



## 8 Mortality

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Mortality rates are a vital measure of population health that can be used to assess the nature and progress of diseases such as diabetes (AIHW 2005d). In Australia, more than one cause of death can be listed on the death certificate. This means that for each death, both underlying and associated causes of death can be listed and have been available for analysis of deaths data since 1997. The underlying cause of death is the disease or injury initiating the sequence of events leading to death.

Diabetes is recognised as having a substantial impact on mortality in Australia; however, it may not be diabetes itself which directly leads to death, but one of its many complications. As a result, it is commonly the complication that is listed as the underlying cause of death on the death certificate. A more complete picture of the mortality burden of diabetes can be obtained by examining both diabetes as the underlying cause, which is the primary disease or injury causing the deaths, and diabetes as an associated cause of death (diseases or injuries that are considered to have contributed to the death).

The method of examining deaths where diabetes is listed as the underlying or associated cause of death may overestimate the true contribution of diabetes to mortality in Australia as it often includes deaths for a wide range of conditions, some of which are unlikely to be complications of diabetes (AIHW: Dixon & Webbie 2005). This may be overcome, at least to some extent,

by examining diabetes-related deaths—that is, deaths where diabetes was listed as the underlying cause of death, or where diabetes was listed as the associated cause of death and the underlying cause of death was one of a specific list (see Box 8.1) commonly associated with diabetes complications.

## Diabetes as the underlying cause of death

Diabetes is among the top ten leading causes of death among Australians. In 2005, diabetes was the underlying cause of death in 3,529 deaths registered (2.7% of all deaths). Of these, about 10% were due to Type 1 diabetes, 42% were due to Type 2 diabetes and the remaining deaths were due to unknown or unspecified type of diabetes.

### Sex and age

More males than females die from diabetes. In 2005, Australian males were nearly one and a half times as likely to die from diabetes as Australian females (a death rate of 19 per 100,000 compared with 13 per 100,000, respectively). Diabetes mortality increases dramatically with age, with over 86% of deaths occurring in those aged 65 years and over in 2005 (Figure 8.1).

#### Box 8.1: Diabetes-related deaths

For the purposes of this report, diabetes-related deaths refer to deaths where:

- diabetes was listed as the underlying cause of death
- OR
- diabetes was listed as an associated cause of death, where the underlying cause of death was one of:
  - myocardial infarction (heart attack)
  - ischaemic heart disease\*
  - stroke or sequelae of stroke\*
  - heart failure\*
  - sudden death (cardiac arrest)

- peripheral vascular disease
- kidney disease
- hyperglycaemia
- hypoglycaemia.

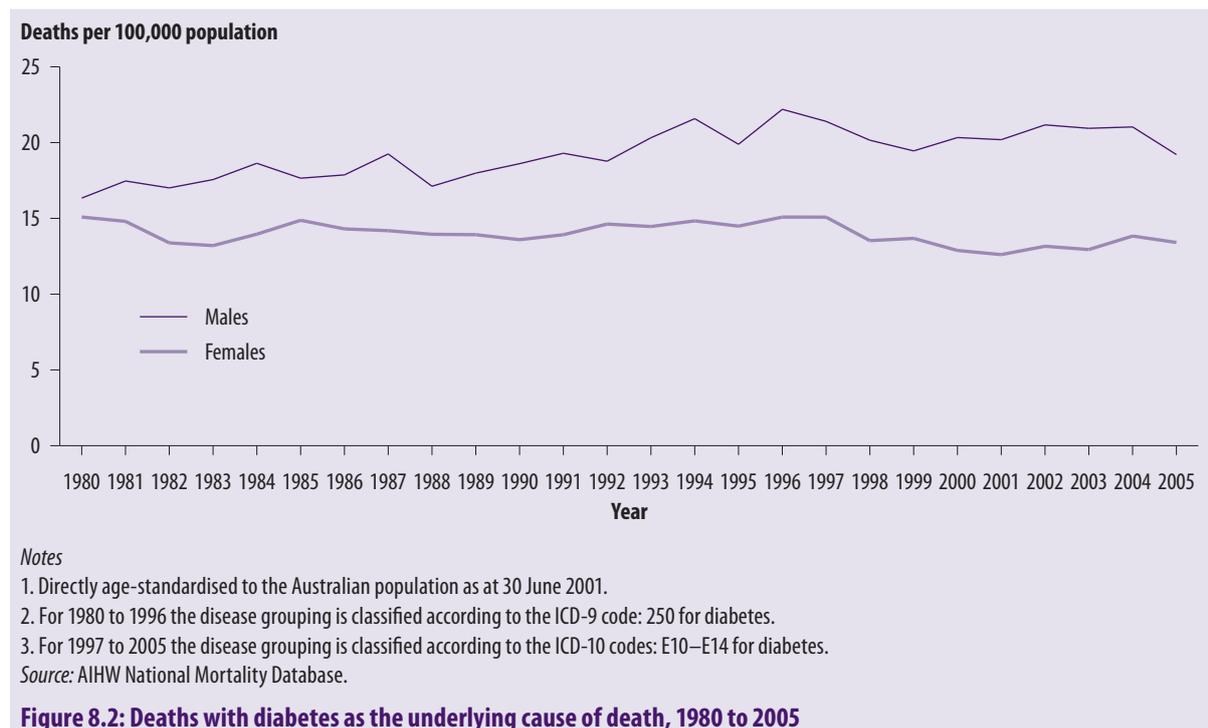
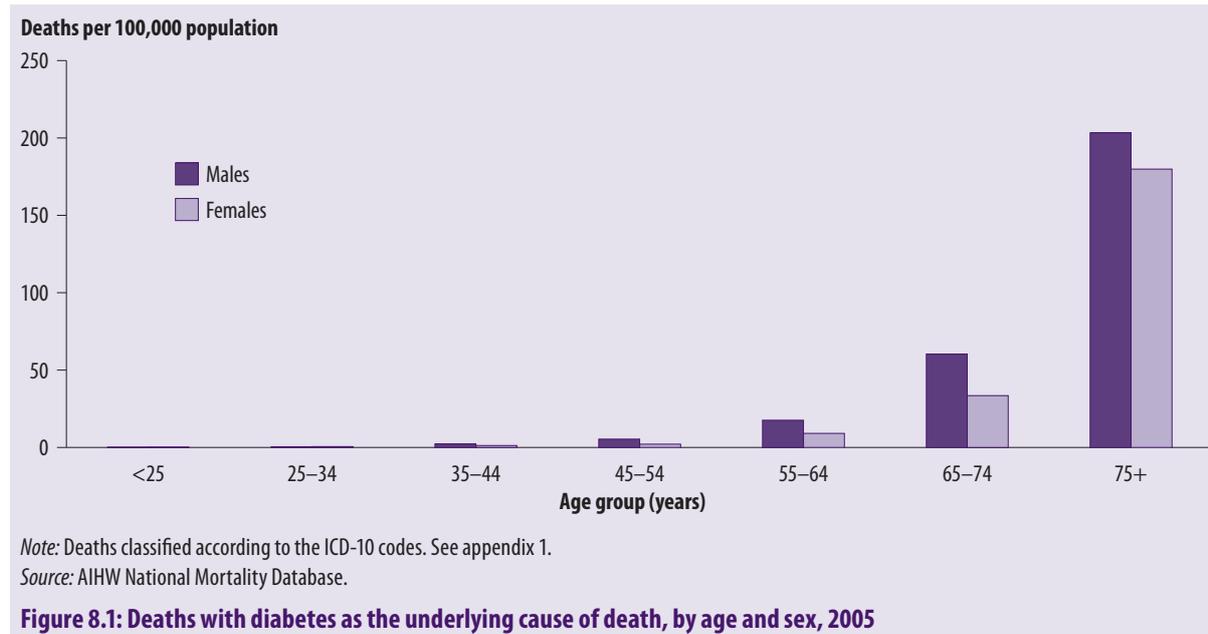
*Note:* 'Diabetes-related deaths' is based on the definition of 'deaths related to diabetes' used in the United Kingdom Prospective Diabetes Study (UKPDS 1998). The UKPDS definition has been modified by diabetes specialists on the National Diabetes Data Working Group to include ischaemic heart disease, sequelae of stroke and heart failure, and other commonly recognised complications of diabetes.

\*Not included in the UKPDS definition of deaths related to diabetes.

## Trends

Over the 26-year period between 1980 and 2005, there were a total of 65,221 deaths (an average of 2,508 deaths per year) registered where diabetes was recorded as the underlying cause; this represents 2% of all deaths registered over that time. Trend analysis indicates that the death

rate for diabetes as an underlying cause of death increased for males over the last 25 years, with an average annual increase of 0.7% between 1980 and 2005. However, for females the death rate for diabetes decreased over the same period, by 0.5% per year on average (Figure 8.2).



## Diabetes as an underlying or associated cause of death

Diabetes is more often listed as an associated cause of death than as the underlying cause. In 2005, the total number of deaths for diabetes increased from 3,529 when diabetes was the underlying cause to 11,864 when diabetes was also listed as an associated cause of death—this represents 9% of all deaths recorded in 2005.

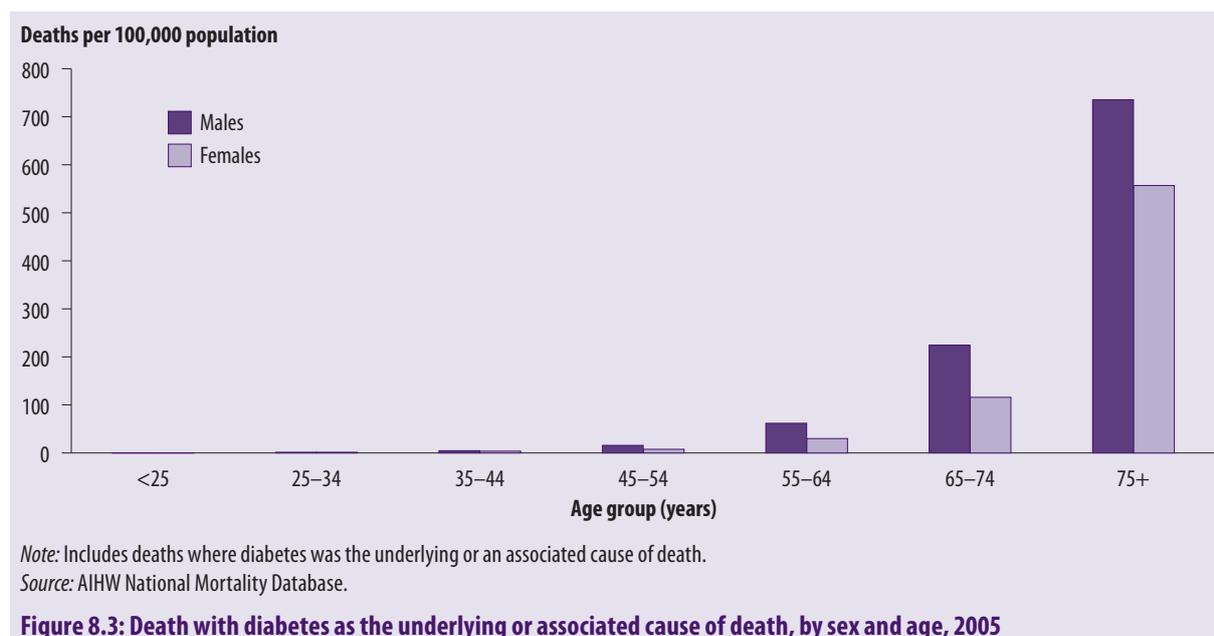
### Sex and age

The sex and age distribution of deaths with diabetes as the underlying or associated cause is similar to that of deaths with diabetes listed as just an underlying cause. In 2005, the total number of deaths was higher for men than for women (6,325 deaths compared with 5,540 deaths, respectively). The majority of deaths, with diabetes as the underlying or associated cause (87%), occurred in those aged 65 years and over (Figure 8.3).

### Trends

As previously noted, data for associated causes of death first became available in 1997. Therefore, trends for deaths with diabetes as an underlying or associated cause are presented for the years 1997 to 2005.

Over the 9-year period, there were a total of 95,478 deaths registered where diabetes was listed as an underlying or associated cause of death (an average of 10,609 deaths per year); this represents 8% of all deaths registered in that period. The death rates for both men and women remained fairly stable between 1997 and 2005, however, males experienced higher death rates than females across all years (Figure 8.4).



## Diabetes-related deaths

Diabetes-related death are deaths where diabetes was listed as the underlying cause of death, or where diabetes was listed as the associated cause of death and the underlying cause of death was one of a specific list (see Box 8.1) commonly associated with diabetes complications.

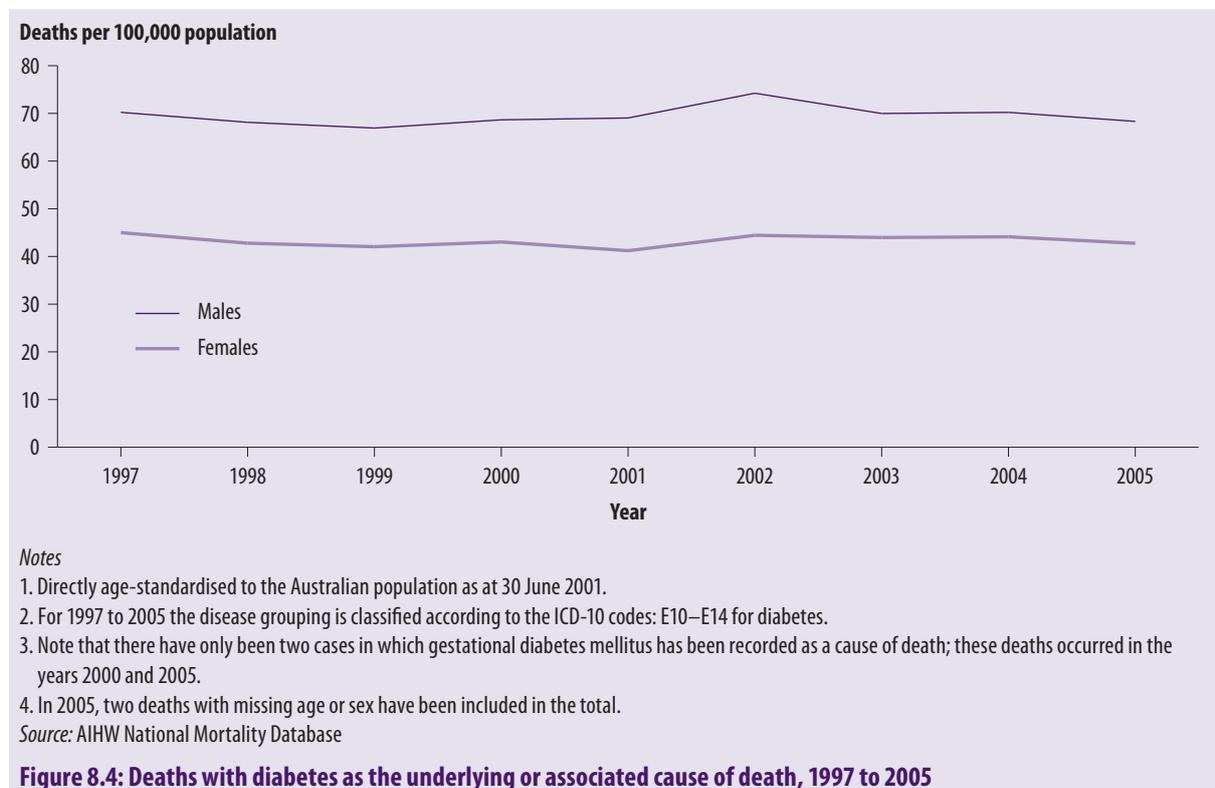
In 2005, there were 7,012 diabetes-related deaths, which constituted 5% of all deaths recorded. More males died from diabetes-related deaths than females (3,629 deaths compared with 3,383 deaths, respectively). The majority of diabetes-related deaths occurred in those aged 65 years and over.

Over the 9-year period 1997 to 2005, there were a total of 61,255 deaths registered where diabetes was a related cause of death. This represents an average of 6,780 deaths each year. The trend for the underlying or associated cause of death was similar—the death rates for diabetes-related deaths remained relatively stable for both males and females, but males had higher rates than females in all years.

## Causes of death commonly listed with diabetes

As noted above, diabetes is rarely listed as the only cause of death on death certificates. In 2005, diabetes was recorded as the only cause of death in 31 (0.9%) deaths where diabetes was the underlying cause of death. Where diabetes was listed as the underlying cause of death, conditions most commonly listed as associated causes of death included coronary heart disease (in 67% of deaths), kidney-related diseases (30%), and stroke and heart failure (20%).

Of the deaths in 2005 where diabetes was listed as an associated cause of death, coronary heart disease was recorded as the underlying cause of death in 28% of deaths. Cancer (25%) and stroke (8%) were the other main underlying causes listed with diabetes deaths.





## Deaths of people on the National Diabetes Register

There were over 7,500 deaths of NDR registrants during the period 1999–2005. Diabetes was the underlying cause of death in just over 14% of deaths. At broad disease group level, neoplasms were the most common underlying cause of death, accounting for just over a third (36%) of all deaths of NDR registrants, followed by diseases of the circulatory system, which accounted for 29% of deaths.

Coronary heart disease (CHD) was the most common specific underlying cause of death of NDR registrants—accounting for 19% of deaths. Cerebrovascular diseases accounted for nearly 5% of total deaths.

Diabetes is often under-reported on death certificates (Whittall et al. 1990) mainly because diabetes indirectly causes death being a strong risk factor for common cause of death such as heart and other circulatory diseases (AIHW: Dixon & Webbie 2005). Furthermore, many people have other chronic disease in addition to diabetes and selecting a single underlying cause of death in these people may be difficult (AIHW: Mathur et al. 2000).

Of all deaths to NDR registrants—people known to have diabetes—in 1999–2005 just under 50% had diabetes listed as a cause on their death certificates.