



## 7 Impact

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## Introduction

Diabetes is associated with substantial morbidity and mortality and has a significant impact on affected individuals and their families. In particular, the onset of macrovascular and microvascular complications reduces quality of life through increased burden of illness and the costs of managing the complications of diabetes over time.

A number of studies have shown that the long-term complications of diabetes may lower the quality of life of people with diabetes (Bates & Jerums 2003; Maddigan et al. 2006; Mehta et al. 1999; Redekop et al. 2002). People with diabetes and peripheral neuropathy experience chronic, painful symptoms that diminish their quality of life and disrupt sleep, which can lead to depression (Argoff et al. 2006). They also experience social isolation due to impaired mobility and consequent physical and emotional ill health (Nabuurs-Franssen et al. 2005). There is evidence suggesting that depression is often diagnosed in people with diabetes because of its association with poor metabolic control, poor diet, adherence to the medication regimen and decreased quality of life (Egede et al. 2002; Hanninen et al. 1999). Depression is found to be highly prevalent among people with Type 2 diabetes and chronic comorbidities than among those with Type 2 diabetes only (Pouwer et al. 2003). People with diabetes complications are also likely to experience physical disability which will limit their ability to perform daily activities (Clarke et al. 2006; Egede 2004).

Diabetes is associated with substantial costs to the health system and to affected individuals and their families. These costs can be direct, indirect or intangible (Milton et al. 2006; Parsons et al. 2000).

Intangible costs are usually quantified using health 'gap' measures that indicate the difference between a population's actual health status and some 'ideal' or reference status. The most widely known example of such a measure is the disability-adjusted life year (DALY). Another measure commonly used in economic evaluations, but not in health status assessments, is the Quality Adjusted Life Year (QALY) (AIHW: Begg et al. 2007).

## Quality of life

Measurement of the quality of life of people with diabetes assists in understanding the effect diabetes has on the individual. In addition, an individual's view of their quality of life is important for evaluating and understanding treatment effects from the person's perspective and for improving future care (Higginson & Carr 2001).

In the 2003 DiabCost Australia study, people with Type 2 diabetes in the 36–65 year age group reported poor quality of life compared with other Australians of the same age. Most frequently reported problems affecting quality of life for people with diabetes were pain/discomfort, impeded mobility and anxiety/depression. Having complications decreased quality of life compared with people without complications, but there was little variation in quality of life between different types of complications. When compared by treatment type, people whose diabetes was controlled by diet alone reported the highest quality of life, whereas those on insulin reported the lowest (Colagiuri et al. 2003).

Little information is available on the quality of life of people with Type 1 diabetes in Australia. A study of children and young people with Type 1 diabetes in Melbourne found that their general health and quality of life were poorer than those of children and young people in the general population. Lower quality of life was found to be related to poor blood glucose control in children (5–11 years), but not in 12–18 year-olds, while the presence of diabetes-related symptoms and concerns was associated with poorer psychosocial functioning for both age groups (Wake et al. 2000). Children with diabetes living in regional areas of Victoria have also been found to have lower quality of life than those from urban areas, despite similar diabetes knowledge and similar levels of glycosylated haemoglobin (HbA1c) (Cameron et al. 2002).

## Self-assessed health

The ABS NHS collects information on 'self-assessed health status', which is the respondent's perception of their general health measured against a five-point scale: excellent, very good, good, fair and poor.

According to 2004–05 NHS self-reports, an age-standardised rate of 20% of people with diabetes assessed their health as very good or excellent, compared with 58% of those without diabetes. People with diabetes in all age groups (48%) were 3 times as likely to rate their own health as fair or poor than people without diabetes (15%) (Figure 7.1).



**Notes**

1. People aged 15 years and over are included.
  2. Directly age-standardised to the 2001 Australian population.
- Source: AIHW analysis of ABS 2004–05 National Health Survey data.

**Figure 7.1: Self-assessed health status of people with and without diabetes, 2004–05**

More females than males (51% and 45%, respectively) with diabetes rated their health as fair or poor (Table 7.1). The corresponding figures for those without diabetes were 14% for females and 15% for males.

**Table 7.1: Self-assessed health status of people with and without diabetes, by sex, 2004–05 (per cent)**

Self-assessed health status	People with diabetes		People without diabetes	
	Males	Females	Males	Females
Excellent	4.9	4.6	21.3	22.0
Very Good	15.0	15.2	35.4	37.1
Good	34.9	29.6	28.3	26.9
Fair	26.3	33.6	11.0	10.2
Poor	19.0	17.0	3.9	3.8

**Notes**

1. People aged 15 years and over are included.
  2. Directly age-standardised to the 2001 Australian population.
- Source: AIHW analysis of ABS 2004–05 National Health Survey data.

People with diabetes and other long-term health conditions were more than twice as likely as people with other long-term health conditions to rate their own health to be fair or poor. The 2004–05 NHS results showed that 60% of people with diabetes and other long-term health conditions rated their health as fair or poor compared with 27% of people with other long-term conditions.

**Mental health**

Depression and depressive symptoms have been shown to be highly prevalent in people with diabetes compared with those without diabetes (Anderson et al. 2001) and there is emerging evidence suggesting that depression itself is a risk factor for Type 2 diabetes (Arroyo et al. 2004; Brown et al. 2005b; Golden et al. 2004). A Canadian population-based study conducted from 1992 to 2000, showed that people with a history of depression were at a greater risk of developing diabetes (Brown et al. 2005b). Possible reasons for this relationship are that people with depression are less likely to be engaged in physical activities, and more likely to experience changes in body weight, which increases the risk of developing diabetes. In addition, some medications used to treat depression are known to cause weight gain and sedation, which, again, could contribute to the development of diabetes (Brown et al. 2005b). In the Fremantle Diabetes Study (1993–1996), 32% of people with Type 2 diabetes self-reported depression and it was associated with a greater prevalence of diabetic complications (Bruce et al. 2005). Having a number of comorbidities places an additional burden on people with diabetes as these conditions are associated with an increased number of functional limitations. Subsequently, functional limitations can reduce the patients’ quality of life and thus contribute to the development of depression (Pouwer et al. 2003).

According to the 2004–05 NHS, 18% of people with diabetes had high or very high levels of psychological distress compared with 12% of people without diabetes, as measured by the Kessler-10 scale (see Box 7.1). More females (22%) than males (15%) with diabetes had high or very high levels of psychological distress (Table 7.2).

**Table 7.2: Level of psychological distress experienced by people with or without diabetes**

Level of psychological distress (K-10 scale <sup>(a)</sup> )	People with diabetes		People without diabetes	
	Males	Females	Males	Females
Low (0–15)	62.5	53.7	68.9	61.7
Moderate (16–21)	22.6	23.9	21.1	24.3
High (22–29)	9.9	13.2	6.9	10.1
Very high (30–50)	5.0	9.2	3.1	3.9

(a) Based on the Kessler-10 scale of psychological distress.

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

### Disability and activity limitation

Diabetes has been shown to be associated with an increased risk of disability in adults (Gregg et al. 2002; Ryerson et al. 2003). This is mainly because diabetes is related to numerous vascular and neuropathic complications that could affect functional status. A study by Gregg et al. (2002) found that after controlling for a number of comorbidities (including coronary heart disease (CHD), stroke, depression, cognitive and visual impairment and arthritis) diabetes was still related to a 42% increased risk of disability.

In a nationally representative sample of U.S. adults, 66% with diabetes had difficulty doing at least one of the physical tasks that were assessed. The tasks involving mobility or lower extremity function, such as stooping, standing, walking, pushing, and climbing, tended to be the most problematic for people with diabetes and had the highest prevalence of any limitation (Ryerson et al. 2003).

Based on 2003 Survey of Disability Ageing and Carers (SDAC) self-reports, there were approximately 634,600 people with diabetes and, of them, 56% had a disability. Disability among people with diabetes was higher at older ages: 46% of people with diabetes aged less than 65 years compared with 67% of people with diabetes aged 65 years and over had a disability. This pattern was similar for both males and females (Figure 7.2).

Of the people with diabetes and a disability, 42% had a profound or severe core activity limitation, indicating that they were unable to do, or always/sometimes needed help with, a core activity task such as self-care, mobility and communication. Again, the proportion reporting profound or severe core activity limitation among people with diabetes and a disability increased with age. Among people with diabetes and a disability, 31% aged less than 65 years and 49% aged 65 years

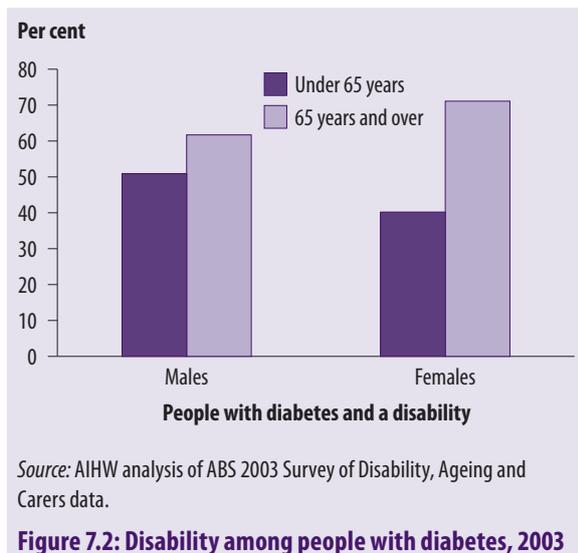
#### Box 7.1: Psychological distress according to Kessler-10 scale

Psychological distress refers to an individual's overall level of psychological strain or pain, evidenced by psychological states such as depression, anxiety and anger. Psychological distress may be fairly transient—for example, experiencing high anxiety over an upcoming event, or sadness because of the break-up of a relationship—but may also be a continuing problem, particularly among those experiencing mental health problems and clinical disorders.

Psychological distress can be measured using the Kessler-10 (K-10) distress scale, which is a 10-item questionnaire asking about feelings such as nervousness, hopelessness, restlessness, depression and worthlessness. For each item, the respondents are asked how often they experienced these feelings in the past 4 weeks, with responses ranging from 'none of the time' to 'all of the time' (scoring 1 to 5). The maximum score is 50 (indicating severe distress) and the minimum score is 10 (no distress). Andrews & Slade (2001) showed a strong association between the K-10 scale and current diagnoses of anxiety and affective disorders. They also showed a lesser, but significant, association with other mental disorder categories.

and over had a profound or severe core activity limitation.

Twenty-four per cent of people with diabetes and a disability considered diabetes as the main condition causing their disability in 2003.



**Figure 7.2: Disability among people with diabetes, 2003**

## Burden of disease

The impact of diabetes on the health of the population can be shown using a number of summary measures of health that combine information on mortality and non-fatal health outcomes into a single number. The disability-adjusted life year or DALY is one such measure that summarises the burden of disease and injury in a population. The DALY combines information on the impact of premature death as well as non-fatal health outcomes. Premature death is measured by the years of life lost (YLL) due to disease or injury and non-fatal health outcomes are measured by years of 'healthy' life lost (YLD) due to disease, disability or injury. To combine these two health measures into a summary health measure, the DALY uses time as a common 'currency'. It is a measure of the years of healthy life lost due to illness or injury—one DALY is one lost year of 'healthy' life (AIHW: Begg et al. 2007).

Diabetes was the eighth leading cause of burden of disease and injury in 2003 and it was responsible for 5.5% of the total burden (Table 7.3), with Type 2 diabetes accounting for 92% of this burden (AIHW: Begg et al. 2007).

**Table 7.3: Diabetes burden of disease by specific cause, 2003**

Cause	YLD	Per cent of total	YLL	Per cent of total	DALYs	Per cent of total
Diabetes per se	89,252	6.6	32,295	2.5	121,547	4.6
Neuropathy	6,500	0.5	—	0.0	6,500	0.2
Peripheral vascular disease	5,917	0.4	—	0.0	5,917	0.2
Diabetic foot	3,672	0.3	—	0.0	3,672	0.1
Amputation	2,455	0.2	—	0.0	2,455	0.1
Retinopathy	1,258	0.1	—	0.0	1,258	0.0
Other <sup>(a)</sup>	2,483	0.2	—	0.0	2,483	0.1
<b>Total diabetes burden</b>	<b>111,536</b>	<b>8.2</b>	<b>32,295</b>	<b>2.5</b>	<b>143,831</b>	<b>5.5</b>
Ischaemic heart disease attributable to diabetes	8,494	0.6	45,948	3.6	54,442	2.1
Stroke attributable to diabetes	3,985	0.3	16,260	1.3	20,245	0.8
<b>Total burden attributable to diabetes</b>	<b>124,015</b>	<b>9.2</b>	<b>94,503</b>	<b>7.4</b>	<b>218,518</b>	<b>8.3</b>

(a) Includes renal failure.

Notes

1. YLD = Healthy years lost due to disability.

2. YLL = Years of life lost due to premature mortality.

3. DALY = Disability adjusted life years.

Source: AIHW: Begg et al. 2007.

Eighty-five per cent of the total diabetes burden was due to diabetes per se (that is, the experience of having diabetes regardless of complications), with the remainder being due to complications such as neuropathy (5%), peripheral vascular disease (PVD) (4%), and diabetic foot (3%). The majority (78%) of the diabetes burden was due to years of health life lost, and the remainder was due to premature death.

Diabetes was responsible for a loss of just over 111,500 years or 8% of 'healthy' life due to disability in 2003. More males—9% compared with 7% females—with diabetes experienced loss of healthy life due to disability (AIHW: Begg et al. 2007).

Diabetes also carries with it an increased risk of ischaemic heart disease and stroke and the associated burden has not been included in the above figures. When this risk was accounted for, the burden attributable to diabetes increased to 8.3% of total burden (Table 7.3).

The burden from diabetes in both sexes increased linearly until age 80 then declined. The contribution from diabetes per se dominated at all ages.

Type 2 diabetes was ranked sixth among the 20 leading specific causes of burden (DALY) for both males and females in 1993. By 2003, it was ranked second for males and fourth for females. Type 2 diabetes is projected to be the leading specific cause for males and second for females by 2023 (AIHW: Begg et al. 2007).

## Costs

Diabetes places a large burden on health-care systems in terms of expenditure on hospitalisations, aged care, medications, diagnostic services, and other out-of-hospital medical care, including general practice and community health services. Non-health care and indirect costs borne by governments, private health insurers, and people with diabetes can also be substantial (AIHW: Dixon 2005). People with diabetes, particularly those with complications, are more likely to use health services than people without diabetes, and to use them more often and for longer periods of time (Ramsey et al. 2002).

Disease-related costs fall into four broad categories:

- direct health-care costs, which include hospital treatment, medications, GP visits, allied health and specialist care, use of diagnostic services and medical research (see Appendix 1 for a description of these categories)
- direct non-health-care costs, including transport to and from medical services, child care, and home care
- indirect costs, such as lost productivity, lost income, disability, and lost years of life
- intangible costs, such as impact on quality of life (Colagiuri et al. 1998; Parsons et al. 2000).

This section mainly focuses on direct health-care expenditure for diabetes—that is, money spent by governments, private health insurers, companies, households and individuals to prevent, diagnose and treat diabetes. Very little information is available in Australia on the other types of costs associated with diabetes.

Two sources of data on direct health expenditure for diabetes are used: the AIHW Disease Expenditure Database and the National Diabetes Services Scheme.

## Direct health expenditure

Data on allocatable recurrent health expenditure from the AIHW Disease Expenditure Database showed that direct health-care expenditure on diabetes in 2004–05 was \$989 million. Diabetes accounted for 1.9% of the year's total allocatable recurrent health expenditure (see Appendix 1 for discussion of exclusions). It is estimated that expenditure on Type 1 diabetes accounted for 14% of the diabetes expenditure, at \$139 million, and expenditure on Type 2 diabetes accounted for 84% at \$828 million. The remaining \$22 million related to diabetes prevention services.

Much of the expenditure on diabetes was on hospital services, \$371 million (37.5%) followed by out-of-hospital medical services, \$288 million (29.1%), diabetes-related pharmaceuticals, \$275 million (27.8%), and research, \$55 million (5.6%) (Figure 7.3).

### The National Diabetes Services Scheme (NDSS)

The NDSS provides access to products and services—such as syringes, insulin infusion pump consumables and blood and urine glucose testing reagents—that are needed for self-management of diabetes at prices subsidised by the Australian Government. It is administered by Diabetes Australia on behalf of the DoHA. The state and territory governments contribute co-payments for needles and syringes, which effectively makes them effectively free to NDSS registrants.

Australian Government expenditure on the NDSS is presented here, but no information on the total value of patient contributions to NDSS-subsidised products is available.

In 2006–07, there were 844,062 people registered with the NDSS (Diabetes Australia 2008) and the Australian government expenditure on the NDSS in that financial year was nearly \$114 million (Personal communication with Special Access Programs Section, DoHA). This expenditure is in addition to the direct health expenditure shown in Figure 7.3, as expenditure on the NDSS, which is grouped under ‘health aids and appliances’, has not been allocated by disease group and therefore not included in the AIHW Disease Expenditure Database.

### Direct non-health care costs

Results from the DiabCost study estimated that average annual direct non-health-care costs for

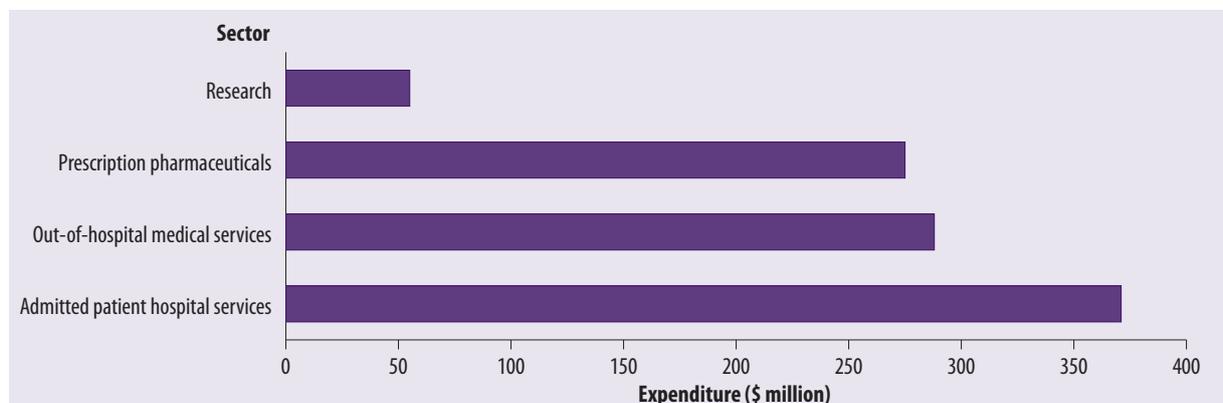
people with Type 2 diabetes were \$1,065 per person (Colagiuri et al. 2003). Home support and special foods accounted for around two-thirds of these costs (40% and 28%, respectively), with transport accounting for a further 12%. There is no information available on the direct non-health-care costs for people with Type 1 diabetes in Australia.

### Indirect costs

The estimated average income lost by patients and carers unable to attend work was low in the DiabCost study: an average of only \$35 per person per year, but the study sample had a mean age of 65 years and therefore few participants were employed (Colagiuri et al. 2003). The average income lost per person, particularly for carers, increased if complications were present. The impact of diabetes in terms of lost income is likely to be higher if people with Type 1 diabetes are included, because this type of diabetes generally develops at a much younger age and therefore affects parents of children with the disease as well as employed people who themselves have Type 1 diabetes. There are currently no Australian data available on the indirect costs associated with Type 1 diabetes.

### Intangible costs

The impact of diabetes on quality of life was discussed earlier in this chapter. However, intangible costs of diabetes are difficult to quantify and there is no information currently available.



Source: AIHW Disease Expenditure Database.

Figure 7.3: Direct health expenditure on diabetes by sector, 2004–05

