AIHW
AUSTRALIAN INSTITUTE OF HEALTH & WELFARE

9

bulletin

A picture of diabetes in overseas-born Australians

Introduction

Diabetes is a long-term condition in which blood glucose levels become too high because the body produces little or no insulin, or cannot use insulin properly. There has been a dramatic worldwide increase in the prevalence of diabetes in recent years (Drivsholm et al. 2001; Dunstan et al. 2002; Harris et al. 1998; IDF 2000; Pan et al. 1997; Ramachandran et al. 1997). This rise primarily reflects the increasing prevalence of Type 2 diabetes in both developed and developing countries, but especially in Asia and the Pacific. The World Health Organization predicts that global diabetes prevalence will continue increasing and that the current estimate of 150 million diabetes cases will double by 2025 (WHO 2002).

The Australian Diabetes, Obesity & Lifestyle Study estimated that almost one million Australians have diabetes, with Type 2 diabetes accounting for 85–90% of cases (Dunstan et al. 2001). Some Australians, such as Aboriginal and Torres Strait Islander peoples and those born in some overseas regions, are at greater risk of diabetes (AIHW 2002).

This bulletin describes patterns of diabetes prevalence, hospitalisations and deaths amongst Australians who were born overseas and compares these patterns with their Australian-born counterparts. This analysis is important because it contributes to the planning and management of diabetes services for people of different cultural and linguistic backgrounds.

The descriptive content of this bulletin also contributes to the global work being undertaken to understand why diabetes has affected countries and ethnicities differently around the world. For example, experts are unsure of whether differences in prevalence are linked to genetic factors of a country's population, its diet and lifestyle, or a combination of these.

CONTENTS

A picture of diabetes in overseas-born Australians

Background

International epidemiological studies have shown that various ethnic groups, such as Indians and Chinese who migrated; Pacific Islanders; Indigenous Australians; and Pima American Indians are more susceptible to Type 2 diabetes than other ethnicities. The introduction of western culture into these communities seems to enhance their susceptibility to diabetes (Colagiuri et al. 1998; Dunstan et al. 2002). An evaluation of international diabetes prevalence studies concluded that ethnic minorities within industrialised countries face an increased risk of diabetes (King & Rewers 1993). This conclusion was supported by Riste et al. (2001) who found that the prevalence of diabetes amongst Britons living in urban Manchester who were of European descent was 20% compared with 22% for those of Afro-Carribbean descent and 33% for those of Pakistani descent.

Abate & Chandalia (2003) have differentiated between the physiological cause of diabetes in different ethnic groups as either insulin resistance or insufficient insulin production. For example, they found that Indians and Hispanics are more often insulin resistant—insulin is not utilised as it should, resulting in high blood glucose. Whereas, African-American people with diabetes more commonly appear to produce insufficient levels of insulin. This has implications for preventing abnormal blood glucose levels progressing into diabetes and the subsequent management of diabetes.

Translating these findings to Australian data is complicated by the methods used to describe cultural and linguistic diversity in Australia. Data are commonly collated on country of birth and language spoken at home, but racial or ethnic ancestry is not asked. The discussion in this bulletin needs to be read with this in mind.

The prevalence of diabetes has previously been reported as higher among people born overseas compared with people born in Australia and among people who speak a language other than English at home. In 1989, Australians who spoke languages other than English at home had significantly higher levels of self-reported diabetes (Welborn et al. 1995). English-speaking males and females had diabetes prevalence rates of 1.7% and 1.9%, respectively. In comparison, the prevalence of diabetes in males and females who spoke a language other than English at home was 2.9% and 3.0%, respectively. In particular, people born in Southern Europe (3.3% of males and 3.5% of females) and South-East Asia (2.0% of males and 2.8% of females) had a higher prevalence of diabetes than Australian-born people (1.6% of males and 1.7% of females).

In a study of women living in Australia, women born in Australia and New Zealand had significantly lower combined incidence of gestational diabetes compared to women born in African, Mediterranean, Arabian, and Asian countries (Beischer et al. 1991). Gestational diabetes occurs during pregnancy and is also strongly associated with developing diabetes later in life. Some research suggests that a 'maternal inheritance mechanism' makes future generations more susceptible to diabetes when the maternal lineage has had diabetes or gestational diabetes (Simmons 1995). This indicates that genetics could be a contributing factor to varying diabetes prevalence rates between different ethnic groups.

Diabetes has genetic, environmental and behavioural risk factors. Obesity, poor diet and insufficient physical activity are the most significant and modifiable risk factors for developing diabetes. People of different backgrounds have different prevalence rates of these risk factors, especially when introduced to a western culture and lifestyle. In 2001, without accounting for age differences amongst these populations, 60.6% of Southern and Eastern European-born people were overweight or obese compared to 46.4% of

Australian-born people, and Australian-born people had the highest prevalence of low or no usual intake of fruit (49.4%) compared to people born in other regions (Table 1). In 2000, people who usually spoke a language other than English at home were more likely to be insufficiently physically active or sedentary (64.2%) compared to people who spoke English at home (53.6%) (Table 2). However, behavioural risk factors are unlikely to completely account for disparities in diabetes prevalence among people of culturally and linguistically diverse backgrounds (DHAC & AIHW 1999; Abate & Chandalia 2003).

Table 1: Risk factors, by region of birth, 2001

	Per cent of people aged 18 years and over								
	Obese[a]			Overweight/obese[b][c]			Low/no usual intake of fruit[c][d]		
Region of birth	Males	Females	People	Males	Females	People	Males	Females	People
Australia	16.2	17.7	16.6	55.1	38.1	46.4	56.3	42.8	49.4
Other Oceania	n.a.	n.a.	n.a.	51.9	44.0	47.9	46.3	44.9	45.6
United Kingdom	n.a.	n.a.	n.a.	56.4	41.6	49.0	55.4	42.2	48.9
Other North-West Europe	n.a.	n.a.	n.a.	55.8	39.1	47.7	50.0	31.5	41.1
Southern & Eastern Europe	n.a.	n.a.	n.a.	70.3	51.1	60.6	35.3	29.7	32.4
North Africa & Middle East	n.a.	n.a.	n.a.	65.7	37.1	54.4	40.0	36.2	38.5
South-East Asia	n.a.	n.a.	n.a.	32.6	18.4	34.5	51.2	44.8	47.5
All other countries	13.6	15.1	13.8	33.4	29.2	31.3	47.2	41.0	44.1

(a) AIHW analysis of the National Health Survey 2001. Age-standardised to the 2001 Standard Australian Population. Obese indicates a self-reported and derived Body Mass Index of 30.0+.

(b) Overweight/obese indicates a self-reported and derived Body Mass Index of 25.0+.

(c) These data are not age-standardised and therefore, the age distribution of the population should be considered when interpreting these estimates.

(d) Low/no usual intake of fruit indicates one serve or less of fruit per day. Australian nutritional guidelines suggest that a minimum of two serves of fruit per day is necessary for adequate nutritional intake for adults (Children's Health Development Foundation: Smith, Kellett & Schmerlaib 1998).

n.a. Not available

Source: ABS 2002b.

Table 2: Sedentary and insufficient levels of physical exercise, by language usually spoken at home, 2000

	Per cent of people sedentary or insufficiently active aged 18–75 years		
Language usually spoken at home	Males	Females	People
English	53.2	54.1	53.6
Language other than English	58.4	70.9	64.2

Notes

1. Standardised to the 2001 Standard Australian Population (ABS).
2. 'Sedentary' is no activity per week.
3. 'Insufficient' is less than 150 minutes of activity per week or less than five sessions of activity per week.

Source: AIHW analysis of the National Physical Activity Survey 2000 (Australian Sports Commission).

A picture of diabetes in overseas-born Australians

Method

This report uses data from the 1999–2000 Australian Diabetes, Obesity and Lifestyle Study, National Health Surveys, the National Diabetes Register, the National Hospital Morbidity Database and the AIHW National Mortality Database (Appendix A).

Country of birth was used to distinguish between people of different cultural backgrounds. Some Australian-born people who have parents who were born overseas may have lifestyles that reflect overseas-born cultural backgrounds. Country of birth data are unable to account for this; however other related cultural measures including language spoken at home or first language spoken were not used in this analysis, as they are not available in hospital and mortality data.

Country of birth was categorised into the following geographical regions based upon Australian Bureau of Statistics (ABS) classifications (see Appendix B):

- Australia
- New Zealand
- South Pacific Islands
- United Kingdom and Ireland
- North and West Europe
- Southern Europe
- Eastern Europe and Central Asia
- Middle East
- North Africa
- Other Africa
- South-East Asia
- North-East Asia
- Southern Asia
- Americas.

When the numbers for a region were too small to statistically analyse, the region was combined with others to make larger regions.

The most recent Australian survey to measure the prevalence of diabetes through blood glucose levels was the 1999–2000 Australian Diabetes, Obesity and Lifestyle Study (AusDiab Study). A major source of self-reported diabetes prevalence data is the ABS series of National Health Surveys (NHSs) conducted in 1977–78, 1983, 1989–90, 1995 and 2001. The NHSs report data for people aged 20 years or over, whereas the AusDiab Study measured a sample of people aged 25 years or over. Results from the 1995 and 2001 NHSs and the 1999-2000 AusDiab Study are reported in this bulletin.

As these surveys were not specifically designed to provide prevalence estimates by region of birth, the estimates calculated may not reflect the true prevalence of diabetes in people born in these regions. Further, as estimates based on survey data are subject to sampling variability (the smaller the estimate, the higher the sampling variability), very small estimates, such as those calculated for some of the regions of birth reported here, have large standard errors (relative to the size of the estimate) and may not be considered statistically reliable.

Standardised prevalence ratios (SPRs) are reported here. For a particular region of birth, the SPR is the ratio of the observed number of cases of diabetes (either self-reported or measured depending on the data source) to the number expected based on the Australian-born population. SPRs are statistically significant to the expected rate based upon the Australian-born population (the expected rate) when the error bars do not include the value of 1.0.

The indirect method of age standardisation has been used for prevalence because of the small number of cases and instability of the age-specific prevalence rates in most of the regions of birth. Different standard populations have been used for males and females—

Australian-born males have been used as the standard population for males, while Australian-born females have been used as the standard population for females. The use of different standards for males and females was adopted to reflect any differences in the Australian-born male and female age-specific rates. However, it should be noted that this means that it is not possible to compare SPRs for males with those for females.

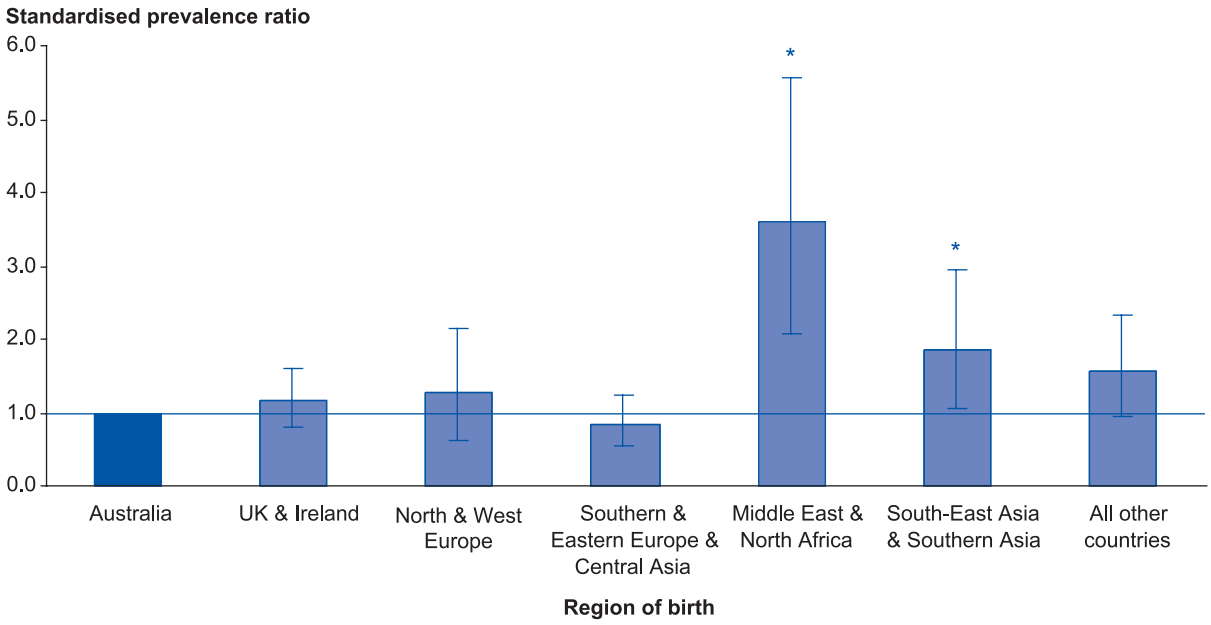
The direct method of standardisation was used for incidence rates, hospital separation rates and mortality rates for people.

Results

Prevalence based on self-report

In 2001, the standardised prevalence ratios (SPRs) for self-reported diabetes (i.e. diabetes reported as a current, long-term condition) for men who were born in the Middle East and North Africa and in South-East and Southern Asia were significantly greater than 1.0 (Figure 1). This means that in these regions of birth, the number of men reporting that they had diabetes was significantly higher than expected based on the age-specific rates for Australian-born men. Men born in the Middle East and North Africa reported 3.6 times more diabetes than expected, while those born in South-East and Southern Asia reported 1.9 times more diabetes than expected.

Figure 1: Standardised prevalence ratios for self-reported diabetes, males by birthplace, 2001



Notes

1. Indirectly age-standardised to the Australian-born male population in the 2001 NHS.
2. Includes males aged 20 years and over.
3. The estimates for North & West Europe, Middle East & North Africa and South-East & Southern Asia have relative standard errors greater than 25% and should be interpreted with caution.

* Indicates significantly different from Australia.

Source: 2001 National Health Survey, ABS.

A picture of diabetes in overseas-born Australians

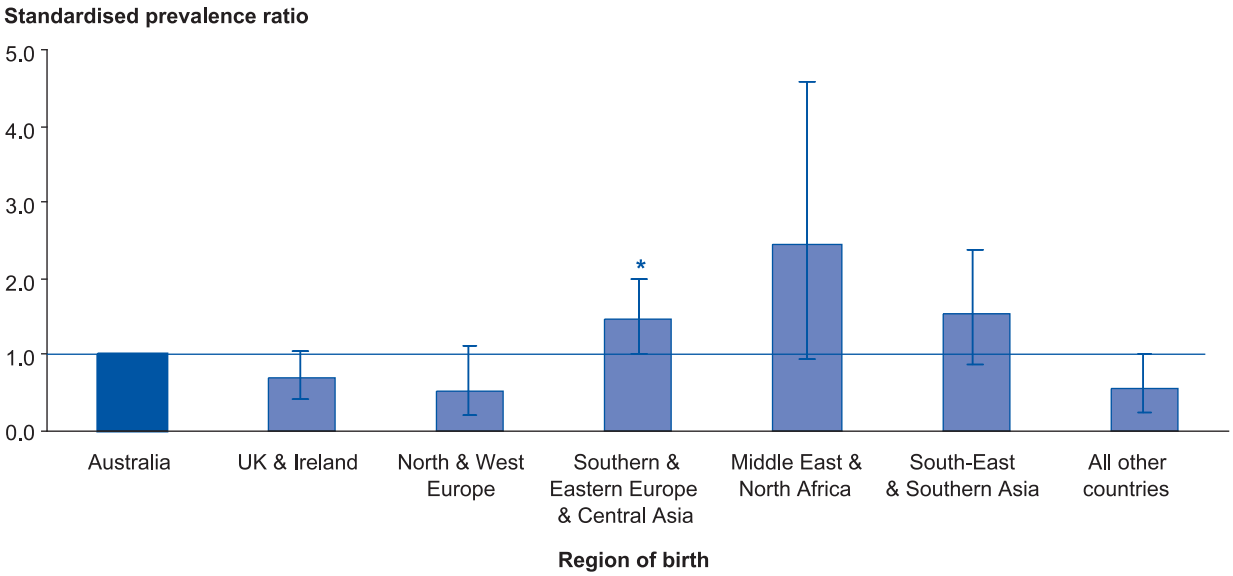
Among women in 2001, only those born in Southern and Eastern Europe and Central Asia reported significantly more cases of diabetes than expected based on rates for Australian-born women, with an SPR of 1.5 (Figure 2).

While women born in the Middle East and North Africa and in South-East Asia and Southern Asia had large SPRs (2.4 and 1.5 respectively), these differences were not statistically significant. This non-significant result was due to the large standard errors and small sample sizes for these regions in 2001.

The Middle East and North Africa had the highest SPR for both sexes, followed by South-East Asia and Southern Asia (although with large standard errors for females). Examination of age-standardised rates for Australian-born men and women indicated no significant difference in the prevalence of self-reported diabetes between men (3.7%) and women (3.9%). Similarly, for other regions of birth, there were no significant differences in the crude prevalence rates for men and women.

The ABS 1995 NHS had a sample size of around 57,600 respondents, twice that of the 2001 NHS sample size. This larger sample size meant that a more detailed analysis could be undertaken of self-reported diabetes prevalence in 1995 by region of birth.

Figure 2: Standardised prevalence ratios for self-reported diabetes, females by birthplace, 2001



Notes

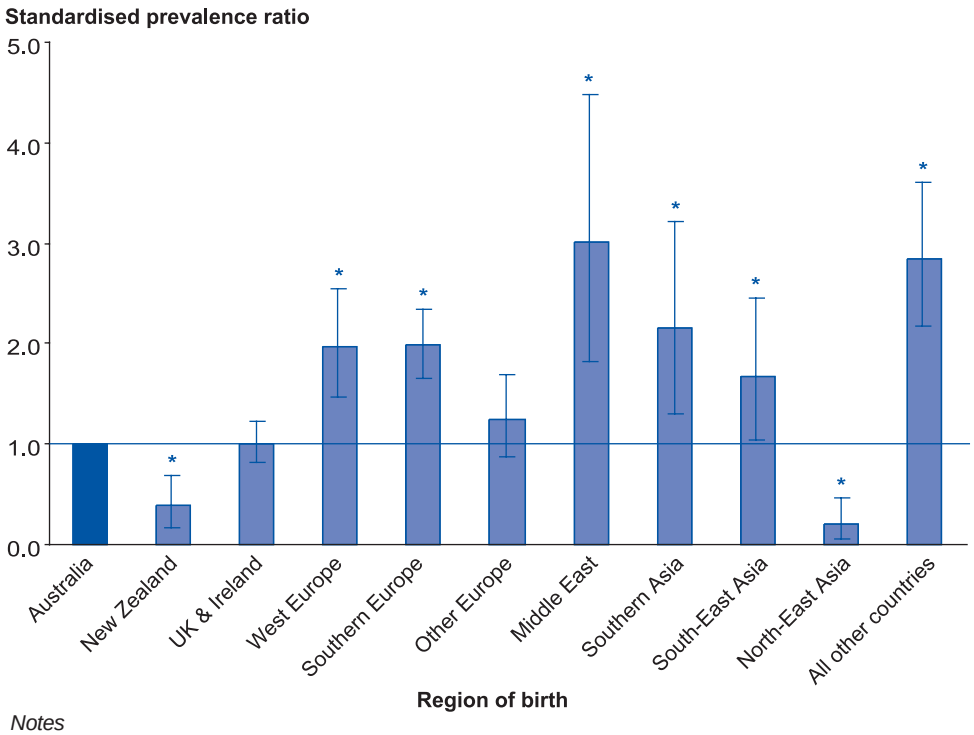
1. Indirectly age-standardised to the Australian-born female population in the 2001 NHS.
2. Includes females aged 20 years and over.
3. The estimates for North & West Europe, Middle East & North Africa, South-East Asia & Southern Asia and All other countries have relative standard errors of greater than 25% and should be interpreted with caution.

* Indicates significantly different from Australia.

Source: Australian Bureau of Statistics 2001 National Health Survey.

In 1995, the numbers of men, aged 20 years and over, born in West Europe, Southern Europe, Middle East, Southern Asia, South-East Asia, and All other countries who reported that they had diabetes were significantly higher than expected based on the age-specific rates for Australian-born men (Figure 3). For example, the number of cases of diabetes reported by men born in the Middle East was three times higher than expected based on Australian-born male rates. Men born in New Zealand had an SPR that was significantly lower than expected based upon Australian-born rates.

Figure 3: Standardised prevalence ratios for self-reported diabetes, males by birthplace, 1995



Notes

1. Indirectly age-standardised to the Australian-born male population in the 1995 NHS.
2. Includes males aged 20 years and over.
3. The estimate for New Zealand has a relative standard error of greater than 25% and should be interpreted with caution.
4. The estimate for North-East Asia has a relative standard error of 50% and is considered too unreliable for general use.

* Indicates significantly different from Australia.

Source: 1995 National Health Survey, ABS.

For women in 1995, only those born in the United Kingdom and Ireland, Southern Europe, Other Europe (i.e. Northern, South-Eastern and Eastern Europe), and All other countries reported significantly more cases of diabetes than expected based on Australian-born female rates (Figure 4). As for men, women born in New Zealand reported fewer cases of diabetes than expected.

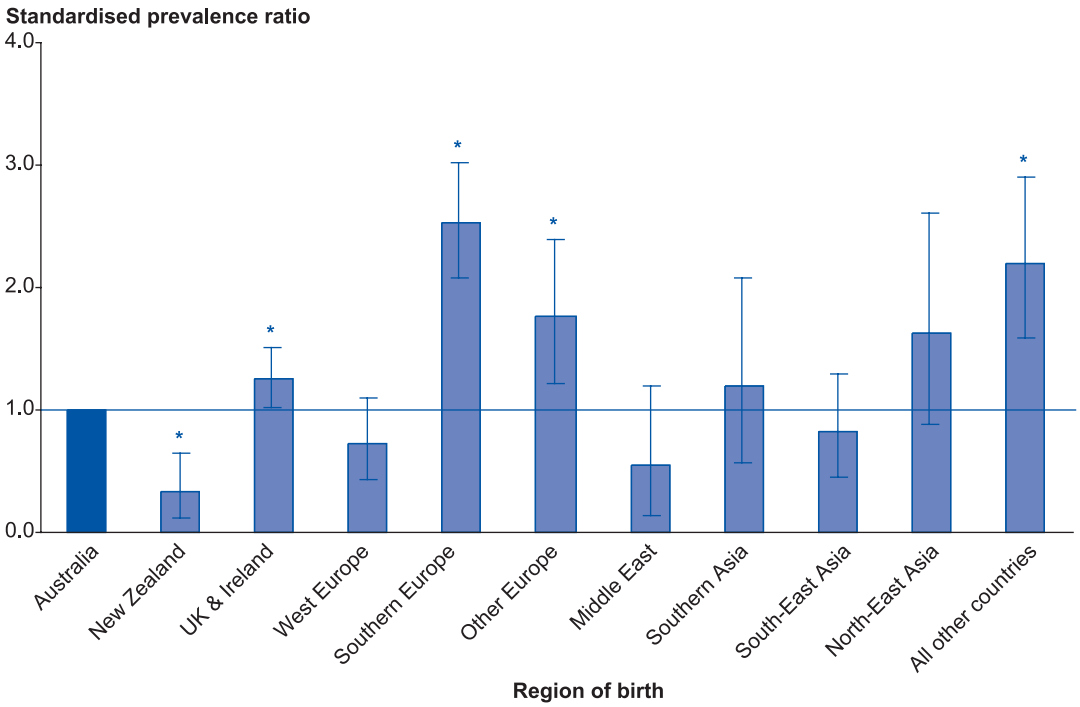
Although it is not possible to directly compare SPRs for men with those for women, the striking difference between the SPRs for men and women born in West Europe warrants some comment. A comparison of crude (i.e. not adjusted for age) rates showed that men born in West Europe reported a significantly higher prevalence of diabetes than women

A picture of diabetes in overseas-born Australians

born in that region. Significant differences in the crude rates between men and women were also observed for those born in the Middle East and North-East Asia, however the rates for females born in the Middle East and males born in North-East Asia had very high relative standard errors.

While the regions of birth reported for 2001 and 1995 are not exactly the same, it is possible to see some consistent patterns in the data, particularly for men. Men born in the Middle East, South-East Asia and Southern Asia reported more diabetes than expected in both 1995 and 2001. Women born in Southern Europe also appear to have reported more diabetes than expected in both survey years. In contrast, there appears to be little evidence of a difference in self-reported diabetes prevalence rates in either year among men born in the United Kingdom and Ireland compared with Australian-born men.

Figure 4: Standardised prevalence ratios for self-reported diabetes, females by birthplace, 1995



Notes

1. Indirectly age-standardised to the Australian-born female population in the 1995 NHS.
2. Includes females aged 20 years and over.
3. The estimates for New Zealand, Southern Asia, South-East Asia and North-East Asia have relative standard errors of greater than 25% and should be interpreted with caution.
4. The estimate for the Middle East has a relative standard error of 50% and is considered too unreliable for general use.

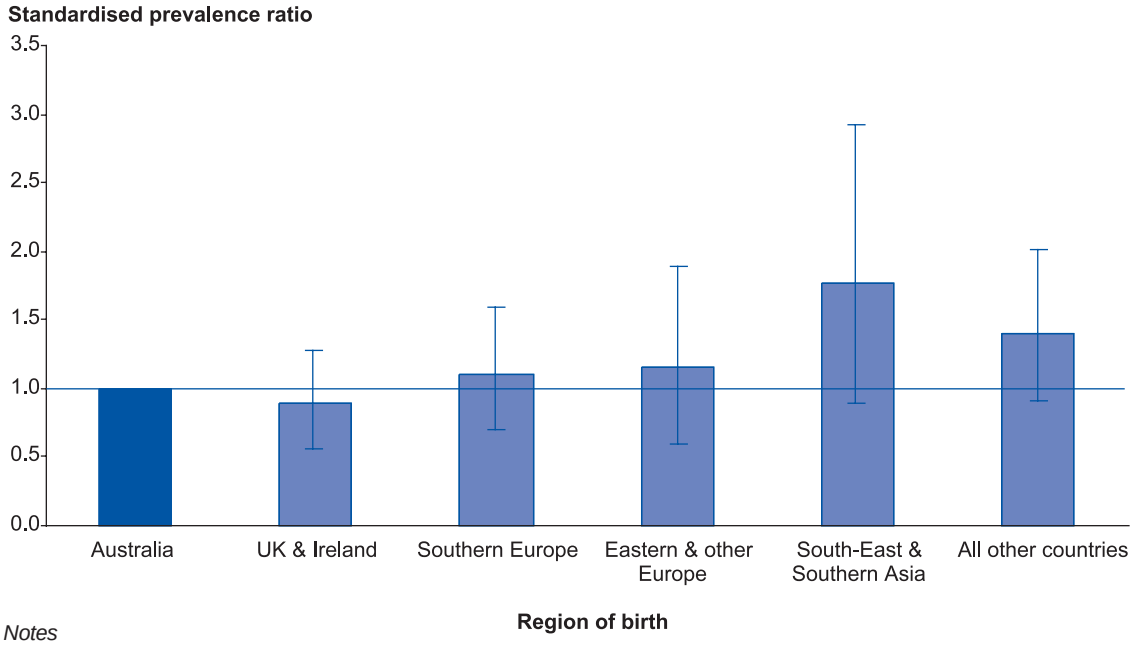
* Indicates significantly different from Australia.

Source: 1995 National Health Survey, ABS.

Prevalence based on measurement of glucose levels

The 1999–2000 AusDiab Study measured plasma glucose levels in a sample of 11,247 people aged 25 years and over. These data could not be analysed by sex because of small numbers for most regions of birth. No significant differences in the age-adjusted prevalence rates for diabetes were observed between Australian-born persons and persons born overseas (Figure 5). However, this is probably because the survey was not designed to provide prevalence estimates by region of birth and therefore did not have large enough sample sizes to detect significant differences by region of birth.

Figure 5: Standardised prevalence ratios for measured diabetes, persons by birthplace, 1999–2000



Notes

1. Indirectly age-standardised to the Australian-born male and female populations in the 1999–2000 AusDiab Study.
2. Includes persons aged 25 years and over.
3. The estimates for Eastern & other Europe and South-East & Southern Asia have relative standard errors of greater than 25% and should be interpreted with caution.

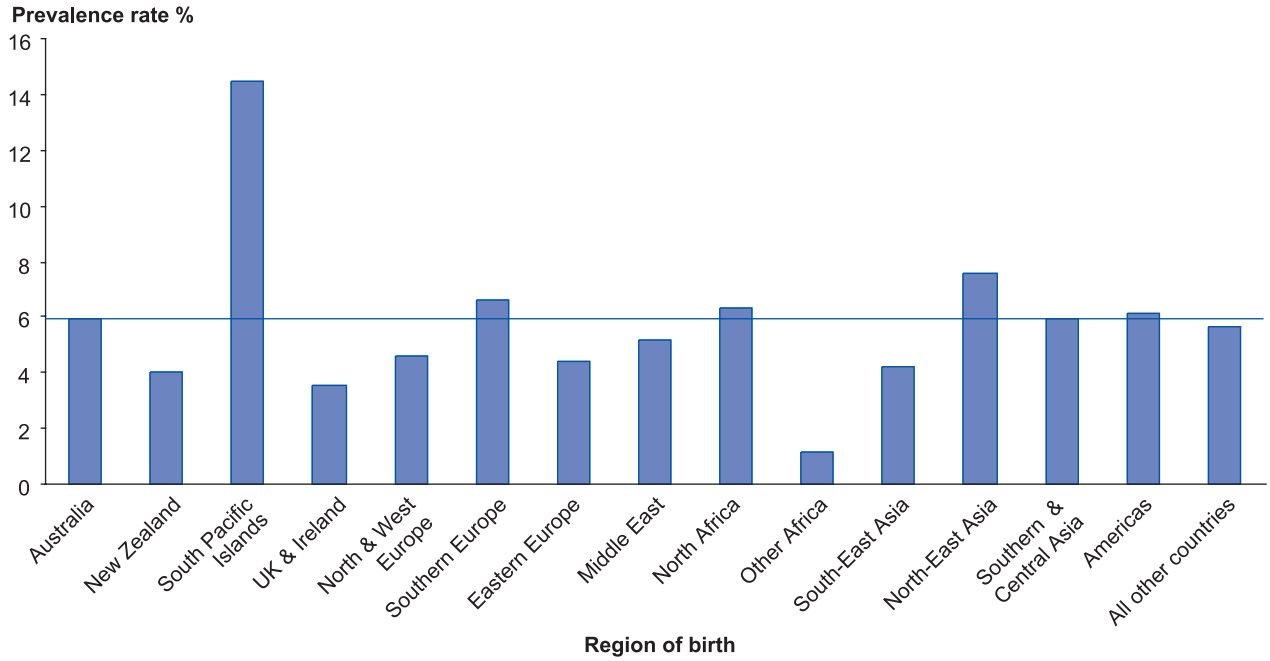
Source: 1999–2000 AusDiab Study.

International comparisons

To provide some context to diabetes prevalence rates among overseas-born Australians, it is interesting to look at the corresponding overseas regions' prevalence rates. However migrants to Australia are not representative of their region of origin, and therefore overseas rates may differ considerably from the overseas-born Australian rates. Data collated by the International Diabetes Federation (IDF) indicate that diabetes prevalence rates are higher in the regions of South Pacific Islands (14.4%), Southern Europe (6.7%), North Africa (6.3%), North-East Asia (7.6%) and the Americas (6.1%) compared with Australia (5.9%). All other regions had lower prevalence rates than Australia (Figure 6). These comparisons should be interpreted with caution, as the IDF data were derived from a variety of measured and self-reported data, with preference given to measured data, and varying methodologies and data sources were used to compile and extrapolate the IDF data into the regions.

A picture of diabetes in overseas-born Australians

Figure 6: International diabetes prevalence rates by region



Notes

1. Includes people aged 20–79 years.
2. These data are not age-standardised and therefore the age distribution of the population should be considered when interpreting these estimates.

Source: IDF 2000.

Incidence

The only available national incidence data on diabetes are those held on the National Diabetes Register. The Register holds information on people with all types of insulin-treated diabetes (including Type 1, Type 2 and gestational diabetes), who started using insulin since January 1999 and who have consented to be on the Register. The following results combine all types of diabetes treated by insulin.

Data for the period 1999–2001 show that there was substantial variation in insulin-treated diabetes incidence by birthplace (Table 3). Incidence per 100,000 population was highest among those born in the Middle East and North Africa (79.8 and 93.3 for males and females respectively), and Southern and Central Asia (78.4 and 91.9 for males and females respectively). Both these groups had incidence rates that were substantially higher than those of the Australian-born registrants (46.2 males and 40.5 females per 100,000 population), being more than 50% higher for males and more than double for females.

These results should be interpreted as indicative only, as coverage of insulin-treated Type 2 diabetes is not complete at this stage. However they do suggest that further research into differentials in insulin-treated Type 2 diabetes incidence by country of birth is warranted.

Table 3: National Diabetes Register, registrants aged 15 years and over at diagnosis by region of birth and sex, 1999–2001

Region of birth	Males		Females	
	Number	Average annual rate per 100,000 population	Number	Average annual rate per 100,000 population
Australia	6,713	46.2	6,629	40.5
Oceania (excluding Australia)	244	44.5	326	54.5 *
North & West Europe	909	32.9 *	757	29.9 *
Southern & Eastern Europe	1,344	61.4 *	1,050	53.7 *
Middle East & North Africa	267	79.8 *	276	93.3 *
Other Africa	86	52.9	75	41.2
South-East Asia	223	54.2	337	55.3 *
North-East Asia	134	42.8	213	53.4
Southern & Central Asia	200	78.4 *	242	91.9 *
Americas	98	46.5	82	39.8

Note: Rates age-standardised to the 2001 Standard Australian Population.

* Indicates significantly different from Australia.

Source: National Diabetes Register, AIHW.

Diabetes-related hospital separations

Diabetes-related hospital separations data presented here are for 1999–00 and include separations with a primary or additional diagnosis of diabetes (ICD-10-AM codes E10, E11, E13, E14; NCCH 1998). Hospital separations data are records of each discharge, transfer, death or change in the type of episode of care; the data may include multiple separations by the same patient.

The 1999-00 data were coded according to insulin dependency rather than diabetes type. Type of diabetes is not easily derived from insulin dependency because Type 2 diabetes may or may not be insulin dependent, therefore these results are presented as all diabetes-related separations.

Diabetes is mostly treated in the community through medical practitioners and allied health professionals. Hospital separations for diabetes include only severe cases and do not give a full picture of diabetes prevalence.

After adjusting for age, males and females born in Australia had similar rates of diabetes-related hospital separations (24 and 27 per 1,000 respectively) in 1999–00 (Figure 7). People born in the South Pacific Islands, Southern Europe, the Middle East and North Africa and women from South-East Asia had significantly higher rates of hospital separations. Most notably, the rates of diabetes hospitalisations for men and women born in the South Pacific Islands were 54 and 71 per 1,000 respectively. People born in the following regions had a lower rate of diabetes-related hospital separations than those born in Australia: New Zealand; United Kingdom and Ireland; North and West Europe; North-East Asia; females from Eastern Europe and Central Asia, and the Americas; and males from South-East Asia.

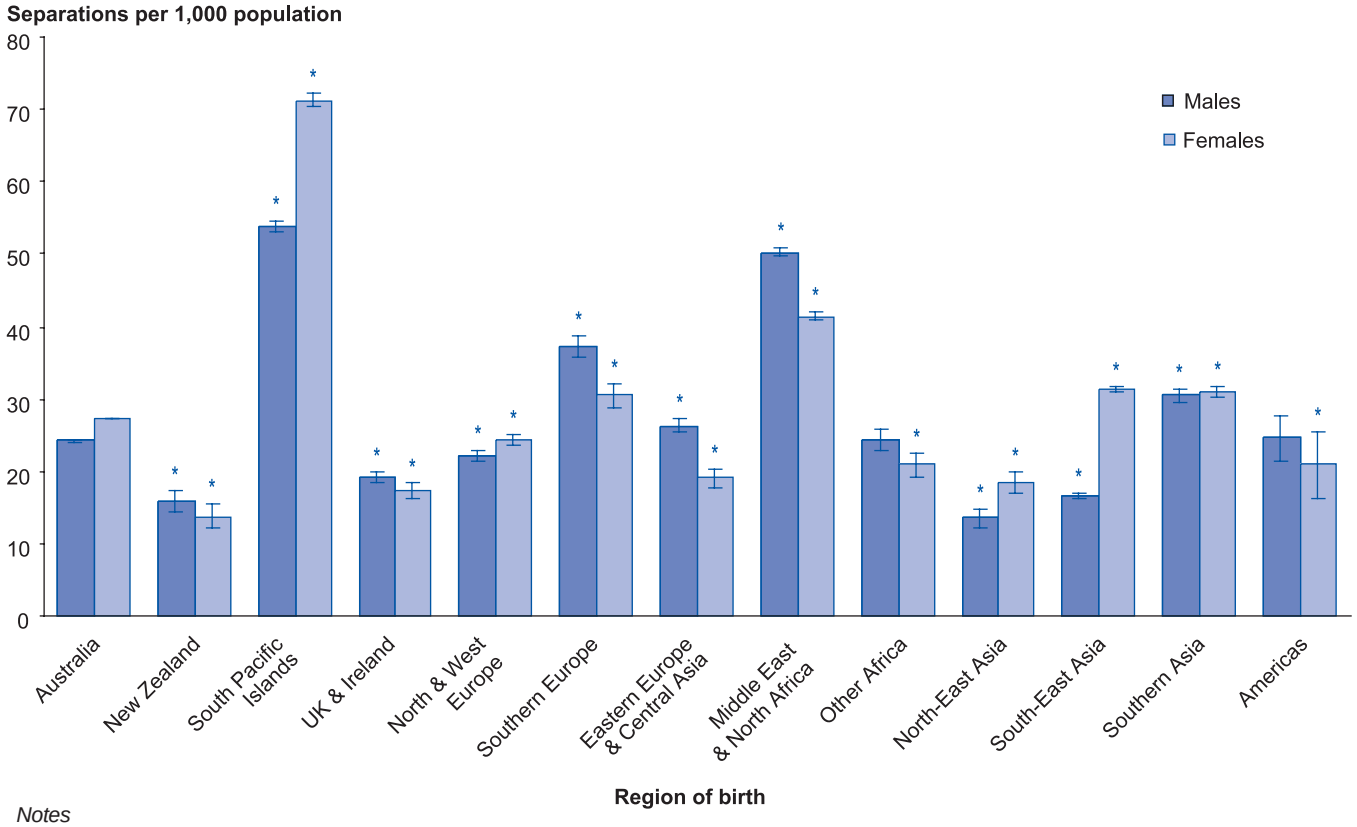
A picture of diabetes in overseas-born Australians

Comparable differentials occurred in total hospital separations in Australia (AIHW 2001, Table 6.8). For example, in 1999–00, Australia-born people had 307 hospitalisations per 1,000 and New Zealand-born people had 243 but the following countries of birth had a higher rate: Papua New Guinea (351), Fiji (399) and other Oceania (512). A higher diabetes-related hospital separation rate amongst people born in these South Pacific Islands may be due to factors replicated across many health conditions.

Males born in Southern Europe, Eastern Europe and Central Asia, and Middle East and North Africa had significantly higher hospital separation rates than females born in the same regions. Conversely, females born in Australia, the South Pacific, North-East Asia, South-East Asia, and Southern Asia had higher hospitalisation rates than their male counterparts.

Diabetes-related hospital separation rates between sub-population groups are affected by various factors including diabetes prevalence, severity of the condition, differing admission practices and levels of service provision, multiple admissions for treatment of chronic complications (such as dialysis), and the use of alternative healthcare services

Figure 7: Age-standardised rate of diabetes-related hospital separations, by region of birth, 1999–00



Notes

1. Standardised to the 2001 Standard Australian Population (ABS).
2. Includes people aged 20 years and over.

* Indicates significantly different from Australia.

Source: National Hospital Morbidity Database, AIHW.

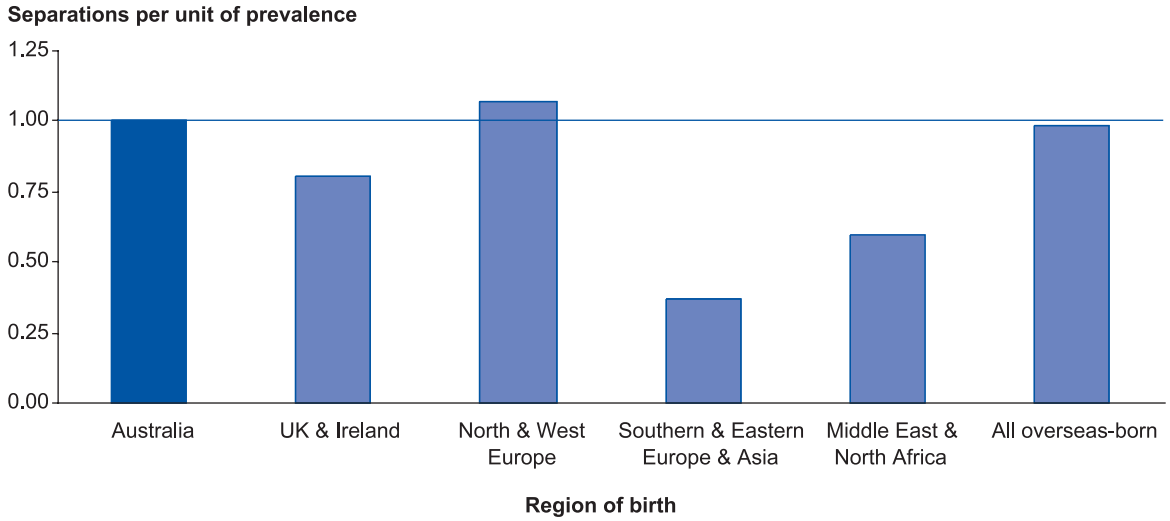
such as diabetes educators, allied health professionals and general practitioners (AIHW 2001). Hospital care is predominantly more necessary for severe cases with complications. For example in Queensland, the probability of diabetes-related hospitalisation increases with an increase in complications (Queensland Health 2002).

In order to more clearly examine patterns of hospital separation rates due to factors other than differing levels of diabetes between these groups, hospitalisations per unit of prevalence rather than per unit of the general population are presented as a ratio in comparison to the Australian rate (Figure 8) (see Appendix A for more detail). This removes the effect of prevalence between regions of birth and therefore the contribution of diabetes severity (and other components of hospital separation data as discussed above) is made more prominent.

For a given level of diabetes prevalence, overall there is little difference between Australian-born and all overseas-born hospitalisations. However, compared to people born in Australia, people born in the United Kingdom and Ireland, Middle East and North Africa, and Southern and Eastern Europe and Asia have fewer hospitalisations per unit of prevalence.

This situation prevails despite higher rates of prevalence and hospitalisations for some of these regions of birth compared to Australian-born people. This demonstrates that hospital separation rates are not a direct reflection of prevalence rates and that other factors could be impacting upon some overseas-born people differently to Australian-born people. In an attempt to determine whether the repetitive nature of dialysis is a major factor in separation rates, diabetes hospital separations where dialysis was coded as a diagnosis or procedure undertaken were analysed. Generally, in diabetes-related hospital separations, dialysis is a rare event (less than 5%) regardless of country of birth.

Figure 8: Ratio of hospital separations per unit of prevalence, by region of birth



Notes

1. Age-standardised to the 2001 Standard Australian Population (ABS).
2. Includes people aged 20 years and over.

Sources: National Hospital Morbidity Database 1999–00, AIHW; 2001 National Health Survey, ABS.

A picture of diabetes in overseas-born Australians

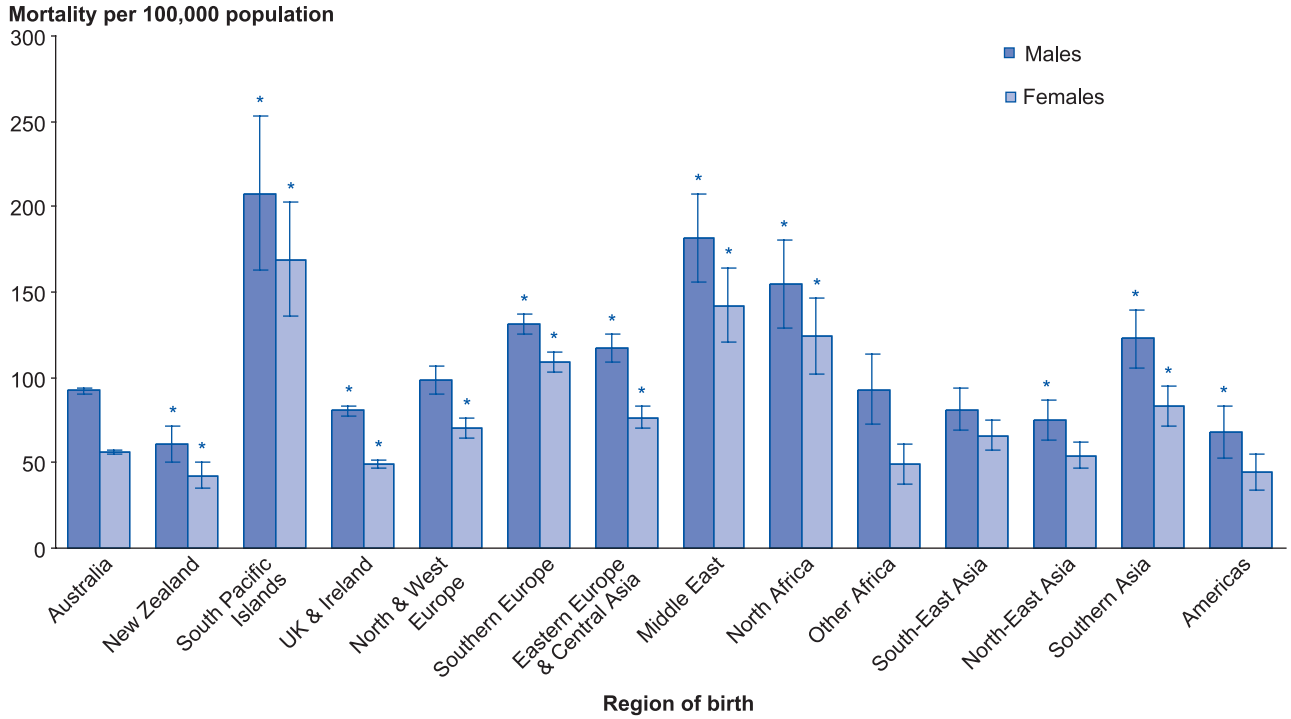
Mortality from diabetes

Diabetes-related deaths reported here are for 1997–2000 and include deaths where diabetes was either the underlying or an associated cause of death (ICD-10 codes E10, E11, E13, E14; WHO 1977). At the national level, diabetes is twice as likely to be listed as an associated cause of death than as the underlying cause of death (AIHW: Mathur et al. 2000).

The highest diabetes death rates were recorded amongst people born in the South Pacific Islands (208 male and 169 female deaths per 100,000) in 1997–2000. In comparison, Australian-born men and women had diabetes death rates of 92 and 57 deaths per 100,000 respectively. However, a high degree of statistical variability is present within some of the regions and therefore differences should be interpreted carefully (Figure 9).

Males and females born in the Middle East (181 and 142 deaths per 100,000 population respectively), North Africa (155 and 125) and Southern Asia (122 and 84) also had higher mortality rates compared to those born in Australia. Except for the UK and Ireland (80 and 49 deaths per 100,000), all regions of Europe also had higher mortality rates than Australia.

Figure 9: Age-standardised mortality rates, by birthplace and sex, 1997–2000



Notes

1. Age-standardised to the 2001 Standard Australian Population (ABS).
2. Data for people aged 25 years and over.

* Indicates significantly different from Australia.

Source: National Mortality Database, AIHW.

In each region, male mortality rates were higher than the corresponding female rates. The difference between the male and female rates was statistically significant for those born in Australia, New Zealand, United Kingdom and Ireland, North and West Europe, Southern Europe, Eastern Europe and Central Asia, Other Africa, North-East Asia and Southern Asia.

In their study of mortality from 1994–1996, Strong et al. (1998) found that underlying cause diabetes mortality rates were 16% and 11% (males and females respectively) lower for 'UK & Ireland-born people'; 32% and 87% higher for people born in 'North & West Europe, the former USSR and Baltic States'; and 12% and 37% higher for people born in 'Asia' than the Australian-born rates.

Diabetes death rates are difficult to compare internationally, and usually underestimate the true extent of deaths caused by diabetes (Colagiuri et al. 1998). This is because the mortality burden of diabetes often presents itself in associated problems such as renal disease, heart disease and stroke (AIHW 1998).

Discussion

Rates of diabetes differ widely between Australians of different regions of birth and the level of difference varies between population health indicators. It is difficult to explain why diabetes prevalence, hospital separation and mortality rates vary so much, amongst regions of birth, but could be due to disparities in access; and utilisation and attitudes to healthcare including hospitals, diabetes management services, and diabetes educational resources (von Hofe et al. 2002).

Males and females born in the Middle East and North Africa had the highest standardised prevalence ratios (3.60 and 2.43 respectively) and the highest incidence rate ratios (1.73 and 2.30) of diabetes compared to Australian-born males and females (Table 4). Men from Southern Europe and Eastern Europe and Central Asia; and women from the United Kingdom and Ireland had the lowest standardised prevalence ratio compared to Australian-born people (0.85 and 0.71 respectively), though these differences were not all significant. Men and women from the United Kingdom and Ireland and North and West Europe had incident rates significantly lower than Australian-born people.

It is unfortunate that prevalence rates for South Pacific Island-born people are unavailable, as these people have the highest hospitalisation (2.22 males and 2.62 females) and mortality (2.25 and 2.98) rate ratios compared to Australian-born people. The second highest hospitalisation rate ratios are for males and females born in the Middle East and North Africa (2.07 and 1.52 respectively); and Middle Eastern-born people also have the second highest mortality rate ratios (1.96 and 2.51) (Table 4).

Rates of diabetes prevalence, incidence, hospitalisations and mortality for men and women born in the Middle East and North Africa were consistently higher than Australian-born rates. However, this expected uniform pattern was not apparent across all regions of birth. For example, men born in the United Kingdom and Ireland reported 17% more diabetes than Australian-born men, but had 21% less hospitalisations and 13% less mortality than Australian-born men. Similarly, men born in Southern and Eastern Europe and Central Asia had lower prevalence rates compared to Australian-born men, yet had higher hospitalisation and mortality rates than their Australian-born counterparts.

A picture of diabetes in overseas-born Australians

Table 4: Age-standardised rate ratios, by region of birth

	Ratios (Australian-born=1.00)							
	Prevalence[a] 2001		Incidence of insulin-treated diabetes 1999–2001		Hospitalisations 1999–00		Mortality 1997–2000	
Region of birth	Males	Females	Males	Females	Males	Females	Males	Females
UK & Ireland	1.17	0.71	0.71*	0.74*	0.79*	0.64*	0.87*	0.87*
North & West Europe	1.26	0.55			0.91*	0.89*	1.07	1.25*
Southern Europe	0.85	1.46*	1.33[b]*	1.33[b]*	1.53*	1.12*	1.42*	1.93*
Eastern Europe & Central Asia					1.09*	0.70*	1.27*	1.35*
Middle East	3.60*	2.43	1.73*	2.30*	2.07*	1.52*	1.96*	2.51*
North Africa							1.68*	2.20*
South-East Asia	1.87*	1.54	1.17	1.37*	0.69*	1.15*	0.88	1.17
Southern Asia			1.70[C]*	2.27[C]*	1.26*	1.14*	1.33*	1.48*
All other countries	1.56	0.57	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
New Zealand	n.a.	n.a.	0.96	1.35*	0.66*	0.50*	n.a.	n.a.
South Pacific	n.a.	n.a.			2.22*	2.62*	2.25*	2.98*
Other Africa	n.a.	n.a.	1.15	1.02	1.00	0.77*	1.00	0.87
North-East Asia	n.a.	n.a.	0.93	1.32	0.56*	0.67*	0.81*	0.96
Americas	n.a.	n.a.	1.01	0.98	1.02	0.77*	0.73*	0.79

(a) From self-reported data. Ratios for prevalence data were calculated using the indirect method of standardisation, rather than the direct method used for hospitalisations and mortality. Therefore the prevalence ratios are based of observed cases to expected cases, whereas the hospitalisation and mortality ratios are of estimated rates.

(b) Does not include Central Asia.

(c) Includes Central Asia.

* Indicates significantly different from Australia.

Note: shaded areas represent combined regions of birth.

There are multiple explanations as to why the patterns in the data in Table 4 are not consistent across regions of birth. Usually, an increased prevalence of diabetes and associated complications would be expected to lead to more frequent hospitalisations and higher mortality rates (DHAC & AIHW 1999). Alternatively, Strong et al. (1998) suggest that high prevalence and low hospitalisation rates may reflect poor management of diabetes complications rather than less complications. Using this hypothesis, high prevalence and high hospitalisation rates may not correspond with high mortality rates.

People born in the United Kingdom and Ireland have the most similar prevalence of diabetes to Australian-born people compared with other regions of birth. This could be a combination of sharing similar cultures and genetic backgrounds. Karvonen et al. (1993) suggest that genetic backgrounds play a role in the risk of diabetes.

The 'healthy migrant effect' is a phenomenon of migrants arriving in Australia with good health (measured by life expectancy and disease burden), reinforced by enforced health stipulations and eligibility criteria (AIHW: Singh & de Looper 2002). However, the patterns of diabetes among overseas-born Australians shown in this bulletin portray a more complicated picture, as some groups appear to suffer disproportionably from diabetes compared to Australian-born people. This could be explained by biological and genetic risk factors, such as a maternal inheritance mechanism; differing behavioural risk factors including changing lifestyle after migration; environmental risk factors such as some groups having a relatively low socio-economic status (SES) within Australia; or combinations of these, for example diabetes risk factors such as obesity and physical inactivity, are associated with low SES and lifestyles of increased urbanisation (Riste et al. 2001).

The rate of self-reported diabetes prevalence is higher among overseas-born people who arrived in Australia before 1991 (5.4%) compared with those who migrated between 1991 and 2001 (2.1%) (ABS 2002b). As diabetes is more prevalent in older age groups, an older average age of people who migrated to Australia before 1991 compared to those after 1991 may explain some of the difference between the two rates. Another explanation may be the length of time spent in Australia—a longer duration in Australia could erode the initial healthy migrant effect. These could be areas for further analysis.

One possible explanation for the increased rates of diabetes amongst some minority ethnicities in developed countries is the 'thrifty genotype' hypothesis. The traditional hunter-gatherer role of American Pima Indians, Australian Aboriginals, and Pacific Islanders peoples is believed to be incorporated in their genes. The thrifty genotype definition reflects that the hunter-gatherer genes store fat and calories which are accumulated during times of plenty to prepare for leaner times. In a western culture, the same peaks and troughs of food availability do not apply, and a high fat and caloric diet is difficult to avoid (Zimmet et al. 2001). Therefore, the increase in these peoples' diabetes prevalence could be due to metabolic causes.

Conclusion

Australia is a multicultural nation with 28% of its population overseas-born (ABS 2002a). However, proportionally more overseas-born people than Australian-born report having diabetes; approximately 35% of people who reported having diabetes in 2001 were born overseas. In particular, diabetes incidence, hospitalisations and/or mortality are more common among people born in the South Pacific Islands, Southern Europe, Middle East, North Africa and Southern Asia.

The data presented here provide information for use by policy makers and to support other epidemiological research that attempts to determine why diabetes patterns differ amongst ethnicities and how migration between countries affects the combination of genetic, behavioural and environmental risk factors for diabetes.

Appendixes

Appendix A: Data sources and methods

Australian Bureau of Statistics National Health Surveys, 1995 and 2001

The 1995 and 2001 National Health Surveys (NHSs) were conducted by the Australian Bureau of Statistics (ABS). They were designed to obtain national information on the health status of Australians, their use of health services and facilities, and health-related aspects of their lifestyle. The 1995 survey collected information from a sample of 57,600 people (ABS 1996) and the 2001 survey collected information from approximately 26,900 respondents (ABS 2002b).

Australian Diabetes, Obesity and Lifestyle Study (AusDiab Study)

The AusDiab Study was conducted in 1999–2000, by the International Diabetes Institute and was partially funded by the Commonwealth Department of Health and Aged Care. It is the most comprehensive survey to date on the prevalence and impact of diabetes. The survey collected information on self-reported and measured diabetes and cardiovascular risk factors, health knowledge, attitudes, and health services utilisation and practices. The study collected information from 11,247 adults aged 25 years and over throughout Australia (excluding the Australian Capital Territory).

National Diabetes Register

The National Diabetes Register, held at the Australian Institute of Health and Welfare, is a database that holds information about people who use insulin as part of their treatment of diabetes. It includes people who began to use insulin from 1 January 1999. Data for the register are obtained from two main sources: the National Diabetes Services Scheme, administered by Diabetes Australia, and the Australasian Paediatric Endocrine Group (APEG) State-based registers. At December 2001, the register contained information on about 23,000 people.

National Mortality Database

The National Mortality Database, held at the Australian Institute of Health and Welfare, contains information on the cause of death supplied by the medical practitioner certifying the death or by a coroner. Registration of deaths is the responsibility of the state and territory Registrars of Births, Deaths and Marriages. Registrars provide the information to the Australian Bureau of Statistics for coding of cause of death using International Statistical Classification of Diseases and Related Health Problems (ICD) codes (WHO 1977) and compilation into aggregate statistics.

On 1 January 1997, the Australian Bureau of Statistics introduced automatic coding software, which identifies multiple causes of deaths within Australia.

National Hospital Morbidity Database

The National Hospital Morbidity Database contains demographic, diagnostic, procedural and duration of stay information on episodes of care for patients admitted to hospital. The data items are supplied by state and territory health authorities to the

Australian Institute of Health and Welfare for storage and custodianship. The database provides information on the number of hospitalisations for a particular condition or procedure and therefore it is not possible to count patients individually.

These data are coded to the ICD-10-AM First Edition for primary or additional diagnosis of diabetes. Insulin-dependent diabetes mellitus is represented by E10, non-insulin-dependent diabetes mellitus is E11, other specified diabetes mellitus is E13 and unspecified diabetes mellitus is E14 (NCCH 1998).

The hospital morbidity data in this report is for 1999–00 only. This is because a change in coding practice makes direct comparison with prior years problematic.

Hospital separations per unit of diabetes prevalence were calculated to remove the effect of prevalence from hospital separation rates. These were determined using the following formula:

$$Sp = S / P$$

Where: Hospital separations per unit of diabetes prevalence per 100, 000 population = Sp

Age-standardised diabetes prevalence per 100,000 population = P

Age-standardised hospital separation rate per 100,000 population = S

This rate (Sp) was expressed as a ratio to Australian-born people.

Estimated Resident Population by country of birth

The Australian Bureau of Statistics Estimated Resident Population (ERP) data by country of birth for 1997–2000 were used to calculate rates of deaths and hospital separations. At the time of publication, 2001 ERP data by country of birth were not available.

Age-standardised rates

Age-standardised rates are used to remove the influence of age when comparing populations with different age structures by applying age-specific rates to a standard population. This report uses the 2001 Australian population as the standard population and 5-year age groups for age-specific rates.

Direct age-standardisation

Direct age-standardisation is the most common method of age standardisation, and is used in this report for incidence, hospital morbidity and mortality data. The calculation of direct age-standardisation comprises three steps:

Step 1: Calculate the age-specific rate for each age group.

Step 2: Calculate the expected number of cases in each age group by multiplying the age-specific rate by the corresponding standard population for each age group, and divide by 100,000 (or 1,000 for hospital separations).

Step 3: Sum the expected number of cases in each age group and divide this sum by the total of the standard population and multiply by 100,000 (or 1,000 for hospital separations) to give the age-standardised rate.

Indirect age-standardisation

In situations where populations are small or where there is some uncertainty about the stability of age-specific prevalence rates, indirect standardisation has been used. This effectively removes the influence of the age structure, but does not provide a measure of prevalence in terms of a rate. Rather, the summary measure is a comparison of the number of observed cases compared to the number expected if the age-specific prevalence rates of the standard population are applied to the study population. The method used for this calculation is composed of three steps:

Step 1: Calculate the age-specific prevalence rates for each age group in the standard population.

Step 2: Apply these age-specific rates to the number in each age group of the study population and sum to derive the total expected number of cases for the study population.

Step 3: Sum the observed cases in the study population and divide this number by the expected number derived in Step 2 to calculate the Standardised Prevalence Ratio (SPR).

An SPR of 1 indicates the same number of observed cases as were expected (suggesting rates in the study and standard populations are similar). A result greater than 1 indicates more cases than expected. A result less than 1 indicates fewer cases than expected.

Confidence intervals (error bars)

Confidence intervals are an indication of the amount of variation associated with an estimate. The figures in this document show 95% confidence intervals as error bars on each column of the graph. These indicate that if the process that led to the estimated value were repeated many times, in 95% of cases the resulting new estimate would fall within that confidence interval.

Appendix B: Geographical regions

The Australian Standard Classification of Countries for Social Statistics (ASCCSS) (ABS 1990) and the Standard Australian Classification of Countries (SACC) (ABS 1998), were used to specify which countries would populate the geographic regions of study. More detail is available from the Australian Bureau of Statistics (ABS) <www.abs.gov.au>.

As the National Health Surveys are conducted by the ABS, they use the ASCCSS and SACC (1995 and 2001 respectively). The Australian Diabetes, Obesity and Lifestyle Study country of birth variable was collected in a text format, and manually mapped to the regions in ASCCSS. In 1999–2000, the National Hospital Morbidity Database used ASCCSS to code country of birth. The National Mortality Database also used the ASCCSS during the years of analysis. The National Diabetes Register incidence data used a combination of SACC and ASCCSS.

References

Abate N & Chandalia M 2003. The impact of ethnicity on Type 2 diabetes. Journal of diabetes and its complications 17:39–58.

ABS (Australian Bureau of Statistics) 1990. Australian Standard Classification of Countries for Social Statistics (ASCCSS). ABS Cat. No. 1269.0. Canberra: ABS.

ABS 1996. National health survey users' guide, Australia 1995. ABS Cat. No. 4363.0. Canberra: ABS.

ABS 1998. Standard Australian Classification of Countries (SACC). ABS Cat. No. 1269.0. Canberra: ABS.

ABS 2002a. Census of population and housing: selected social and housing characteristics, Australia. ABS Cat. No. 2015.0. Canberra: ABS.

ABS 2002b. National health survey—summary of results, Australia. ABS Cat. No. 4364.0. Canberra: ABS.

AIHW (Australian Institute of Health and Welfare) 1998. International health—how Australia compares. AIHW Cat. No. PHE 8. Canberra: AIHW.

AIHW 2001. Australian hospital statistics 1999–00. Health Services Series No. 17. AIHW Cat. No. HSE-14. Canberra: AIHW.

AIHW 2002. Diabetes: Australian facts 2002. AIHW Cat. No. CVD 20. Canberra: AIHW.

AIHW: Mathur S, Gajanayake I & Hodgson G 2000. Diabetes as a cause of death, Australia, 1997 and 1998. AIHW Cat. No. CVD 12. Diabetes Series no. 1. Canberra: AIHW.

AIHW: Singh M & de Looper M 2002. Australian health inequalities: 1 birthplace. AIHW Cat. No. AUS 27. Canberra: AIHW.

Beischer NA, Oats JN, Henry OA, Sheedy MT & Walstab JE 1991. Incidence and severity of gestational diabetes mellitus according to country of birth in women living in Australia. Diabetes. 40(2):35–8.

Children's Health Development Foundation: Smith A, Kellett E & Schmerlaib Y 1998. The Australian guide to healthy eating. South Australia: Commonwealth Department of Health and Family Services.

Colagiuri S, Colagiuri R & Ward J 1998. National diabetes strategy and implementation plan. Canberra: Diabetes Australia.

DHAC (Commonwealth Department of Health and Aged Care) & AIHW 1999. National health priority areas report: diabetes mellitus 1998. AIHW Cat. No. PHE 10. Canberra: DHAC & AIHW.

Drivsholm T, Ibsen H, Schroll M et al. 2001. Increasing prevalence of diabetes mellitus and impaired glucose tolerance among 60-year-old Danes. Diabetic Medicine. 18:126–32.

Dunstan D, Zimmet P, Welborn T, Sicree R, Armstrong T, Atkins R et al. 2001. Diabesity & associated disorders in Australia—2000: the accelerating epidemic. The Australian Diabetes, Obesity and Lifestyle Study. Melbourne: International Diabetes Institute.

A picture of diabetes in overseas-born Australians

Dunstan D, Zimmet P, Welborn T, de Courten M, Cameron A, Sicree R et al. 2002. The rising prevalence of diabetes and impaired glucose tolerance: the Australian diabetes, obesity and lifestyle study. Diabetes Care. 25(5):829–34.

Harris M, Flegal K, Cowie C, Eberhardt M, Goldstein D, Little R et al. 1998. Prevalence of diabetes, impaired fasting glucose, and impaired glucose tolerance in US adults. Diabetes Care. 21(4):518–24.

IDF (International Diabetes Federation) 2000. Diabetes atlas 2000. Belgium: IDF.

Karvonen M, Tuomilehto J, Libman I & LaPorte R 1993. A review of the recent epidemiolgical data on the worldwide incidence of Type 1 (insulin-dependent) diabetes mellitus. Diabetologia. 36:883–92.

King H & Rewers M 1993. Global estimates for prevalence of diabetes mellitus and impaired glucose tolerance in adults. Diabetes Care. 16(1):157–177.

NCCH (National Centre for Classification in Health) 1998. The international statistical classification of diseases and related health problems, 10th revision, Australian Modification (ICD-10-AM). First ed. Sydney: University of Sydney.

Pan X-R, Yang W-Y, Li G-W & Liu J 1997. Prevalence of diabetes and its risk factors in China, 1994. Diabetes Care. 20(11):1664–9.

Queensland Health 2002. Chronic diseases surveys: diabetes prevalence and management report. Brisbane: Queensland Health.

Ramachandran A, Snehalatha C, Latha E et al. 1997. Rising prevalence of NIDDM in an urban population in India. Diabetologia. 40:232–7.

Riste L, Khan F & Cruickshank K 2001. High prevalence of Type 2 diabetes in all ethnic groups, including Europeans, in a British inner city. Diabetes Care. 24(8):1377–83.

Simmons D 1995. Ethnic comparisons in diabetes and insulin levels. Asia Pacific Journal of Clinical Nutrition. 4:346–8.

Strong K, Trickett P & Bhatia K 1998. The health of overseas-born Australians, 1994–1996. Australian Health Review. 21(2):124–33.

von Hofe B, Thomas M & Colagiuri R 2002. A systematic review of issues impacting on health care for culturally diverse groups using diabetes as a model. Sydney: Australian Centre for Diabetes Strategies & Multicultural Health Unit.

Welborn T, Knuiman M, Bartholomew H & Whittall D 1995. 1989–90 National health survey: prevalence of self-reported diabetes in Australia. Medical Journal of Australia. 163:129–132.

WHO (World Health Organization) 1977. International classification of diseases: manual of the international statistical classification of diseases, injuries and causes of death. Volume 1. Geneva: WHO.

WHO (World Health Organization) 2002. Diet, nutrition and the prevention of chronic diseases: report of a joint WHO/FAO expert consultation. Report No. 916. Geneva: Joint WHO/FAO Expert Consultation on Diet, Nutrition and the Prevention of Chronic Diseases.

Zimmet P, Alberti K & Shaw J 2001. Global and societal implications of the diabetes epidemic. Nature. 414:782–7.

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