

5 Diabetes mortality in other population groups

5.1 Introduction

The previous chapters discussed diabetes as a cause of death at the national level and among Aboriginal and Torres Strait Islander peoples. They highlighted the considerable contribution that diabetes may make to all-cause mortality and that diabetes was more likely to be an associated cause than the underlying cause of death. Deaths from diabetes were shown to increase sharply with age, and the strong association between diabetes and diseases of the circulatory system and diseases of the genito-urinary system was quite evident. Further, the data indicated that diabetes was more likely to be an associated cause of death when coronary heart disease and renal disease were the underlying causes of death. Diabetes-related deaths were shown to be substantially higher among Indigenous Australians compared with non-Indigenous Australians.

This chapter examines and explores mortality differentials among regions and for particular population groups:

- States and Territories;
- urban, rural and remote areas of Australia; and
- socioeconomically disadvantaged Australians.

Within each of these sections mortality data is presented for all diabetes-related deaths, for diabetes as the underlying cause of death and for diabetes as an associated cause of death. To allow for more detailed analysis, mortality data for 1997 and 1998 have been combined. Disaggregation by age has not been undertaken, as the number of deaths across regions and population groups are too small.

5.2 States and Territories

Diabetes as the underlying cause or an associated cause of death

Variation exists across the States and Territories in age-standardised death rates for diabetes-related deaths. The rate in the Northern Territory was substantially higher than that of the other States and Territory—the rate for males was almost twice and for females almost four times the national average (Table 5.1). Diabetes-related death rates were also high in South Australia and Victoria, with the lowest rate in the Australian Capital Territory. The higher death rate in the Northern Territory is attributed mainly to the relatively large proportion of Indigenous Australians in the Territory, among whom death rates from diabetes are considerably higher.

Table 5.1: Age-standardised death rates for diabetes-related deaths, States and Territories, 1997 and 1998

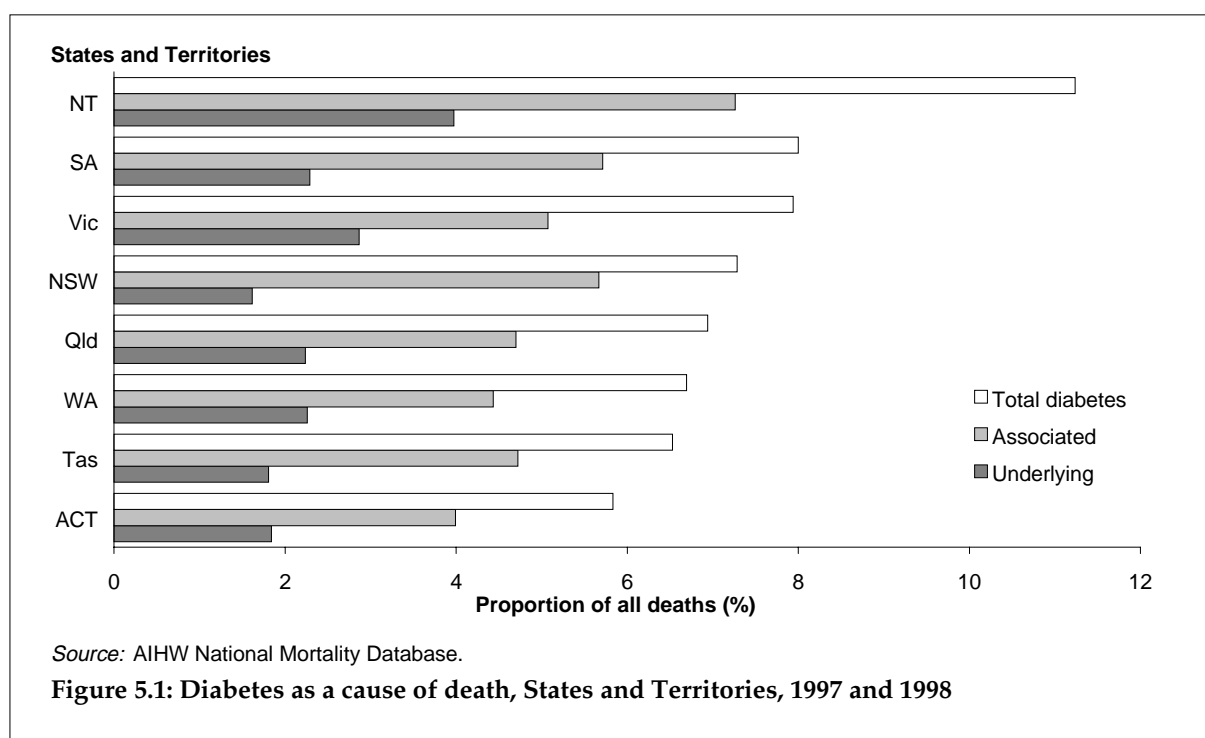
States and Territories	Males		Females	
	Rate per 100,000 ^(a)	95% Confidence interval	Rate per 100,000 ^(a)	95% Confidence interval
New South Wales	56.7	54.8–58.6	35.8	34.5–37.1
Victoria	61.7	59.4–64.0	37.7	36.2–39.2
Queensland	52.0	49.4–54.5	35.9	34.0–37.8
Western Australia	49.4	45.9–53.0	33.7	31.2–36.3
South Australia	63.5	59.6–67.4	37.1	34.5–39.6
Tasmania	57.5	50.7–64.3	31.9	27.5–36.3
Australian Capital Territory	39.1	29.8–48.4	30.4	23.7–37.1
Northern Territory	97.6	73.9–121.3	136.1	107.9–164.4
Australia	57.2	56.1–58.3	36.5	35.8–37.3

(a) Death rates are age-standardised to the 1991 Australian population.

Source: AIHW National Mortality Database.

In 1997 and 1998, the proportion of deaths where diabetes was the underlying or associated cause varied across the States and Territories (Figure 5.1). The Northern Territory had the highest proportion of diabetes-related deaths (11.2%) followed by South Australia (8.0%), Victoria (7.9%) and New South Wales (7.3%), with the lowest proportion in the Australian Capital Territory (5.8%).

Although, nationally, diabetes is twice as likely to be recorded as an associated cause of death rather than as the underlying cause of death, this varied between the States and Territories (Figure 5.1). In New South Wales diabetes was an associated cause of death 3.5 times as often as it was the underlying cause; similarly, in Tasmania and South Australia diabetes was an associated cause 2.6 and 2.5 times as often. For the other States and Territories the corresponding ratios were between 1.8 and 2.2.



Diabetes as the underlying cause of death

The proportion of deaths where diabetes was recorded as the underlying cause of death in 1997 and 1998 varied across the States and Territories. The Northern Territory and Victoria had the highest proportion of deaths (4.0% and 2.9% respectively), which was larger than the national average (2.2%). In New South Wales, Tasmania and the Australian Capital Territory diabetes was less likely to be recorded as the underlying cause of death (1.6–1.8%) compared with the other States and Territory (Figure 5.1).

Associated causes of death

When diabetes was the underlying cause of death in 1997 and 1998, the overall pattern of associated causes was consistent with the national level across most States and Territories (Table 5.2). Diseases of the circulatory system was the highest recorded associated cause of death across all States and Territories, with the smallest proportion recorded in the Northern Territory.

In the Northern Territory, the Australian Capital Territory and Western Australia, diseases of the genito-urinary system was recorded more often as an associated cause than was recorded nationally (48.6%, 33.3% and 28.0% compared with 22.0%). Mental disorders, infectious and parasitic diseases, and endocrine, nutritional and metabolic diseases and immunity disorders were recorded up to twice as often in the Northern Territory when compared with the national figures (18.6%, 22.9%, 20.0% as compared with 9.7%, 9.6%, and 8.3%) The pattern observed in the Northern Territory largely reflects that of Indigenous Australians (Table 5.2).

Table 5.2: Deaths where diabetes is the underlying cause of death by associated causes of death, States and Territories, 1997 and 1998

Associated causes	NSW	Vic	Qld	WA	SA	Tas	ACT	NT
Proportion of diabetes deaths (%)								
Diseases of the circulatory system	80.4	86.6	81.7	80.4	85.4	76.1	72.9	67.1
Diseases of the genito-urinary system	21.3	19.1	23.1	28.0	22.6	19.4	33.3	48.6
Diseases of the respiratory system	19.5	19.7	19.3	15.3	18.5	19.4	8.3	15.7
Mental disorders	10.2	10.3	8.3	11.3	5.6	11.9	16.7	18.6
Infectious and parasitic diseases	12.0	7.4	9.7	10.7	7.7	11.2	6.3	22.9
Endocrine, nutritional and metabolic diseases and immunity disorders ^(a)	7.7	7.3	9.3	9.5	9.5	9.0	6.3	20.0
Diseases of the digestive system	6.0	4.5	6.8	5.8	5.2	10.4	8.3	2.9
Neoplasms	5.2	4.2	6.0	6.4	6.0	3.7	4.2	0.0
Injury and poisoning	4.2	3.2	6.7	5.4	3.0	6.7	2.1	4.3
Diseases of the nervous system and sense organs	4.9	4.1	3.0	4.7	4.7	4.5	2.1	4.3
Diseases of the musculoskeletal systems and connective tissue	2.7	2.9	2.3	3.3	3.0	1.5	2.1	5.7
Diseases of the blood and blood-forming organs	2.1	2.0	2.0	4.5	1.5	3.0	0.0	2.9
Other ^(b)	2.3	1.0	2.6	1.0	2.1	0.7	0.0	1.4
Total deaths where diabetes is the underlying cause (number)	1,461	1,871	991	485	535	134	48	70

(a) Excludes deaths where diabetes is an associated cause.

(b) Other includes diseases of the skin and subcutaneous tissue, congenital anomalies, complications of pregnancy, childbirth and the puerperium, certain conditions originating in the perinatal period, symptoms, signs and ill-defined conditions.

Notes

1. Column percentages do not sum to 100, as more than one disease category may be recorded on the death certificate as an associated cause.
2. One death with diabetes as the underlying cause was unable to be assigned to a State or Territory.

Source: AIHW National Mortality Database.

Diabetes as an associated cause of death

Diabetes as an associated cause of death varied across the States and Territories from 4.0% of all deaths in the Australian Capital Territory to 7.3% in the Northern Territory in 1997 and 1998 (Figure 5.1).

Diabetes as an associated cause of death within each underlying cause of death disease category

The pattern of association between diabetes and the leading underlying causes of death varies between the States and Territories (Table 5.3 and Table A2). New South Wales, Queensland and Western Australia reflected the national pattern with endocrine, nutritional, and metabolic diseases and immunity disorders accounting for the highest proportion of deaths with diabetes as an associated cause within these States. In Victoria, diseases of the circulatory system accounted for the highest proportion (7.1%), in South Australia it was diseases of the genito-urinary system (9.3%), and in Tasmania infectious and parasitic diseases (11.5%). Conclusions can not be drawn for the Australian Capital

Territory and the Northern Territory as some proportions are based on a small number of deaths.

Table 5.3: Deaths associated with diabetes within each underlying cause of death, States and Territories, 1997 and 1998

Underlying causes of death	NSW	Vic	Qld	WA	SA	Tas	ACT	NT
	Per cent							
Endocrine, nutritional and metabolic diseases and immunity disorders ^(a)	9.1	6.4	9.3	10.3	5.3	6.8	0.0	7.1
Diseases of the circulatory system	8.2	7.1	7.2	6.6	8.0	6.9	5.9	16.2
Diseases of the genito-urinary system	7.2	6.6	5.0	5.9	9.3	4.6	10.7	21.6
Infectious and parasitic diseases	5.8	5.6	7.0	6.6	5.1	11.5	3.2	20.0
Diseases of the musculoskeletal systems and connective tissue	6.2	5.1	6.7	6.3	4.4	0.0	11.8	0.0
Diseases of the digestive system	5.5	5.5	4.8	4.9	4.5	4.7	2.2	6.8
Diseases of the blood and blood-forming organs	6.5	3.3	3.9	1.6	4.7	14.3	0.0	0.0
Diseases of the respiratory system	5.0	4.6	3.6	5.1	4.1	4.4	3.3	6.9
Neoplasms	3.7	3.9	3.0	2.7	4.9	2.9	2.6	3.4
Diseases of the nervous system and sense organs	3.7	3.4	1.9	3.0	3.0	1.1	4.3	0.0
Mental disorders	2.9	2.9	3.3	3.4	1.4	4.1	4.1	2.4
Injury and poisoning	1.3	1.4	1.3	0.9	0.9	1.3	1.5	0.6
Other ^(b)	0.8	1.2	0.2	1.5	0.7	0.0	1.9	0.0
All underlying causes of death^(a)	5.8	5.2	4.8	4.5	5.8	4.8	4.1	7.6

(a) Excludes deaths where diabetes is the underlying cause.

(b) Other includes diseases of the skin and subcutaneous tissue, congenital anomalies, complications of pregnancy, childbirth and the puerperium, certain conditions originating in the perinatal period, symptoms, signs and ill-defined conditions.

Note: Cells with zero proportions reflect no deaths with diabetes as an associated cause in that disease category for the particular State or Territory in 1997 and 1998.

Source: AIHW National Mortality Database.

Comparison of each of the underlying causes of death where diabetes is an associated cause and where it is not an associated cause

The ranking of the underlying causes of death when diabetes is an associated cause and not an associated cause was consistent with the pattern at the national level across most States and Territories. Diseases of the circulatory system, neoplasms and diseases of the respiratory system were the three leading causes of death irrespective of diabetes being an associated cause. In the Northern Territory, however, a slightly different pattern emerged when diabetes was not an associated cause, with the injury and poisoning the second most prominent cause of death, followed by neoplasms and diseases of the respiratory system (Table 5.4).

Across all States and Territories diseases of the circulatory system accounted for a considerably higher proportion of deaths when diabetes was an associated cause than when it was not an associated cause. The magnitude of this difference was similar across most States and Territories, except in the Northern Territory.

Table 5.4: Distribution of the underlying causes of death associated and not associated with diabetes, States and Territories, 1997 and 1998

Underlying causes of death	NSW	Vic	Qld	WA	SA	Tas	ACT	NT
Associated with diabetes								
	Proportion of deaths (%)							
Diseases of the circulatory system	60.3	55.2	62.0	55.1	58.7	61.7	53.8	61.7
Neoplasms	17.4	21.7	17.8	17.1	23.0	16.3	19.2	8.6
Diseases of the respiratory system	9.0	8.9	7.1	11.6	7.8	10.3	7.7	10.2
Diseases of the digestive system	2.9	3.4	3.0	3.6	2.5	2.9	1.9	3.9
Diseases of the genito-urinary system	2.5	2.7	1.9	2.5	3.1	1.7	5.8	6.3
Mental disorders	1.3	1.6	1.4	2.0	0.5	1.7	1.9	0.8
Injury and poisoning	1.4	1.4	1.9	1.5	0.8	1.4	2.9	1.6
Infectious and parasitic diseases	1.3	1.1	1.4	1.5	1.0	2.0	1.0	6.3
Endocrine, nutritional and metabolic diseases and immunity disorders ^(a)	1.2	1.3	1.6	1.9	0.8	0.9	0.0	0.8
Diseases of the nervous system and sense organs	1.4	1.5	0.8	1.8	0.9	0.6	2.9	0.0
Diseases of the musculoskeletal systems and connective tissue	0.5	0.6	0.8	0.6	0.4	0.0	1.9	0.0
Diseases of the blood and blood-forming organs	0.4	0.2	0.2	0.1	0.3	0.6	0.0	0.0
Other ^(b)	0.2	0.3	0.1	0.7	0.1	0.0	1.0	0.0
<i>Total deaths (%)</i>	<i>100.0</i>	<i>100.0</i>	<i>100.0</i>	<i>100.0</i>	<i>100.0</i>	<i>100.0</i>	<i>100.0</i>	<i>100.0</i>
Total deaths (number)	5,124	3,312	2,081	952	1,335	350	104	128
Not associated with diabetes								
Diseases of the circulatory system	41.1	39.7	40.4	37.1	41.7	41.8	36.3	26.1
Neoplasms	27.8	29.2	28.7	29.2	27.6	27.6	30.3	20.2
Diseases of the respiratory system	10.4	10.1	9.7	10.2	11.3	11.2	9.7	11.2
Diseases of the digestive system	3.1	3.2	3.0	3.3	3.4	2.9	3.6	4.4
Diseases of the genito-urinary system	2.0	2.1	1.8	1.9	1.9	1.8	2.0	1.9
Mental disorders	2.8	3.0	2.0	2.7	2.4	2.0	1.9	2.6
Injury and poisoning	6.1	5.8	7.6	8.1	5.7	5.5	8.2	21.0
Infectious and parasitic diseases	1.3	1.0	0.9	1.0	1.1	0.8	1.2	2.0
Endocrine, nutritional and metabolic diseases and immunity disorders ^(a)	0.8	1.0	0.8	0.8	0.9	0.6	0.7	0.8
Diseases of the nervous system and sense organs	2.3	2.4	2.0	2.7	1.8	2.6	2.7	2.5
Diseases of the musculoskeletal systems and connective tissue	0.5	0.6	0.5	0.4	0.5	0.4	0.6	0.3
Diseases of the blood and blood-forming organs	0.3	0.4	0.3	0.3	0.4	0.2	0.6	0.3
Other ^(b)	1.5	1.5	2.1	2.3	1.4	2.6	2.2	6.6
<i>Total deaths (%)</i>	<i>100.0</i>	<i>100.0</i>	<i>100.0</i>	<i>100.0</i>	<i>100.0</i>	<i>100.0</i>	<i>100.0</i>	<i>100.0</i>
Total deaths (number)	83,797	60,085	41,194	20,034	21,502	6,930	2,454	1,564

(a) Excludes deaths where diabetes is the underlying cause.

(b) Other includes diseases of the skin and subcutaneous tissue, congenital anomalies, complications of pregnancy, childbirth and the puerperium, certain conditions originating in the perinatal period, symptoms, signs and ill-defined conditions.

Note: Ten deaths with diabetes not as an associated cause were unable to be assigned to a State or Territory.

Source: AIHW National Mortality Database.

In the Northern Territory, diseases of the circulatory system as the underlying cause of death was 2.4 times as likely when diabetes was an associated cause than when it was not an associated cause, compared with 1.4–1.5 times as likely for the other States and Territory. The higher ratio in the Territory can be attributed to the large proportion of Indigenous Australians living in the Northern Territory who are known to have considerable higher death rates from diseases of the circulatory system compared with non-Indigenous Australians (see Chapter 4).

Consistent with the national pattern, diabetes deaths are also more often associated with diseases of the genito-urinary system than when diabetes was not an associated cause across most States and Territories with the exception of Queensland, Western Australia and Tasmania (where the difference is not statistically significant). The proportion of deaths from neoplasms and injury and poisoning were consistently lower when diabetes was an associated cause than when it was not an associated cause across most States and Territories (Table 5.4).

In the Northern Territory, when diabetes was an associated cause of death, diseases of the genito-urinary system and infectious and parasitic diseases were far more likely to be listed as underlying causes of death compared with the national average.

5.3 Urban, rural and remote areas of Australia

Diabetes as the underlying cause or an associated cause of death

In 1997 and 1998, diabetes was more likely to be the underlying or associated cause of death in remote areas than in urban and rural areas of Australia (9.5% of all deaths in remote areas compared with 7.3% and 7.5% in urban and rural areas). The higher proportion in remote areas is attributed to females among whom a significant upward gradient exists with increasing rurality. Among males, the proportion of diabetes-related deaths was similar across urban, rural and remote areas (Table 5.5).

Table 5.5: Diabetes as a cause of death, urban, rural and remote areas, 1997 and 1998

Cause of death	Males			Females			Persons		
	Urban	Rural	Remote	Urban	Rural	Remote	Urban	Rural	Remote
Proportion of all deaths (%)									
Underlying	2.1	2.1	3.0	2.1	2.4	5.0	2.1	2.3	3.7
Associated	5.4	5.2	5.3	5.0	5.3	6.5	5.2	5.3	5.7
<i>Total diabetes deaths</i>	<i>7.4</i>	<i>7.4</i>	<i>8.2</i>	<i>7.1</i>	<i>7.7</i>	<i>11.5</i>	<i>7.3</i>	<i>7.5</i>	<i>9.5</i>
Number									
Underlying	1,876	862	111	1,820	809	118	3,696	1,671	229
Associated	4,887	2,104	196	4,282	1,762	155	9,169	3,866	351
<i>Total diabetes deaths</i>	<i>6,763</i>	<i>2,966</i>	<i>307</i>	<i>6,102</i>	<i>2,571</i>	<i>273</i>	<i>12,865</i>	<i>5,537</i>	<i>580</i>
Total deaths	90,881	40,212	3,732	85,930	33,420	2,377	176,811	73,632	6,109

Source: AIHW National Mortality Database.

In remote areas, the proportion of diabetes-related deaths was larger for females than for males, whereas in urban areas the reverse was true. In rural areas there was no significant difference between males and females in the proportion of diabetes-related deaths

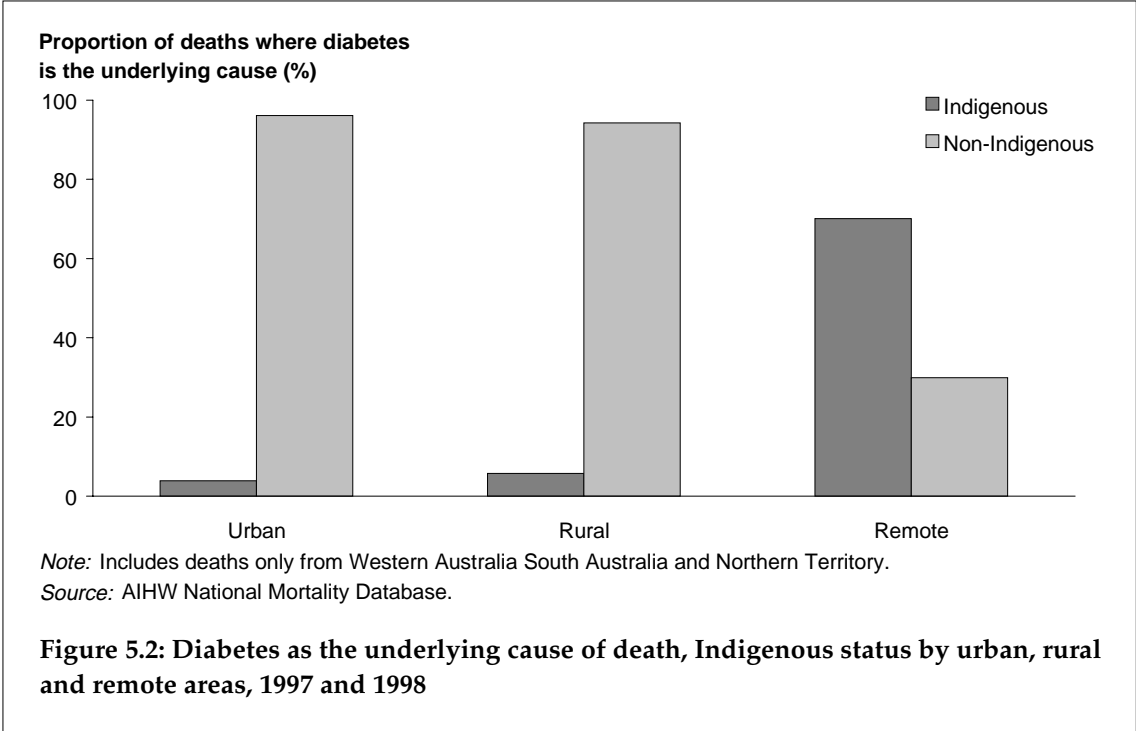
(Table 5.5). A slightly different pattern emerges, however, when the different age structures of urban, rural and remote area populations are taken into account. Age-standardised death rate comparisons clearly indicate a much higher death rate among males than females in urban areas (56.0 compared with 34.8 per 100,000) and in rural areas (58.2 compared with 38.4 per 100,000). In remote areas, however, there was no sex differential. For both males and females, death rates in remote areas were significantly larger than in urban and rural areas and were in the vicinity of 72–73 per 100,000 population (Table A1).

Consistent with the national level, in urban and rural areas diabetes was twice as likely to be recorded as an associated cause rather than as the underlying cause of death. In remote areas, however, the difference was not as marked with diabetes 1.5 times as likely to be recorded as an associated cause rather than as the underlying cause of death (Table 5.5).

Diabetes as the underlying cause of death

There was an upward gradient in diabetes as the underlying cause of death with increasing rurality (2.1%, 2.3% and 3.7% of all deaths). The magnitude of this regional difference is higher among females than males, with the proportion of deaths where diabetes is the underlying cause of death among females in remote areas twice that of those in urban and rural areas (5.0% compared with 2.1% and 2.4% respectively) (Table 5.5).

This pattern is predominantly influenced by the high concentration of Indigenous Australians in remote areas. Within remote areas in Western Australia, South Australia and the Northern Territory, Indigenous Australians accounted for two-thirds of all diabetes-related deaths, with this proportion increasing to around 70% when diabetes is the underlying cause of death. In comparison, Indigenous Australians accounted for less than 6% of deaths in urban and rural areas in these jurisdictions (Figure 5.2). As was evident from the previous chapter Indigenous Australians are almost three times as likely as non-Indigenous Australians to have diabetes recorded as the underlying cause of death.



Associated causes of death

When diabetes was the underlying cause of death in 1997 and 1998, there was little difference across urban and rural areas in the pattern of associated causes, and this generally reflected the national average (Table 5.6). In remote areas, however, the pattern was somewhat different and is consistent with that of Indigenous Australians. In remote areas, diseases of the circulatory system were less likely to be reported as an associated cause compared with urban and rural areas, 73.4% compared with 83.5% and 82.6% respectively. Diseases of the genito-urinary system were recorded more often as an associated cause in remote areas (34.1%) than in urban and rural areas of Australia (22.0% and 20.3%).

The sex differentials in associated causes of death across urban, rural and remote areas are generally small. However, in remote areas males were considerably more likely than females to have diseases of the circulatory system listed as an associated cause (80.2% compared with 66.9%) (Table A3).

Table 5.6: Deaths where diabetes is the underlying cause of death by associated causes of death, urban, rural and remote areas, 1997 and 1998

Associated causes of death	Urban	Rural	Remote
	Proportion of diabetes deaths (%)		
Diseases of the circulatory system	83.5	82.6	73.4
Diseases of the genito-urinary system	22.0	20.3	34.1
Diseases of the respiratory system	19.0	18.8	17.9
Mental disorders	9.6	9.9	11.8
Infectious and parasitic diseases	9.7	9.0	12.7
Endocrine, nutritional and metabolic diseases and immunity disorders ^(a)	8.9	7.0	9.6
Diseases of the digestive system	5.5	6.0	4.4
Neoplasms	5.2	5.1	2.6
Injury and poisoning	4.2	4.7	4.4
Diseases of the nervous system and sense organs	4.5	3.5	3.9
Diseases of the musculoskeletal systems and connective tissue	2.9	2.8	1.3
Diseases of the blood and blood-forming organs	2.1	2.4	3.5
Other ^(b)	1.8	1.4	3.1
Total deaths where diabetes is the underlying cause (number)	3,696	1,671	229

(a) Excludes deaths where diabetes is an associated cause.

(b) Other includes diseases of the skin and subcutaneous tissue, congenital anomalies, complications of pregnancy, childbirth and the puerperium, certain conditions originating in the perinatal period, symptoms, signs and ill-defined conditions.

Note: Column percentages do not sum to 100, as more than one disease category may be recorded on the death certificate as an associated cause.

Source: AIHW National Mortality Database.

Diabetes as an associated cause of death

In 1997 and 1998 there was no significant difference in diabetes being recorded as an associated cause of death across urban, rural and remote areas of Australia (5.2%, 5.3% and 5.7% respectively). While this was true when examining male deaths, among females a significant upward gradient exists with increasing rurality. The proportion of deaths where diabetes was an associated cause in urban areas was higher for males than females (5.4%

compared with 5.0%), whereas in remote areas the reverse was true. In rural areas the sex difference was not statistically significant (Table 5.5).

Diabetes as an associated cause of death within each underlying cause of death disease group

The ranking of the underlying causes of death when diabetes is an associated cause varied across urban, rural and remote areas of Australia. In urban areas the ranking reflected the national pattern, with endocrine, nutritional and metabolic diseases and immunity disorders, diseases of the circulatory system, and diseases of the genito-urinary system accounting for the highest proportion of deaths. In rural areas, diseases of the circulatory system accounted for the highest proportion of deaths when diabetes was an associated cause, followed by endocrine, nutritional and metabolic diseases and immunity disorders and diseases of the genito-urinary system. In remote areas, infectious and parasitic diseases and endocrine, nutritional and metabolic diseases and immunity disorders accounted for highest proportion of deaths when diabetes was an associated cause (16.2% and 16.1%) (Table 5.7).

In remote areas, the proportion of deaths was twice as high for endocrine, nutritional and metabolic diseases and immunity disorders and infectious and parasitic diseases when compared with urban and rural areas. The number of deaths in remote areas for several of the disease groups is very small and should be treated with caution (Table 5.7).

Table 5.7: Deaths associated with diabetes within each underlying cause of death, urban, rural and remote areas, 1997 and 1998

Underlying causes of death	Urban	Rural	Remote	Urban	Rural	Remote
	Per cent			Number		
Endocrine, nutritional and metabolic diseases and immunity disorders ^(a)	7.9	7.0	16.1	125	38	10
Diseases of the circulatory system	7.5	7.7	9.6	5,332	2,342	197
Diseases of the genito-urinary system	6.9	6.4	9.5	247	83	12
Infectious and parasitic diseases	6.1	5.4	16.2	132	31	12
Diseases of the musculoskeletal systems and connective tissue	5.7	5.2	13.8	50	22	4
Diseases of the digestive system	5.0	5.5	7.4	266	128	16
Diseases of blood and blood forming organs	4.9	3.8	7.7	28	9	1
Diseases of the respiratory system	4.6	4.3	6.3	823	313	40
Neoplasms	3.5	3.9	3.3	1,720	775	45
Diseases of the nervous system and sense organs	3.5	2.2	3.7	134	36	4
Mental disorders	2.8	3.0	3.0	132	49	4
Injury and poisoning	1.5	0.7	0.6	154	34	5
Other ^(b)	0.9	0.5	0.4	26	6	1
All underlying causes of death^(a)	5.3	5.4	6.0	9,169	3,866	351

(a) Excludes deaths where diabetes is the underlying cause.

(b) Other includes congenital anomalies, diseases of the skin and subcutaneous tissue, complications of pregnancy, childbirth and the puerperium, certain conditions originating in the perinatal period, symptoms, signs and ill-defined conditions.

Source: AIHW National Mortality Database.

Comparison of each of the underlying causes of death where diabetes is an associated cause and where it is not an associated cause

The ranking of the underlying causes of death when diabetes is an associated cause or not an associated cause across urban and rural areas of Australia is consistent with the pattern at the national level. Diseases of the circulatory system, neoplasms, and diseases of the respiratory system were the three leading causes of death irrespective of diabetes being an associated cause. Diseases of the digestive system and diseases of the genito-urinary system ranked fourth and fifth in those who had diabetes as an associated cause; however, injury and poisoning and diseases of the digestive system ranked fourth and fifth where diabetes was not an associated cause. In remote areas, however, the pattern was slightly different when diabetes was not an associated cause of death; injury and poisoning ranked third after diseases of the circulatory system and neoplasms, and diseases of the respiratory and digestive systems ranked fourth and fifth. The ranking of the underlying causes of death when diabetes is an associated cause of death in remote areas reflected that of urban and rural areas (Table 5.8).

Table 5.8: Distribution of the underlying causes of death associated and not associated with diabetes, urban, rural and remote areas, 1997 and 1998

Underlying causes of death	Urban		Rural		Remote	
	Associated with diabetes	Not associated with diabetes	Associated with diabetes	Not associated with diabetes	Associated with diabetes	Not associated with diabetes
	Proportion of deaths (%)					
Diseases of the circulatory system	58.2	40.1	60.6	41.0	56.1	33.7
Neoplasms	18.8	28.6	20.0	28.3	12.8	23.9
Diseases of the respiratory system	9.0	10.3	8.1	10.3	11.4	10.7
Diseases of the digestive system	2.9	3.1	3.3	3.2	4.6	3.6
Diseases of the genito-urinary system	2.7	2.0	2.1	1.8	3.4	2.1
Mental disorders	1.4	2.8	1.3	2.3	1.1	2.3
Injury and poisoning	1.7	6.2	0.9	6.7	1.4	14.6
Infectious and parasitic diseases	1.4	1.2	0.8	0.8	3.4	1.1
Endocrine, nutritional and metabolic diseases and immunity disorders ^(a)	1.4	0.9	1.0	0.7	2.8	0.9
Diseases of the nervous system and sense organs	1.5	2.3	0.9	2.3	1.1	1.9
Diseases of the musculoskeletal systems and connective tissue	0.5	0.5	0.6	0.6	1.1	0.5
Diseases of the blood and blood-forming organs	0.3	0.3	0.2	0.3	0.3	0.2
Other ^(b)	0.3	1.7	0.2	1.7	0.3	4.4
<i>Total deaths (%)</i>	<i>100.0</i>	<i>100.0</i>	<i>100.0</i>	<i>100.0</i>	<i>100.0</i>	<i>100.0</i>
Total deaths (number)	9,169	163,946	3,866	68,095	351	5,529

(a) Excludes deaths where diabetes is the underlying cause.

(b) Other includes congenital anomalies, diseases of the skin and subcutaneous tissue, complications of pregnancy, childbirth and the puerperium, certain conditions originating in the perinatal period, symptoms, signs and ill-defined conditions.

Source: AIHW National Mortality Database.

Across urban, rural and remote areas, diseases of the circulatory system accounted for a higher proportion of deaths when diabetes was an associated cause than when it was not an associated cause. The magnitude of the difference was consistent across urban, rural and remote areas. In urban areas, diabetes was also more often associated with diseases of the genito-urinary system compared with deaths not associated with diabetes, whereas in rural and remote areas there was no significant difference. The proportion of deaths from neoplasms and injury and poisoning were consistently lower when associated with diabetes, than when not associated with diabetes across the three regions (Table 5.8).

5.4 Socioeconomically disadvantaged Australians

In this section diabetes-related deaths are examined in terms of socioeconomic disadvantage. In the absence of reliable data from death certificates on levels of socioeconomic disadvantage, people (i.e. deaths) have been classified according to the average disadvantage of their statistical local area of usual residence. The small area index of socioeconomic disadvantage is derived from social and economic characteristics of the local area such as a low income, low educational attainment, high levels of public sector housing, high unemployment, and jobs in relatively unskilled occupations. Deaths for 1997 and 1998 were classified into quintiles of socioeconomic disadvantage (i.e. each quintile represents approximately 20% of the cases), with quintile 1 representing the least disadvantaged households and quintile 5 the most disadvantaged households (for further details see Chapter 2).

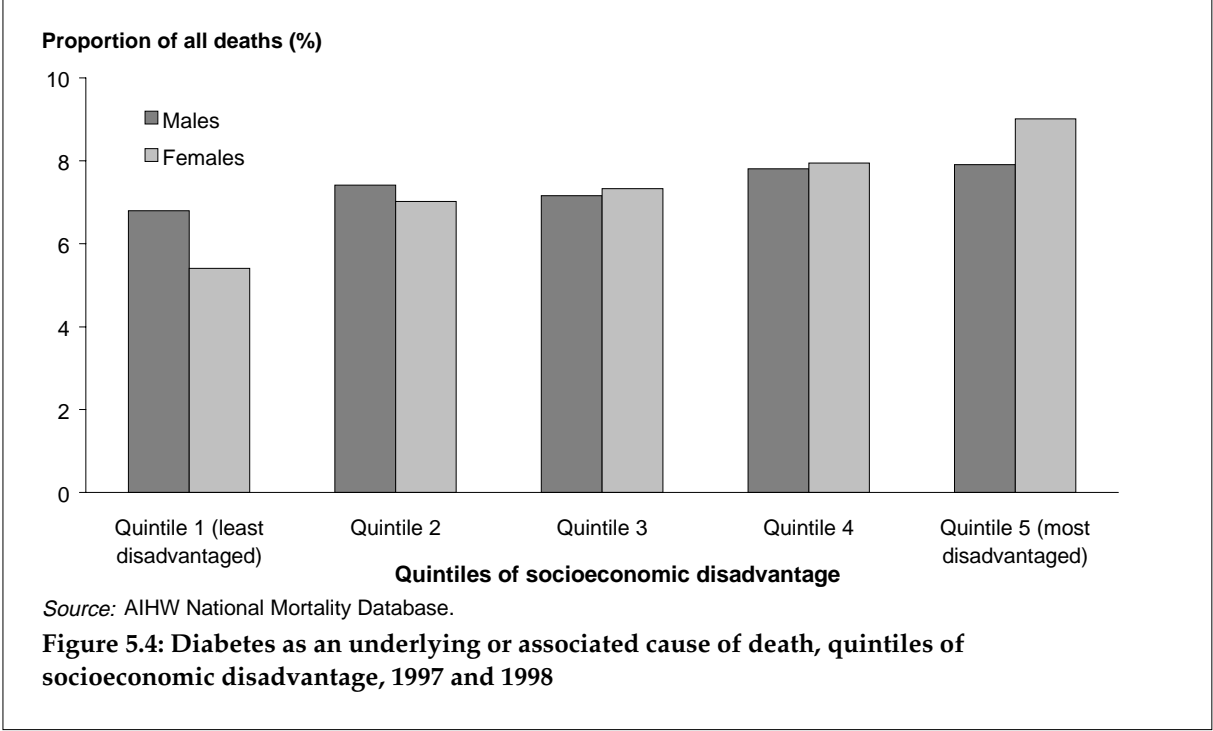
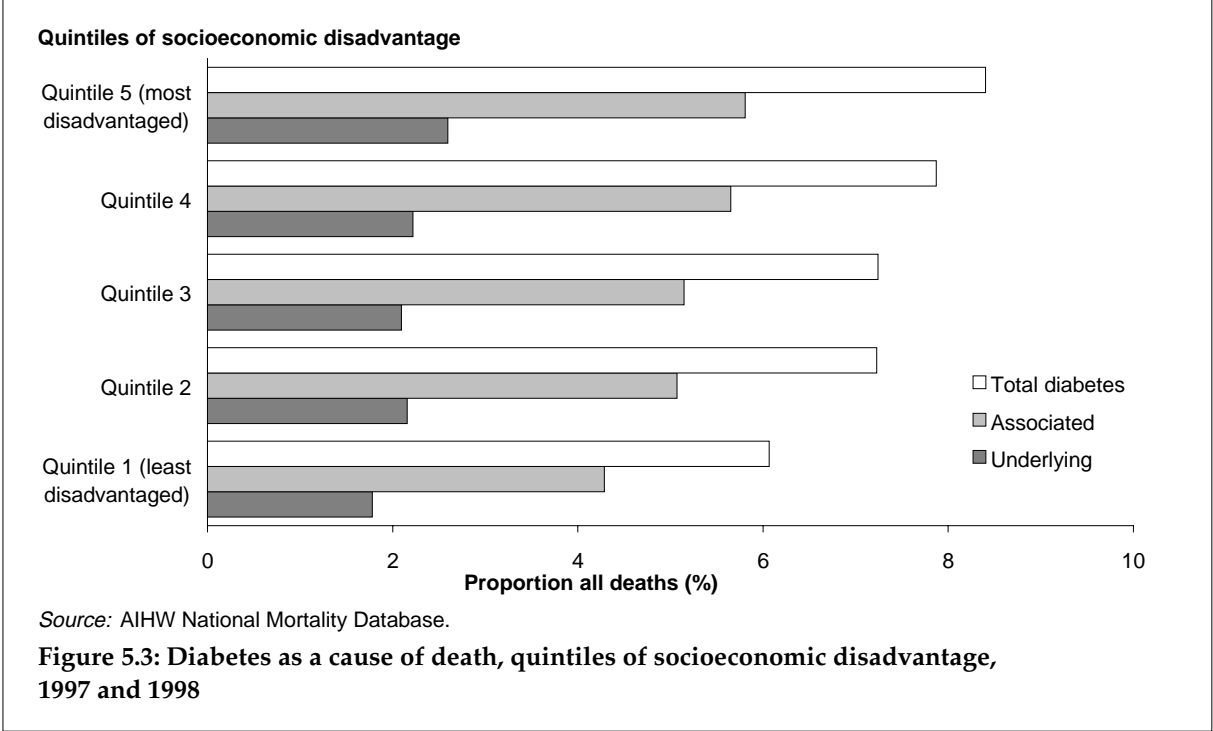
Diabetes as the underlying cause or an associated cause of death

In 1997 and 1998 there was an upward gradient in diabetes as the underlying or associated cause of death with increasing socioeconomic disadvantage. In quintile 1, with the least number of disadvantaged households, diabetes-related deaths accounted for 6.1% of all deaths, with this proportion increasing across each of the quintiles to reach 8.4% in quintile 5 (the most disadvantaged). In other words, diabetes-related mortality in the most disadvantaged quintile was 38% higher than in the least disadvantaged quintile. Inequalities in diabetes mortality would be greater for disadvantaged groups defined in terms of smaller areas or individual circumstances (Figure 5.3).

This increase in the proportion of deaths with socioeconomic disadvantage was also apparent for diabetes both as the underlying cause and as an associated cause of death. The proportional increase between the least and most disadvantaged quintiles is greater for diabetes as the underlying cause of death than for diabetes as an associated cause. Consistent with the national level, diabetes was twice as likely to be reported as an associated cause of death than the underlying cause of death across each of the quintiles (Figure 5.3).

Males in the least disadvantaged quintile had a larger proportion of diabetes-related deaths than females, whereas females in the most disadvantaged quintile had a larger proportion of deaths than males (Figure 5.4). A slightly different pattern emerges, however, when the age structure of each of the quintiles of socioeconomic disadvantage is taken into account. Age-standardised death rate comparisons (for 1997 only) clearly indicate a much higher death rate among males than females across each of the quintiles of socioeconomic disadvantage (Table A1).

Although the proportions increase across the quintiles for both males and females, a steeper continuous gradient was seen among females. For females, diabetes-related mortality in the most disadvantaged quintile was 67% higher than in the least disadvantaged quintile; for males, the corresponding proportion was 16% (Figure 5.4).



Diabetes as the underlying cause of death

Diabetes was less likely to be recorded as the underlying cause of death in areas with lower socioeconomic disadvantage (1.8% in the first quintile compared with 2.6% in the fifth quintile) in 1997 and 1998. The proportion of deaths where diabetes was the underlying cause of death was 44% higher in the most disadvantaged quintile compared with the least disadvantaged quintile. This proportional increase is greater than for diabetes as an associated cause of death (Figure 5.3).

Associated causes of death

When diabetes is the underlying cause of death, there is little difference in the pattern of associated causes across the different quintiles of socioeconomic disadvantage. The ranking of associated causes generally reflected that found at the national level, with diseases of the circulatory system the leading associated cause of death across all quintiles, 81.7–83.9% of diabetes deaths. Diseases of the genito-urinary system and diseases of the respiratory system accounted for the second and third highest proportion of deaths in all quintiles (Table 5.9).

Table 5.9: Deaths where diabetes is the underlying cause of death by associated causes of death, quintiles of socioeconomic disadvantage, 1997 and 1998

Associated causes of death	Quintiles (least to most disadvantaged)				
	1	2	3	4	5
	Proportion of all deaths (%)				
Diseases of the circulatory system	82.7	83.1	83.9	83.5	81.7
Diseases of the genito-urinary system	23.5	20.1	20.3	20.9	24.4
Diseases of the respiratory system	18.6	20.7	18.9	19.0	17.9
Mental disorders	9.1	9.1	11.0	10.7	8.9
Infectious and parasitic diseases	9.6	9.4	9.6	10.2	9.1
Endocrine, nutritional and metabolic diseases and immunity disorders ^(a)	8.0	6.8	8.4	8.5	9.3
Diseases of the digestive system	5.4	5.6	4.9	6.7	5.4
Neoplasms	6.2	4.6	5.4	4.3	5.1
Injury and poisoning	4.2	4.1	5.1	4.5	3.8
Diseases of the nervous system and sense organs	5.4	3.7	4.6	3.6	4.1
Diseases of the musculoskeletal systems and connective tissue	2.7	2.9	2.5	3.0	2.9
Diseases of the blood and blood-forming organs	1.6	1.9	2.6	1.4	3.0
Other ^(b)	2.0	1.5	2.2	1.7	1.2
Total deaths where diabetes is the underlying cause (number)	850	1,000	1,101	1,143	1,490

(a) Excludes deaths where diabetes is an associated cause.

(b) Other includes diseases of the skin and subcutaneous tissue, congenital anomalies, certain conditions originating in the perinatal period, symptoms, signs and ill-defined conditions.

Notes

1. Column percentages do not sum to 100, as more than one disease category may be recorded on the death certificate as an associated cause.
2. Twelve deaths with diabetes as the underlying cause were unable to be matched to the quintiles of socioeconomic disadvantage.

Source: AIHW National Mortality Database.

Diabetes as an associated cause of death

Diabetes was less likely to be recorded as an associated cause of death in areas with lower socioeconomic disadvantage (4.3% in the first quintile compared with 5.8% in the fifth quintile) in 1997 and 1998. The proportion of deaths where diabetes was an associated cause was 35% higher in the most disadvantaged quintile compared with the least disadvantaged quintile (Figure 5.3).

Diabetes as an associated cause of death within each underlying cause of death disease group

For some of the underlying causes of death, there is a marked gradient with socioeconomic disadvantage in the proportion of deaths where diabetes is an associated cause. The gradient was most notable for infectious and parasitic diseases, endocrine, nutritional and metabolic diseases and immunity disorders, diseases of the genito-urinary system and to a lesser extent neoplasms and diseases of the circulatory system. The proportion of deaths when diabetes was an associated cause for these underlying causes in the most disadvantaged quintile were respectively 2.4, 1.8, 1.7, 1.5, and 1.4 times that of the least disadvantaged quintile (Table 5.10 and Table A4).

Table 5.10: Deaths associated with diabetes within each underlying cause of death, quintiles of socioeconomic disadvantage, 1997 and 1998

Underlying causes of death	Quintile (least to most disadvantaged)				
	1	2	3	4	5
	Per cent				
Endocrine, nutritional and metabolic diseases and immunity disorders ^(a)	5.4	8.9	9.0	6.1	9.9
Diseases of the circulatory system	6.1	7.4	7.6	8.5	8.4
Diseases of the genito-urinary system	5.0	6.4	6.9	7.0	8.7
Infectious and parasitic diseases	3.6	6.0	6.5	6.3	8.5
Diseases of the musculoskeletal systems and connective tissue	4.8	4.5	5.7	5.7	7.2
Diseases of the digestive system	4.4	4.6	5.3	5.6	5.9
Diseases of the blood and blood-forming organs	3.7	2.6	3.2	7.4	5.8
Diseases of the respiratory system	4.1	4.5	4.5	4.8	4.8
Neoplasms	2.9	3.7	3.4	3.8	4.3
Diseases of the nervous system and sense organs	2.4	2.6	3.6	3.7	3.3
Mental disorders	3.1	2.5	2.2	3.4	3.5
Injury and poisoning	1.1	1.4	1.2	0.9	1.5
Other ^(b)	1.3	0.5	1.0	0.8	0.5
All underlying causes of death^(a)	4.4	5.2	5.3	5.8	6.0

(a) Excludes deaths where diabetes is the underlying cause.

(b) Other includes congenital anomalies, diseases of the skin and subcutaneous tissue, complications of pregnancy, childbirth and the puerperium, certain conditions originating in the perinatal period, symptoms, signs and ill-defined conditions.

Note: Thirty-six deaths with diabetes as an associated cause were unable to be matched to quintiles of socioeconomic disadvantage.

Source: AIHW National Mortality Database.

Comparison of each of the underlying causes of death where diabetes is an associated cause and where it is not an associated cause

When diabetes is an associated cause of death in 1997 and 1998 there was little difference in the proportion of diabetes deaths and the ranking of the underlying causes across the different quintiles of socioeconomic disadvantage. The pattern of underlying causes generally reflects the national level with diseases of the circulatory system, neoplasms and diseases of the respiratory system the three leading causes of death in all quintiles, irrespective of diabetes being an associated cause (Table 5.11).

Diseases of the digestive system and diseases of the genito-urinary system ranked fourth and fifth in deaths when diabetes was an associated cause of death, whereas injury and poisoning and diseases of the digestive system ranked fourth and fifth when diabetes was not an associated cause. This pattern was consistent across all quintiles and reflected the ranking found at the national level.

Consistent with the national pattern, diseases of the circulatory system accounted for a higher proportion of deaths when diabetes was an associated cause than when it was not an associated cause, across all quintiles. The proportion of deaths from neoplasms was consistently lower across all levels of socioeconomic disadvantage for deaths associated with diabetes than not associated with diabetes. Diabetes was also less often associated with injury and poisoning across all quintiles (Table 5.11).

Table 5.11: Distribution of the underlying causes of death associated and not associated with diabetes, quintiles of socioeconomic disadvantage, 1997 and 1998

Underlying causes of death	Quintiles (least to most disadvantaged)				
	1	2	3	4	5
	Proportion of deaths (%)				
Associated with diabetes					
Diseases of the circulatory system	58.6	58.1	59.6	60.3	57.3
Neoplasms	18.3	20.1	17.6	19.2	19.6
Diseases of the respiratory system	9.8	8.8	8.8	8.3	8.7
Diseases of the digestive system	2.9	2.7	3.2	3.1	3.3
Diseases of the genito-urinary system	2.5	2.6	2.5	2.2	2.9
Mental disorders	1.9	1.3	1.3	1.3	1.3
Injury and poisoning	1.3	1.7	1.5	1.0	1.7
Infectious and parasitic diseases	1.0	1.3	1.4	1.1	1.6
Endocrine, nutritional and metabolic diseases and immunity disorders ^(a)	1.1	1.6	1.4	0.9	1.4
Diseases of the nervous system and sense organs	1.4	1.1	1.5	1.3	1.2
Diseases of the musculoskeletal systems and connective tissue	0.6	0.4	0.6	0.5	0.6
Diseases of the blood and blood-forming organs	0.3	0.2	0.2	0.4	0.3
Other ^(b)	0.4	0.2	0.3	0.2	0.1
<i>Total deaths (%)</i>	<i>100.0</i>	<i>100.0</i>	<i>100.0</i>	<i>100.0</i>	<i>100.0</i>
Total deaths (number)	2,046	2,353	2,706	2,911	3,334
Not associated with diabetes					
Diseases of the circulatory system	41.4	39.6	40.3	40.1	39.8
Neoplasms	28.3	28.9	27.7	29.5	27.8
Diseases of the respiratory system	10.3	10.1	10.2	10.0	10.9
Diseases of the digestive system	2.9	3.1	3.2	3.2	3.3
Diseases of the genito-urinary system	2.2	2.1	1.9	1.8	1.9
Mental disorders	2.7	2.7	3.1	2.3	2.4
Injury and poisoning	5.3	6.7	6.7	6.4	7.0
Infectious and parasitic diseases	1.2	1.1	1.1	1.0	1.1
Endocrine, nutritional and metabolic diseases and immunity disorders ^(a)	0.9	0.9	0.8	0.9	0.8
Diseases of the nervous system and sense organs	2.6	2.3	2.2	2.1	2.2
Diseases of the musculoskeletal systems and connective tissue	0.5	0.5	0.5	0.6	0.5
Diseases of the blood and blood-forming organs	0.4	0.3	0.3	0.3	0.3
Other ^(b)	1.4	1.7	1.8	1.9	1.9
<i>Total deaths (%)</i>	<i>100.0</i>	<i>100.0</i>	<i>100.0</i>	<i>100.0</i>	<i>100.0</i>
Total deaths (number)	44,838	43,038	48,776	47,451	52,589

(a) Excludes deaths where diabetes is the underlying cause.

(b) Other includes congenital anomalies, diseases of the skin and subcutaneous tissue, complications of pregnancy, childbirth and the puerperium, certain conditions originating in the perinatal period, symptoms, signs and ill-defined conditions.

Note: Thirty-six deaths with diabetes as an associated cause and 878 deaths with diabetes not as an associated cause were unable to be matched to quintiles of socioeconomic disadvantage.

Source: AIHW National Mortality Database.

5.5 Discussion

States and Territories

This chapter has highlighted the variation in diabetes-related deaths across the States and Territories of Australia in 1997 and 1998. Diabetes-related deaths are highest in the Northern Territory and lowest in the Australian Capital Territory when the differing age structures of these populations are taken into account.

Consistent with the national level, diseases of the circulatory system are the highest recorded associated cause when diabetes is the underlying cause of death. The proportion is considerably lower in the Northern Territory, which is largely due to a higher proportion of diabetes deaths in the Territory associated with mental disorders, infectious and parasitic diseases, and endocrine, nutritional and metabolic diseases and immunity disorders. Diseases of the genito-urinary system are also more often recorded as an associated cause in the Northern Territory, the Australian Capital Territory and Western Australia than in the other jurisdictions.

The overall pattern across the States and Territories in the underlying causes of death when diabetes is an associated cause and not an associated cause of death (except in the Northern Territory) reflects the national level. Across all States and Territories diseases of the circulatory system accounts for the highest proportion of deaths irrespective of diabetes being an associated cause. In the Northern Territory diseases of the circulatory system are far more likely to be an associated cause (than not an associated cause) compared with the other States and Territory.

The higher diabetes-related mortality in the Northern Territory can partially be explained by the high concentration of Indigenous Australians who live in the Northern Territory (28.3% compared with 2.1% nationally). As was evident from the previous chapter, diabetes-related deaths are twice as high among Indigenous Australians compared with non-Indigenous Australians. The association between diabetes and diseases of the circulatory system and diseases of the genito-urinary system is also shown to be stronger among Indigenous Australians than non-Indigenous Australians, which is also clearly evident for the Northern Territory.

Urban, rural and remote areas of Australia

Diabetes-related deaths are higher in remote areas than in urban and rural areas of Australia. Given that Indigenous Australians account for two-thirds of diabetes-related deaths in remote areas, this pattern is consistent with that observed for Indigenous Australians.

When diabetes is the underlying cause of death, the pattern of associated causes across urban and rural areas is similar and generally reflects that of the national average. In remote areas, however diseases of the circulatory system are less likely to be recorded as an associated cause, and diseases of the genito-urinary system are more often listed as an associated cause compared with urban and rural areas. This reflects the finding among Indigenous Australians.

There is no significant difference in diabetes being recorded as an associated cause of death across urban, rural and remote areas of Australia. The pattern of association between diabetes and the underlying cause of death varies across these three areas. Urban areas

generally reflect the national pattern, whereas in rural areas diseases of the circulatory system account for the highest proportion of deaths associated with diabetes. In remote areas, infectious and parasitic diseases, and endocrine, nutritional and metabolic diseases and immunity disorders account for the highest proportion of deaths associated with diabetes. The ranking of the leading underlying causes of death when diabetes is an associated cause across urban, rural and remote areas and not an associated cause across urban and rural areas generally reflects the national pattern.

Socioeconomically disadvantaged Australians

Socioeconomic disadvantage is an important predictor of premature mortality. Diabetes-related mortality is 38% higher among the most disadvantaged quintile of the Australian population compared with the least disadvantaged quintile. The proportional increase with increasing socioeconomic disadvantage is greater for diabetes as the underlying cause of death than diabetes as an associated cause of death. This finding is consistent with studies in the United Kingdom that have shown that mortality is twice as high in people with diabetes in the most disadvantaged group as in those in the least disadvantaged group (Chaturvedi et al. 1998)

The proportion of diabetes-related deaths increases more rapidly across the quintiles for females than for males—a 67% increase between the least disadvantaged quintile and the most disadvantaged quintile for females compared with a 16% increase for males.

Consistent with the national level, diseases of the circulatory system and to a lesser extent diseases of the genito-urinary and respiratory systems are predominantly associated with diabetes across all levels of socioeconomic disadvantage. There are no marked differences in the proportion of diabetes deaths across the quintiles of socioeconomic disadvantage for each of the associated causes.

Diabetes is more likely to be an associated cause in the most disadvantaged quintile than in the least disadvantaged quintile for infectious and parasitic diseases, endocrine, nutritional and metabolic diseases and immunity disorders, diseases of the genito-urinary system, neoplasms and diseases of the circulatory system.

A possible explanation for the gradient in socioeconomic disadvantage in diabetes-related deaths is diseases of the circulatory system and its risk factors (Chaturvedi et al. 1998). Mortality from diseases of the circulatory system is twice as high in the most disadvantaged quintile compared with the least disadvantaged quintile for those aged 25–64. Further, smoking, high blood pressure, physical inactivity and obesity (all risk factors for diabetes) have been shown to be higher among the most disadvantaged group compared with the least disadvantaged group (AIHW 1999).