2000 CHRONIC DISEASES SURVEYS:

DIABETES PREVALENCE AND MANAGEMENT REPORT

DECEMBER 2002

Surveys conducted by:

Epidemiology Services Unit, Health Information Centre in conjunction with Public Health Services, Queensland Health

Report Prepared By:

Dr Gayle Pollard, Dr Magnolia Cardona and Ms Kirstine Sketcher-Baker

ISBN: 0-7345-2966-X

Suggested citation: Queensland Health, 2000 Chronic Diseases Surveys: Diabetes Prevalence and Management Report (December 2002)

Further copies of this publication are available from:
Manager,
Epidemiology Services Unit
Health Information Centre
Queensland Health
GPO Box 48
Brisbane QLD 4001
Ph: (07) 3234 1881

ACKNOWLEDGMENTS

Our thanks go first to the survey respondents for their willingness to participate and their time in answering the questions so that the findings could assist other people with diabetes. Our gratitude also goes to the three endocrinologists, Dr Michael D'Emden (Royal Brisbane Hospital), Dr Yong Mong Tan (Townsville General Hospital) and Dr John Prins (Princess Alexandra Hospital) for clinical advice in the design of clinical parameters for analysis. We acknowledge the input of Ellen Hawes into the early phase of the project and thank Dr Michael Coory, Kerry Brady, David Firman, Dr Terry Coyne and Adam Pike for commenting on earlier drafts of this report. Finally, the Queensland Health Central Library staff's valuable assistance in literature search and document supply is also appreciated.

TABLE OF CONTENTS

TABLES

FIGURES

SUMMARY OF FINDINGS

This study is the first in Queensland to yield baseline information, at a population level, on the self-reported help seeking and management behaviour of people with diabetes. Although the patterns of care reported are not totally within the recommended guidelines, the data provides a useful baseline for future comparisons.

A. GENERAL POPULATION SURVEY (DIABETES PREVALENCE)

- A total of 1625 individuals aged 18 years and over from throughout Queensland completed the diabetes prevalence interview. The interview was conducted using computer assisted telephone interviewing (CATI) technology
- Self-reported diabetes prevalence was 8.5% (including 5.3% told they have diabetes and 3.2% told they had high blood sugar or a touch of sugar) and has increased since the 1995 National Health Survey.
- If females who were likely to have only had gestational diabetes were removed from the equation, prevalence was 7.0% which is identical with that found in the Queensland phase of the 2001 AusDiab survey
- Diabetes was more prevalent among older, unemployed and lower income respondents.
- There were no differences in diabetes prevalence by gender or rural/urban distribution.
- Overall, the proportion of the general population who knew the definition of diabetes had improved by 19% between 1998 and 2000 (59% to 78%).
- However, a relatively low level of knowledge regarding complications (average of less than one long-term outcome known) indicates that some aspects of the message about the severity and nature of the disease have not been successfully communicated to the general community.
- Despite mass media and targeted sub-group campaigns, the level of population awareness of risk factors for diabetes also leaves much to be desired: more than half did not know any risk factors, and the average number of risk factors known was 1.57. This gap cannot be overlooked as many of the risk factors are lifestyle related and therefore avoidable.

B. DIABETES MANAGEMENT SURVEY

- A total of 1105 individuals aged 18 years and over from throughout Queensland were interviewed in the diabetes management survey. This survey also was conducted using CATI technology
- On average, each respondent exhibited 3.2 risk factors for diabetes complications (out of a total of 5: smoking, obesity, physical inactivity, high blood pressure, high cholesterol). These risk factors were more likely to be present among respondents aged 40 years and over, the unemployed, and residents of accessible areas.

- The number of complications respondents reported increased with increased presence of risk factors/behaviours and longer duration of disease. Specifically, heart problems, vision problems and peripheral neuropathy all became increasingly common with increased disease duration.

- Just under a quarter of respondents with diabetes (23%) had been admitted to hospital in the past year, and a third of them were aware/believed that their most recent hospitalisation was related to their diabetes.

- Eighty-six percent of respondents with Type II diabetes mentioned diet as a part of their current management of their condition. Other components of management included exercise (67%), hypoglycaemic agents (47%) and insulin (12%).

- Over 90% of respondents on insulin felt confident about their ability to inject themselves.

- Over half of respondents (57.7%) stated that they measured their blood glucose levels before a meal.

- Frequency of glucose measurements varied greatly, from more than once a day to less than once a week, raising concerns about the appropriateness of their actions for adequate disease control. Using standard definitions, only one third (33%) of respondents reported actions consistent with good blood glucose management.

- Overall, 15.9% of respondents with diabetes reported an 'acceptable' knowledge of their disease and its management. This level was higher among females, those in paid employment, those with higher level of education and people with longer duration of disease. The level of 'acceptable' knowledge decreased significantly as the number of risk factors/behaviours increased.

- People with diabetes were much more likely than the general population to have a higher level of knowledge of the disease, but they were also just as likely as members of the general public to name generalised and incorrect long-term outcomes of diabetes. In addition almost 30% of respondents with diabetes could not name any of the symptoms of low blood sugar or hypoglycaemia.

- The main health care provider was identified as the GP or family doctor by 84% of respondents, and the next most common was the private endocrinologist or specialist (8%).

- According to the recommendations of the *Diabetes Standard Pathway of Care 2000,* less than one quarter of the respondents who should have attended a particular type of health professional (dietitian, podiatrist, diabetes educator, endocrinologist) had visited them within the recommended time period.

- However, many respondents who had no apparent need to attend these health professionals had done so (14%-56% depending on health professional type).

- Reported frequency of visits to the GP was lower than the accepted standards while visits to the optometrist and ophthalmologist were higher than recommended.

1.0 INTRODUCTION

Diabetes, the most common endocrine disorder, is characterised by elevated levels of sugar in blood due to absence of insulin (type 1) or resistance to its action (type 2). The disease is characterised by metabolic abnormalities and by long-term complications involving the eyes, kidneys, nerves and blood vessels.
Isselbacher K.J. et al. (eds) Harrison's Principles of Internal Medicine, volume 2, 13th Edition, McGraw-Hill, 1994.

In type 1 diabetes, the immune system destroys the pancreatic cells, leading to an acute onset of disease in children and young people. In type 2 diabetes, obesity leads to insulin resistance in the peripheral tissues, so the disease usually has an insidious onset later in life.
Griffiths E, Williams K. Diabetes: a refresher on signs and complications. Community Nurse 1998;24-27

Over the past decade or so, there has been increased international focus on the health burden of diabetes, it increasing incidence and prevalence, and the associated costs to society. In Australia in 1996 it has been estimated that diabetes was responsible for 6.5% of all deaths, 5.2% of all years of life lost, and 4.6% of the years of life lost owing to disability[1].

Also in 1996, Australian Health Ministers agreed that diabetes be identified as the fifth National Health Priority Area. Following this, the *National Diabetes Strategy and Implementation Plan* (1998) identified population sub-groups requiring special attention in diabetes prevention and care services as follows: Indigenous Australians, people from culturally and linguistically diverse backgrounds, people living in rural and remote areas, children and adolescents, and older Australians.

Much of the burden of diabetes can be reduced through better diagnosis and management. Improvements in diabetes management have been identified in a range of settings, such as general practice, hospital emergency departments, outpatient diabetes clinics and antenatal care clinics. Considerable work is needed in order to better understand the ways in which people with diabetes self-manage their condition and how living with diabetes impacts upon their lives.

It is expected that the implementation of the *National Diabetes Strategy* will see joint efforts from government at all levels, the private sector, non-government and community organisations, and consumers and carers. Queensland Health currently contributes to diabetes control by promoting primary prevention messages, assisting in early identification, increasing the capacity of the health system to manage and monitor services, and improving data development and quality of information services.

Queensland Health has also developed the *Health Outcomes Plan for Diabetes 2000-2004*, which complements plans published or being developed in other National Health Priority Areas. This plan covers diabetes primary prevention, early detection, and management. In 2000, Queensland Health was instrumental in the multidisciplinary development of the *Standard Care Pathway for Management of Diabetes Mellitus in Adults*. Paper and electronic versions of the pathway were disseminated at various fora, and the message was communicated across the State to health care workers at relevant levels (General Practitioners, specialists, allied health workers).

In addition to providing an estimate of self-reported diabetes prevalence, this research examines how diabetes affects the lives of a sample of Queenslanders. It investigates their risk factors, how the disease impacts on their overall health, how they utilise the services of health professionals, how they manage their condition, whether they follow the recommended pathways of care, and their level of knowledge of the condition and its complications.

The findings will provide a rich data source for those seeking to understand how Queenslanders of various demographic characteristics understand their diabetes, experience and manage their disease, and will identify potential points of intervention for primary and secondary prevention.

2.0 METHODOLOGY

2.1 Introduction

Two telephone surveys, a General Population Survey and a Diabetes Management Survey, were conducted independently but concurrently between 31 March and 1 June 2000.

The General Population Survey included questions on a variety of health-related topics including diabetes. One of the aims of this survey was to determine the prevalence of diabetes among adults in Queensland.

The Diabetes Management Survey was aimed to collect data on a variety of topics relating to the management of diabetes among adults in Queensland who have diabetes.

2.2 Survey Samples

2.2.1 General Population Survey

From each selected private household (see Section 2.2), one resident individual was asked to participate in the survey. All household residents aged 18 years or more were eligible to participate. However, if there was more than one eligible individual in a selected household, the one who had most recently had a birthday was asked to participate. Owing to differences between male and female response rates, respondents were stratified by sex to ensure an equal male – female ratio.

2.2.2 Diabetes Management Survey

From each selected private household (see Section 2.2), one resident individual was asked to participate in the survey. In order to participate, the individual had to meet each of the following eligibility criteria:

- be aged 18 years or more; and
- have been told by a doctor, nurse or at a hospital that they have diabetes,

If there was more than one eligible individual in a household contacted, the one who had most recently had a birthday was asked to participate.

Individuals were excluded from selection in each of the surveys if they met any one of the following exclusion criteria:

- be less than 18 years of age;
- not speak English sufficiently well for an interview to be conducted;
- have a mental or physical disability that prevented them from being able to take part in a telephone interview;
- be absent from their household for the duration of the interview period; or
- be a visitor at, rather than a usual resident of, the contacted dwelling.

2.3 Survey Methodology

Interviews for both surveys were conducted using the Health Information Centre's computer-aided telephone interviewing (CATI) system. Trained telephone interviewers and a shift supervisor were employed to conduct the interviews. The surveys were pilot-tested to refine the wording of questions and familiarise the interviewers with the questionnaire content. To ensure consistency, interviewers were instructed to read the questions exactly as seen on the computer screen. The interviewing process was monitored by the shift supervisor to ensure high standards were maintained throughout the interviewing period.

For each survey a simple random sample of listed private telephone numbers was drawn from a copy of the current listing of the Queensland electronic white pages (a database of all listed private numbers). In the General Population Survey, this sample was supplemented by random samples drawn from all possible non-listed numbers in active telephone number ranges covering Brisbane, the Gold Coast, the Sunshine Coast, Toowoomba, Cairns and Townsville. These geographical regions were considered to warrant random sampling because information supplied by Telstra indicated that in them the proportion of 'silent' numbers was more than 15% of all private numbers. It is estimated that this sampling scheme excluded around 2% of Queensland households with 'silent' numbers. The scheme produced a sample of telephone numbers that included as a subset a good approximation to a simple random sample of households with a fixed telephone.

Supplementary random sampling was not undertaken for the Diabetes Management Survey. This was because it was calculated that the large number of unconnected numbers this method would add to the pool of numbers having to be rung may have increased costs to a point sufficient to render the survey non-viable.

A small, but unknown proportion of the target population was excluded from selection in each survey because their household did not have a fixed telephone. In 1999, around 4% of all Queensland households had no fixed telephone.

2.4 Survey Measures

Structured interviews were specifically designed for the surveys to assess the following aspects of diabetes prevalence, management, knowledge and risk factors among Queensland adults:

1. Self-reported diabetes prevalence
2. Prevalence of diabetes blood tests
3. Age at onset of diabetes
4. Current management for diabetes
5. Confidence at giving self insulin injections
6. Main health care provider in relation to diabetes
7. Prevalence of diabetes side effects
8. Frequency of visits to various health professionals for diabetes
9. Prevalence of measuring blood glucose levels
10. Knowledge of symptoms of hypoglycaemia
11. Current body mass index (BMI)
12. Physical activity

13. Smoking status
14. Knowledge of potential diabetes side effects
15. General population knowledge of diabetes risk factors
16. Demographic variables (including respondent: age, sex, marital status, employment status, language background, Indigenous status, education level, annual household income, place of residence and private health insurance status).

2.5 Statistical Analyses

In both surveys the proportion of missing values per question was negligible (<1%) and consequently few records were excluded from multivariate analyses because of missing data. The exception to this was the question regarding total household income. In the General Population Survey 12% of respondents (195 persons) and in the Diabetes Management Survey 14% of respondents (159 persons) either refused to answer or did not know their total household income and were consequently excluded from multivariate analyses involving this variable.

Bivariate tests of associations between categorical variables were conducted using chi-square analyses. Multivariate logistic regression was used to model dichotomous outcome variables, and odds ratios were calculated from the resulting parameter estimates. Results are presented as odds ratios together with 95% confidence intervals.

2.5.1 Data Weighting Procedure

To minimise any bias in the data resulting from an over or under representation of a particular age group or sex, the results from the General Population Survey were weighted, according to the age and sex distribution of the Queensland adult population. Population data was obtained from the medium series of the 2000 estimated resident populations, which were based on the 1996 Census conducted by the Australian Bureau of Statistics. All statistical analyses were conducted on weighted data.

2.5.2 Place of Residence Coding

From the information provided by respondents about their place of residence, it was determined in which statistical local area (SLA) they lived. Several classification systems were used to group SLAs in a meaningful fashion for analytical purposes.

The classification systems used were:

- RaRA: Rural /Remote Areas Classification[2] – a classification which allocates SLAs into one of seven groups: capital city, other major urban, rural major, rural other, remote major, remote other and other offshore areas. Allocation is broadly on the basis of population size and population density. For analysis purposes the seven classification groups were combined into two: capital city/other major urban and rural major/rural other/remote major/remote other/offshore areas.

- ARIA: Accessibility/Remoteness Index for Australia[3] - a classification of geographical areas according to their accessibility to health and other facilities. It is derived from the road distance of 11,338 populated localities to 201 service centres across Australia. For each locality distances are converted to a continuous measure from 0 (high accessibility) to 12 (high remoteness) and grouped into five categories: highly accessible, accessible, moderately accessible, remote and very remote; and
- SEIFA: Socio-Economic Index For Areas[4] - an index of the relative socio-economic disadvantage of geographical areas. Respondents are classified into SEIFA quintiles on the basis of their statistical local area (SLA) of usual residence.

2.5.3 Diabetes/High Blood Sugar

Anecdotal evidence suggests that some people believe that they have 'high blood sugar' or 'a touch of sugar' rather than diabetes.

To assess this, in both surveys respondents were asked firstly whether they had ever been told that they had diabetes. If they answered 'no' to this question they were then asked whether they had ever been told that they had 'high blood sugar or a touch of sugar'. For the purposes of this report, respondents were classified as having diabetes if they answered 'yes' to either of these questions.

Expert advice indicated that if 'high blood sugar/a touch of sugar' was excluded from the screening part of the questionnaire, diabetes prevalence would likely be underestimated. However, by including people with 'high blood sugar/a touch of sugar', it is likely that some respondents who have impaired glucose tolerance (IGT) have been included as people with diabetes. This is likely to have lead to an overestimate of overall prevalence rates[9 10].

Throughout this report respondents who answered 'yes' to either of the screening questions are included amongst those broadly classified as having diabetes. However, in certain sections where differences between the two groups have been found, this is highlighted.

3.0 RESULTS

3.1 General Population Survey (Diabetes Prevalence)

3.1.1 Participants

A total of 1625 individuals aged 18 years and over completed the diabetes prevalence interview. The overall contact rate was 85% and the response rate among eligible households was 80%.

Tables 3.1.1a and 3.1.1b present demographic characteristics of the respondents to the 2000 survey. Estimated Resident Population (ERP) figures were available from the ABS for 1998 for only six of the demographic variables (age, sex, the three geographic distribution variables and SEIFA scores) from the 2000 survey and these are included in Table 3.1.1a. In the absence of comparative census data for other variables, the comparative data from the 1998 Statewide Health Survey conducted by the Health Information Centre have been included in both tables.

Table 3.1.1a: Age, sex and geographic characteristics of respondents, General Population Survey (n=1625)

Characteristic	Subgroup	2000 Survey Sample n	2000 Survey Sample %	2000 ABS %	1998 SWHS* %
Sex	Male	814	50.1#	49.6	50.0#
	Female	811	49.9#	50.4	50.0#
Age	18-29 years	243	15.0	23.9	25.3
	30-39 years	322	19.8	20.2	21.2
	40-49 years	340	21.0	19.5	19.7
	50-59 years	313	19.3	15.6	13.7
	60-69 years	189	11.7	9.8	9.7
	70 years and over	216	13.3	10.9	9.4
Public health zone	Northern	270	16.6	16.1	14.8
	Central	667	41.1	38.4	39.9
	Southern	688	42.3	45.5	45.3
RaRA classification	Urban (1 & 2)	1063	65.4	70.4	66.6
	Rural and Remote (3,4,5,6)	562	34.6	29.6	33.4
ARIA classification	Highly accessible	1133	69.7	72.8	na
	Accessible	232	14.3	13.8	na
	Moderately accessible	211	13.0	7.5	na
	Remote/Very remote	49	3.0	5.9	na
SEIFA quintile (of respondent's place of residence)	Least disadvantaged (1)	301	18.5	20.9	na
	2	349	21.5	21.2	na
	3	357	22.0	17.2	na
	4	314	19.3	21.5	na
	Most disadvantaged (5)	304	18.7	19.2	na

* 1998 Statewide Health Survey, population weighted data
\# Sample stratified by sex hence 50:50 male:female ratio

Table 3.1.1b: Demographic characteristics of respondents, General Population Survey (n=1625)

Characteristic	Subgroup	2000 Survey Sample n	2000 Survey Sample %	1998 SWHS* %
Marital status	Married / De facto	1158	71.4	71.5
	Separated / Widowed / Divorced	245	15.1	11.4
	Single / Never married	220	13.5	17.0
Education level	Completed primary school or less	215	13.3	11.3
	Completed junior high school	418	25.8	22.9
	Completed senior high school	303	18.7	23.7
	Trade / Tech. certificate / Diploma	415	25.6	25.0
	University or college degree	270	16.7	16.8
First language	English	1517	93.5	na**
	Other	105	6.5	na
Indigenous status	Indigenous	24	1.5	1.6
	Non-indigenous	1598	98.3	98.2
Employment status	Employed full-time	720	44.3	44.4
	Employed part-time / Casual	261	16.1	17.2
	Home duties	172	10.6	12.0
	Unemployed	50	3.1	3.7
	Full-time student	32	2.0	2.8
	Part-time student	5	0.3	0.4
	Retired	343	21.1	16.5
	Permanently ill / Unable to work	40	2.5	2.9
Annual household Income	Less than $25,000 per year	438	27.0	na**
	$25,001 - $50,000 per year	463	28.5	na
	$50,001 - $100,000 per year	429	26.4	na
	Over $100,000 per year	100	6.2	na
	Don't know / Refused to answer	195	12.0	na
Private health Insurance status	Private hospital cover only	137	8.4	na
	Extras cover only	50	3.1	na
	Both hospital and extras cover	499	30.7	na
	Don't know level of cover	18	1.1	0.4
	No private health insurance	921	56.7	60.9

* 1998 Statewide Health Survey, population weighted data
** Not available

Benchmark demographic data were available from two sources: (i) age and sex specific estimated resident population totals published by the ABS for 1998; and (ii) the demographic profile of the 1998 Statewide Health Survey conducted by the Health Information Centre using an identical population-proportional sampling design. The Statewide Health Survey had a large sample size (5594) and the percentages listed in Tables 3.1.1a and 3.1.1b are weighted for age and household size.

There was generally close agreement between respondents in the 1998 and 2000 telephone surveys for most demographic variables except age group. While household income information was collected in the 1998 survey, very different income categories were used, making comparisons between surveys problematic.

A comparison of the age-specific proportions of respondents in the 2000 survey revealed an under-representation of persons aged 18-29 years and corresponding over representation of persons aged over 50, compared to ERP data. There was a similar but less pronounced bias in the 1998 data before weighting. An under-representation of persons educated to senior high school level and an over-representation of respondents with less education was consistent with the age bias in the 2000 sample.

The observed under-representation of persons aged 18-29 years may be owing to a higher refusal rate in this age group than for older groups, but another more significant contributor to the difference may be a lower contact rate. Specifically, it is likely that persons less than 30 years of age spend more time away from their house and consequently are relatively harder to contact by telephone than older persons. Furthermore, the proportion of households with no fixed telephone and where household members all exclusively use mobile telephones is growing rapidly from a small base within Queensland and Australia. It is likely that persons living in such households are predominantly aged under 30 years.

3.1.2 Diabetes Prevalence

5.3% of survey respondents stated that at some time in their life they had been told either by a doctor, nurse or at a hospital that they have diabetes. An additional 3.2% who had not been told they had diabetes, stated that they had been told that they have high blood sugar or a touch of sugar.

Therefore, 8.5% of the population had ever been told that they either have diabetes or high blood sugar (95% C.I.: 7.1 - 9.9%).

It is widely considered that if a respondent says he/she has been told they have diabetes but has not had a blood test for diabetes, they are unlikely to actually have the condition. If those respondents who had not had a blood test are excluded from calculations, then the population prevalence figure for diabetes/high blood sugar is 7.9% (95% C.I: 6.6 - 9.2%).

Further, if females who are likely to have only had gestational diabetes are removed from the equation, prevalence is 7.0%. This figure is identical with that found in the Queensland phase of the 2001 AusDiab survey[7] in which respondents' blood was tested. The 1995 National Health Survey[6], however, found a much lower prevalence of self-reported diabetes (2.4%). This finding is consistent with an increased trend in diabetes incidence in Australia over the past decade or so[11, 12, 13] and with the practice of enhanced screening for early detection.

Younger respondents (88.9%) were significantly more likely than those who were older (21.4%) to have been told that they had high blood sugar/a touch of sugar rather than that they had diabetes (χ^2=17.07, df=4, p=0.0047). There were no rural-urban or sex differences in the likelihood of respondents being told they had either diabetes or high blood sugar (χ^2=0.43, df=1, p=0.512).

3.1.2.1 Variations across demographic groups

Diabetes was significantly more prevalent among older respondents than those who were younger (χ^2=29.93, df=5, p=<0.0001) (Table 3.1.2.1). Following from this result, diabetes was also more prevalent in those demographic sub-groups, which contained a high proportion of older respondents. Specifically, diabetes was significantly more prevalent among those who were not employed (χ^2=9.85, df=1, p=0.0017) and those with an annual household income of less than $25,000 ($\chi^2$=9.4, df=1, p=0.0022).

Diabetes prevalence did not vary significantly with respondent sex, private health insurance status or the SEIFA quintile. The apparent contradiction of lack of correlation between diabetes and SEIFA, may be explained by the fact that the SEIFA index is an average of the socio-economic status of a geographic area, whereas income and employment status mentioned above as highly correlated with diabetes are measures of individual socio-economic status.

Table 3.1.2.1: Diabetes prevalence by demographic variables (n=128)

Demographic Variable	Subgroup	Respondents with diabetes (n=128)	
		n	%
Sex	Male	55	6.8
	Female	73*	8.9*
Age	18-29 years	12	3.2 ⇓
	30-39 years	26	8.0 ⇑
	40-49 years	18	5.6 ⇓
	50-59 years	29	11.6 ⇑
	60-69 years	23	14.4 ⇑
	70+ years	18	10.5 ⇑
Employment status	Employed	64	6.3 ⇓
	Not employed	64	10.7 ⇑
Household ncome	Less than $25,000 per year	46	11.5 ⇑
	$25,001 per year and over	67	6.6 ⇓
Public health zone	Northern	23	8.2
	Central	57	8.6
	Southern	49	7.1
RaRA classification	Capital city/other major urban (1&2)	83	7.7
	All rural and remote (3-6)	45	8.2
SEIFA quintile (of place of Residence)	Least disadvantaged (1)	19	6.0
	2	27	7.7
	3	36	9.9
	4	20	6.5
	Most disadvantaged (5)	27	9.2

⇑ ⇓ Statistically significantly higher or lower (χ^2 test, $p < 0.05$) than other comparison group(s)
* Includes respondents who have only had gestational diabetes
Note: Household income does not include respondents who did not state their income

The numerically higher prevalence of diabetes in females will, at least in part, be due to the inclusion of women who have only had gestational diabetes in the sample. If an adjustment is made (on the basis of data collected in the Diabetes Management Survey) to remove the proportion of females likely to have only had gestational diabetes then the prevalence for females becomes 7.3% (c.f. males: 6.8%).

The lack of significant variation in prevalence between the sexes is consistent with results from the Queensland phase of the recent AusDiab survey[7] (males: 7.0%; females 6.9%). The 1995 National Health Survey[6] results, however, indicated that reported prevalence was higher in females (6.5%) than in males (4.5%), although these data may include females who have only had gestational diabetes.

In contrast, mortality and hospital separation rates in Queensland show that more males than females occupy beds and die of the disease[8]. This pattern may reflect women's tendency to take better care of themselves, thus developing fewer complications and leading to reduced hospitalisation and lower subsequent death rates despite equal or higher prevalence rates.

3.1.2.2 Variations across geographical areas

Variation in diabetes prevalence was investigated across Public Health Zone, RaRA (Rural and Remote Areas) Classification (capital city/other major urban vs other categories) (Table 3.1.2.1) and ARIA (Accessibility/Remoteness Index of Australia). No significant differences in prevalence were detected across any of these areas/scales.

3.1.3 Knowledge of Diabetes

Respondents were asked whether they could describe what diabetes is. Over three quarters (78.2%) of respondents were able to describe at least one of the basic features of diabetes, such as: raised blood sugar/glucose levels or poor control of blood sugar or need insulin or malfunctioning pancreas.

These respondents were then asked two questions to probe their level of knowledge of diabetes. The 21.8% of respondents who had no apparent knowledge of diabetes were not asked these questions and were deemed to not have any detailed knowledge of the condition.

3.1.3.1 Knowledge of possible long term outcomes

In general, respondents did not display a good understanding of the possible long-term outcomes of diabetes (Table 3.1.3.1). Blindness (31%) and amputations/gangrene/poor circulation (30%) were the only two correct possible outcomes named by more than one in four respondents. Many respondents gave very general answers and it is possible that these individuals did not truly understand the outcomes of diabetes. A large number of respondents also gave incorrect outcomes, including things such as anxiety, mood change or thirst.

Table 3.1.3.1: Respondents' knowledge of the possible long-term outcomes of diabetes# (n=1625)

Possible Long-Term Outcome	Number of Respondents n	% of All Respondents * (n=1625)#
Correct Possible Outcomes		
Blindness	502	30.9
Amputations/Gangrene/Poor circulation	481	29.6
Coma	197	12.1
Heart problems	180	11.1
Kidney failure	170	10.5
Generalised Outcomes		
Premature death	672	41.4
Severe health problems (unspecified)	362	22.3
Incorrect Outcomes	416	25.6
Don't know	80	4.9
Unable to describe any aspect of diabetes**	355	21.8

* Multiple responses permitted

\# Only respondents who could demonstrate a basic knowledge of diabetes were asked this question, those who were not asked were deemed to not be aware of the long-term outcomes.

** These respondents were not asked the knowledge questions.

Just over half (53%) of all respondents named at least one correct outcome. The average number of correct long-term outcomes named by respondents was just 0.9.

Just over half of all respondents (52%) named a generalised outcome, however, 64% of these also named at least one correct outcome.

One quarter (26%) of all respondents named an incorrect outcome, however, 75% of these also named at least one correct outcome.

This relatively low level of knowledge regarding complications indicates that the message about the severity and nature of the disease has not been successfully communicated to the general community.

3.1.3.2 Knowledge of risk factors

Respondents did not display a good understanding of diabetes risk factors or behaviours (Table 3.1.3.2). The average number of risk factors named by respondents was only 1.57. No risk factor was known to at least half of the respondents.

'Family history' was the most commonly named risk factor (32%), however, the second most common response, 'high sugar diet' (30%), is not a recognised diabetes risk factor.

Table 3.1.3.2: Respondents' knowledge of diabetes risk factors and risk behaviours (n=1625)

Risk factor/behaviour named***	Number of Respondents n	% of All Respondents * (n=1625)#
Family history	519	31.9
High sugar diet	483	29.7
Overweight / obesity	395	24.3
High fat diet	311	19.1
Not exercising	197	12.1
Age	170	10.5
Poor diet in general (fat/sugar not specified)	162	10.0
Too much alcohol	115	7.1
Stress	52	3.2
Smoking	51	3.1
High cholesterol	29	1.8
Pregnancy	28	1.7
High blood pressure	18	1.1
Lifestyle in general	15	0.9
Other	99	6.1
Don't know	212	13.0
Unable to describe any aspect of diabetes**	355	21.8

* Multiple responses permitted
\# Only respondents who could demonstrate a basic knowledge of diabetes were asked this question, those who were not asked were assumed to not be aware of the long-term outcomes.
** These respondents were not asked the knowledge questions.
*** Not all are true diabetes risk factors

Despite mass media and targeted sub-group campaigns, the level of population awareness on risk factors for diabetes also leaves much to be desired. This gap cannot be overlooked as many of the risk factors are lifestyle related and therefore avoidable.

3.1.3.3 Comparison with data from 1998 survey

In 1998 the Health Information Centre conducted a large Statewide Health Survey using the same methodology as the 2000 General Population Survey. The same diabetes knowledge questions were asked of respondents in both of these surveys.

Between 1998 and 2000 general knowledge of diabetes appears to have improved in the general population. In 1998 41% of respondents were unable to name any aspect of diabetes, while in 2000 this figure had dropped to 22% (Table 3.1.3.3a).

Awareness of the possible long-term outcomes of diabetes had also improved, specifically awareness of amputations and blindness had almost doubled (Table 3.1.3.3a). However, significantly more respondents in 2000 named generalised outcomes of diabetes. Similar proportions of respondents named incorrect outcomes in both surveys.

Table 3.1.3.3a Respondents' knowledge of the possible long-term outcomes of diabetes#, 1998 Statewide Health Survey and 2000 General Population Survey.

Possible Long-Term Outcome	1998 Survey % of All Respondents * (n=5594)#	2000 Survey % of All Respondents * (n=1625)#
Correct Possible Outcomes		
Amputations	18.5	29.6
Blindness	16.4	30.9
Coma	14.3	12.1
Heart problems	6.6	11.1
Kidney failure	5.5	10.5
Generalised Outcomes		
Premature death	29.8	41.4
Severe health problems (unspecified)	12.0	22.3
Incorrect Outcomes	15.7	25.6
Don't know	4.5	4.9
Unable to describe any aspect of diabetes**	40.6	21.8

* Multiple responses permitted

\# Only respondents who could demonstrate a basic knowledge of diabetes were asked this question, those who were not asked were deemed to not be aware of the long-term outcomes.

** These respondents were not asked the knowledge questions.

While the overall knowledge of diabetes in the general population appears to have increased, if only those respondents who were able to describe at least some aspect of the disease are considered the increases in overall knowledge are more moderate.

Between 1998 and 2000 knowledge of diabetes risk factors and behaviours also appears to have improved significantly in the general population (Table 3.1.3.3b). However, while correct risk factors were named much more frequently in 2000, the incorrect risk factor 'high sugar diet' also was named significantly more frequently.

Table 3.1.3.3b: Respondents' knowledge of diabetes risk factors and risk behaviours[#], 1998 Statewide Health Survey and 2000 General Population Survey

Risk factor/behaviour named[*]	1998 Survey % of All Respondents ** (n=5594)[#]	2000 Survey % of All Respondents ** (n=1625)[#]
Recognised Risk Factors		
Family history	24.7	31.9
Overweight / obesity	12.6	24.3
High fat diet	8.6	19.1
Not exercising	5.8	12.1
Age	5.8	10.5
Too much alcohol	4.7	7.1
Smoking	2.1	3.1
Pregnancy	1.1	1.7
Not Recognised Risk factors		
High sugar diet	18.8	29.7
Stress	14.3	3.2
Poor diet in general (fat/sugar not spec'd)	1.5	10.0
Other	5.1	7.0
Don't know	14.3	13.0
Unable to describe any aspect of diabetes**	40.6	21.8

Only respondents who could demonstrate a basic knowledge of diabetes were asked this question, those who were not asked were assumed to not be aware of the long-term outcomes.
* Not all are true diabetes risk factors
** Multiple responses permitted
*** These respondents were not asked the knowledge questions.

3.2 Diabetes Management Survey

3.2.1 Participants

A total of 1105 individuals aged 18 years and over were interviewed in the diabetes management survey. These respondents all stated that they had been told by a doctor, nurse or at a hospital that they have diabetes. The overall contact rate was 91% and the response rate among eligible households was 96.8%.

Of the 1105 respondents, 115 were identified as having only had past gestational diabetes. As gestational diabetes was not the focus of this survey, these individuals were not asked any of the questions relating to current management of the condition.

The demographic characteristics of respondents to this survey are presented in Table 3.2.1.

Table 3.2.1: Demographic and geographic characteristics of respondents, Diabetes Management Survey (n=1105)

Characteristic	Subgroup	Survey Sample n	Survey Sample %
Sex	Male	513	46.4
	Female	592	53.6
Age	18-29 years	43	3.9
	30-39 years	112	10.1
	40-49 years	167	15.1
	50-59 years	256	23.2
	60-69 years	251	22.7
	70 years and over	275	24.9
Marital status	Married / De facto	794	71.9
	Separated / Widowed / Divorced	231	20.9
	Single / Never married	80	7.2
Education level	Completed primary school or less	266	24.1
	Completed junior high school	316	28.6
	Completed senior high school	158	14.3
	Trade, technical certificate or diploma	249	22.5
	University or college degree	116	10.5
First language	English	1016	91.9
	Other	86	7.8
Indigenous status	Indigenous	25	2.3
	Non-Indigenous	1080	97.7
Employment status	Employed full-time	259	25.5
	Employed part-time / Casual	107	10.5
	Home duties	122	12.0
	Unemployed	20	2.0
	Full-time student	5	0.5
	Part-time student	1	0.1
	Retired	426	41.8
	Permanently ill / Unable to work	78	7.7
Household income	Less than $25,000 per year	474	42.9
	$25,001 - $50,000 per year	254	23.0
	$50,001 - $100,000 per year	172	15.6
	Over $100,000 per year	47	4.3
	Don't know / Refused to answer	158	14.3

Table 3.2.1 (cont'd)

Characteristic	Subgroup	Survey Sample n	Survey Sample %
Private health Insurance status	Private hospital cover only	119	10.8
	Extras cover only	24	2.2
	Both hospital and extras cover	324	29.3
	Don't know level of cover	3	0.3
	No private health insurance	635	57.5
Public health zone	Northern	189	17.1
	Central	456	41.2
	Southern	460	41.7
RaRA classification	Urban (1 & 2)	732	66.2
	Rural and remote (3-6)	373	33.8
ARIA classification	Highly accessible	763	69.1
	Accessible	171	15.5
	Moderately accessible	133	12.0
	Remote/Very remote	38	3.4
SEIFA quintile (of respondent's place of residence)	Least disadvantaged (1)	170	15.4
	2	212	19.2
	3	244	22.1
	4	245	22.2
	Most disadvantaged (5)	234	21.2

No comparable population information is available on the characteristics of Queensland adults with diabetes and so Queensland benchmark figures were not available for demographic variables.

3.2.2 Definitions of Diabetes Type

Respondents were not asked directly what type of diabetes they had as it was considered that data about type collected in this manner would be very unreliable. However, from the other questions asked it was possible to infer the type of diabetes, which the respondent had.

For the purposes of this report, the following definitions of diabetes types have been used. These definitions were developed on the basis of expert advice received from three endocrinologists working in the diabetes field, one from each of the three Queensland Health Zones.

1. Person with diabetes of identifiable type

Definition:

Respondent ever told by a doctor, nurse or at a hospital that they have diabetes OR high blood sugar/a touch of sugar AND has had a blood test for diabetes AND did not only have diabetes during pregnancy.

NB: This definition may capture people with IGT and/or IFG resulting in an overestimate of Type I and Type II prevalence.

2. Type I Diabetes

Definition:

Respondent currently on insulin AND started on insulin immediately upon diagnosis AND under 20 years of age at diagnosis

OR

Respondent currently on insulin AND started on insulin within one month of diagnosis AND was under 20 years of age at diagnosis*

OR

Respondent currently on insulin AND does not know how long after diagnosis they started on insulin AND was under 20 years of age at diagnosis**.

* No respondents qualified for this part of the definition

** One respondent qualified for this part of the definition

3. Type II Diabetes

Definition:

Respondent qualified as a person with diabetes using the definition above and is not otherwise defined as having Type I diabetes or gestational diabetes.

4. Gestational Diabetes (GDM)

Definition:

Respondent female AND stated that she was first told that she had diabetes during a pregnancy AND stated that she only had diabetes during pregnancy when asked "How old were you when you were first told that you had diabetes/high blood sugar, other than the diabetes/high blood sugar you had while you were pregnant?"

5. Relevant Population

- The population to which these definitions will be applied *excludes* those respondents who identified themselves as being of Aboriginal or Torres Strait Islander origin.
- This is because the age ranges in the above definitions would be inappropriate for the Aboriginal and Torres Strait Islander population.
- Only 25 respondents to the Diabetes Management Survey identified as being of Aboriginal or Torres Strait Islander origin and three of these only had diabetes during pregnancy.

Table 3.2.2: Respondents by type of diabetes (n=1080*)

Diabetes Type	Number of Respondents*	% of Respondents (n = 1080)*
Type I	31	2.9
Type II	894	82.8
GDM only	112	10.4
Non-GDM but never had blood test	43	4.0

* Excludes 25 Aboriginal/Torres Strait Islander respondents to whom definitions did not apply. Three of these had GDM only

The number of respondents with non-Type II diabetes was too small for further statistical analysis to be undertaken .

3.2.3 Risk Factors Associated with Diabetes Complications

Respondents were asked whether they exhibited a number of different risk factors and behaviours for complications associated with diabetes (Table 3.2.3a). Several of the risk factors were exhibited by more than half of all respondents and one (being aged 40 years or older) was common to over 90% of respondents.

Table 3.2.3a: Risk factors associated with diabetes complications exhibited by respondents (n=990*)

Risk Factor / Behaviour	Number of Respondents	% of Respondents (n = 990)
Aged 40 years or more	903	91.2
Overweight / Obese	677	68.4
Ever had high blood pressure	545	55.1
Active for 30mins or less on <10 days in last 2 wks	520	52.5
Ever had high cholesterol	395	39.9
Current smoker	133	13.4

* GDM-only individuals excluded

Three of the risk factors had the potential to be modified by the respondent (smoking, body mass index (BMI) and exercise), while others were not modifiable (age, ever had high blood pressure and ever had high cholesterol).

The following respondents were significantly more likely to exhibit three or more risk factors or behaviours (excluding age group) than were other respondents (Table 3.2.3b):

- those aged 50-64 years
- those not in employment
- those whose first language was English
- those whose geographical socio-economic status was 'most disadvantaged'
- those who lived in areas most accessible to services.

When demographic variables significant at the univariate level were considered in a multivariate model, the strongest predictors of the presence of three or more risk factors were age group ($p<0.0001$) and employment ($p=0.0031$). The other significant predictors were ARIA classification ($p=0.0265$) and first language ($p=0.0458$) which was marginally significant. SEIFA did not remain a significant predictor.

Table 3.2.3b: Percentage of respondents with three or more risk factors/behaviours by demographic characteristics (n=435)

Demographic Variable	Subgroup	Respondents with Three or More Risk Factors/Behaviours	
		n	%
Age group	18-49 years	84	38.2 ⇓
	50-59 years	125	50.6 ⇑
	60-69 years	125	50.6 ⇑
	70 years and over	101	36.7 ⇓
Employment status	Employed	138	39.5 ⇓
	Not employed	298	46.9 ⇑
First Language	English	411	45.2 ⇑
	Non-English	25	32.5 ⇓
SEIFA	Least disadvantaged	55	35.0 ⇓
	2	73	39.9 ⇓
	3	107	49.1 ⇑
	4	101	44.9 ⇑
	Most disadvantaged	100	48.3 ⇑
ARIA classification	Highly accessible	289	42.0 ⇓
	Accessible	83	54.3 ⇑
	Moderately accessible	52	44.8 ⇑
	Remote/Very remote	12	36.4 ⇓

⇑ ⇓ Statistically significantly higher or lower (χ^2 test, $p < 0.05$) than other comparison group(s)
Note: Household income does not include respondents who did not state their income

Variation in number of risk factors/behaviours did not vary significantly with sex of respondent, Public Health Zone, RaRA classification, RRMA classification or number of years since original diabetes diagnosis

3.2.4 Complications of Diabetes

Respondents were asked whether they had ever had any of a variety of possible complications of diabetes. The most commonly reported conditions were high blood pressure and frequent tingling, burning, pain or numbness in the legs or feet (Table 3.2.4a). The average number of complications reported per respondent was 1.3.

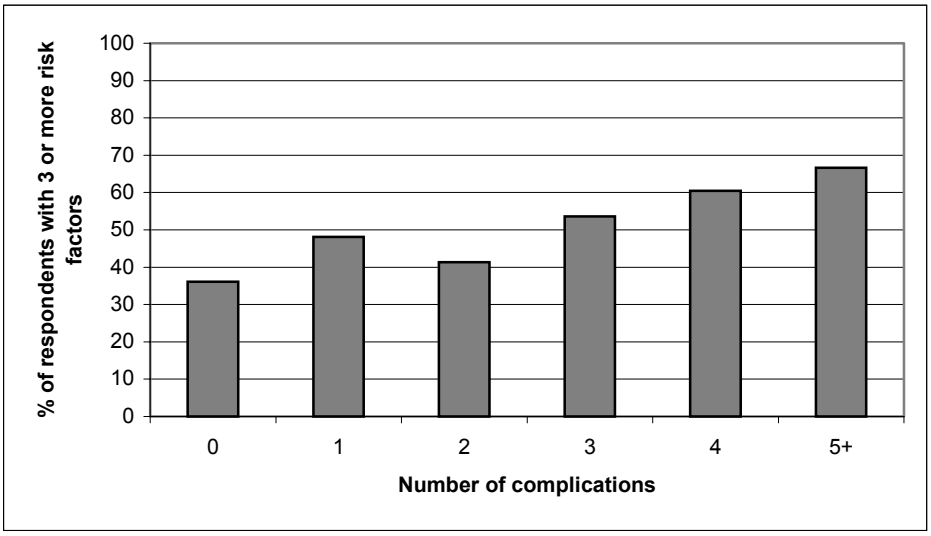
Table 3.2.4a: Respondent reports of possible diabetes complications (n=990*)

Condition	% of respondents with condition (n = 990*)	
	In last year	More than 1 year ago
Frequent tingling, burning, pain or numbness in legs or feet	33.1	6.6
Diabetes-related vision problems	15.8	13.2
Heart attack/angina/stroke/heart failure	8.1	14.0
Eye disease or operation	5.9	15.4
Kidney failure/disease**	3.2	6.1
Foot ulcer	1.6	4.0
Limb amputation	0.8	0.6

* GDM-only individuals excluded
** Respondents may have included kidney/bladder infections in their answers

The longer that respondents had diabetes, the more likely they were to have more complications (χ^2=54.71, df=12, p=<0.0001). The more risk factors/behaviours that respondents exhibited, the more likely they were to have higher numbers of complications (χ^2=133.77, df=6, p=<0.0001) (Figure 3.2.4).

Figure 3.2.4: Percentage of respondents with three or more risk factors by number of diabetes complications



The incidence of eye disease and kidney failure or disease did not vary significantly with the number of years the respondent had diabetes (χ^2 test, $p > 0.05$) (Table 3.2.4b). However, heart problems, vision problems and tingling feet & legs all became increasingly common the longer respondents had had diabetes.

Table 3.2.4b: Respondents with diabetes complications by duration of diabetes

Condition	Duration of Diabetes	Respondents with condition n	%
Limb amputation*	0 – 2 yrs	3	1.0
	3 – 9 yrs	3	0.8
	10 yrs or more	8	2.6
Foot ulcer*	0 – 2 yrs	11	3.7
	3 – 9 yrs	9	2.5
	10 yrs or more	36	11.7
Kidney failure/disease	0 – 2 yrs	25	8.5
	3 – 9 yrs	28	7.7
	10 yrs or more	38	12.3
Heart attack/angina/ heart failure/stroke	0 – 2 yrs	55	18.7 ⇓
	3 – 9 yrs	76	20.8 ⇓
	10 yrs or more	85	27.6 ⇑
Diabetes-related vision problems	0 – 2 yrs	67	22.8 ⇓
	3 – 9 yrs	91	24.9 ⇓
	10 yrs or more	121	39.3 ⇑
Frequent tingling, burning, pain or numbness in legs or feet	0 – 2 yrs	110	37.4 ⇓
	3 – 9 yrs	132	36.2 ⇓
	10 yrs or more	141	45.8 ⇑
Eye disease or operation	0 – 2 yrs	54	18.4
	3 – 9 yrs	70	19.2
	10 yrs or more	74	24.0

⇑ ⇓ Statistically significantly higher or lower (χ^2 test, $p < 0.05$) than other comparison group(s)
* Numbers too small for statistical analysis

Univariate analyses indicated that a number of demographic variables were significantly associated with the number of complications reported. Older respondents were likely to have more complications, as were those with a Junior or Trade level education, those who were not in employment and those on lower incomes.

Number of complications did not vary significantly with public health zone, RaRA, ARIA, SEIFA, first language or sex of respondent. The fact that sex was not a significant predictor of number of complications is interesting given that it is men who spend more time in hospital and more frequently die as a result of diabetes complications.

When only variables significant at the univariate level were considered in a multivariate model, the two most strongly associated with the presence of three or more complications were employment status and duration of diabetes. Those not in employment were more than twice as likely as other respondents to have three or more complications. It is highly likely that disease severity impacted upon current employment status rather than employment status affecting severity of disease. The other significant predictors in the multivariate model were respondent age over 40 years, English being the first language spoken, and single marital status (Table 3.2.4c).

Table 3.2.4c: Predictors of respondent having three or more diabetes complications

Predictor	Odds Ratio	95% C.I.	
Employment status (base: in paid employment full time or part time) Not in paid employment	2.60#	1.62	4.14
Duration of diabetes (base: 10+ years) 0 – 2 years 3 – 9 years	 0.38# 0.73#	 0.23 0.42	 0.61 1.26
Respondent age(base: aged 40+ years) aged less than 40 years	0.38*	0.14	1.03
First language (base: non-English) English	2.75*	1.07	7.05
Marital Status (base: Single/ Never married) Married/Defacto Separated/Divorced/Widowed	 0.60* 1.01*	 0.29 0.47	 1.22 2.15

Odds ratios significant, $p < 0.001$.
* Odds ratios significant, $0.001 < p < 0.05$

3.2.4.1 Hospitalisations

Twenty-three percent of diabetic respondents had been admitted to hospital, for at least one night, in the previous 12 months. Of these, 31% or 71 individuals stated that their most recent hospitalisation was related to their diabetes. There is no certainty that individuals would always be aware of whether their hospitalisation was related to their diabetes therefore this figure may be an underestimate. Because respondents could have been admitted to hospital multiple times over the previous 12 month period, the total proportion of respondents who had been admitted to hospital for diabetes-related causes over the previous 12 months could not be calculated.

No significant association was found between the number of risk factors exhibited by respondents and their likelihood of having been hospitalised (χ^2=4.96, df=6, p=0.549). However the more complications a respondent had, the more likely they were to have been hospitalised. Further details on predictors of hospital admissions, based on data from a separate survey of in-patients with diabetes will be presented in a separate report.

3.2.5 Current Management

The two most common managements approaches which respondents stated they had for their diabetes were watching their diet (86%), and exercise (67%) (Table 3.2.5).

Of those respondents with Type II diabetes, 37.9% reported that their only current management was watching their diet and/or exercising.

Of the 14.5% of all respondents (Types I and II and non-GDM no blood test) who reported having insulin injections, the vast majority (94.4%) stated that they were very confident in giving themselves the injections. A further 3.5% said they were moderately confident while just 2.1% were not very or not at all confident.

Table 3.2.5: Type II DM respondents' current management for diabetes (n=894*)

Management	Number of Respondents ** n	% of Respondents ** (n=894*)
Watching diet as recommended by doctor or dietitian	769	86.0
Exercise recommended by doctor	599	67.0
Tablets or capsules	422	47.2
Insulin injections	109	12.2
Other management	29	3.2
No management	39	4.4
Don't know	3	0.3

* Type I DM and GDM-only individuals excluded
** Multiple responses permitted

3.2.6 Self Measurement of Blood Glucose Levels

Over half of respondents (57.7%) stated that they do, at least sometimes, measure their blood glucose levels before a meal.

The frequency at which these respondents took glucose measurements varied greatly, from more than once a day to less than once a week (Table 3.2.6a).

Table 3.2.6a: Frequency at which blood glucose measurements are taken (n=571)

Frequency	Number of Respondents n	% of Respondents (n=571)
More than once a day	243	42.6
Once a day	151	26.4
3-4 times a week	30	5.3
Twice a week	13	2.3
Once a week	62	10.9
Less than once a week	52	9.1
Some other frequency	210	3.5

The majority of respondents who took blood glucose measurements had high readings (over 10 milli-moles per litre) only occasionally or rarely. However, almost one in five had high readings often or very often (Table 3.2.6b)

Table 3.2.6b: Frequency at which high (10 milli-moles/L) blood glucose measurements are obtained (n=571)

Frequency	Number of Respondents n	% of Respondents (n=571)
Very often	35	6.1
Often	73	12.8
Occasionally	199	34.9
Rarely	156	27.3
Never	103	18.0
Don't know	5	0.9

It was desirable to create a measure of whether respondents had good management in both measuring and keeping blood glucose levels 10 milli-moles or less. Therefore, for the purposes of this survey, respondents were defined as having good blood glucose management if:

- they always measured their blood glucose before a meal AND
- they measured their blood glucose at least 3-4 times a week AND
- they only occasionally, rarely or never had high blood glucose readings (over 10 milli-moles/L).

Respondents were defined as having poor blood glucose management if they failed to meet the above criteria for good management.

Using these definitions 33% of respondents reported good blood glucose management and 67% of respondents reported poor management.

Respondents in current employment were significantly less likely than others to have good blood glucose management (Table 3.2.6c). The prevalence of good management also varied significantly with age group although not with sex, marital status, education level, SEIFA quintile, income or private health insurance status.

Although no significant differences in good management were detected across RaRA classification, those respondents residing in the Northern Public Health Zone were significantly less likely than those living in other zones to have good management (χ^2=12.5, df=2, p=0.002) (Table 3.2.6c).

The longer a respondent had diabetes, the more likely they were to have good blood glucose management (χ^2=12.295, df=2, p=0.002) (Table 3.2.6c). Also, the more complications a respondent reported, the more likely they were to have good blood glucose management (χ^2=7.053, df=2, p=0.0294).

Table 3.2.6c: Respondents with good blood glucose management by demographic and other variables (n=326)

Demographic & Other Variables	Subgroup	Respondents with Good Blood Glucose Management (n=326)	
		n	%
Sex	Male	167	32.8
	Female	159	33.4
Age	18-29 years	9	33.3 ⇑
	30-39 years	14	24.1 ⇓
	40-49 years	37	27.6 ⇓
	50-59 years	69	28.2 ⇓
	60-69 years	105	42.9 ⇑
	70+ years	92	33.5 ⇑
Employment status	Employed	87	25.0 ⇓
	Not employed	239	37.5 ⇑
Household income	Less than $25,000 per year	158	35.4
	$25,001 per year and over	118	29.8
Private Health Insurance	Yes	134	31.5
	No	190	34.3
Education level	Completed Junior or less	185	34.3
	Completed Senior	45	35.7
	Trade/Tech Cert/Diploma	67	29.6
	Uni or College degree	29	30.8
Public health zone	Northern	39	22.9 ⇓
	Central	128	32.3 ⇑
	Southern	159	37.9 ⇑
RaRA classification	Capital city/other major urban (1&2)	216	32.8
	All rural and remote (3-6)	108	33.1
SEIFA quintile (of place of residence)	Least disadvantaged (1)	47	29.9
	2	57	31.3
	3	71	32.9
	4	89	39.7
	Most disadvantaged (5)	62	30.1
Yrs since diagnosis	0 – 2 years	86	29.5 ⇓
	3 – 9 years	108	29.8 ⇓
	10 or more years	126	41.0 ⇑
No. complications	0	47	26.7 ⇓
	1 – 2	173	32.4 ⇓
	3 or more	106	38.5 ⇑

⇑ ⇓ Statistically significantly higher or lower (χ^2 test, $p < 0.05$) than other comparison group(s)
Note: Household income does not include respondents who did not state their income

When the variables showing significant relationships with good blood glucose management in univariate analyses were included in a multivariate model, respondent age ceased to be a significant predictor. Significant predictors were employment status, public health zone and duration of diabetes (Table 3.2.6d).

Table 3.2.6d: Predictors of respondent having good blood glucose management

Predictor	Odds Ratio	95% C.I.	
Public health zone (base: Southern)			
Northern	**0.52***	0.34	0.78
Central	0.83	0.61	1.11
Duration of diabetes (base: 20+ years)			
0 – 2 years	**0.64***	0.45	0.90
3 – 9 years	**0.63***	0.46	0.87
Employment status (base: in paid employment full time or part time)			
Not in paid employment	**1.75***	1.30	2.36

* Odds ratios significant, 0.001 < p < 0.05

When the few Indigenous respondents were excluded from the multivariate analysis, the model remained essentially unchanged. Therefore the poorer self-management of blood glucose levels found in the Northern Zone is likely to have been influenced by the remoteness and reduced access to health and support services in this area rather than be a reflection of the poorer health status of the Indigenous population.

3.2.7 Health Care Providers

3.2.7.1 Main health care provider

The type of health care provider most commonly named as the respondents' main health care provider in relation to their diabetes was the GP or family doctor (84%), the next most common was the private endocrinologist or specialist (8%) (Table 3.2.7a).

This pattern of care is reassuring, as the demand for General Practitioners is easier to meet than the need for specialist services. Further, this fits the Queensland Standard Pathways of Care[5] where the primary coordinator of health is the Primary Health Care worker.

Table 3.2.7.1: Respondents' main health care provider in relation to their diabetes (n=990*)

Health Care Provider	Number of Respondents n	% of Respondents (n=990*)
GP or family doctor	830	83.8
Private endocrinologist or specialist	75	7.6
Hospital outpatients or Diabetes Centre	39	3.9
Hospital doctor	22	2.2
Someone else	12	1.2
Don't know / couldn't say	3	0.3
Refused to answer	1	0.1
No health care provider	8	0.8

* GDM-only individuals excluded

3.2.7.2 Health care providers visited in previous 12 months

The majority of respondents (90%) had seen a GP in relation to their diabetes in the previous 12 months (Table 3.2.7.2). In addition, over half (54%) had seen an optometrist or ophthalmologist.

Table 3.2.7.2 Health professionals visited in the previous 12 months in relation to the respondents' diabetes (n=987*)

Health Professional	Number of Respondents ** n	% of Respondents ** (n=987*)
GP or family doctor	885	89.7
Optometrist or ophthalmologist	531	53.8
Nutritionist or dietitian	235	23.8
Diabetes educator or nurse	214	21.7
Podiatrist or chiropodist	179	18.1
Endocrinologist	111	11.2
Any other health professional	52	5.3
None of the above	58	5.9

* GDM-only individuals excluded
** Multiple responses permitted

3.2.7.3 Health care providers respondents with diabetes should have visited

The services of various health professionals are encouraged to best manage diabetes. The frequency of visits to these professionals depends on the different needs of people with diabetes. To examine whether respondents should have visited a podiatrist, endocrinologist, diabetes educator, dietitian, ophthalmologist/optometrist and GP six variables were derived, on the basis of the *Diabetes Standard Pathway of Care 2000*[5], as follows:

1. Respondents should have seen a <u>podiatrist</u> in the previous 12 months if they had:
- a foot ulcer in the previous twelve months OR
- a limb amputation in the previous twelve months OR
- frequent tingling, pins and needles, burning, pain or numbness in legs or feet in the previous twelve months.

2. Respondents should have seen an <u>endocrinologist</u> in the previous 12 months if they had:
- poor blood glucose management (see section 3.2.6) OR
- visited hospital in the previous 12 months for a diabetes-related incident.

3. Respondents should have seen a <u>diabetes educator</u> in the previous 12 months if they had:
- poor blood glucose management (see section 3.2.6) OR
- visited hospital in the previous twelve months with a diabetes related incident OR
- been diagnosed with diabetes in the previous twelve months.

4. Respondents should have seen a dietitian in the previous 12 months if they had:
- poor blood glucose management (see section 3.2.6) OR
- a body mass index greater than or equal to 30 OR
- high cholesterol in the previous twelve months OR
- a hospitalisation in the previous twelve months OR
- been diagnosed with diabetes in the previous twelve months

5. Respondents should have seen an ophthalmologist or optometrist in the previous 12-24 months if they had:
- been diagnosed with diabetes in the previous twelve months OR
- been diagnosed with retinopathy in the pervious twelve months

6. All respondents should have seen a GP in the previous twelve months. (NB People with diabetes should see a GP every three to four months, however data on this time scale was not collected explicitly in this survey. Therefore the 12 month period was used.

Almost 90% of respondents had visited a GP in the previous 12 months. However, with the exception of ophthalmologist/optometrist, for all of the other health professionals listed above, less than one quarter of the respondents whose characteristics indicated that they should have attended in the previous 12 months had done so(Table 3.2.7.3).

Correspondingly, many respondents who had no apparent need to attend these health professionals had done so. For example, over half of the respondents who had attended a podiatrist, had no apparent need to do so, according to the guidelines.

Table 3.2.7.3 Respondents' attendance patterns at various health professionals in the previous 12 months (n=987*)

Health Professional	Should have attended and did		No apparent need to attend but did	
	n	%	n	%
Optometrist / Ophthalmologist	190	43.7	797	56.2
Podiatrist	334	23.6	653	15.3
Endocrinologist	685	10.2	302	13.6
Diabetes educator or nurse	741	19.3	246	28.9
Dietitian	847	23.7	140	24.3
GP	987	89.7	0	-

* GDM-only individuals excluded

3.2.7.4 Frequency of visits to health care providers

The majority of diabetic respondents (87%) usually visited a GP at least once every six months about their diabetes (Table 3.2.7.4). This frequency is below the accepted level in the recommended Pathways of Care. Optometrists or Ophthalmologists were the only other health professionals whom respondents reported visiting regularly. However the guidelines recommend a lesser frequency of visits to them.

Table 3.2.7.4: Usual frequency at which respondents visit various health care professionals about their diabetes.

Frequency of Visits	Health Care Professional % of respondents (n = 950*)				
	GP	Podiatrist	Dietitian	Optometrist / Ophthalmologist	Diabetes Educator
Every 6 weeks or more often	38.4	3.2	3.1	0.6	1.4
Less than every 6 weeks but more than every 6 months	39.3	5.5	3.1	4.1	2.7
Once every 6 months	9.1	2.1	2.5	7.8	2.1
Approximately once every year	5.4	3.7	4.2	30.8	3.2
Less often than once a year	0.6	1.1	2.2	39.1	1.4
Do not visit regularly at all	7.1	84.1	84.4	17.4	88.6
Don't know	0.2	0.4	0.5	0.2	0.6
TOTAL	100%	100%	100%	100%	100%

* 40 early survey respondents were not asked this question owing to a late questionnaire alteration

Most respondents either visit regularly or had at least had an initial assessment of their diabetes with an optometrist or ophthalmologist (89%) and with a dietitian (62%). However, less than one in three respondents (31%) had been assessed by a podiatrist and less than one in four (39%) had been assessed by a diabetes educator.

It is clear that adherence by these respondents to the Pathways of Care[5] is erratic and does not necessarily follow the recommendations. However, the guidelines have only been released recently, and therefore this data should be taken as a baseline only.

3.2.8 Knowledge of Possible Long Term Outcomes of Diabetes

In general, diabetic respondents reported a moderate understanding of the possible long-term outcomes of diabetes (Table 3.2.8). Two of the most commonly named outcomes were the very general responses of 'premature death' (40%) and unspecified 'severe health problems' (26%). It is possible that the 26% of respondents who gave only these answers or these in combination with incorrect outcomes did not truly know any of the possible outcomes of diabetes. Blindness (46%) and amputations/gangrene/poor circulation (50%) were the only other two outcomes named by more than one in four respondents (Table 3.2.8).

Table 3.2.8: Respondents' knowledge of the possible long-term outcomes of diabetes*

Possible Long-Term Outcome	Number of Respondents n	% of All Respondents# (n=990##)	% of Respondents# Gen. Popn Survey (n=1625)*
Correct Possible Outcomes			
Blindness	446	45.5	30.9
Amputations/Gangrene/Poor circulation	491	50.1	29.6
Coma	83	8.5	12.1
Heart problems	241	24.6	11.1
Kidney failure	223	22.8	10.5
Generalised Outcomes			
Premature death	395	40.3	41.4
Severe health problems (unspecified)	251	26.0	22.3
Incorrect Outcomes	236	24.1	25.6
Don't know	74	7.6	4.9

* Only respondents who could demonstrate a basic knowledge of diabetes were asked this question, those who were not asked were deemed to not be aware of the long-term outcomes.
\# Multiple responses permitted
\## GDM-only individuals excluded

People with diabetes were much more likely than the general population to name blindness, amputations, heart problems and kidney failure as possible long term effects of diabetes. This indicates a higher level of knowledge among people with the disease. The average number of correct long-term outcomes named by respondents was 1.5. This is only slightly higher than the average of 0.9 named by the general population. Overall, almost three-quarters of respondents (74%) named at least one correct outcome, which is markedly higher than in the general population (53%). However, 71% of respondents with diabetes also named at least one incorrect or generalised outcome.

Over half (56%) of all respondents named a generalised outcome, however, 70% of these did name at least one correct outcome.

One quarter (24%) of all respondents named an incorrect outcome but the majority (83%) of these also named at least one correct outcome.

Overall, despite being more able to name correct outcomes, people with diabetes were just as likely as members of the general public to name generalised and incorrect long-term outcomes of diabetes

3.2.9 Knowledge of Symptoms of Hypoglycaemia

Knowledge of the range of symptoms of hypoglycaemia was generally low. Almost 30% of diabetic respondents could not name any of the symptoms of low blood sugar or hypoglycaemia (Table 3.2.9). Only one symptom, dizziness or lightheadedness (37%), was named by more than one in four respondents.

Table 3.2.9: Respondents' knowledge of the symptoms of hypoglycaemia (n=990*)

Perceived symptom	Number of Respondents ** n	% of Respondents ** (n=990*)
Dizziness or lightheadedness	368	37.2
Weakness or fatigue	243	24.5
Shakiness	200	20.2
Cold sweats or sweaty palms	133	13.4
Collapse (including coma)	123	12.4
Blurred vision	107	10.8
Nausea	62	6.3
Confusion	58	5.9
Hunger	58	5.9
Restless sleep or lack of concentration	52	5.3
Thirst#	34	3.4
Anxiety or mood change#	33	3.3
Irritability or anger	32	3.2
Morning headaches or headaches in general	25	2.5
Increased heart rate	10	1.0
Other	87	8.8
Don't know	291	29.4

* GDM-only individuals excluded
** Multiple responses permitted
# Not a symptom of hypoglycaemia

3.2.10 'Acceptable' Knowledge of Diabetes

For the purposes of this survey, a respondent was considered to have a good knowledge of the long-term outcomes of diabetes if they named any **two or more** of the following possible outcomes:

- Blindness
- Heart problems
- Amputations/gangrene/poor circulation
- Kidney failure
- Coma

Similarly, they were considered to have a good knowledge of the symptoms of hypoglycaemia if they named any **three or more** of the following symptoms:

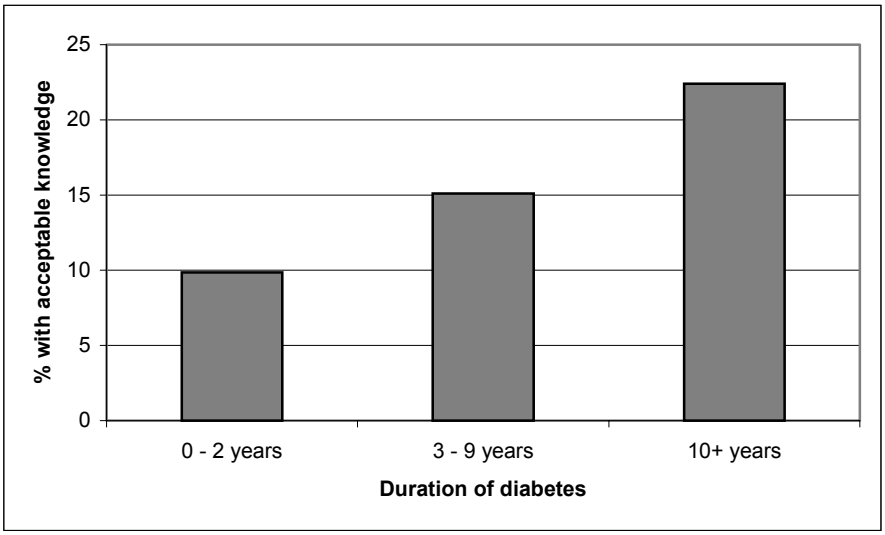
- Blurred vision
- Confusion
- Cold sweats or sweaty palms
- Collapse (including coma)
- Dizziness or lightheadedness
- Hunger
- Irritability or anger
- Increased heart rate
- Morning headaches or headaches
- Nausea
- Restless sleep or lack of concentration
- Shakiness
- Weakness or fatigue

Overall, respondents were defined as displaying an 'acceptable' knowledge of diabetes if they showed both good knowledge of the long-term outcomes of diabetes and good knowledge of the symptoms of hypoglycaemia.

3.2.10.1 Variations in 'acceptable' knowledge of diabetes

Overall, 15.9% of respondents reported an 'acceptable' knowledge of diabetes. 'Acceptable' knowledge increased significantly with length of time the respondent had been diagnosed with diabetes (χ^2=18.006, df=2, p=0.0001), from 10% for those who have had diabetes for less than 3 years to 22% for those who have had the disease for 10 years or more (Figure 3.2.10.1a). This is a logical result owing to exposure time to management, education, counselling and other support services.

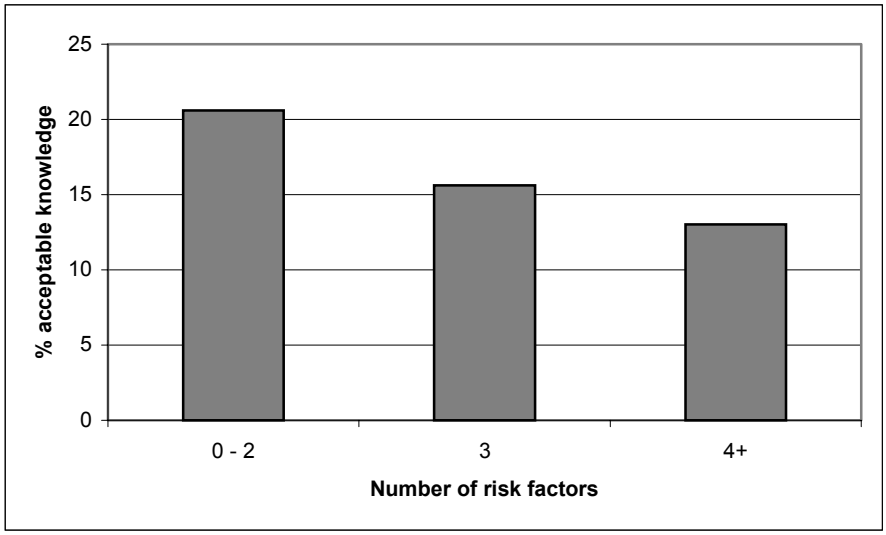
Figure 3.2.10.1a: Percentage of respondents with 'acceptable' knowledge of diabetes by duration of diabetes



The likelihood of respondents displaying 'acceptable' knowledge was significantly associated with whether the respondent had stated that they had been told they had diabetes (17%) or 'high blood sugar/a touch of sugar' (10%) (χ^2=6.63, df=1, p=0.001).

The proportion of respondents with 'acceptable' knowledge of diabetes decreased significantly as the number of risk factors/behaviours the respondents reported increased (χ^2=16.31, df=6, p=0.0122) (Figure 3.2.10.1b). Twenty-one percent of respondents with less than three risk factors reported 'acceptable' knowledge while only 13% of respondents with four or more risk factors reported the same level of knowledge.

Figure 3.2.10.1b: Percentage of respondents with 'acceptable' knowledge of diabetes by the number of risk factors reported

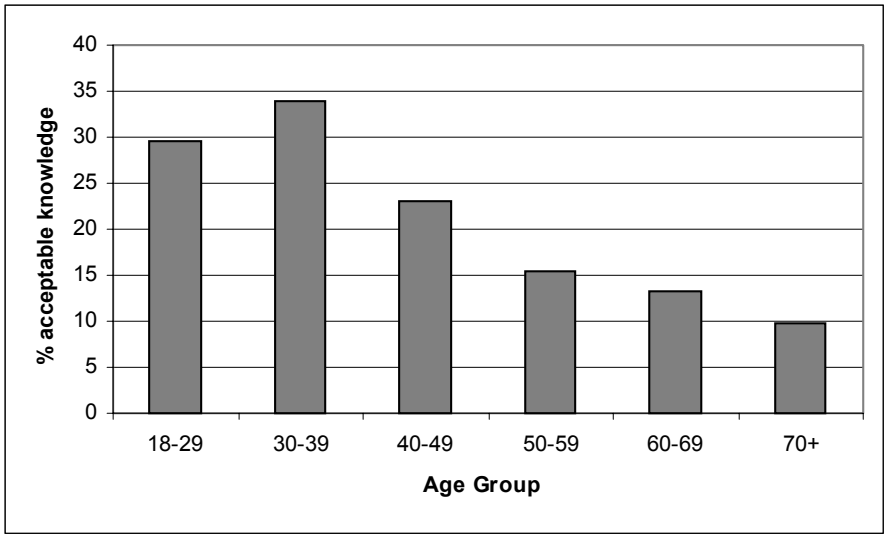


Female respondents were significantly more likely to display an 'acceptable' knowledge of diabetes (20%) than were their male counterparts (12%) (χ^2=10.2, df=1, p=0.0014). Good knowledge also varied significantly with respondent age group (χ^2=32.23, df=5, p<0.0001), peaking in the 30-39 age group and decreasing with increasing age (Figure 3.2.10.1c). Following from this result, 'acceptable' knowledge was also more prevalent in those demographic sub-groups, which contained a high proportion of younger respondents. Specifically, knowledge was significantly more prevalent among those who were employed (χ^2=4.50, df=1, p=0.0338), those who had completed senior high school or a higher level of education (χ^2=9.21, df=3, p=0.0266) and those with an annual household income of $25,000 or more ($\chi^2$=12.14, df=1, p=0.0005).

Respondents with Type II diabetes were significantly less likely (15%) to display an 'acceptable' knowledge of diabetes than were those with Type I (55%) (χ^2=37.6, df=2, p<0.0001).

'Acceptable' knowledge was more prevalent in both younger respondents and those who had had the disease for a longer period of time. This apparent discrepancy can be explained by the high rate of geriatric diagnosis of Type II diabetes. There are therefore many older people who have only been diagnosed for a relatively short period of time and are therefore displaying a lower level of knowledge. The apparent discrepancy was probably influenced also by the fact that those in younger age groups had a significantly high level of education (χ^2=110.76, df=16, p<0.0001).

Figure 3.2.10.1c: Percentage of respondents with an 'acceptable' knowledge of diabetes by age group



'Acceptable' knowledge did not vary significantly across SEIFA quintiles, RaRA classifications or Public Health Zones.

Respondents with an 'acceptable' knowledge of diabetes were significantly more likely (43%) to display good management of their diabetes than those with lower knowledge levels (31%) (χ^2=8.80, df=1, p=0.0030).

'Acceptable' knowledge of diabetes did not vary significantly with the number of diabetes complications the respondent reported.

When the variables showing significant relationships with 'acceptable' knowledge of diabetes in univariate analyses were included in a multivariate model, respondent age group was the strongest predictor (Table 3.2.10.1). Whether the respondent either had been told that they had diabetes or high blood sugar was also significant, with those who had been told 'diabetes' more than twice as likely to display 'acceptable' knowledge

Table 3.2.10.1: Predictors of respondent having 'acceptable' knowledge of diabetes

Predictor	Odds Ratio*	95% C.I.	
Age group (base: 70+ years)			
18 – 29 years	**5.37***	1.85	15.56
30 – 39 years	**5.81#**	2.57	13.14
40 – 49 years	**3.22***	1.61	6.46
50 – 59 years	**2.07***	1.08	3.96
60 – 69 years	1.62	0.87	3.01
Duration of diabetes (base: 10+ years)			
0 – 2 years	**0.25#**	0.15	0.42
3 – 9 years	**0.48***	0.26	0.89
Sex (base: female)			
Male	**0.53#**	0.36	0.79
Diagnosed with diabetes (base: High blood sugar)			
Diabetes	**2.12***	1.23	3.67
Household income (base: $25 000 +)			
Under $25 000	**0.62***	0.39	0.98

Odds ratios significant, $p < 0.001$
* Odds ratios significant, $0.001 < p < 0.05$

Variations in respondent knowledge of the possible long-term outcomes of diabetes and of the symptoms of hypoglycaemia are not reported separately in this document because they closely correspond to the variations in 'acceptable' knowledge of diabetes reported above.

4.0 CONCLUSIONS

Self-reported prevalence of diabetes increased over the five years prior to the survey. The most likely explanatory factors are a true increase in the incidence, an increase in screening rates and lowering of the laboratory threshold for diagnostic criteria.

Females are more likely to self-report a diagnosis of diabetes than males but blood surveys reveal that males are more likely to have the disease. Recall bias may be a factor in this apparent inconsistency.

Overall, knowledge of diabetes, its risk factors and complications has improved in Queensland in the past four years. People with diabetes are more likely than the general public to have a knowledge of the long term complications of the disease. Yet, the overall mixed level of accuracy in the knowledge of the disease (there was evidence of guess work leading to incorrect responses) indicates that more public and provider-patient education is needed to minimise the impact of the disease in the community.

The number of risk factors exhibited by respondents did not vary by sex or geographic area of residence. Duration of disease was a predictor of foot ulcers, heart problems, vision problems and peripheral neuropathy, but not of kidney disease.

While there was no gender difference in self management of blood glucose levels, two thirds of respondents exhibited poor glucose self-management. This was particularly significant in the Northern Zone, possibly reflecting limited access to support services.

General Practitioners continue to be the main health care providers of people with diabetes in Queensland. It is reassuring that the coordination of diabetes management is widely available from the Primary Health Care sector. However, there is still room for improvement in adherence to the recommendations for management detailed in the *Diabetes Standard Pathway of Care 2000*.

This study is the first in Queensland to yield baseline information on the help seeking and management behaviour of people with diabetes at a population level. Although the patterns of care are not totally satisfactory, this data provides a useful baseline for future comparisons.

REFERENCES

1 Mathers C, Vos T and Stevenson C. *The Burden of Disease and Injury in Australia*, AIHW catalogue No PHE 17, November 1999. Canberra: AIHW

2 Commonwealth Department of Human Services and Health. *Rural/Remote Areas Classification*. Canberra: AGPS, 1994.

3 Commonwealth Department of Health and Aged Care and National Key Centre for Social Applications of Geographical Information Systems (University of Adelaide). *Accessibility/Remoteness Index of Australia*. Occasional papers series no. 5. Canberra: Department of Health and Aged Care, 1999.

4 Australian Bureau of Statistics. *Information paper: 1991 census socioeconomic indices for areas*. Catalogue no. 29120. Canberra: ABS, 1993.

5 Queensland Health (2000). *Diabetes Standard Pathway of Care 2000*

6 Australian Bureau of Statistics (1997) *National Health Survey, 1995. Diabetes. Australia.* ABS Catalogue No. 4371.0, Canberra.

7 Dunstan D, Cameron A, de Courten M, Coyne T, D'Emden M, *et al*.. *AUSDIAB: The Australian Diabetes, Obesity & Lifestyle Study*. International Diabetes Institute, 2001.

8 Queensland Health, Public Health Services,. *Health Indicators for Queensland*. Brisbane 2001.

9 DECODE Study Group on behalf of the European Diabetes Epidemiology Study Group. *Will new diagnostic criteria for diabetes mellitus change phenotype of patients with diabetes? Reanalysis of European epidemiological data.* BMJ 1998*,317:371-375*

10 Parsons J, Wilson D and Scardigno A. *The Impact of Diabetes in South Australia 2000. The Evidence*. South Australian diabetes Clearing House on behalf of the Diabetes Health Priority Area Advisory Group, 2000.

11 McCarty DJ, Zimmet P, Dalton A, Segal L, Wellborn TA. *The rise and rise of diabetes in Australia, 1996. A review of statistics, trends and costs*. Diabetes Australia, Canberra, 1996.

12 Handelsman P and Jackson L. *A national needs assessment of children and adolescents with diabetes, Australia 1999*. Sydney: The Diabetes Research Foundation, Juvenile Diabetes Foundation of Australia. In: AIHW: *Australia's Health 2000* [Diabetes Section of chapter 2.3]. *The seventh biennial report of the Australian Institute of Health and Welfare*. AIHW Cat No.19.