cardiovascular disease	5.1
	Nervous system diseases	3.8	Nervous system diseases	5.1
25–44	Injury and poisoning	51.4	Cancer	36.3
	Cancer	15.2	Injury and poisoning	28.0
	Cardiovascular disease	13.7	Cardiovascular disease	11.7
	Digestive disorders	3.5	Digestive disorders	4.5
45–64	Cancer	42.6	Cancer	56.9
	Cardiovascular disease	27.0	Cardiovascular disease	15.3
	Injury and poisoning	10.0	Injury and poisoning	6.2
	Digestive disorders	5.1	Respiratory system diseases	5.4
65–84	Cancer	36.6	Cardiovascular disease	35.1
	Cardiovascular disease	34.4	Cancer	32.4
	Respiratory system diseases	9.9	Respiratory system diseases	9.6
	Endocrine	4.2	Endocrine	4.6
85+	Cardiovascular disease	45.5	Cardiovascular disease	51.9
	Cancer	19.3	Cancer	12.2
	Respiratory system diseases	12.2	Respiratory system diseases	9.4
	Genitourinary diseases	3.5	Mental disorders	5.5

(a) Organised at ICD chapter level.

(b) Percentage of deaths within each age and sex group.

Source: AIHW National Mortality Database.

The changes with age in leading causes of death reflect both longer exposure to various environmental factors and the underlying ageing processes. Among those aged 25–44 years, injuries and poisoning remain the leading cause of death in males, as with the two younger age groups. However, in females aged 25–44 years, cancer takes over from

injuries and poisoning as the leading cause of death. In both sexes, cancer is the most common cause of death among those aged 45–64 years, followed by cardiovascular disease, which includes both ischaemic heart disease and stroke.

Cancer and cardiovascular disease are again the two most common causes of death among those aged 65–84 years, but cardiovascular disease dominates the 85 years or over age group mortality. On the other hand, injury is no more one of the top four leading causes of death among those aged 65 years or over.

Respiratory diseases are significant contributors to death among those in advancing age. Prominent among these is COPD, a leading specific contributor to deaths overall. Respiratory diseases are responsible for about 10% of deaths among persons aged 65 years or over.

Potential years of life lost

The potential years of life lost (PYLL) from a disease or injury is an indicator of premature or untimely death. If dying before the age of 75 years is considered premature, then a person dying at the age of 50 years would have lost 25 potential years of life.

In contrast to the basic mortality measures where all deaths are counted equally, PYLL highlights deaths that occur at younger ages. These deaths strongly affect families and society because they occur prematurely and exact an emotional and often economic toll. Furthermore, much of this premature mortality may be avoidable.

Ischaemic heart disease is a major contributor to premature mortality among males, but breast cancer is the leading cause of PYLL among females (Table 2.21). Suicide, land transport accidents and lung cancer also feature highly for both sexes.

Males have 75% more PYLL than females. Two of the largest contributors to this gap are ischaemic heart disease and suicide.

Table 2.21: Leading causes of potential years of life lost (PYLL), 2004

Rank	Males			Females		
	Cause of death	PYLL	Per cent ^(a)	Cause of death	PYLL	Per cent ^(a)
1	Ischaemic heart disease (I20–I25)	61,458	11.4	Breast cancer (C50)	28,323	9.2
2	Suicide (X60–X84)	51,503	9.6	Lung cancer (C33–C34)	16,420	5.4
3	Land transport accidents (V00–V89)	41,875	7.8	Ischaemic heart disease (I20–I25)	15,545	5.1
4	Lung cancer (C33–C34)	28,223	5.2	Land transport accidents (V00–V89)	14,130	4.6
5	Other heart diseases (I05–I09, I11, I13, I26, I27, I30–I52)	17,423	3.2	Suicide (X60–X84)	13,520	4.4
	All causes	539,105	100.0		307,858	100.0

(a) Per cent of all-causes PYLL.

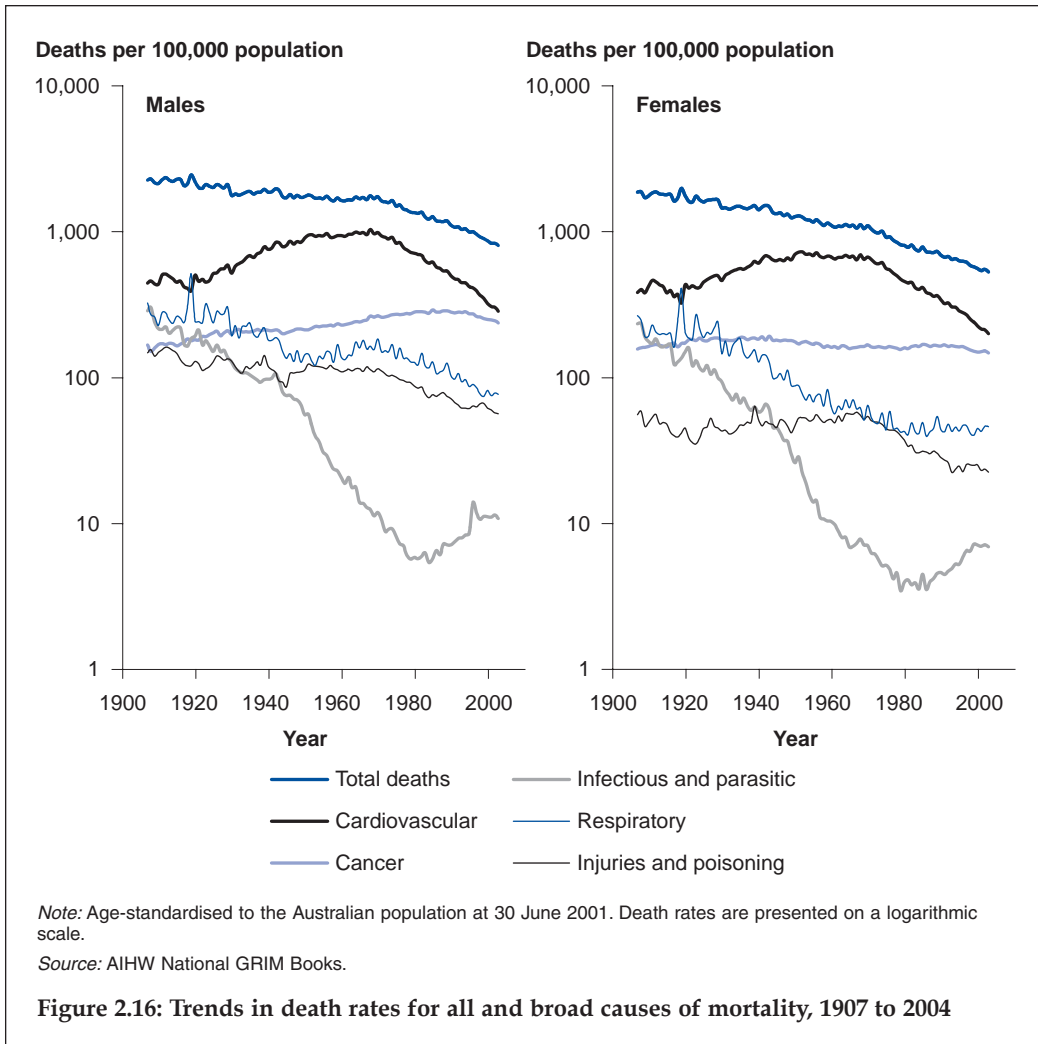
Notes

- Codes refer to the International Classification of Diseases, 10th revision (ICD-10).
- PYLL is the sum of years between 75 and the age of death for all deaths due to a particular cause of death.

Source: AIHW National GRIM Books.

Trends in cause-specific mortality

A major feature of mortality trends in Australia is the steady reduction in age-standardised death rates over the last several decades. Overall death rates in Australia have fallen by around two-thirds over the past century. The male age-standardised rate fell by 66%, from 2,234 deaths per 100,000 in the early 1900s to 770 in 2004. The corresponding female death rate fell by 72%, from 1,844 to 511 (Figure 2.16).



These consistent overall trends, however, mask much variation in underlying trends in cause-specific death rates. The number of deaths occurring in different age groups from specific conditions has also changed considerably over time. Analysing these trends in more detail can provide a valuable guide to the evolution of a nation's health (Jemal et al. 2005).

Box 2.3: AIHW National GRIM Books

The AIHW has compiled a time series of cause-specific mortality data from early ABS paper records and more recent ABS electronic unit record data to form the General Record of Incidence of Mortality (GRIM) Books.

The GRIM Books are a collection of dynamic and interactive workbooks comprising cause-specific Australian mortality information for the most recent years (currently to 2004) and historically, for many causes, back to 1907. State and territory data are available from 1964 only. Individual workbooks have been created for over 150 causes (or combinations of causes) of death. However, data for all years and every cause may not always be available.

The mortality data are tabulated by cause of death, year of registration, age and sex. These data, together with population estimates, are used to calculate annual age-specific and age-standardised mortality rates, and other summary measures of mortality.

Trends in death rates for specific causes

The death rates for several causes did not follow the steadily declining slope noted for overall mortality, even though by the end of the 20th century the death rates for most of the major causes of death had fallen by varying degrees (Figure 2.16). The following long-term mortality trends for five broad disease groups, by ICD chapter, are noteworthy:

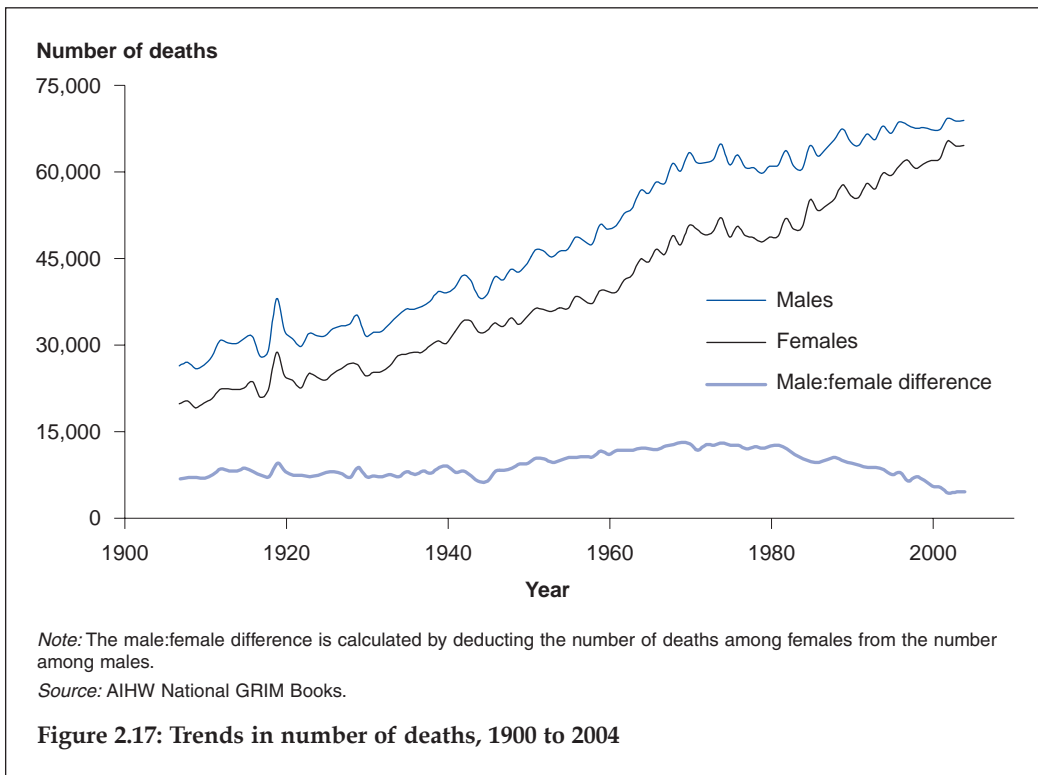
- Reduction in mortality from infectious and parasitic diseases was the single largest contributor to mortality reductions across the century. The death rate fell from 283 per 100,000 males in 1907 to 11 by 2004 (although there was a rise from the century's low point of 5 in 1984). Similarly, the corresponding rate for females fell from 229 to 7 per 100,000. It should be noted that 'infectious and parasitic diseases' excludes pneumonia and influenza, currently the largest contributors to communicable disease mortality.
- Respiratory diseases experienced the second largest reduction in mortality in Australia long-term. In males, the rate fell from 320 per 100,000 in 1907 to 71 in 2004, while in females the corresponding fall was from 263 to 44. These trends exclude the spikes in death rates from the 1918–19 Spanish influenza pandemic.
- Death rates for injury and poisoning recorded the third largest percentage reductions in mortality. The male death rate declined from 147 per 100,000 males in 1907 to 55 in 2004, and the rates for females fell from 55 to 23. These declines were interrupted briefly during the third quarter of the twentieth century by an increase in motor vehicle accident deaths.
- Cardiovascular mortality has shown an interesting trend over the century: a large rise followed by an even larger fall. The rate for males increased from 437 per 100,000 in 1907 to 1,020 in 1968, then fell to 267 in 2004. In females, it increased from 379 per 100,000 in 1907 to 718 in 1952, before declining to 186.

- In contrast to trends for other major underlying causes, the death rate for cancer increased from 166 per 100,000 males in 1907 to 232 in 2004, with a peak of 287 in 1985. Among females, the death rate rose from 154 per 100,000 in 1907 to a peak of 190 in 1943, then fell to 143 in 2004.

Number of deaths

Despite the marked fall in age-specific death rates, with Australia's population growing larger and older the net effect is that the total number of deaths has been steadily increasing. Between 1907 and 2004, the number of deaths almost trebled from 45,305 to 132,508. The increase was higher for females (from 19,366 in 1907 to 64,113 in 2004) in comparison to males (from 25,939 to 68,395). These increases are mostly due to population growth.

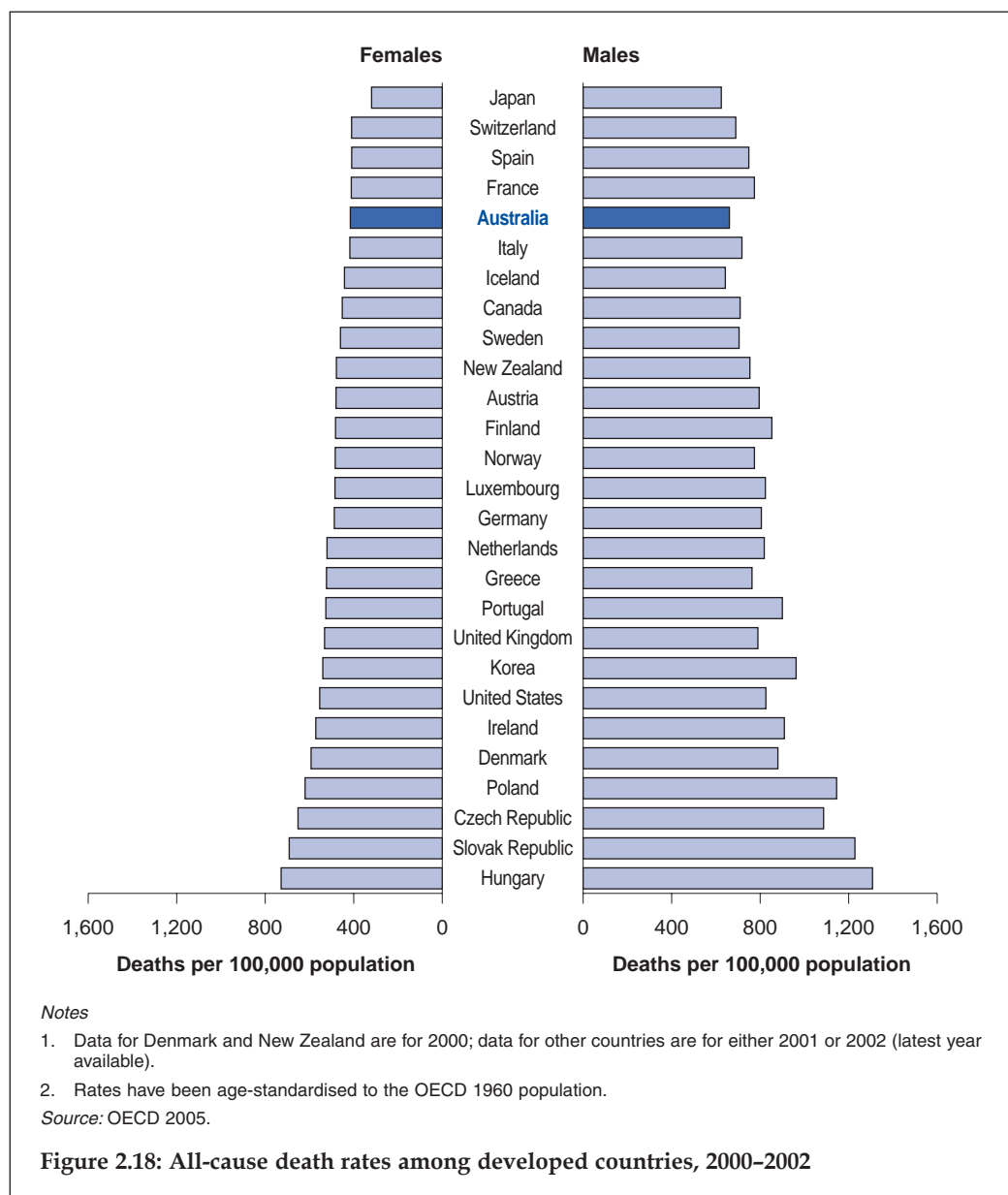
Each year there have been thousands more male deaths than female, reflecting the greater male death rates. The greatest difference was 12,800 more male deaths in 1969, due mainly to the highest number of male deaths for cardiovascular disease, lung cancer and some respiratory conditions. The rise in number of deaths over the century and the ratio of males to female deaths are shown in Figure 2.17.



International comparisons

Among developed countries, Australia has a low overall death rate (Figure 2.18). The age-standardised male death rate of 661 per 100,000 in 2001–2002 ranked third lowest

among OECD countries, and the female death rate of 415 ranked fifth lowest. Japan had the lowest death rates for both males (624) and females (319). Rates in Eastern European countries such as Hungary, the Czech Republic, the Slovak Republic and Poland are considerably higher.



Substantial reductions in death rates, especially for persons in older age groups, have led to increases in life expectancy. In 1960, average life expectancy across OECD

countries was 68.5 years; by 2003 this had risen to 77.8 years. Implicated in these rises have been rising living standards and national incomes, improved lifestyles and better education, along with better access to health care and more affordable medicines (OECD 2005).

Associated causes of death

A fuller picture of events and circumstances around the time of death may be generated from 'multiple causes of death' data, made available by the ABS since 1997. The information is useful for further assessing the contribution of a disease or condition to mortality.

In assessing the contribution of various disorders, it may be useful to examine the underlying cause of death as a proportion of all listings, both underlying and associated (Table 2.22). When cancer is listed it is mostly as an underlying cause of death. In 2004, it was the underlying cause of 87% of male deaths where cancer was listed and 89% of similar female deaths. On the other hand, heart failure was listed as an underlying cause of death in less than 15% of relevant listings.

Table 2.22: Selected diseases as underlying or associated causes of death, 2004 (number of deaths)

Type of cause of death	Cause of death					
	CHD	Stroke	Heart failure	Diabetes	Cancer	CPD
	Males					
Underlying	13,152	4,826	883	1,869	21,831	2,986
Associated ^(a)	7,486	4,340	6,672	4,385	3,327	4,625
Total^(b)	20,638	9,166	7,555	6,254	25,158	7,611
Per cent underlying ^(c)	64	53	12	30	87	39
	Females					
Underlying	11,424	7,215	1,396	1,730	17,022	2,213
Associated ^(a)	5,854	4,701	7,814	3,751	2,186	2,475
Total^(b)	17,278	11,916	9,210	5,481	19,208	4,688
Per cent underlying ^(c)	66	61	15	32	89	47

(a) The total number of deaths with the selected disease listed as an associated cause of death and not as an underlying cause of death.

(b) Total number of listings.

(c) Underlying: underlying cause of death listings/ total listings as percentage.

Source: AIHW National Mortality Database.

Multiple causes of death data provide some insights into comorbidity or disease co-occurrence. For example, they show associations between coronary heart disease (CHD), diabetes and heart failure (Table 2.23).

Of all male deaths in 2004 where CHD was listed as a cause (underlying or associated), CHD itself was the underlying cause in 64% of deaths. Diabetes was the underlying

cause in only 5% of all male deaths that had CHD mentioned, while heart failure was not the underlying cause of any deaths that had CHD listed. Heart failure was not often listed as an underlying cause in its own right, being the underlying cause less than 1 in 8 times it was mentioned. CHD was the underlying cause of death in 35% of heart failure listings among males.

In contrast to heart failure, diabetes featured as the underlying cause in almost 1 in every 3 deaths (30%) in which it was mentioned. A further 23% of male deaths where diabetes was mentioned had CHD as the underlying cause of death. Similar patterns emerged between various causes of death in females.

No causal pathways from one disease to another can be inferred from these results. However, in combination with information about disease processes and shared risk factors, the way that certain diseases (such as CHD and diabetes) often appear together in mortality records may help us to better understand the associations between them.

Table 2.23: Correlations between underlying and associated causes of death, 2004

Underlying cause of death	Number of deaths	Listing as an underlying or associated cause of death (per cent)					
		CHD	Stroke	Heart failure	Diabetes	Cancer	COPD
Males							
CHD	13,152	63.7	12.9	35.2	22.5	4.1	18.9
Stroke	4,826	2.9	52.7	2.8	6.2	1.5	2.9
Heart failure	883	0.0	0.9	11.7	0.8	0.3	1.7
Diabetes	1,869	5.1	4.3	4.2	29.9	0.6	1.5
Cancer	21,831	9.7	9.8	10.7	19.0	86.8	18.8
COPD	2,986	3.1	1.9	6.2	3.2	1.3	39.2
Other	22,848	15.4	17.6	29.1	18.5	5.4	16.9
All causes	68,395	100.0	100.0	100.0	100.0	100.0	100.0
Total listings (number)	n.a.	20,638	9,166	7,555	6,254	25,158	7,611
Females							
CHD	11,424	66.1	10.7	33.8	19.7	3.1	15.0
Stroke	7,215	4.0	60.6	4.3	8.4	1.6	3.1
Heart failure	1,396	0.0	1.2	15.2	1.1	0.3	2.3
Diabetes	1,730	4.8	3.5	3.8	31.6	0.5	1.2
Cancer	17,022	6.4	5.4	7.1	14.5	88.6	13.6
COPD	2,213	2.2	0.8	3.8	2.5	0.7	47.2
Other	23,113	16.4	17.9	32.1	22.2	5.2	17.6
All causes	64,113	100.0	100.0	100.0	100.0	100.0	100.0
Total listings (number)	n.a.	17,278	11,916	9,210	5,481	19,208	4,688

Note: The above table should be read down columns.

Source: AIHW National Mortality Database.