8. Diabetes

ALPINE ARARAT BALLARAT BANYULE BASS COAST BAW BAW BAYSIDE BENALLA BOROONDARA
BRIMBANK BULOKE CAMPASPE CARDINIA CASEY CENTRAL GOLDFIELDS COLAC-OTWAY CORANGAMITE
DAREBIN EAST GIPPSLAND FRANKSTON GANNAWARRA GLEN EIRA GLENELG GOLDEN PLAINS
GREATER BENDIGO GREATER DANDENONG GREATER GEELONG GREATER SHEPPARTON HEPBURN
HINDMARSH HOBSONS BAY HORSHAM HUME INDIGO KINGSTON KNOX LATROBE LODDON MACEDON
RANGES MANNINGHAM MANSFIELD MARIBYRNONG MAROONDAH MELBOURNE MELTON MILDURA
MITCHELL MOIRA MONASH MOONEE VALLEY MOORABOOL MORELAND MORNINGTON PENINSULA
MOUNT ALEXANDER MOYNE MURRINDINDI NILLUMBIK NORTHERN GRAMPIANS PORT PHILLIP
PYRENEES QUEENSCLIFFE SOUTHERN GRAMPIANS SOUTH GIPPSLAND STONNINGTON STRATHBOGIE
SURF COAST SWAN HILL TOWONG WANGARATTA WARRNAMBOOL WELLINGTON WEST WIMMERA
WHITEHORSE WHITTLESEA WODONGA WYNDHAM YARRA YARRA RANGES YARRIAMBIACK ALPINE
ARARAT BALLARAT BANYULE BASS COAST BAW BAW BAYSIDE BENALLA BOROONDARA BRIMBANK
BULOKE CAMPASPE CARDINIA CASEY CENTRAL GOLDFIELDS COLAC-OTWAY CORANGAMITE DAREBIN
EAST GIPPSLAND FRANKSTON GANNAWARRA GLEN EIRA GLENELG GOLDEN PLAINS GREATER BENDIGO
GREATER DANDENONG GREATER GEELONG GREATER SHEPPARTON HEPBURN HINDMARSH HOBSONS
BAY HORSHAM HUME INDIGO KINGSTON KNOX LATROBE LODDON MACEDON RANGES MANNINGHAM
MANSFIELD MARIBYRNONG MAROONDAH MELBOURNE MELTON MILDURA MITCHELL MOIRA MONASH
MOONEE VALLEY MOORABOOL MORELAND MORNINGTON PENINSULA MOUNT ALEXANDER MOYNE
MURRINDINDI NILLUMBIK NORTHERN GRAMPIANS PORT PHILLIP PYRENEES QUEENSCLIFFE SOUTHERN
GRAMPIANS SOUTH GIPPSLAND STONNINGTON STRATHBOGIE SURF COAST SWAN HILL TOWONG
WANGARATTA WARRNAMBOOL WELLINGTON WEST WIMMERA WHITEHORSE WHITTLESEA WODONGA
WYNDHAM YARRA YARRA RANGES YARRIAMBIACK ALPINE ARARAT BALLARAT BANYULE BASS COAST
BAW BAW BAYSIDE BENALLA BOROONDARA BRIMBANK BULOKE CAMPASPE CARDINIA CASEY CENTRAL
GOLDFIELDS COLAC-OTWAY CORANGAMITE DAREBIN EAST GIPPSLAND FRANKSTON GANNAWARRA
GLEN EIRA GLENELG GOLDEN PLAINS GREATER BENDIGO GREATER DANDENONG GREATER GEELONG
GREATER SHEPPARTON HEPBURN HINDMARSH HOBSONS BAY HORSHAM HUME INDIGO KINGSTON
KNOX LATROBE LODDON MACEDON RANGES MANNINGHAM MANSFIELD MARIBYRNONG MAROONDAH
MELBOURNE MELTON MILDURA MITCHELL MOIRA MONASH MOONEE VALLEY MOORABOOL MORELAND
MORNINGTON PENINSULA MOUNT ALEXANDER MOYNE MURRINDINDI NILLUMBIK NORTHERN
GRAMPIANS PORT PHILLIP PYRENEES QUEENSCLIFFE SOUTHERN GRAMPIANS SOUTH GIPPSLAND
STONNINGTON STRATHBOGIE SURF COAST SWAN HILL TOWONG WANGARATTA WARRNAMBOOL
WELLINGTON WEST WIMMERA WHITEHORSE WHITTLESEA WODONGA WYNDHAM YARRA YARRA RANGES
YARRIAMBIACK ALPINE ARARAT BALLARAT BANYULE BASS COAST BAW BAW BAYSIDE BENALLA
BOROONDARA BRIMBANK BULOKE CAMPASPE CARDINIA CASEY CENTRAL GOLDFIELDS COLAC-
OTWAY CORANGAMITE DAREBIN EAST GIPPSLAND FRANKSTON GANNAWARRA GLEN EIRA GLENELG
GOLDEN PLAINS GREATER BENDIGO GREATER DANDENONG GREATER GEELONG GREATER SHEPPARTON
HEPBURN HINDMARSH HOBSONS BAY HORSHAM HUME INDIGO KINGSTON KNOX LATROBE LODDON
MACEDON RANGES MANNINGHAM MANSFIELD MARIBYRNONG MAROONDAH MELBOURNE MELTON
MILDURA MITCHELL MOIRA MONASH MOONEE VALLEY MOORABOOL MORELAND MORNINGTON
PENINSULA MOUNT ALEXANDER MOYNE MURRINDINDI NILLUMBIK NORTHERN GRAMPIANS PORT
PHILLIP PYRENEES QUEENSCLIFFE SOUTHERN GRAMPIANS SOUTH GIPPSLAND STONNINGTON
STRATHBOGIE SURF COAST SWAN HILL TOWONG WANGARATTA WARRNAMBOOL WELLINGTON WEST
WIMMERA WHITEHORSE WHITTLESEA WODONGA WYNDHAM YARRA YARRA RANGES YARRIAMBIACK

8. Diabetes

Introduction

Diabetes mellitus is a common chronic condition characterised by high blood glucose (sugar) levels. The two main types of diabetes mellitus are type 1 (insulin-dependent) diabetes and type 2 diabetes. Gestational diabetes is another form of the condition that affects women during pregnancy, although they have had no prior diagnosis of diabetes. This condition usually abates after birth but is a risk factor for developing type 2 diabetes later in life.

Type 1 diabetes is an autoimmune disease in which the body's immune system destroys the insulin-producing cells of the pancreas, rendering the individual unable to produce enough of the hormone insulin, which is essential for the control of glucose levels in the blood. It most commonly occurs in those under the age of 30 years and may be referred to as juvenile-onset diabetes. People with type 1 diabetes require replacement insulin injections (usually several times a day) for life. Unlike type 2 diabetes, it is not caused by lifestyle factors. Type 1 diabetes accounts for approximately 10–15 per cent of diabetes mellitus and, while a great deal of research is being carried out, at this stage nothing can be done to prevent or cure type 1 diabetes.

Type 2 diabetes is the most common form of diabetes, which occurs mostly in people aged 50 years or over. Risk factors for type 2 diabetes include being overweight or obese and having a family history of the condition. Type 2 diabetes accounts for around 85 per cent of all cases of diabetes mellitus. It is caused by insufficient production of insulin and/or the body becoming resistant to high glucose levels in the blood. In many cases, appropriate diet and exercise can control type 2 diabetes. More severe cases require treatment with oral glucose-lowering drugs, insulin injections, or a combination of these. Left untreated, diabetes mellitus can cause kidney, eye and nerve damage, heart disease, stroke and impotence.

Survey results

- In 2011–12 type 2 diabetes was the most common reported form of doctor-diagnosed diabetes (5.0 per cent), followed by type 1 diabetes (0.6 per cent). A further 5.3 per cent of Victorian adults reported having been told by a doctor that they had high blood sugar levels.
- There was no difference in the prevalence of type 1 diabetes between males and females. In contrast, the prevalence of doctor-diagnosed type 2 diabetes was significantly higher in men (6.0 per cent) compared with women (4.1 per cent), with the mean age at diagnosis higher among women (55.7 years) compared with men (53.5 years).
- The prevalence of type 2 diabetes increased between 2003 and 2011–12 in both men and women, while the mean age at diagnosis remained unchanged over the same period.
- There was no difference in the prevalence of type 2 diabetes, or doctor-diagnosed high blood sugar levels between adults living in rural and metropolitan Victoria, regardless of gender.
- A higher prevalence of type 2 diabetes was reported among adults who lived in the LGAs of Greater Dandenong (C), Melton (S), Moreland (C) and Whittlesea (C) compared with all Victorian adults.
- In contrast, there were five LGAs that had a significantly lower prevalence of type 2 diabetes compared with all Victorian adults – Bayside (C), Melbourne (C), Nillumbik (S), Port Phillip (C) and Surf Coast (S).

Prevalence of diabetes

Survey respondents were asked 'Have you ever been told by a doctor that you have diabetes?'. If they responded that they had, they were then asked to indicate the type of diabetes they were diagnosed with.

Table 8.1 shows the prevalence of diabetes, by diabetes type and sex. Overall, 0.6 per cent of Victorian adults reported having been diagnosed with type 1 diabetes and there was no difference between males and females. In contrast, the prevalence of having been diagnosed with type 2 diabetes was significantly higher in men (6.0 per cent) compared with women (4.1 per cent).

Table 8.1: Prevalence of diabetes,[a] by diabetes type and sex, Victoria, 2011–12

	Males			Females			Persons		
		95% CI			95% CI			95% CI	
	%	LL	UL	%	LL	UL	%	LL	UL
Type 1 diabetes	0.7	0.5	0.9	0.6	0.4	0.8	0.6	0.5	0.8
Type 2 diabetes	6.0	5.5	6.5	4.1	3.8	4.5	5.0	4.7	5.3
Other	0.1*	0.0	0.2	0.05*	0.0	0.1	0.06*	0.0	0.1
Gestational diabetes				2.0	1.7	2.4			

a. Self-reported doctor-diagnosed type 2 diabetes.

Data were age-standardised to the 2011 Victorian population.

LL/UL 95% CI = lower/upper limit of 95 per cent confidence interval.

* Estimate has a relative standard error (RSE) of between 25 and 50 per cent and should be interpreted with caution.

Table 8.2 shows the prevalence of type 2 diabetes, by age group and sex. The prevalence of type 2 diabetes increased with age, being highest in men and women aged 65 years or over. Overall and in those aged 45–54 or 65 years or over, the prevalence of type 2 diabetes was significantly higher among men than women.

Table 8.2: Prevalence of type 2 diabetes,[a] by age group and sex, Victoria, 2011–12

Age group (years)	Males			Females			Persons		
	%	95% CI LL	95% CI UL	%	95% CI LL	95% CI UL	%	95% CI LL	95% CI UL
18–24	0.0	-	-	0.0	-	-	0.0	-	-
25–34	**			**			**		
35–44	2.1	1.3	3.4	1.2	0.7	1.9	1.6	1.2	2.3
45–54	6.1	4.8	7.6	3.2	2.5	4.1	4.6	3.9	5.5
55–64	11.1	9.6	12.9	8.4	7.2	9.7	9.7	8.8	10.8
65+	16.2	14.7	17.8	11.8	10.7	13.0	13.8	12.9	14.8
Total	**6.0**	**5.5**	**6.5**	**4.1**	**3.8**	**4.5**	**5.0**	**4.7**	**5.3**

a. Self-reported doctor-diagnosed type 2 diabetes.

Data are age-specific estimates, except for 'Total', which represent the estimates for Victoria and have been age-standardised to the 2011 Victorian population.

LL/UL 95% CI = lower/upper limit of 95 per cent confidence interval.

Estimates that are (statistically) significantly different to the corresponding estimate for Victoria are identified by colour as follows: **above**/**below** Victoria.

** Estimate has a relative standard error (RSE) greater than 50 per cent and is not reported as it is unreliable for general use.

Respondents were asked about their age when diagnosed with type 2 diabetes. The mean age at diagnosis was 53.5 years in men and 55.7 years in women.

Respondents who indicated never having been told by a doctor that they had diabetes, or that they did not know, were asked if they had ever been told by a doctor that they had high blood sugar levels. A further 5.3 per cent of Victorian adults, in addition to the 5.0 per cent who reported a previous diagnosis of type 2 diabetes, reported having been told by a doctor that they had high blood sugar levels (Table 8.3). The prevalence of ever being diagnosed with high blood sugar levels peaked in men aged 55–64 years and in women aged 45–54 years. The lowest rates were reported by men and women aged 18–24 years.

Table 8.3: Prevalence of ever being diagnosed with high blood sugar levels,[a] by age group and sex, Victoria, 2011–122

Age group (years)	Males			Females			Persons		
	%	95% CI LL	95% CI UL	%	95% CI LL	95% CI UL	%	95% CI LL	95% CI UL
18–24	1.5*	0.7	3.1	1.2*	0.6	2.5	1.4*	0.8	2.3
25–34	2.9*	1.7	5.0	3.6	2.5	5.2	3.3	2.4	4.5
35–44	3.6	2.6	5.2	4.6	3.7	5.8	4.1	3.4	5.1
45–54	4.0	3.1	5.3	5.6	4.6	6.7	4.8	4.1	5.6
55–64	8.0	6.6	9.6	4.9	4.1	6.0	6.4	5.6	7.4
65+	6.5	5.5	7.6	4.3	3.7	5.1	5.3	4.7	5.9
Total	**4.4**	**3.9**	**5.0**	**4.0**	**3.6**	**4.5**	**4.2**	**3.9**	**4.6**

a. Self-reported doctor-diagnosed high blood sugar levels. The question was only asked of respondents who did not report a previous diagnosis of diabetes.

Data are age-specific estimates, except for 'Total', which represent the estimates for Victoria and were age-standardised to the 2011 Victorian population.

LL/UL 95% CI = lower/upper limit of 95 per cent confidence interval.

Estimates that are (statistically) significantly different to the corresponding estimate for Victoria are identified by colour as follows: **above**/**below** Victoria.

* Estimate has a relative standard error (RSE) of between 25 and 50 per cent and should be interpreted with caution.

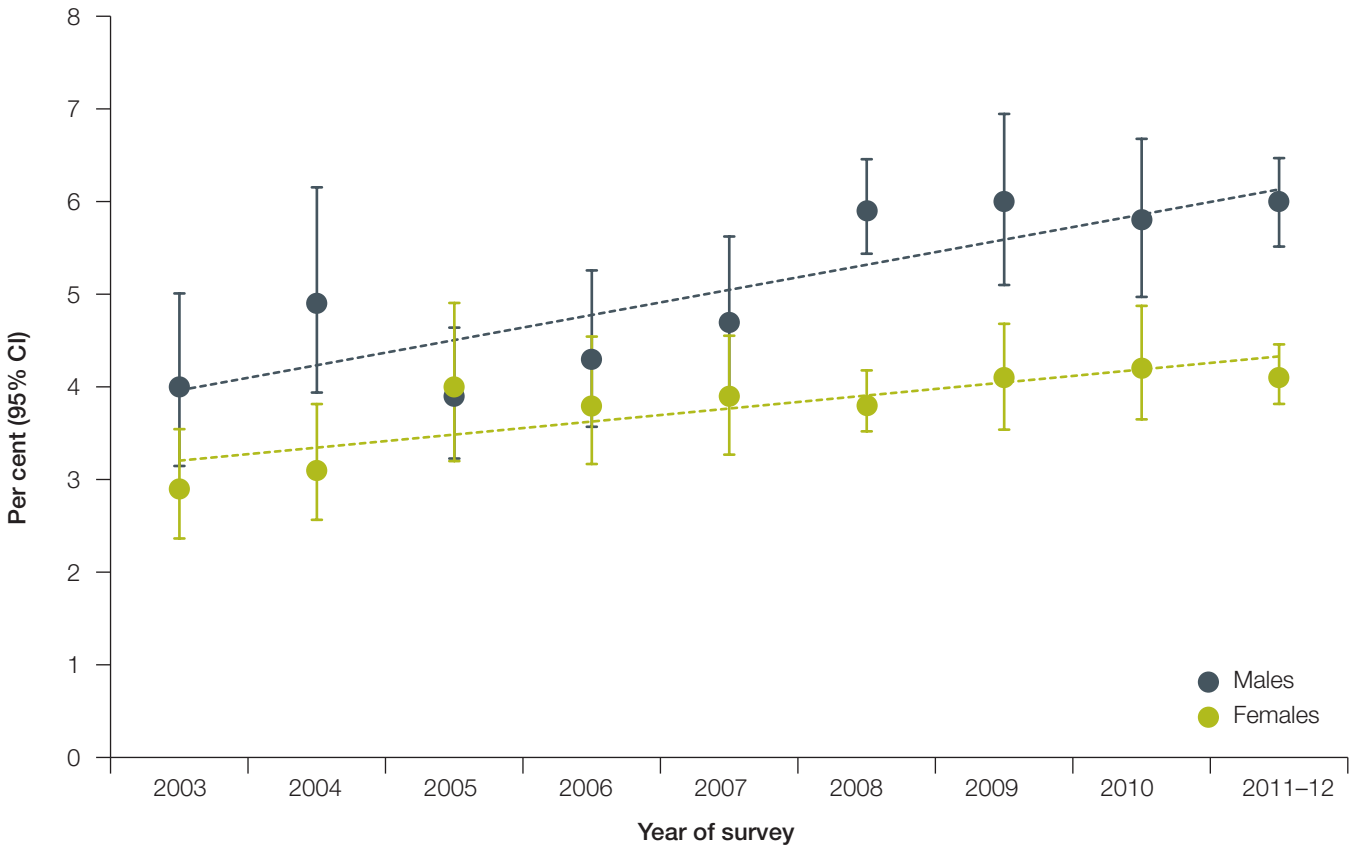
Table 8.4 and Figure 8.1 show the prevalence of type 2 diabetes between 2003 and 2011–12. The prevalence of type 2 diabetes increased significantly between 2003 and 2011–12 in both men and women.

Table 8.4: Prevalence of type 2 diabetes[a] from 2003 to 2011–12, by sex, Victoria

	Males			Females			Persons		
		95% CI			95% CI			95% CI	
Year	%	LL	UL	%	LL	UL	%	LL	UL
2003	4.0	3.1	5.0	2.9	2.4	3.5	3.4	2.9	4.0
2004	4.9	3.9	6.2	3.1	2.6	3.8	3.9	3.4	4.6
2005	3.9	3.2	4.6	4.0	3.2	4.9	4.0	3.4	4.6
2006	4.3	3.6	5.3	3.8	3.2	4.5	4.1	3.6	4.7
2007	4.7	3.9	5.6	3.9	3.3	4.6	4.2	3.7	4.8
2008	5.9	5.4	6.5	3.8	3.5	4.2	4.8	4.6	5.2
2009	6.0	5.1	6.9	4.1	3.5	4.7	5.0	4.5	5.5
2010	5.8	5.0	6.7	4.2	3.6	4.9	4.9	4.4	5.5
2011–12	**6.0**	**5.5**	**6.5**	**4.1**	**3.8**	**4.5**	**5.0**	**4.7**	**5.3**

a. Self-reported doctor-diagnosed type 2 diabetes.
Data were age-standardised to the 2011 Victorian population.
LL/UL 95% CI = lower/upper limit of 95 per cent confidence interval.
Ordinary least squares regression was used to test for trends over time.

Figure 8.1: Prevalence of type 2 diabetes[a] from 2003 to 2011–12, by sex, Victoria



a. Self-reported doctor-diagnosed type 2 diabetes.
Data were age-standardised to the 2011 Victorian population.
95% CI = 95 per cent confidence interval.
Ordinary least squares regression was used to test for trends over time.

Table 8.5 shows the mean age at diagnosis with type 2 diabetes between 2003 and 2011–12. The mean age at diagnosis did not change significantly between 2003 and 2011–12.

Table 8.5: Mean age at diagnosis with type 2 diabetes[a] from 2003 to 2011–12, by sex, Victoria

	Males			Females			Persons		
		95% CI			95% CI			95% CI	
Year	Mean	LL	UL	Mean	LL	UL	Mean	LL	UL
2003	53.1	49.9	56.3	54.3	51.4	57.2	53.6	51.5	55.8
2004	56.3	53.7	58.9	55.0	52.5	57.5	55.8	53.9	57.6
2005	55.6	53.5	57.7	57.0	53.6	60.4	56.3	54.3	58.4
2006	55.9	53.8	58.1	57.4	54.8	59.9	56.6	54.9	58.3
2007	56.3	54.2	58.5	57.2	55.2	59.1	56.7	55.3	58.2
2008	53.7	52.5	54.8	55.7	54.6	56.9	54.5	53.7	55.4
2009	53.1	50.0	56.1	55.9	54.0	57.8	54.3	52.3	56.2
2010	55.0	52.9	57.0	56.3	54.0	58.7	55.6	54.0	57.1
2011–12	**53.5**	**52.3**	**54.6**	**55.7**	**54.7**	**56.7**	**54.4**	**53.7**	**55.2**

a. Self-reported doctor-diagnosed type 2 diabetes.
Data were age-standardised to the 2011 Victorian population.
LL/UL 95% CI = lower/upper limit of 95 per cent confidence interval.
Ordinary least squares regression was used to test for trends over time.

Table 8.6 shows the prevalence of type 2 diabetes and ever being diagnosed with high blood sugar levels, by Department of Health region and sex. There was no difference in the prevalence of type 2 diabetes in men or women whether they lived in rural or metropolitan Victoria. No significant regional differences existed either, with the exception of men from the Grampians Region, who had a significantly lower prevalence of type 2 diabetes compared with all Victorian men.

Similarly, there were no significant differences in the prevalence of ever being diagnosed with high blood sugar levels in men or women, regardless of whether they lived in rural or metropolitan Victoria, nor were there any significant regional differences.

Table 8.6: Prevalence of type 2 diabetes[a] and high blood sugar levels,[b] by Department of Health region and sex, 2011–12

Region	Type 2 diabetes %	Type 2 diabetes 95% CI LL	Type 2 diabetes 95% CI UL	High blood sugar %	High blood sugar 95% CI LL	High blood sugar 95% CI UL
Males						
Eastern Metropolitan	5.1	4.0	6.3	4.3	3.2	5.6
North & West Metropolitan	7.1	6.1	8.1	5.4	4.4	6.7
Southern Metropolitan	6.2	5.2	7.4	4.1	3.2	5.3
Metropolitan males	6.2	5.6	6.9	4.7	4.1	5.4
Barwon-South Western	5.0	3.4	7.3	3.1	2.0	5.0
Gippsland	5.9	4.8	7.3	5.3	3.6	7.8
Grampians	4.5	3.7	5.5	3.4	2.3	5.0
Hume	6.5	5.5	7.8	3.5	2.4	4.9
Loddon Mallee	4.9	3.9	6.2	3.7	2.6	5.4
Rural males	5.3	4.7	6.1	3.7	3.1	4.4
Total	**6.0**	**5.5**	**6.5**	**4.4**	**3.9**	**5.0**
Females						
Eastern Metropolitan	3.6	2.9	4.4	4.1	3.1	5.4
North & West Metropolitan	4.7	4.0	5.5	4.1	3.4	4.8
Southern Metropolitan	4.0	3.4	4.8	3.9	3.1	4.9
Metropolitan females	4.1	3.7	4.6	4.0	3.5	4.5
Barwon-South Western	3.6	2.7	4.8	4.8	3.3	7.1
Gippsland	4.9	4.0	5.9	5.6	3.9	8.0
Grampians	4.3	3.5	5.3	4.0	2.7	6.0
Hume	4.3	3.7	5.1	3.5	2.7	4.5
Loddon Mallee	4.0	3.2	5.0	3.9	2.9	5.1
Rural females	4.2	3.8	4.6	4.4	3.7	5.2
Total	**4.1**	**3.8**	**4.5**	**4.0**	**3.6**	**4.5**
Persons						
Eastern Metropolitan	4.2	3.6	4.9	4.2	3.4	5.0
North & West Metropolitan	5.8	5.3	6.5	4.7	4.1	5.4
Southern Metropolitan	5.0	4.4	5.7	4.0	3.3	4.7
Metropolitan persons	5.1	4.8	5.5	4.3	3.9	4.7
Barwon-South Western	4.3	3.3	5.5	4.0	3.0	5.5
Gippsland	5.4	4.6	6.2	5.4	4.2	7.1
Grampians	4.4	3.8	5.1	3.6	2.7	4.8
Hume	5.4	4.8	6.1	3.4	2.8	4.3
Loddon Mallee	4.4	3.8	5.2	3.7	3.0	4.7
Rural persons	4.7	4.4	5.2	4.0	3.6	4.6
Total	**5.0**	**4.7**	**5.3**	**4.2**	**3.9**	**4.6**

a. Self-reported doctor-diagnosed type 2 diabetes.

b. Self-reported doctor-diagnosed high blood sugar levels. The question was only asked of respondents who did not report a previous diagnosis of diabetes.

Data were age-standardised to the 2011 Victorian population.

Metropolitan and rural regions are identified by colour as follows: metropolitan/rural.

LL/UL 95% CI = lower/upper limit of 95 per cent confidence interval.

Estimates that are (statistically) significantly different to the corresponding estimate for Victoria are identified by colour as follows: above/below Victoria.

Table 8.7 and Figure 8.2 show the prevalence of type 2 diabetes, by LGA. People who lived in the LGAs of Greater Dandenong (C), Melton (S), Moreland (C) and Whittlesea (C) reported a significantly higher prevalence of type 2 diabetes compared with all Victoria. In contrast, people who lived in the LGAs of Bayside (C), Melbourne (C), Nillumbik (S), Port Phillip (C) and Surf Coast (S) had a significantly lower prevalence of type 2 diabetes compared with all Victorians.

Table 8.7: Prevalence of type 2 diabetes,[a] by LGA, Victoria, 2011–12

LGA	Type 2 diabetes %	95% CI LL	95% CI UL
Alpine (S)	5.0	3.6	6.9
Ararat (RC)	3.6	2.4	5.5
Ballarat (C)	3.9	2.8	5.6
Banyule (C)	3.6	2.4	5.5
Bass Coast (S)	5.1	3.7	6.8
Baw Baw (S)	4.1	2.8	6.0
Bayside (C)	2.8*	1.7	4.7
Benalla (RC)	5.1	3.7	7.0
Boroondara (C)	3.2	2.0	5.2
Brimbank (C)	4.0	2.6	6.1
Buloke (S)	5.9	4.0	8.6
Campaspe (S)	4.8	3.4	6.6
Cardinia (S)	4.2	2.8	6.2
Casey (C)	5.8	4.2	8.0
Central Goldfields (S)	6.1	4.5	8.3
Colac-Otway (S)	5.0	3.6	6.8
Corangamite (S)	4.4	2.9	6.6
Darebin (C)	6.2	4.3	8.8
East Gippsland (S)	3.8	2.7	5.3
Frankston (C)	6.3	4.7	8.6
Gannawarra (S)	4.9	3.4	6.9
Glen Eira (C)	3.7	2.5	5.6
Glenelg (S)	6.0	4.4	8.3
Golden Plains (S)	4.1	2.6	6.6
Greater Bendigo (C)	4.7	3.2	6.8
Greater Dandenong (C)	7.6	5.4	10.5
Greater Geelong (C)	4.0	2.5	6.5
Greater Shepparton (C)	4.9	3.3	7.0
Hepburn (S)	5.0	3.5	7.1
Hindmarsh (S)	5.7	4.1	7.8
Hobsons Bay (C)	5.9	4.2	8.3
Horsham (RC)	3.4	2.2	5.2
Hume (C)	6.9	4.9	9.5
Indigo (S)	4.2	2.8	6.4
Kingston (C)	4.1	2.8	6.2
Knox (C)	6.2	4.5	8.5
Latrobe (C)	7.0	5.1	9.4
Loddon (S)	5.0	3.6	7.0
Macedon Ranges (S)	3.0	1.9	4.9
Manningham (C)	3.2	2.0	5.1
Mansfield (S)	4.5	3.1	6.3
Maribyrnong (C)	5.3	3.7	7.6
Maroondah (C)	4.2	2.8	6.2
Melbourne (C)	2.9	1.8	4.6
Melton (S)	8.5	6.1	11.7
Mildura (RC)	5.3	3.4	8.1
Mitchell (S)	6.0	4.2	8.5
Moira (S)	6.0	4.5	8.0
Monash (C)	5.4	3.7	7.9
Moonee Valley (C)	6.3	4.5	8.7
Moorabool (S)	4.5	3.1	6.5
Moreland (C)	7.9	5.8	10.6
Mornington Peninsula (S)	6.0	4.1	8.8
Mount Alexander (S)	3.5	2.4	5.1
Moyne (S)	3.8	2.5	5.6
Murrindindi (S)	5.1	3.2	7.8
Nillumbik (S)	2.2*	1.4	3.7
Northern Grampians (S)	5.6	4.2	7.6
Port Phillip (C)	2.6*	1.5	4.4
Pyrenees (S)	6.0	4.3	8.4
Queenscliffe (B)	3.1*	1.8	5.2
South Gippsland (S)	4.2	3.1	5.7
Southern Grampians (S)	4.3	2.9	6.4
Stonnington (C)	4.2*	2.5	7.1
Strathbogie (S)	5.4	3.7	7.6
Surf Coast (S)	2.8	1.7	4.5
Swan Hill (RC)	4.7	3.3	6.5
Towong (S)	5.1	3.6	7.0
Wangaratta (RC)	4.2	2.7	6.5
Warrnambool (C)	5.5	4.0	7.6
Wellington (S)	6.6	4.8	9.1
West Wimmera (S)	4.6	2.9	7.2
Whitehorse (C)	3.8	2.6	5.7
Whittlesea (C)	8.4	6.3	11.2
Wodonga (RC)	6.4	4.7	8.7
Wyndham (C)	4.4	2.8	6.9
Yarra (C)	3.5	2.2	5.4
Yarra Ranges (S)	3.9	2.6	6.0
Yarriambiack (S)	5.7	4.2	7.7
Victoria	**5.0**	**4.7**	**5.3**

a. Self-reported doctor-diagnosed type 2 diabetes.

Data were age-standardised to the 2011 Victorian population, using 10-year age groups.

Metropolitan and rural LGAs are identified by colour as follows: metropolitan/rural.

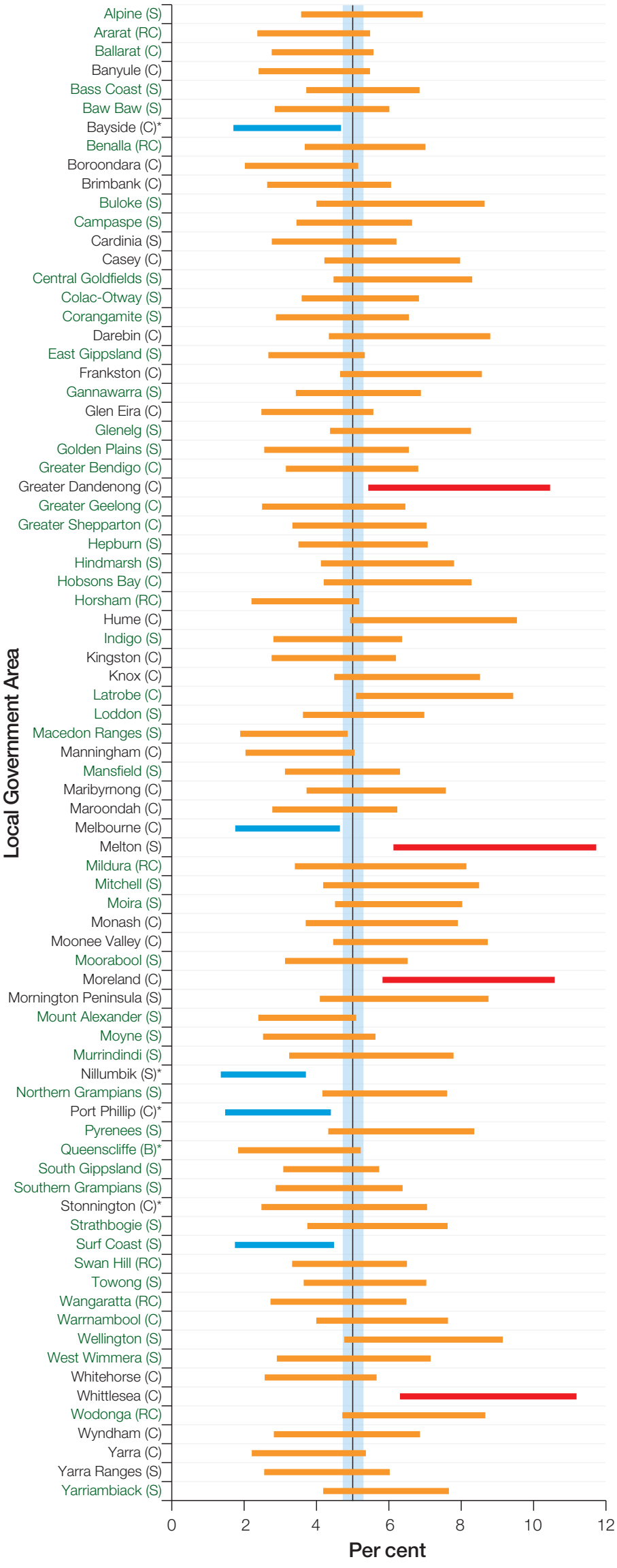
LL/UL 95% CI = lower/upper limit of 95 per cent confidence interval.

LGA= Local government area; B = Borough; C = City; S = Shire; RC = Rural City.

Estimates that are (statistically) significantly different to the corresponding estimate for Victoria are identified by colour as follows: above/below Victoria.

* Estimate has a relative standard error (RSE) of between 25 and 50 per cent and should be interpreted with caution.

Figure 8.2: Prevalence of type 2 diabetes,[a] by LGA, Victoria, 2011–12



a. Self-reported doctor-diagnosed type 2 diabetes.

Data were age-standardised to the 2011 Victorian population, using 10-year age groups.

The horizontal bars represent the 95% CI around the estimate for each LGA.

The vertical line on the graph is the Victorian estimate and the vertical column is the 95% CI around the estimate for Victoria.

Metropolitan and rural LGAs are identified by colour as follows: metropolitan/rural.

95% CI = 95 per cent confidence interval; LGA= local government area; B = Borough; C = City; S = Shire; RC = Rural City.

Estimates that are (statistically) significantly different to the corresponding estimate for Victoria are identified by colour as follows: **above**/**below** Victoria.

* Estimate has a relative standard error (RSE) of between 25 and 50 per cent and should be interpreted with caution.

Table 8.8 shows the prevalence of type 2 diabetes, by selected socioeconomic determinants, modifiable risk factors, health status and sex.

When compared with all Victorian men and women, a significantly higher prevalence of type 2 diabetes was reported among men and women with the following characteristics:

- high or very high levels of psychological distress
- sedentary behaviour
- fair or poor self-reported health status
- obesity.

When compared with all Victorian men, a significantly higher prevalence of type 2 diabetes was reported among men with the following characteristics:

- not in the labour force
- total annual household income of less than $40,000
- current smoker.

When compared with all Victorian women, a significantly higher prevalence of type 2 diabetes was reported among women with the following characteristic:

- abstinence from alcohol consumption (non-drinker).

When compared with all Victorian men and women, a significantly lower prevalence of type 2 diabetes was reported among men and women with the following characteristics:

- employed
- total annual household income of $100,000 or more
- at long-term risk of alcohol-related harm
- excellent or very good self-reported health status
- normal body weight.

When compared with all Victorian men, a significantly lower prevalence of type 2 diabetes was reported among men with the following characteristics:

- total annual household income of between $40,000 and $100,000
- non-smoker.

When compared with all Victorian women, a significantly lower prevalence of type 2 diabetes was reported among women with the following characteristics:

- tertiary educated
- low risk of long-term alcohol-related harm
- underweight.

Table 8.8: Prevalence of type 2 diabetes,[a] by selected socioeconomic determinants, modifiable risk factors, health status and sex, Victoria, 2011–12

	Males			Females		
		95% CI			95% CI	
	%	LL	UL	%	LL	UL
Total	**6.0**	**5.5**	**6.5**	**4.1**	**3.8**	**4.5**
Area of Victoria						
Rural	5.3	4.7	6.1	4.2	3.8	4.6
Metropolitan	6.2	5.6	6.9	4.1	3.7	4.6
Education level						
Primary	6.1	5.5	6.9	4.8	4.2	5.5
Secondary	5.8	4.9	6.8	4.1	3.5	4.8
Tertiary	5.9	5.0	6.8	3.0	2.5	3.7
Employment status (age < 65 years)						
Employed	3.0	2.6	3.5	1.9	1.6	2.2
Unemployed	4.1*	2.3	7.4	3.6*	2.1	6.0
Not in labour force	10.7	6.9	16.2	3.7	3.0	4.5
Total annual household income						
< $40,000	8.6	7.1	10.5	5.1	4.4	5.9
$40,000 to < $100,000	4.6	3.9	5.4	3.3	2.7	4.0
≥ $100,000	4.1	3.2	5.4	1.9*	1.1	3.2
Psychological distress [a]						
Low (<16)	5.2	4.7	5.7	3.4	3.1	3.8
Moderate (16–21)	7.1	5.9	8.5	4.9	4.2	5.7
High (22–29)	9.6	7.3	12.6	5.8	4.5	7.3
Very high (≥ 30)	9.9	6.9	14.0	9.2	6.7	12.4
Physical activity [b]						
Sedentary	8.2	6.5	10.2	6.3	5.1	7.8
Insufficient time and sessions	6.5	5.6	7.5	4.6	4.0	5.3
Sufficient time and sessions	5.5	4.9	6.1	3.4	3.0	3.9

a. Based on the Kessler 10 scale for psychological distress.

b. Based on national guidelines (DoHA 1999).

c. Based on national guidelines (NHMRC 2003).

d. Includes those meeting both guidelines

e. Long-term risk of alcohol-related harm refers to the increased risk of developing various cancers, cirrhosis of the liver, cognitive problems and dementia, and alcohol dependence.

f. Based on body mass index (BMI).

Data were age-standardised to the 2011 Victorian population.

LL/UL 95% CI = lower/upper limit of 95 per cent confidence interval.

Estimates that are (statistically) significantly different to the corresponding estimate for Victoria are identified by colour as follows: **above**/**below** Victoria.

*Estimate has a relative standard error (RSE) of between 25 and 50 per cent and should be interpreted with caution.

Note that estimates may not add to 100 per cent due to a proportion of 'don't know' or 'refused' responses, not reported here.

Table 8.8: Prevalence of type 2 diabetes,[a] by selected socioeconomic determinants, modifiable risk factors, health status and sex, Victoria, 2011–12 (continued)

	Males			Females		
		95% CI			95% CI	
	%	LL	UL	%	LL	UL
Met fruit / vegetable guidelines [c]						
Both guidelines	7.7	5.3	11.0	4.4	3.5	5.6
Vegetable guidelines [d]	6.8	4.9	9.4	4.1	3.3	5.1
Fruit guidelines [d]	6.2	5.5	7.0	4.4	3.9	4.8
Neither	5.6	5.0	6.3	3.8	3.3	4.4
Long-term risk of alcohol-related harm [e]						
Abstainer	7.7	6.5	9.2	**6.6**	5.8	7.5
Low risk	5.8	5.3	6.4	**3.4**	3.0	3.7
Risky or high risk	**3.5**	2.2	5.4	**0.8***	0.4	1.5
Smoking status						
Current smoker	**8.3**	6.7	10.4	4.0	3.1	5.3
Ex-smoker	6.8	6.0	7.8	4.5	3.8	5.2
Non-smoker	**4.7**	4.2	5.4	4.0	3.7	4.5
Self-reported health status						
Excellent / very good	**3.1**	2.6	3.6	**1.9**	1.6	2.2
Good	6.7	5.9	7.6	4.4	3.9	5.0
Fair / poor	**11.3**	9.7	13.0	**9.2**	8.1	10.5
Body weight status [f]						
Underweight	6.9*	3.3	13.8	**0.5***	0.2	1.3
Normal	**3.3**	2.8	4.0	**1.6**	1.3	1.9
Overweight	5.4	4.8	6.1	4.3	3.7	5.0
Obese	**11.1**	9.7	12.8	**8.7**	7.7	9.8

a. Based on the Kessler 10 scale for psychological distress.

b. Based on national guidelines (DoHA 1999).

c. Based on national guidelines (NHMRC 2003).

d. Includes those meeting both guidelines

e. Long-term risk of alcohol-related harm refers to the increased risk of developing various cancers, cirrhosis of the liver, cognitive problems and dementia, and alcohol dependence.

f. Based on body mass index (BMI).

Data were age-standardised to the 2011 Victorian population.

LL/UL 95% CI = lower/upper limit of 95 per cent confidence interval.

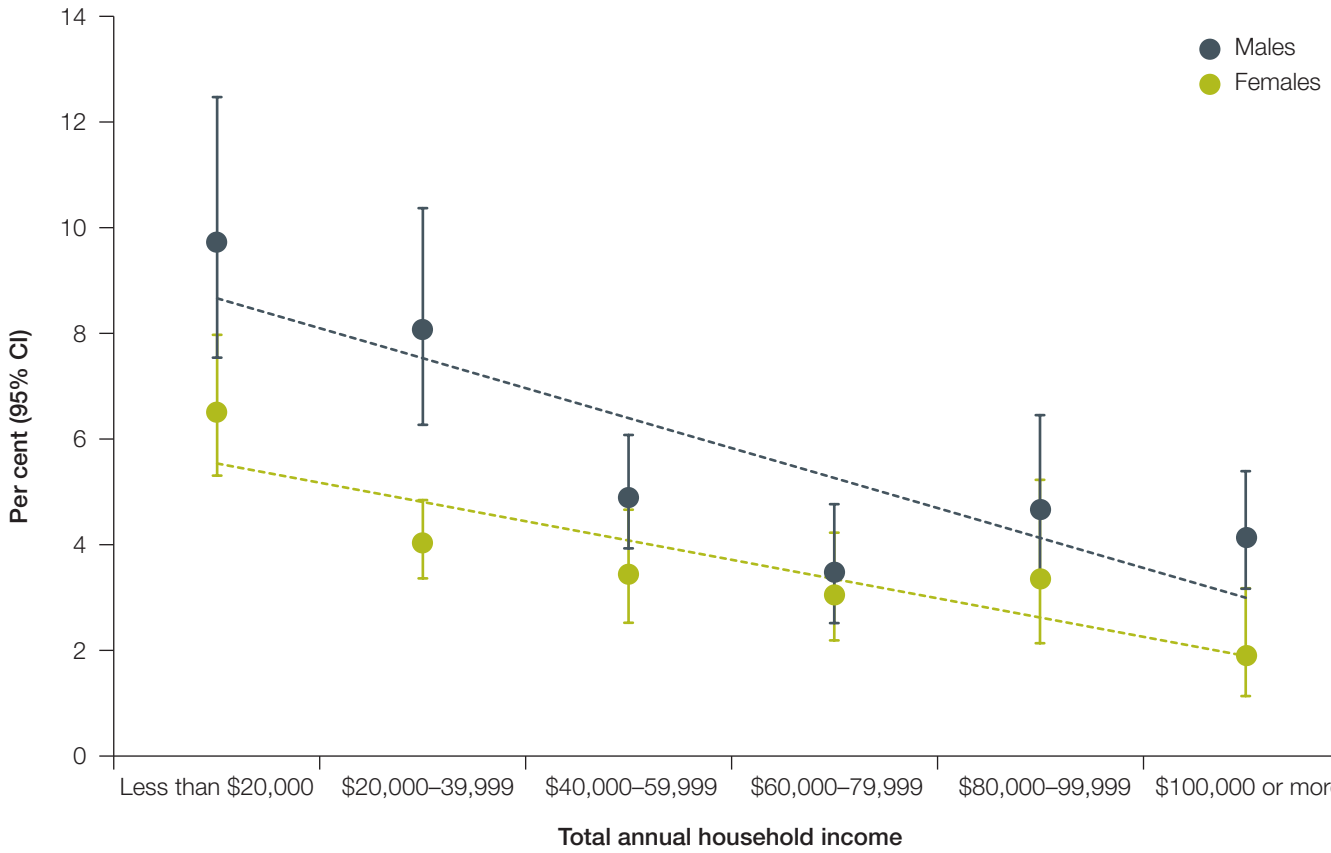
Estimates that are (statistically) significantly different to the corresponding estimate for Victoria are identified by colour as follows: **above**/**below** Victoria.

*Estimate has a relative standard error (RSE) of between 25 and 50 per cent and should be interpreted with caution.

Note that estimates may not add to 100 per cent due to a proportion of 'don't know' or 'refused' responses, not reported here.

The relationship between SES and the prevalence of type 2 diabetes was investigated, using total annual household income as a measure of SES (Figure 8.3). The prevalence of type 2 diabetes in both men and women significantly increased with decreasing total annual household income.

Figure 8.3: Prevalence of type 2 diabetes,[a] by total annual household income and sex, Victoria, 2011–12



a. Self-reported doctor-diagnosed type 2 diabetes.

Data were age-standardised to the 2011 Victorian population.

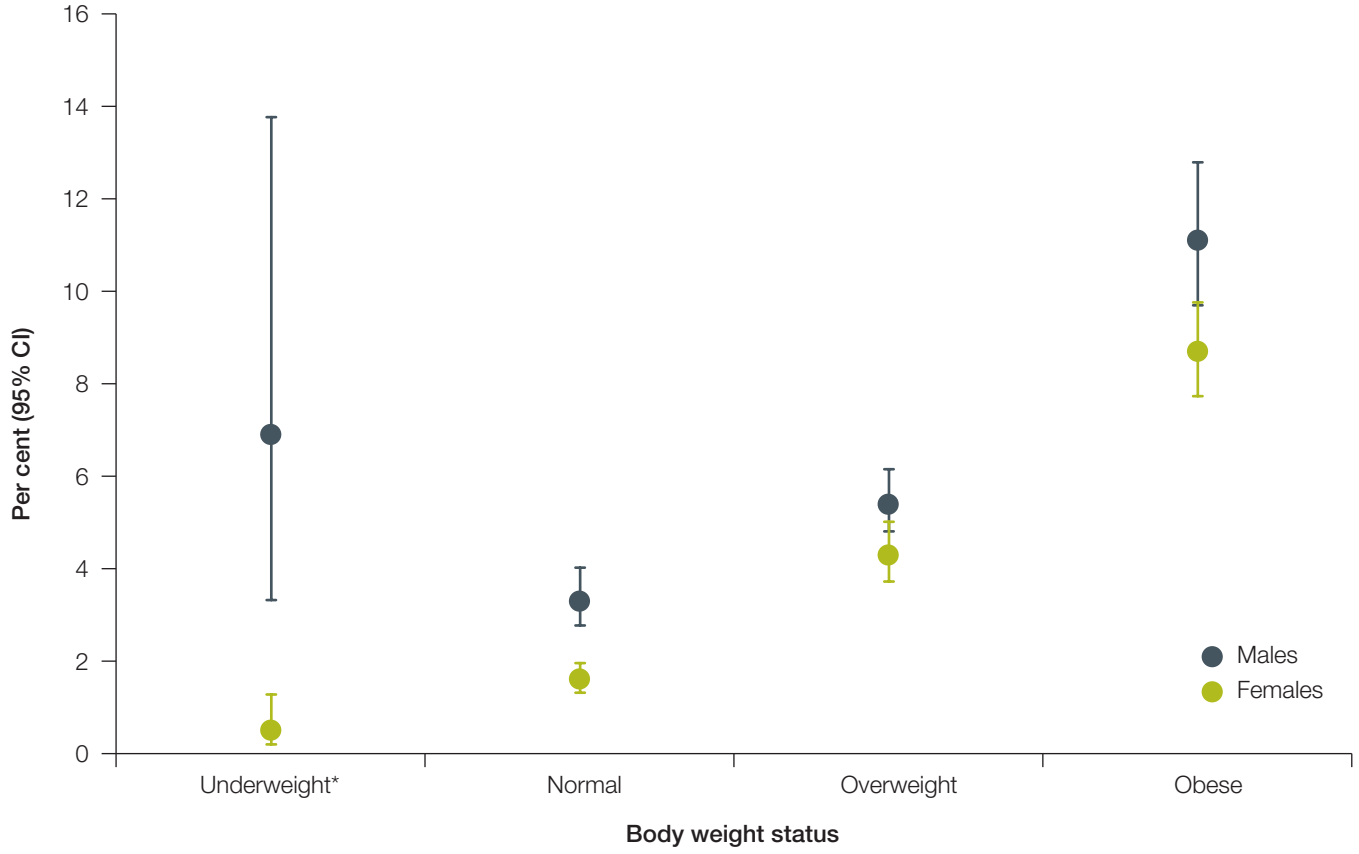
95% CI = 95 per cent confidence interval.

Ordinary least squares regression was used to test for trends over time.

Excess body weight is a major risk factor for the development of type 2 diabetes. Respondents reported their height and weight and their body mass index (BMI) was then calculated. Body weight status was categorised using the WHO recommended ranges (WHO 1999; 2013). Respondents were classified as underweight if they had a BMI of less than 18.5 kg/m2, normal weight if their BMI was in the range of 18.5–24.9 kg/m2, overweight if their BMI was in the range of 25.0–29.9 kg/m2 and obese if their BMI was 30 kg/m2 or more.

Figure 8.4 shows the relationship between body weight and the prevalence of type 2 diabetes. In women, the prevalence of type 2 diabetes increased with increasing body weight and was highest in those categorised as obese (8.7 per cent). A similar pattern was observed for men, with the exception of those who were underweight. However, the RSE for the estimates of underweight in both men and women were in the range of 25–50 per cent, which warrants cautious interpretation of results. There were no significant differences in the prevalence of type 2 diabetes between men and women who were classified as overweight or obese.

Figure 8.4: Prevalence of type 2 diabetes,[a] by body weight status[b] and sex, Victoria, 2011–12



a. Self-reported doctor-diagnosed type 2 diabetes.

b. Based on self-reported body mass index (BMI) and categorised by WHO recommended ranges (WHO 1999; 2013).

Data were age standardised to the 2011 Victorian population.

95% CI = 95 per cent confidence interval.

* Estimates have relative standard errors (RSE) of between 25 and 50 per cent and should be interpreted with caution.

Discussion

Interpretation of the findings

Type 2 diabetes is the most common form of diabetes, and results from the survey show 5.0 per cent of respondents had previously been diagnosed by a doctor with the condition (Table 8.1). This is referred to as a self-reported doctor-diagnosed lifetime prevalence estimate, since survey respondents were asked to recall and then report if they had ever been diagnosed with diabetes by a doctor. As a measure of prevalence, it is important to note that the estimate may be subject to recall bias because of the way the information was collected – by respondent recall. It is also important to note that this type of prevalence estimate excludes undiagnosed cases of disease and likely underestimates actual prevalence as results from other studies suggest there are considerable numbers of people in the population with undiagnosed type 2 diabetes (Dunstan et al. 2001; Department of Health 2012). Nevertheless, self-reported estimates of chronic disease are a reliable indicator for monitoring disease patterns and trends at the population level.

The 2011–12 survey results show that, similar to survey results for the adult Australian population, the prevalence of type 2 diabetes in Victoria was higher in men (6.0 per cent) than women (4.1 per cent), and increased with age (AIHW 2012) (Table 8.2). Excess body weight is an important risk factor for type 2 diabetes, and when body weight is taken into account, the prevalence in Victoria was almost double for obese men (11.1 per cent) and more than double for obese women (8.7 per cent) (Figure 8.4) compared with all men and women.

An analysis of Victorian Population Health Survey results over time show the prevalence of type 2 diabetes in adult Victorians increased significantly from 3.4 per cent in 2003 to 5.0 per cent in 2011–12 (Table 8.4). This is consistent with survey results for Australian adults that indicate prevalence more than doubled between 1989–90 and 2007–08, from 1.5 per cent to 4.1 per cent (AIHW 2012). However, the prevalence rate for type 2 diabetes in Victoria has remained stable over the last five years, with no significant increase between 2007 and 2011–12 (Table 8.4). Survey results for the adult Australian population indicate a similar pattern, with no significant change in the prevalence of type 2 diabetes between 2007–08 (4.0 per cent) and 2011–12 (4.0 per cent) (ABS 2012). The recent levelling of the prevalence rate requires further investigation and longer term monitoring to determine whether it is a temporary flattening in the rate or reflects a longer term trend.

There were very few differences in prevalence observed by geographic zone (Table 8.6, Table 8.7 and Figure 8.2), but a strong social gradient was evident for Victoria, with higher prevalence rates for type 2 diabetes observed in higher income households compared with lower income households (Figure 8.3). The few geographic differences in prevalence that were observed largely reflect differences in SES across the state.

There were only four LGAs (Greater Dandenong (C), Melton (S), Moreland (C) and Whittlesea (C)) where the prevalence of type 2 diabetes was higher than the rate for all of Victoria (Table 8.7 and Figure 8.2). With the exception of Melton, which has neither a particularly high nor low level of SES, the remaining three LGAs have a relatively low level of SES, based on the Index of Relative Socioeconomic Disadvantage rankings (ABS 2008). In contrast, the five LGAs that had a significantly lower prevalence of type 2 diabetes compared with Victoria, have a relatively high level of SES.

Curiously, although the prevalence of obesity was higher in rural Victoria compared with the metropolitan area (Table 2.67), and given excess body weight is an important risk factor for type 2 diabetes, there was no significant difference in the prevalence of type 2 diabetes between rural and metropolitan Victoria (Table 8.6). Possible explanations for this result that would require further investigation include: (a) an over-representation of another/other risk factor/s for type 2 diabetes in metropolitan Victoria counteracting the higher prevalence of obesity in rural Victoria; (b) an over-representation of risk mitigating behaviours in rural Victoria that counteract the higher prevalence of obesity in rural Victoria (e.g. higher physical activity levels); (c) the lag phase between the development of obesity and type 2 diabetes which may not, as yet, have allowed for a difference in prevalence to become apparent; (d) under-diagnosis of type 2 diabetes in rural Victoria; or (e) differences in the accuracy of self-reported height and weight resulting in under-reporting of obesity in metropolitan Victoria.

The prevalence of type 2 diabetes was investigated by smoking status, level of alcohol consumption, level of fruit and vegetable consumption, physical activity level, body weight status, level of psychological distress, level of self-reported health, education level, employment status, household income and area of residence within Victoria (Table 8.8). The analysis showed that the prevalence of smoking was significantly higher in men, but not women, with type 2 diabetes, consistent with the findings from other studies that show that smoking is associated with an increased risk of type 2 diabetes in men, but not women (Colagiuri et al. 2009). In contrast, the analysis showed a significantly higher prevalence of abstinence from consumption of alcohol in women, but not men, with type 2 diabetes. There is no evidence to suggest that abstinence or being a non-drinker is associated with type 2 diabetes. It is possible this finding reflects appropriate self-management of the condition by respondents.

A significantly higher proportion of both men and women with type 2 diabetes did so little physical activity as to be categorised as ‘sedentary’ (Table 8.8). Physical inactivity has been shown to be a significant risk factor for type 2 diabetes, while moderate intensity exercise has been shown to be protective (Colagiuri et al. 2009). The findings suggest that higher prevalence of moderate-intensity physical activity in the population could reduce type 2 diabetes incidence.

The analysis also showed high prevalence of type 2 diabetes in men and women who have high or very high levels of psychological distress (Table 8.8). To date, high levels of psychological distress have not been implicated as a possible risk factor for type 2 diabetes. High levels of psychological distress may be a consequence of type 2 diabetes. Men and

women who reported being in fair or poor health also had high prevalence of type 2 diabetes, which may also be a consequence of having type 2 diabetes.

Finally, the survey results show 4.2 per cent of respondents reported having ever been told by a doctor that they had high blood sugar levels (Table 8.3). Although respondents may not have had high blood sugar levels at the time of the survey, high blood sugar levels are of concern, as 10–20 per cent of those affected go on to develop type 2 diabetes (Diabetes Australia 2011). The risk factors for high blood sugar levels include physical inactivity and excess body weight, which are both modifiable and present an opportunity to prevent type 2 diabetes. The finding that an additional 4.2 per cent of adult Victorians may be at risk of type 2 diabetes highlights the importance of screening for type 2 diabetes in people with risk factors and the importance of appropriate follow-up testing and management when high blood sugar levels are detected.

Other sources of data

The 1999–2000 AusDiab study was the first national physical and biomedical measurement study of diabetes prevalence in Australia. The prevalence of diabetes for Australian adults aged 25 years or over was 7.5 per cent (Dunstan et al. 2001). This was based on oral glucose tolerance testing of survey respondents, self-report of a previous diagnosis and use of medication for their condition. The study also found that for every known case of diabetes, there was an undiagnosed case of diabetes in the population. The results of this landmark survey have had a significant impact on diabetes in Australia.

In 2009–10, the Victorian Government Department of Health conducted the Victorian Health Monitor (VHM), a statewide representative cross-sectional health measurement survey (Department of Health 2012). The VHM collected nutrition information and a range of physical and biomedical measurement data, including information on diabetes, cardiovascular disease, obesity, dyslipidaemia and hypertension, from a representative sample of adults aged 18–75 years in Victoria. The VHM identified through fasting plasma glucose testing, self-report of a previous diagnosis and use of medication that the prevalence of diabetes was 4.6 per cent for Victorians aged 18–75 years. This included 3.4 per cent with a previous diagnosis of diabetes who were on medication for their condition and a further 1.2 per cent who were previously undiagnosed with diabetes, suggesting that for every three diagnosed cases there is one undiagnosed case of diabetes in Victoria.

The 2011–12 Australian Health Survey reported a prevalence of 4.4 per cent for diabetes in Victorians aged 18 years or over, based on fasting plasma glucose test results, self-report of a previous diagnosis and use of medication for the condition (ABS 2013). Further results from this survey are pending.

Diabetes Australia Victoria reported in November 2011 that about 250,000 Victorians (all ages) had diabetes, according to data derived from the National Diabetes Services Scheme (NDSS) (Diabetes Australia Victoria 2011). This was equivalent to about 4.5 per cent of the Victorian population in 2011.

Concluding remarks

The most recent information on the prevalence of diabetes in Victoria is reasonably consistent, regardless of the information source. Measured blood glucose levels from recent population health surveys indicate the prevalence of diabetes in Victorian adults to be between 4.4 and 4.6 per cent (ABS 2013; Department of Health 2012). Type 1 diabetes is prevalent in about 0.6 per cent, and type 2 diabetes is prevalent in about 4.0 per cent of adult Victorians aged 18–75 years (Department of Health 2012). The 2011–12 Victorian Population Health Survey provides estimates for the prevalence of diabetes in Victorian adults based on self-report of a previous diagnosis, and results suggest that type 1 diabetes is prevalent in about 0.6 per cent, and type 2 diabetes is prevalent in about 5.0 per cent of Victorians aged 18 years or over.

Trend analyses of results from survey data is also consistent, with indications that the prevalence of type 2 diabetes has increased over the past 10 years but that the rate has been stable over the past five years. This pattern has emerged despite increasing levels of obesity in the population (Table 2.66). Because obesity is a significant risk factor for type 2 diabetes, it would be reasonable to assume that the prevalence of both type 2 diabetes and obesity would increase in tandem. A possible explanation for the recent levelling in prevalence of type 2 diabetes is improved detection (screening) and management of at-risk individuals (the obese, those with impaired fasting glucose, family history of the disease, etc.) with changes to diet, levels of physical activity and drug therapy. It is important to understand, however, that although the prevalence rate appears to have levelled off in recent years, the actual number of people with type 2 diabetes in Victoria is likely to continue to increase due to demographic shifts in the population (population growth and population ageing).

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