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Attitudes to food and lifestyle choices in women with well-controlled and poorly-controlled type 2 diabetes mellitus from different ethnic groups: A pilot study.

A thesis presented in partial fulfilment of the requirements for the degree of Master of Science in Nutrition at Massey University, Auckland, New Zealand.

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January, 2005

Abstract

Type 2 diabetes has reached epidemic proportions in New Zealand, as it has globally. There has also been a dramatic rise in numbers from different ethnic groups attending the Auckland Diabetes Centre, with interpreters in approximately 60 different languages being employed. Research indicates that good glycaemic control in people with diabetes can dramatically reduce the risk of complications. However there are many barriers to achieving this.

This thesis, by a dietitian working at the Auckland Diabetes Centre, examines the research pertaining to the ethnic groups with the highest prevalence of type 2 diabetes, these being Maori, Pacific, Chinese and Indian, along with European groups. It investigates some of the socio-cultural and psychological issues which may be barriers to lifestyle and dietary modification for optimal diabetes control. A total of 232 women attending the Auckland Diabetes Centre took part in this study, aged from 24 to 78 years, the average being 56 years. Duration of diabetes ranged from one to 44 years, with an average of seven years. A questionnaire, designed to obtain their views on diabetes, how it affects their lifestyle, and their perceptions of food and health, was completed at their followup visit. All had received dietary and lifestyle advice and questionnaire responses indicated a good dietary knowledge. It was evident from comments made that most felt the information given by the dietitian was practical, focused on normal food; it was easy to understand and gave them confidence. Most agreed that not smoking, regular meals, daily physical activity, and taking medication (if prescribed) were very important.

No statistical association was found between diabetes control and age, income, marital status, education, weight, blood pressure or lipid profile. However duration was significant, with more of those with poorly controlled diabetes likely to have diabetes longer ($p<0.001$); there was also evidence of an ethnic difference ($p=0.02$). This was to be expected given that diabetes is a progressive disease, but could indicate frustration and loss of motivation. Psychological issues were significant ($p<0.001$). The number of ethnic differences found in this study suggest that a more holistic approach and a wider knowledge of cultural and psychological issues is required in diabetes education.

Health professionals need to be cognisant of the individual's health beliefs, cultural practices, and any psychological issues, to better assist people of different ethnic groups in management of their diabetes, in order that they may live full and normal lives and avoid complications. At present only 26 (8%) practising dietitians are from minority ethnic groups and not all of these are bilingual. There are only 192 (60%) dietitians employed by District Health Boards, for a population of four million people, 115,000 of whom have diagnosed diabetes.

This pilot has identified more precisely the requirements for effective counselling.

'People would sooner die than change – and most do'
- Mark Twain

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Sincere thanks to my supervisor Patsy Watson
the research participants,
my friends and family.

'Tell me and I will forget
Show me and I might remember
Involve me and I will understand.'
- Confucius

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1 Introduction

Type 2 diabetes mellitus is one of the world's major public health problems, and prevalence is increasing in both developed and developing countries. In addition to an increase in sedentary lifestyles and life expectancy, obesity is the major driver of the diabetes epidemic, accounting for nearly a third of the overall increase in diabetes. Higher rates are found in migrant or urbanised populations which may have experienced a greater degree of lifestyle change or Westernisation.

Intensive diabetes management regimes currently recommended to prevent or delay complications have proved a challenge for both the person with diabetes and their health care professional in overcoming psychobehavioural and social-environmental barriers to optimal self-management. Diabetes management is dependent on the complex interplay between emotional, cognitive and social processes that determine human behaviour.

Two significant challenges facing dietitians in the immediate future are firstly, the increasingly diverse population of this country, and secondly the increased emphasis on patient/client behavioural changes as evidence of effectiveness.

Demographic patterns are changing rapidly, and Auckland could be regarded as a microcosym of New Zealand's future ethnic mix; currently 70% of the country's immigrants settle in Auckland. In the Central Auckland Health District alone there are 150 nationalities, and interpreters in more than 60 languages are currently employed by the Auckland Diabetes Centre. However health is more than simply the provision of health services. Effective practice requires an understanding of each ethnic group – their culture, health beliefs, environment, lifestyle, socio-economic status and degree of acculturation. Within each ethnic group there may be many different cultures, but certain similarities in attitudes and behaviour are peculiar to each ethnic group.

Perceived ethnic and social differences with health care providers often discourage consumers from seeking care or sharing relevant information required for appropriate

treatment. These issues are particularly important for the dietetic profession, since diet is a major factor in the prevention and control of chronic disease such as obesity, diabetes and heart disease. In nutrition counselling, where many therapeutic interventions are on a personal level, sensitivity to the strong influence of culture on an individual's food intake, attitudes and behaviours is imperative.

The research hypothesis was that attitudes to food and lifestyle choices may have an impact on control of type 2 diabetes.

The aim of this pilot study was to identify differences in health beliefs and perceptions of diabetes, and to examine whether these beliefs can predict adherence to diabetes self-care regimes. High-risk ethnic groups Maori, Pacific, Indian, Chinese as well as European were included in this study.

Objectives of this study were:

- to identify demographic, anthropometric and socioeconomic factors which may influence diabetes control;
- to determine whether values of different ethnicities impact on diabetes control;
- to investigate the psychological impact of diabetes across the ethnic groups;
- to measure dietary knowledge and health awareness, and identify barriers to their implementation.

The following chapter will outline the medical aspects of diabetes, including classification, cause, treatment and complications. Prevalence of the disease in New Zealand will be outlined, as well as an overview of issues pertaining to diabetes in cultural groups with a high prevalence of diabetes, and costs of diabetes both to the individual and to society.

'The best prescription is knowledge' – Dr CE Koop

2 Literature Review

This chapter is intended to provide a background in diabetes. The literature has been reviewed in four sections, the first addressing diabetes, the second prevalence of type 2 diabetes, the third cultural issues and the fourth psychosocial issues. Where possible Levels I and II evidence has been used, namely meta-analyses, systematic reviews and randomised controlled trials. Health professionals in the relevant disciplines were also consulted, as were people from the ethnic groups under consideration in this study.

2.1 Diabetes Mellitus

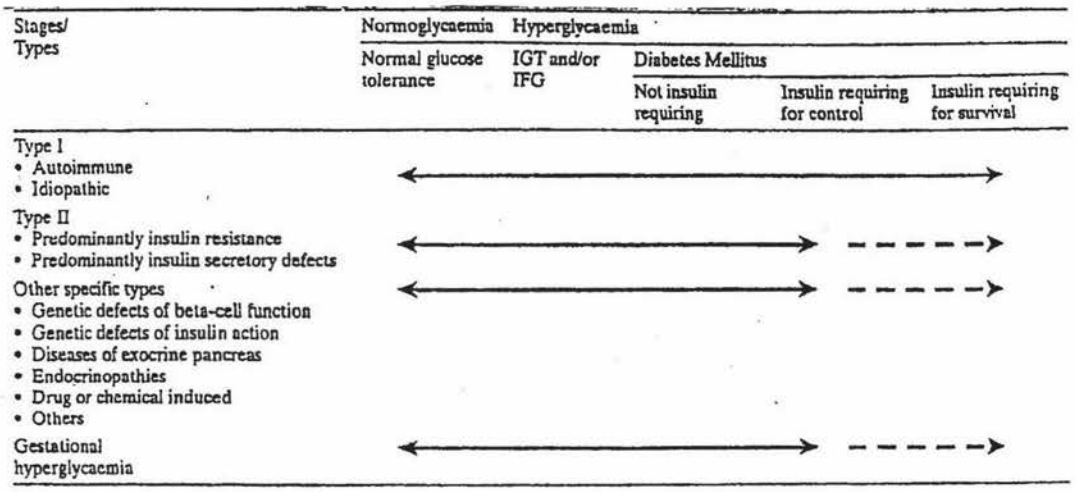
Diabetes mellitus is recognised as a group of heterogeneous disorders with the common elements of hyperglycaemia and glucose intolerance, due to insulin deficiency, impaired effectiveness of insulin action, or both (Harris and Zimmet 1997). It is classified on the basis of aetiology, natural history, and clinical presentation of the disorder (Amos et al 1997).

2.1.1 Classification of diabetes mellitus:

In 1936 Himsworth proposed that there were at least two clinical types of diabetes mellitus, one requiring insulin to survive; the other not requiring insulin to survive, based on clinical observation (Himsworth 1936). This has subsequently been confirmed by epidemiological and intensive molecular biology research. There are a number of potential defects that determine this, particularly for type 2 diabetes mellitus (Zimmet 1995).

The World Health Organisation (WHO) developed a classification of diabetes mellitus and other categories of glucose intolerance in 1980 (WHO 1980), its most recent revision being in 1998 (Alberti and Zimmet 1998; WHO 1999). The new classification is based on stages of glucose tolerance status with a complementary sub-classification according to aetiological type, as proposed by Kuzuya and Matsuda (Kuzuya and Matsuda 1997), and illustrated diagrammatically in Figure 2.1.

Figure 2.1 *Classification of diabetes mellitus:*



Source: Kuzuya and Matsuda 1997

Type 1 is characterised by the presence of autoantibodies to glutamic acid decarboxylase, islet cell, insulin or tyrosine phosphatase-2 which identify the auto-immune process associated with beta-cell destruction. (Those with no evidence of antibodies are classified as type 1 idiopathic.) Onset is acute, generally in those under 30 years of age; it represents 10-15% of all cases of diabetes. Type 1 was previously known as insulin dependent diabetes mellitus; the new 'staging' classification has labelled it 'insulin-requiring for survival', to prevent ketosis, coma and death.

Type 2 is characterised by disorders of insulin resistance and insulin secretion, both usually present at diagnosis. Onset is often asymptomatic, generally in those over 50 years of age (Appendix 2.1), but under 30 years of age in high prevalence groups such as Maori, Pacific and Asian ethnic groups (Appendix 2.2), people with a family history of diabetes, and those with metabolic syndrome. Obesity is the most important risk factor for type 2 diabetes mellitus. Onset occurs at least four to seven years before clinical diagnosis (Harris et al 1992). It represents 85-90% of all cases of diabetes. Type 2 was previously known as non-insulin dependent diabetes mellitus. The new classification proposes that it be termed 'not insulin requiring' or 'insulin requiring for control'. Patients formerly categorised as having type 2 diabetes mellitus in which the defect is now known, such as maturity onset diabetes in the young and latent autoimmune diabetes in adults now appear under 'other specific types'.

For the purpose of this study only patients with type 2 diabetes mellitus have been included, and any reference to diabetes will signify type 2 diabetes mellitus unless otherwise stated.

2.1.2 Diagnosis of diabetes:

Diabetes is diagnosed with a fasting venous plasma glucose of 7.0 mmol/l or over on two occasions, or a random venous plasma glucose greater than 11.1 mmol/l on two occasions, where symptoms are present, or with an oral glucose tolerance test where the two-hour plasma glucose is 11.1 mmol/l or over (Gill 2000).

Precursors to diabetes are impaired fasting glucose, impaired glucose tolerance, gestational diabetes or diabetes in pregnancy, and metabolic syndrome. The prevalence of impaired fasting glucose and impaired glucose tolerance in New Zealand is unknown. Impaired fasting glucose (6.1 to 6.9 mmol/l) has recently been introduced as a result of evidence that a fasting venous plasma glucose below 7.0 mmol/l, the diagnostic threshold for diabetes, may not be normal, as it is associated with risk factors for both macrovascular disease and future diabetes. It detects fewer of those who subsequently progress to diabetes than does impaired glucose tolerance. Impaired glucose tolerance is diagnosed with an oral glucose tolerance test where the two-hour plasma glucose is 7.8 to 11 mmol/l. These high-risk subjects have been widely used in trials for diabetes prevention.

Gestational diabetes is diagnosed with a fasting venous plasma glucose greater than 5.5 mmol/l or a two-hour plasma glucose greater than 9.0 mmol/l in an oral glucose tolerance test. This is a form of glucose intolerance that develops during the second half of pregnancy and disappears after parturition. The mother with gestational diabetes is at increased risk for developing diabetes in later life (Gill 2000).

New Zealand guidelines for the diagnosis of diabetes follow the World Health Organisation criteria outlined above (WHO 1999, MoH 2003a). The American Diabetes Association has recently recommended that the cut-off point for impaired fasting glucose should be reduced from 6.1 to 5.6 mmol/l (ADA 2003a). The reason that the American Diabetes Association guidelines are not adopted in New Zealand is that in America the oral glucose tolerance test is no longer considered to be a cost-effective

diagnostic tool, whereas it remains the traditional diagnostic test in New Zealand, Australia and Europe.

The metabolic syndrome, also known as the syndrome of insulin resistance or Syndrome X, may lead to impaired glucose tolerance and diabetes (Reaven 1988; Lorenzo et al 2003; Wang 2004). It is characterised by abdominal obesity, glucose intolerance, hypertension and dyslipidaemia. The atherogenic lipid profile of high triglyceride and low HDL-cholesterol (similar to that seen in diabetes) is a more powerful predictor of insulin resistance than obesity, hypertension or fasting plasma glucose and, in the presence of obesity, greatly increases the risk of coronary heart disease (Reaven et al 2003). However a recent study identified waist circumference as the optimal predictor (Palanaippan et al 2004). Diagnosis is by three or more of the following criteria: fasting plasma glucose (>6.1 mmol/l), waist circumference >88 cm in women (>102 cm in men), blood pressure >130/85 mmHg, serum triglycerides >1.7 mmol/l, serum HDL-cholesterol <1.29 mmol/l in women (<1.04 mmol/l in men) (National Cholesterol Education Program 2001). According to this definition more than 20% of adult Americans have the metabolic syndrome (Ford et al 2004). The World Health Organisation has developed slightly different diagnostic criteria (Alberti and Zimmet 1998; WHO 1999). A universally accepted definition of the metabolic syndrome is needed (Ford et al 2004).

2.1.3 Complications of diabetes

Diabetes is a major cause of morbidity and mortality; in 1999 it was the sixth leading cause of death, contributing to 19% of all deaths among individuals aged over 25 years. The Ministry of Health estimates that at least 1500 New Zealanders die of diabetes-related illnesses each year (MoH 2002a). It is the leading cause of cardiovascular disease, strokes, renal failure, blindness and amputations. Individuals with diabetes have a two- to four-fold risk of cardiovascular disease-related deaths compared with those without diabetes (National Diabetes Statistics 1999). Cardiovascular disease in individuals with diabetes is more severe, starts at an earlier age, and is more costly (Nichols and Brown 2002). Diabetes has been rated as the third highest cause of modifiable disability-adjusted life years lost (DALYs) after ischaemic heart disease and smoking (MoH 2001a). Population-based health promotion strategies have substantially

reduced the incidence of cardiovascular disease, but disparities between different ethnicities continue (MoH 2002b).

Research in America that studied characteristics among 2,437 adults newly-diagnosed with type 2 diabetes between 1996 and 1998 found that those with early diagnosis of diabetes (18 to 44 years) were more likely to be obese (BMI 39 vs 33kg/m^2, $p<0.001$), female ($p=0.04$), with slightly worse glycaemic control (HbA1c7.7% vs 7.5%, $p=0.03$) than adults diagnosed at 45 years of age and over. They had a higher prevalence of diastolic hypertension (37% vs 26%, $p<0.001$) despite a lower prevalence of systolic hypertension (34% vs 55%, $p<0.001$), with an equally high rate of abnormal lipids (82% vs 86%, $p=0.13$) (Hillier and Pedula 2001).

2.1.3.1 ***Acute complications*** of diabetes are low blood glucose (hypoglycaemia) and high blood glucose (hyperglycaemia).

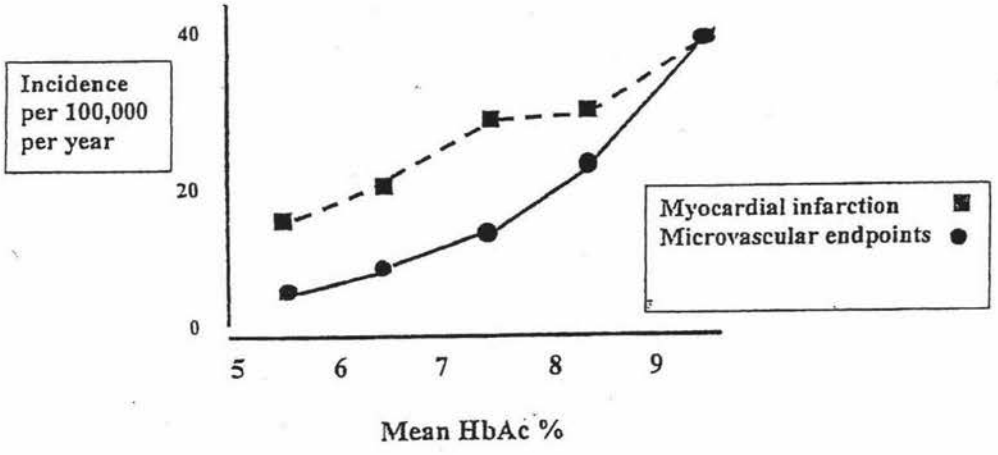
Hypoglycaemia, a blood glucose level less than 4 mmol/l, may be caused by an excess dose of insulin or long-acting insulin secretagogue, too long a period between insulin and food, insufficient carbohydrate at meals or snacks or delayed meals, more exercise than usual that has not been compensated for by increased carbohydrate, or alcohol if taken in excess without food. Symptoms can be both autonomic and neuroglycopenic, and can include headache, sweating, extreme hunger, double vision, shakiness, unsteady gait, tingling around lips and tongue, irritability, confusion or odd behaviour. The latter occurs because glucose is usually the sole fuel source for the brain. People with long-standing diabetes or frequent periods of hypoglycaemia may have hypoglycaemic unawareness and not display symptoms until blood glucose is less than 2.0 mmol/l giving insufficient warning, and this may result in coma or seizure. Severe hypoglycaemia may affect quality of life in people with diabetes treated with insulin or long-acting insulin secretagogues such as sulphonylureas (United Kingdom Prospective Diabetes Study 37 1999).

Hyperglycaemia, a random blood glucose level greater than 11 mmol/l, may occur in undiagnosed or inadequately treated diabetes, classic symptoms being thirst, frequent urination and fatigue. Intensive self-monitoring of blood glucose is required for stabilisation of blood glucose levels, as part of an integrated self-care package. Glycated haemoglobin A1c (HbA1c) is a measure of the mean blood glucose level over the

previous two to three months, providing the essential baseline measure of glycaemic control. Its central role arose out of the Diabetes Control and Complications Trial in subjects with type 1 diabetes, which found that risk of complications rose with increasing HbA1c with a significant steepening of the curve above a value of 8%, equivalent to an approximate mean blood glucose level of 10 mmol/l (Gill 2000).

2.1.3.2 ***Chronic complications*** are caused by chronic hyperglycaemia, which can affect blood vessels and nerves, leading to microvascular and macrovascular complications. Figure 2.2 shows the increase in these complications with increasing HbA1c levels.

Figure 2.2: *Complications are caused by chronic hyperglycaemia*

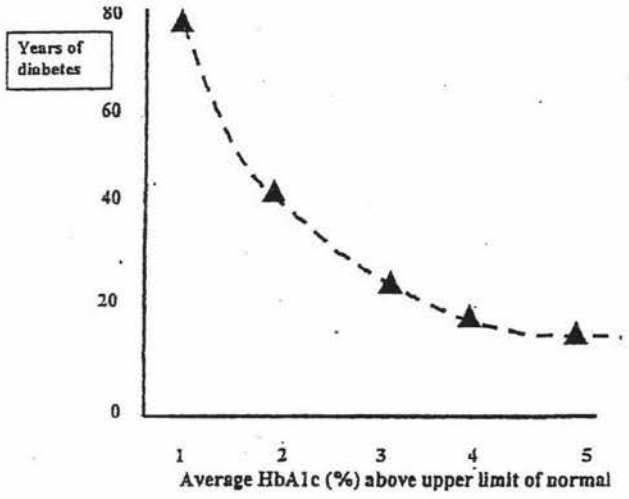


Source: Gill 2000

- ***The microvascular complications*** of retinopathy, nephropathy, and neuropathy can result in blindness, renal failure and amputations respectively.

Diabetic eye disease or retinopathy may be defined as the presence of typical retinal microvascular lesions in an individual with diabetes. Six to 39% of people with diabetes have retinopathy at diagnosis, with 4 to 8% having sight-threatening disease (United Kingdom Prospective Diabetes Study 33 1998c; Kohner et al 1998). Diabetic retinopathy is estimated to be the most frequent cause of new cases of blindness among adults aged from 20 to 74 years (American Diabetes Association 2004a). Figure 2.3 shows the relationship between HbA1c level and time to develop retinopathy.

Figure 2.3: *Duration of diabetes, glycaemic control and time to develop retinopathy*



Source: United Kingdom Prospective Diabetes Study 33 1998c

Diabetic kidney disease or nephropathy is a clinical state of altered renal function and is the single leading cause of end-stage renal failure. It occurs in 20 to 40% of people with diabetes. Microalbuminuria is the first indication, defined as a sustained urinary albumin excretion of 30 to 300 mg/day. Overt diabetic nephropathy is defined by a urinary albumin excretion of greater than or equal to 300 mg/day, indicating clinical proteinuria (MoH 2003a). Microalbuminuria is also a well-established marker of increased cardiovascular disease risk (Garg and Bakris 2002).

In New Zealand the prevalence of microalbuminuria, overt diabetic nephropathy and end-stage renal failure is higher among Maori, Pacific and Asian people compared with Europeans and predicts premature mortality (Simmons et al 1994a; Australian and New Zealand Dialysis and Transplant Register 2001; Lunt et al 1990a; Metcalfe et al 1993). A subset of people with diabetes may have a genetic predisposition and some trigger pushes them to develop diabetic nephropathy, or the rest of the population of people with diabetes may have some protective mechanism. A phenotypical trait of blood pressure sensitivity to sodium may also be genetically-determined, therefore a restriction of sodium is important in the treatment of early nephropathy in diabetes, even if the patient is normotensive (Imanishi et al 2001). In the sodium sensitive person sodium excretion by the distal nephrons of the kidney is impaired and higher blood pressure levels are needed to maintain sodium balance in the body fluids, especially when intake is high. Systolic blood pressure is an independent marker of renal decline

(Nand 2004). Optimal glycaemic, blood pressure, lipid and weight control with smoking cessation can reduce the risk and progression of diabetic nephropathy.

Diabetic foot disease can be defined as a group of syndromes in which neuropathy, ischaemia and infection lead to tissue breakdown or ulceration, resulting in morbidity and possible amputation (Apelqvist et al 2000). Neuropathy is caused by diabetic microvascular disease which can lead to loss of foot sensation; ischaemia is caused by loss of circulation due to peripheral arterial disease. Of people with diabetes presenting at dedicated foot clinics, about 50% have neuropathic feet and 50% have neuro-ischaemic feet (Hutchinson et al 2000). In a South Auckland study of people with diabetes attending local diabetes services or general practitioners, 48.5% had foot lesions (Simmons et al 1995). Major lesions (amputation or foot ulceration) were most common among Pacific people with diabetes (9.4%) compared with Maori (5.5%) and Europeans (3.9%). Shoes are not generally worn inside the house by Pacific and Maori people which puts them at risk of foot trauma, a common cause of foot ulcers. Other risk factors include: older age, longer duration of diabetes, poor vision, renal disease, impaired mobility, smoking, poor footwear, poor nutritional status and social deprivation/isolation (MoH 2003b). The evidence regarding risk factors and causal pathways was summarised in the draft Australian Foot Guideline (Australian Centre for Diabetes Strategies 2001).

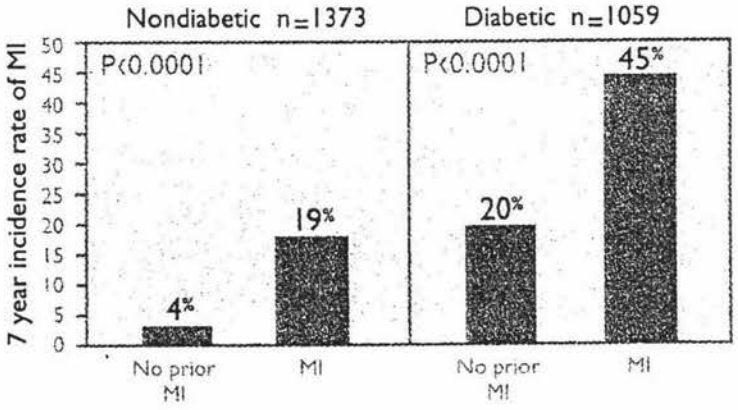
- ***Macrovascular complications***.

Diabetic heart disease:

In diabetes approximately two thirds of all deaths are due to cardiovascular disease, defined as angina, myocardial infarction, ischaemic stroke, transient ischaemic attack and peripheral vascular disease (Haffner et al 1998). These are not specific to diabetes, but diabetes increases the risk two to five times (Kanters et al 1999; Yudkin et al 1996; Evans et al 2002; Fonesca 2004). Hyperglycaemia interacts with other risk factors for heart disease, such as hypertension and dyslipidaemia, which also occur with a 30 to 50% increased frequency in people with diabetes (Turner et al 1998). Each 1% reduction in HbA1c is associated with a 21% reduction in the risk of diabetes-related death and a 14% reduction in risk of myocardial infarction over 10 years (Stratton et al 2000). Asymptomatic people with diabetes have the same cardiac mortality event rate as people without diabetes with a prior event. Silent myocardial ischaemia is present in

25% and cardiac autonomic neuropathy is present in 50% of people with diabetes, and both are predictive for subsequent cardiac events (Haffner et al 1998), as illustrated in Figure 2.4 below. Hence every person with diabetes is classified at higher cardiovascular risk.

Figure 2.4: *Diabetes and CHD: 7-year incidence of fatal/nonfatal MI* (EastWest Study)*



MI = myocardial infarction ** These patients had no MI at baseline*

Source: Haffner et al 1998

In New Zealand absolute cardiovascular risk is usually calculated from the National Heart Foundation's cardiovascular risk tables based on the Framingham Heart Study (Milne 2003). A more refined assessment in people with diabetes has been modelled using data from the United Kingdom Prospective Diabetes Study 38 (1998c) which includes adjustments for HbA1c and duration of diabetes. An approximation to this calculated risk can be made on the National Heart Foundation's cardiovascular risk tables by adjusting upwards one category (5%) those with an HbA1c consistently over 8% or duration of diabetes greater than 10 years (Stevens et al 2001). For all people with diabetes the five-year cardiovascular risk should be less than 15% (i.e. less than 15% risk of having a cardiac event in the next five years). Where possible, the goal is to achieve: total cholesterol less than 4 mmol/l; HDL greater than 1 mmol/l; total:HDL ratio less than 4.5; LDL less than 2.5 mmol/l; triglycerides less than 1.7 mmol/l, blood pressure less than 130/80 mmHg. and HbA1c less than 7% (MoH 2003a).

The United Kingdom Prospective Diabetes Study is considered by health professionals to be the most important international evidence-based research project in type 2 diabetes to date (Skyler 1999). It found that intensive control of blood glucose concentrations in people with diabetes significantly reduces the risk of diabetes-related complications. Factors found to affect control included culture, diet, stress, access to healthcare, socio-economic status, education, psychological issues, physical activity, and attitudes of the patients. In particular intensive blood glucose control was shown to reduce the risk of major diabetic eye disease by one quarter and early kidney damage by one third. It also demonstrated that at diagnosis approximately half of the people with diabetes already have some evidence of diabetic tissue damage, suggesting that a formal screening programme should be established in high-risk areas to identify diabetes before symptoms occur, allowing for early therapy and better outcomes (United Kingdom Prospective Diabetes Study 33 1998a, 34 1998b; Turner et al 1999a).

2.1.4: Comorbidities

2.1.4.1 *Hypertension*:

Hypertension is a major risk factor for cardiovascular events, and is a significant contributor to macrovascular and microvascular complications of diabetes. Nearly 60% of adults with diabetes have comorbid hypertension, which doubles their risk for cardiovascular events (Arauz-Pacheco et al 2002).

The United Kingdom Prospective Diabetes Study demonstrated that intensive blood pressure control in people with diabetes reduced the risk of diabetes-related deaths by 32%, strokes by 44%, and microvascular disease (such as renal failure and deterioration of vision) by 37% (United Kingdom Prospective Diabetes Study 38 1998c). The investigators recommended a target blood pressure of less than 150/85 mmHg, although the study achieved a mean blood pressure of 144/82 mmHg. Current recommendations are for a target of 130/80 mmHg or below (MoH 2003a).

The 1997 report of the Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure recommends :

> 'modest weight loss and moderately intensive aerobic physical activity with and without medications as treatment for hypertension'.

This is supported by data from two recent meta-analyses. The first, using combined data from 18 randomised trials, found that modest weight loss of 4-8% of body weight was associated with a 3 mmHg drop in systolic and diastolic blood pressures (Mulrow et al 2002). In the second, analysis of 54 randomised trials found that aerobic exercise was associated with 5- and 4-mmHg decreases in mean systolic and diastolic blood pressures, respectively (Whelton et al 2002). It has also been shown that eating patterns can have a profound effect on blood pressure. An increase in vegetable, fruit, and low-fat dairy intake with limiting of alcohol can reduce mean systolic and diastolic blood pressure by 11.4 and 5.5 mmHg respectively (Appel and Moore 1997). The measures outlined here are considered of equal importance to the limiting of salt intake. In elderly (over 65 years of age) without prior stroke, there is a risk in extreme lowering of blood pressure (systolic blood pressure <125 mmHg), although a randomised controlled trial is required to determine optimal levels of control (Katakura et al 2003).

2.1.4.2 ***Dyslipidaemia:***

The classic lipid abnormality in diabetes is low high density lipoprotein (HDL) cholesterol and high triglycerides. Elevated serum low density lipoprotein (LDL) cholesterol may also be present in up to 75% of people with diabetes. Diabetic dyslipidaemia is present in one-quarter to one-third of people with diabetes and is related to insulin resistance, exacerbated by central obesity (Stamler et al 1993). This lipid profile is also present in the metabolic syndrome.

The United Kingdom Prospective Diabetes Study confirmed that LDL-cholesterol is a powerful indicator of cardiovascular risk in diabetes. The authors suggested that to reduce risk it is important to: reduce LDL-cholesterol, HbA1c, blood pressure; raise HDL-cholesterol and limit smoking (Turner et al 1998). The largest lipid-lowering study to date, the Heart Protection Study, achieved a reduction in combined vascular events of approximately 30% in the group with diabetes, by lifestyle change and pharmacotherapy. In the group with metabolic syndrome there was a 40% reduction in risk (Heart Protection Study Collaborative Group 2003).

Hyperglycaemia (HbA1c >8%) has been positively correlated with total triglycerides, LDL, and smaller (non-cardioprotective) HDL particle size ($p = <0.05$, all) in women, as determined by nuclear magnetic resonance. HDL levels and particle size are

inversely related to HbA1c ($p<0.001$). Apart from improved glycaemic control, other measures such as increased exercise, weight loss, smoking cessation, lipid-lowering drugs, and hormonal factors may also favourably impact on serum lipids and the lipoprotein subclass profile (Heart Protection Study Collaborative Group 2003).

2.1.4.3 *Obesity*

Obesity in population groups is assessed by determining the body mass index or BMI (weight/height^2, kg/m^2) or the degree of abdominal obesity based on waist circumference, as shown in Tables 2.1 and 2.2 (Pi-Sunyer et al 1998; Swinburn 1998). The World Health Organisation has recognised that body mass index cut-off values for obesity among Asians need to be re-examined, owing to preliminary data from various Asian countries demonstrating that risk factors are manifested at lower levels of body mass index (Inoue and Zimmet 2000; Deurenberg et al 1998; Yap and Deurenberg 1999; Bell et al 2002; McAuley et al 2002). It has been suggested that in certain Asian populations both body mass index and waist circumference criteria be reduced by 15-20% (Bloomgarden 2002). Widely accepted standards for visceral fat estimation do not exist (Lebovitz 1998); currently the only reliable way to determine visceral fat is with a CT or MRI scan.

Table 2.1: *Proposed classification of weight by BMI in different adult ethnic groups.*

Ethnicity	Normal weight	Overweight	Obese	Risk of co-morbidities
European	18.5-25	25-30	>30	average
Pacific/Maori.	18.5-26	26-32	>32	high
Chinese/Indian	18.5-23	23-25	>25	very high

Source: Pi-Sunyer et al 1998; Inoue and Zimmet 2000)

Table 2.2: *Proposed waist circumference in different adult ethnic groups.*

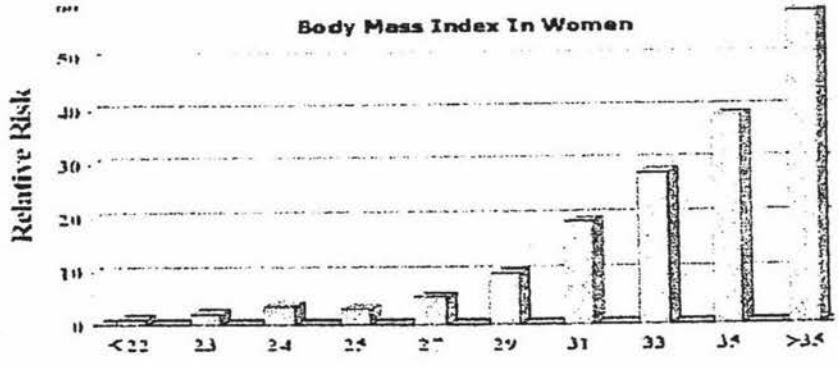
Ethnicity	Men	Women
European	<102 cm	<88cm
Pacific/Maori.	<102 cm	<88 cm
Chinese/Indian	<90 cm	<80 cm

Source: Pi-Sunyer et al 1998; Inoue and Zimmet 2000)

In New Zealand 21% of the population are obese and this is expected to rise to 30% within a decade (MoH 2003b). One-quarter of Maori females, and almost one-half of Pacific females are obese (MoH 1999a; MoH 2003b; Appendix 2.3). The 2002 National Children's Nutrition Survey found that one-third of children (5 to 14 years of age) surveyed were either overweight or obese: 41% of Maori, 62% of Pacific and 24% of European /Other children (MoH 2003c). Childhood obesity rates have more than doubled in New Zealand over the past decade, which has serious implications for earlier diagnosis of diabetes with earlier complications. Metabolic syndrome is estimated to be present in 10% of American children (Bloomgarden 2002).

Obesity increases the risk of developing diabetes 40 to 80 times, and approximately 80% of people with diabetes are obese (Toomath 2002). With centrally distributed (android) body fat there is impairment of glucose tolerance and substantially-increased insulin secretion after an oral glucose load. Intra-abdominal fat increases with age and carries the highest risk for developing diabetes, cardiovascular disease, hyperlipidaemia and hypertension, as well as other comorbidities such as sleep apnoea and osteoarthritis of weight-bearing joints (Lemieux et al 2000; Wilson et al 2001) – but correlation does not imply causation. However, a 5-10% weight reduction can result in a significant improvement in blood glucose, blood pressure, triglyceride and HDL-cholesterol (Pories 1992; Wing et al 1998; Maggio and Pi-Sunyer 1997; Markovic et al 1998). A mean weight loss of 9kg is associated with a mean reduction of 2.7% in absolute HbA1c in subjects with diabetes, primarily by improvement in insulin sensitivity (Dixon et al 2003). Figure 2.5 shows the increase in risk of diabetes in women with increasing body mass index.

Figure 2.5: *Relative risk of diabetes in relation to body mass index in women*



Source: Colditz 1995

The United Kingdom Prospective Diabetes Study highlighted that early intensive dietary intervention and weight loss after diagnosis could delay the progression of diabetes. (United Kingdom Prospective Diabetes Study 7 1990).

More than a decade ago Barker described a relationship between small size at birth and increased risk of coronary heart disease, diabetes, hypertension and dyslipidaemia in adulthood (Barker et al 1997). These relationships have been confirmed in many different populations, but the underlying mechanisms remain uncertain (Harding 2003; Yajnik 2004; Appendix 2.4).

Birth size is a surrogate for summing the interaction between foetal experience plus genotype. Experimentally prenatal under-nutrition leads to offspring with insulin resistance, leptin resistance, hypertension, abdominal (truncal) obesity, reduced muscle mass, hyperphagia, fat preference in diet, impaired thermogenesis, reduced activity and increased anxiety levels. If deprived the foetus alters its physiology with insulin resistance to conserve its nutrients in expectation of its postnatal environment. This is known as a predictive adaptive response. In New Zealand there are a number of racial groups with this 'survival' genotype, thought to have evolved due to unpredictable food supply in the past, that have undergone environmental transition. These include Maori, Pacific, Indian and Chinese groups (Gluckman 2003). The lifetime risk of being diagnosed with diabetes is around 30% for Maori, 25% for Pacific and only 9% for New Zealand Europeans (MoH 2002a). In European populations the overall incidence of diabetes remains low despite the high level of obesity (Diamond 2003).

2.1.5 Other risk factors

2.1.5.1 *Socioeconomic disadvantage and health inequalities*

The experience of having diabetes and caring for it can vary dramatically according to a person's race and ethnicity. Minority groups bear a greater burden of diabetes and its complications, and are disproportionally represented in economically-disadvantaged communities. Poverty is negatively correlated to health, reducing life expectancy by six years for women (MoH 2002b). The likelihood of developing diabetes is highest in low socio-economic groups (Agardh et al 2004; Appendix 2.5). Maori and Pacific people are over-represented in the most socio-economically deprived areas in New Zealand, as

well as in the lower income brackets (Reid et al 2000; Statistics NZ 2002a). They also tend to acquire diabetes earlier than Europeans, are at a genetically higher risk of renal failure, and are not accessing health services as frequently (Metcalf et al 1993; Appendix 2.6). Similar differences are seen in American racial minority groups; when access to care is comparable, microvascular complications, macrovascular disease, and subsequent death occur with different frequencies among various racial groups (Young et al 2003).

In the 1997 New Zealand National Nutrition Survey one third of Maori and Pacific women responded that they could only sometimes afford to eat properly, and that variety of foods was limited. One quarter of these women were stressed about lack of money for food, and when there was no food for special occasions. Maori (29%), Pacific (39%), and European/Other (10%) women stated that food runs out in their household sometimes due to lack of money (Russell et al 1999). A more recent National Children's Nutrition Survey found that only 64% Maori, 47% Pacific and 86% European/Others parents/caregivers reported that their household could always afford to eat properly (MoH 2003c). These surveys only considered Maori, Pacific and European/Others, where 'others' could differ widely from European. In 2002 the Ministry of Health facilitated the establishment of an Asian Public Health Project team to assess Asian health needs in Auckland. Their report states that approximately 30% of Asian people live in the most deprived areas (deciles 8-10), in comparison to 73% of Pacific, 51% Maori and 18% of European people. In 2001 7.4% of the Asian population were unemployed in the Auckland region compared to 10% Pacific, 11% Maori, and 3.1% European people (MoH 2003e). These figures do not give the full picture since Indian and Chinese are not differentiated yet anecdotally Indian people have greater fluency in English and hence presumably better access to health and other services as well as employment.

New Zealand's current race-based health policy based on need appears to have successfully narrowed the gap between Maori and European life expectancy from 10 years in the late 1990s to seven to eight years currently (Blakely 2004). However equal access to health care for all ethnic groups is a priority. The government's immigration policy change to accept immigrants with chronic diseases and no English language has created an immense challenge for healthcare providers. Lack of foresight and

communication between immigration and health ministries has led directly to inequities in health care, and an additional burden on the health system.

2.1.5.2 *Smoking*

Smoking may increase insulin resistance, interfere with insulin action, and result in poor metabolic control (Haire-Joshu et al 1999, 2001). It causes premature morbidity and mortality and is associated with increased incidence of cardiovascular disease and other diabetic complications, including retinopathy, neuropathy, nephropathy, and arterial occlusive disease. Smokers with diabetes have a 14 times higher risk of cardiovascular disease than that for smoking or diabetes alone. The American Diabetes Association position statement on smoking provides clear recommendations for smoking cessation as a primary focus of diabetes management and care (American Diabetes Association 2004b), as do the New Zealand guidelines (MoH 2003a).

Low mood is associated with increased smoking and decreased cessation rates. Smoking reduces anxiety and elevates mood, useful for individuals dealing with the stressors of diabetes and reluctant to give up amidst all the other pleasures they see themselves having to give up because of their diabetes. Pharmacotherapy should be considered as adjunctive therapy for smokers with diabetes (Anderson and Rubin 2002).

In New Zealand Maori women have the highest rates of smoking (50.5%) and Asian women the lowest (4.4%); in Pacific (33%) and European (18.8%) women the rate is high and equal to men in these ethnic groups (MoH 2003b). The number of people on low incomes who smoke is high. At least one third of the shorter life expectancy of those living in the most deprived areas (as measured by the New Zealand Deprivation Index) is accounted for by tobacco consumption. The percentage of deaths due to smoking for females has increased from 9% to 14%, (and decreased for males from 29% to 22%) between 1980 and 1998 (MoH 2002b).

2.1.5.3 *Alcohol*

Since the 1980s the alcohol-related mortality rate for New Zealand males has decreased, whereas the female rate increased in the mid-1990s. Maori and Pacific alcohol-related mortality rates are approximately twice as high as the rate for New Zealand European/Other (MoH 2002b).

Prospective cohort studies indicate that mild to moderate alcohol consumption (five to fifteen grams in women) is associated with a 30 to 80% reduced risk of coronary heart disease among adults with diabetes (Solomon et al 2000). These levels support a recommendation that safe intakes for people with diabetes are the same or slightly lower than intakes recommended for people without diabetes. There is no evidence that quantifies the risk of alcohol consumption in people with both coronary heart disease and diabetes (MoH 2003a). Acute alcohol intake reduces peripheral insulin sensitivity. Paradoxically, chronic light to moderate alcohol consumption is associated with enhanced insulin sensitivity in people with normal glucose tolerance (Zilkens and Puddey 2003). Alcoholic beverages provide energy and have potential adverse effects on sugar intake, triglyceride levels and blood pressure. Neuropathy and retinopathy are more common in those with an excessive alcohol consumption (Bell 1996).

2.1.6 Cost of diabetes and its complications in New Zealand

The Health Funding Authority's Diabetes 2000 Implementation Plan estimated an expenditure of $160 million in 1998/99 and recommended a budget of $175 million for 2001/02 for all people with diagnosed diabetes (MoH 2000).

However a subsequent report commissioned by Diabetes New Zealand (PricewaterhouseCoopers 2001) estimated expenditure to be in the region of $247 million for 2001/02 to cover the many cases where diabetes was the underlying cause, but primary diagnosis was stroke, coronary conditions, amputation or infection. These are direct medical costs and do not take into account social costs such as diminished quality of life and diminished productive capacity, or personal costs to people with diabetes and their families (Appendix 2.7). In addition the cost estimate excludes undiagnosed cases of diabetes. Data show that diabetes is associated with excess costs for up to eight years before diagnosis, and that this added cost is due mainly to the presence of cardiovascular disease. Simmons factored these into his cost estimates in 1996 but his figures have not been updated since (Simmons 1996). His report stated that if government rationing continues the estimated annual cost would exceed $1 billion by 2021. In other words the cost of diabetes could rise from 3% to 12% of total health spending in 20 years, as is currently the case in America (American Diabetes Association 2003b), crowding out other health services. Recommendations were made

which could reduce the serious economic consequences of the rising prevalence of diabetes, however to date none of these have been adopted (Denton 2004).

It is evident that current services are insufficient to ensure that all people with diabetes are receiving the care they need to effectively manage their condition. There are no screening initiatives in New Zealand to capture those with undiagnosed diabetes, impaired glucose tolerance and impaired fasting glucose, so the diagnosis for diabetes may be made up to 15 years after the onset of damaging high blood glucose and lipid levels. A national screening programme could identify these so that they could be targeted with dietary and lifestyle advice to slow or avert the costly diabetes epidemic (Kenealy et al 2002). There is no national register in New Zealand to provide linkage between diagnosis, treatment and outcomes; consequently mortality figures underestimate diabetes as a primary causal factor (MoH 2002c; American Diabetes Association 2003b).

Costs are highest in those from lower socio-economic groups who face barriers which impede early diagnosis and diabetes management, leading to expensive complications such as visual reduction, amputation and possible dialysis. These barriers are not only economic; these groups are unlikely to be able to access free services provided by the health sector due to lack of transport, difficulty in getting time off work, language difficulties and other priorities (Appendix 2.8).

The estimated average cost per severe complication is $20,000. Whereas stroke, coronary bypass or foot amputation cost approximately $18,000, dialysis costs on average $37,000 in the first year, and $25,000 for subsequent years (costs provided by Christchurch Hospital 2001). Hospital admission for minor complications has been estimated at $1000, and for a condition caused by undiagnosed diabetes, such as pneumonia $10,000. The annual cost for diabetes specialist services was estimated to be $1000 per person (PricewaterhouseCoopers 2001). In a 1993 study the average cost per diabetic foot admission in South Auckland was estimated to be $12,500 (Thompson et al 1993). By 2003 diabetes-related costs for the top 20 diabetes patients seen at South Auckland's inpatient and outpatient service were $77,000 to $170,000 per patient, and the average cost of clinic-based haemodialysis was $45,000 per year (Thomas 2004).

2.1.7 Treatment of diabetes, its complications and co-morbidities

In the 1980s treatment focused on microvascular complications, but today the major complications are seen as macrovascular, although the issue remains contentious (personal observation). Glycaemic control, risk factors and complications can now be monitored and treated as shown in Table 2.3 (Phillips 2003).

Table 2.3: *Management of diabetes: 1980s and today.*

	1980s	2000s
Severity	'A touch of sugar'	Major risk factor for cardiovascular disease
Major complications	Eye disease	Cardiovascular disease/kidney damage
Interventions available for risk factors	Few medications Limited effectiveness Many side effects	Many medications Demonstrated effectiveness Few side effects
Treatment of complications • Retinopathy • Cardiovascular disease • End stage renal disease	Hypophysectomy	Laser ocular surgery Angioplasty and surgery Dialysis and transplant
Benefits of intervention Blood glucose Blood pressure Blood lipids	Not clear	Strongly implied by randomised control trials
Microalbuminuria Aspirin	Not considered	
Monitoring	Intermittent laboratory blood glucose	Home blood glucose monitoring* Glycosylated haemoglobin Microalbuminuria

**At the time of writing, continuous and non-invasive blood glucose monitoring are experimental but they are expected to become available in the next few years.*

Source: Phillips 2003

The acute complication of hypoglycaemia is treated with glucose as glucose tablets, gel or powder, these being most rapidly absorbed, or if unavailable, sugar in any form that can be quickly assimilated. It is important to establish the cause of hypoglycaemia to prevent recurrent episodes. For hyperglycaemia, medication should be added if diet, physical activity and education have not achieved individual treatment targets or if the patient is very symptomatic (Manley et al 2000). Screening for chronic complications is essential from the time of diagnosis, by retinal photography, regular foot checks and biochemistry to monitor renal function and cardiac risk factors. Comorbidities such as hypertension and dyslipidaemia are treated initially with diet, physical activity and education, unless levels are extremely high, in which case medication is commenced immediately. Successful weight reduction may result in a reduction in medications required.

2.1.7.1 *Nutrition therapy:*

Nutrition is a major component of the management of diabetes, being important for optimal glycaemic control and the prevention of both micro- and macro-vascular complications. Focus needs to be on glucose and lipid level goals by modifying fat intake, improving food choices and spacing meals throughout the day, with regular monitoring of blood glucose, HbA1c, lipids and blood pressure. If obesity is present calories will need to be restricted for moderate weight loss. Daily physical activity is important, as are regular medications, if needed.

Requirements are firstly assessment of individual metabolic and lifestyle parameters, followed by identification of nutritional goals, intervention designed to meet nutritional goals, and evaluation of therapeutic outcomes (Gillanders 2004). To meet these goals intake of saturated fat (<7% of energy), total fat (<35% of energy) and added sugars need to be reduced, and intake of intact carbohydrate (42-50% of energy) as whole-grains, legumes, fruit and vegetables, and low fat milk products increased, in conjunction with specific target-driven pharmacotherapy. These measures have been shown to reduce HbA1c, cholesterol, triglyceride and blood pressure levels, hence delaying onset of microvascular and macrovascular complications of diabetes (United Kingdom Prospective Diabetes Study 38 1998c; Gaede et al 1999).

Every person with diabetes or the metabolic syndrome should receive intensive dietary advice from a dietitian, to gradually adopt a cardio-protective dietary pattern (MoH 2003a). This entails a reduction in the intake of foods rich in saturated fatty acids or added sugars, and white flour bakery products. A progressive replacement of these foods with vegetables, fruit, whole-grain, high fibre products including dried peas and beans (legumes) is recommended, along with an increase in consumption of fish, and a small amount of mono-unsaturated fats in the form of oil, nuts, seeds or margarine, the latter ideally containing plant sterols (Garg 1998). Plant sterols in amounts of two to three grams per day have been shown to lower total, LDL and VLDL cholesterol by inhibiting cholesterol absorption and synthesis (American Diabetes Association 2004c). A reduction in salt and alcohol intake may also be required; no more than six grams of salt per day (He and MacGregor 2002), and no more than two standard drinks at one time for women (Solomon 2000; Zilkens and Puddey 2003), are recommended.

Dietary carbohydrate is the primary dietary determinant of postprandial glucose and insulin responses.

To control postprandial hyperglycaemia it is necessary to:

- distribute carbohydrate foods evenly throughout the day;
- avoid a large volume of carbohydrate-rich foods at any one meal;
- include high-fibre foods with a low to moderate glycaemic index at each meal.

Distribution of carbohydrate evenly through the day reduces all-day insulin secretion and mean blood glucose levels (Jenkins et al 1992; Bertelsen et al 1993). Limiting the total amount of carbohydrate per meal decreases postprandial hyperglycaemia (Wolever and Mehling 2003). Dietary interventions that provide a high percentage of fibre-rich unrefined carbohydrate with a low glycaemic index, essential micronutrients and bioactive compounds, are recommended for the improvement of glycaemic control, total and LDL cholesterol, and triglyceride levels (Mann 2001; Perry and Mann 2000; Chandalia et al 2000; Brown et al 1999). Their slow digestibility improves satiety, reducing overall food intake due to the suppression of glucose and insulin responses, assisting with weight control. (Warren et al 2003). The concept of glycaemic index is widely used, but remains controversial in America (Franz 2003).

Dietary fibre recommendations for people with diabetes have remained at 30gms per day through the last two decades while attention focused on glycaemic index and glycaemic load. Incorporating low glycaemic index foods into a dietary pattern consistently lowers HbA1c by 2-16% (Brand-Miller 2003a; Wolever and Mehling 2003; Brynes et al 2003). However lists of glycaemic indices of foods initially overlooked their energy density, fibre content and nutritional value, although fat content is now included (Brand-Miller et al 2003b). To allay this source of confusion, fibre recommendations have recently been increased to more than 40g per day, with emphasis on the cardioprotective qualities of viscous non-starch polysaccharide or soluble fibre (Anderson et al. 1999; MoH 2003a). Components of dietary fibre may collectively explain up to 50% of the glycaemic response (Wolever and Mehling 2003). Fibre can trigger the same signalling mechanisms as fat, promoting release of cholecystokinin, slowing glucose release, and lowering the glycaemic response to the food. Protein also promotes satiety in much the same way.

Protein intake of New Zealand adults is 15 to 16% of total energy intake and is relatively constant across age, sex, and ethnic groups (MoH 1999a). Intake of protein in this range does not appear to be associated with the development of diabetic nephropathy, particularly if it includes vegetable protein. However the long-term effects of consuming protein in excess of 20% of total energy intake on the development of nephropathy has not been determined, and the long-term efficacy and safety of the currently popular high protein low carbohydrate Atkins type diets for weight reduction remains unknown (Atkins 2003).

In people with well-controlled diabetes dietary protein does not increase plasma glucose concentrations, although protein is just as potent a stimulant of insulin secretion as carbohydrate. Hyperglycaemia can contribute to an increased turnover of protein so that protein requirement may be greater than the recommended dietary allowance, but not greater than usual intake. New Zealand continues to use Australian 1990 recommended dietary allowances (Truswell et al 1990), which for protein is 45g per day for adult women, based on 0.75g/kg body weight (11-15% of total energy intake) for a reference 60kg woman (MoH 2003d). Most New Zealand women consume more than the current recommended dietary allowances.

Fat intake in New Zealand is high, providing 35% of total energy intake, mainly from saturated fat; the suggested minimum fat required is 15% of total energy intake, from a balanced intake of essential fatty acids. These are linoleic (omega-6), found in sunflower, soy or corn oils, which can lower total and LDL-cholesterol, and alpha linoleic acid (omega-3) found in oily fish, linseed, nuts, olive and canola oils which are also cardioprotective, having anti-arrhythmia, anti-inflammatory and vasodilating properties (MoH 2003a). The latter are predominant in the Mediterranean diet which has been shown to reduce cardiac mortality by more than 50% (de Lorgeril et al 1999).

Hence there is considerable scope for weight reduction and improvement of lipid profile, particularly by minimising intake of saturated and trans fats, and cholesterol, found in commercially fried foods, baked goods, convenience foods and spreads (MoH 2003d; Uusitalo et al 1996). The food industry needs to formulate 'weapons of mass reduction' – foods with more fibre, water and protein that will increase satiety (Tasman-Jones 2003).

Weight reduction and maintenance

Weight reduction is the primary objective in the management of overweight and obese people with diabetes, and is recommended for Maori and Pacific women with a body mass index greater than 26 kg/m^2, European women with a body mass index greater than 25 kg/m^2, and Chinese and Indian women with a body mass index greater than 23 kg/m^2 (see Tables 2.1, 2.2). A realistic goal is for a weight reduction of 5-10% of initial body weight, which if maintained, will produce long-term improvements in glycaemic control, lipid profile and blood pressure. Caloric intake needs to be 1000 calories/day less than current intake to produce a half to one kilogram per week weight loss.

The addition of exercise to a weight reduction programme achieves better long-term weight loss, minimises loss of lean body mass, reduces insulin resistance, improves serum lipid profiles and long-term glycaemic control (Boule 2001). The combination of a low calorie/low fat diet, physical activity, and behaviour modification is most effective for producing and maintaining weight loss (Miller et al 1997). However treatment for severe obesity is generally slow unless very-low-calorie diets, pharmacotherapy or surgery are used (Wing et al 1994; Padwal et al 2003; Dixon and O'Brien 2002).

Drugs associated with weight gain include insulin, suphonylureas, glucocorticoids, a1-adrenergic-receptor antagonists (Terazosin), phenothiazines (chlorpromazine), tricyclic antidepressants (amitriptyline), lithium, valproate, and cyproheptadine (periactin) (New Ethicals Catalogue 1998).

Algorithms for food, medication and activity can be developed to help manage diabetes on a daily basis. Goals are to achieve normal blood glucose, blood pressure and lipid levels, prevent, delay or treat complications, and improve health through optimal nutrition for all life stages. Effective interventions combine continuous nutrition education with behaviourally-oriented counselling to help people acquire the skills, motivation, and support needed to alter their daily eating patterns and food preparation practices, along with goal setting and monitoring (Norris et al 2001; Franz et al 2002). To integrate nutrition therapy into an individual's lifestyle requires a patient-centred approach, sensitive to ethnic and cultural differences. The New Zealand Dietetic Association states that:

'Education must be given in the context of their cultural setting extended to the wider family, and delivered with sensitivity towards their traditional health beliefs and behaviours' (New Zealand Dietetic Association 1997).

Contact with a registered dietitian is recommended at least twice per year to monitor metabolic parameters and assess effectiveness of the nutrition therapy (Monk et al 1995). Family members and significant others should be involved in the nutrition education process and are encouraged to follow the same lifestyle recommendations as the person with diabetes. Flexibility, realistic goals and ongoing support are more important than factual education in helping people master dietary self-management. Obstacles include institutional pressures to see more people in less time, cultural and economic barriers (American Diabetes Association 2003b).

2.1.7.2 *Physical activity:*

Although diet is more effective for producing weight loss, evidence suggests that physical activity may be the single best predictor of weight loss maintenance, and has been shown to reduce HbA1c independent of body weight (Miller et al 1997; Kukkonen-Harjula et al 1998; Anderson et al 2001a). In New Zealand Pacific people have been found to be the most obese and least active; a study by Bell found that for Tongan and Samoan women a large proportion of their leisure time was sedentary (36%, 25% respectively) which is thought to contribute to their high prevalence of diabetes (Bell et al 2001a,b). Chinese immigrants do less recreational exercise than Europeans and seldom play sports (Ng 1994). For an activity programme to be successful it must be safe, realistic, feasible, affordable and sustainable (Joslin 1959).

Documented benefits of physical activity for people with diabetes include:

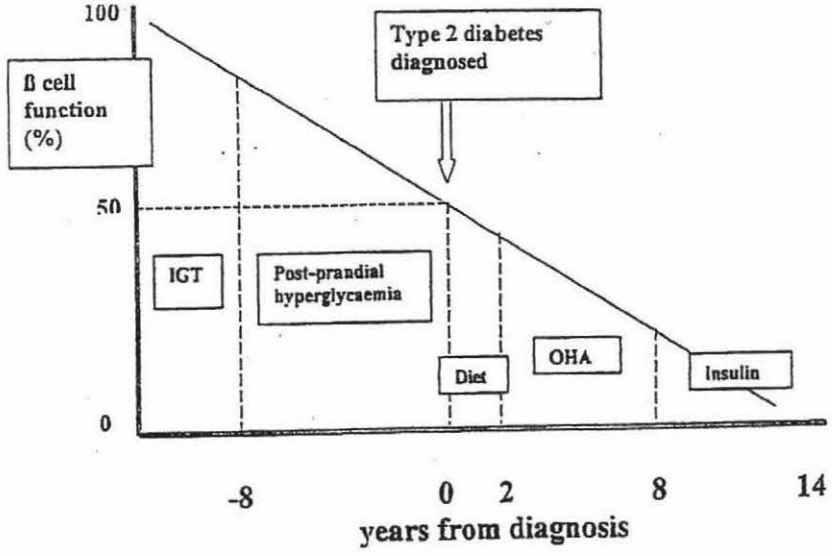
- health benefits, such as improvements in glucose regulation, weight control, lipid profiles (increasing HDL, decreasing TG and LDL), hypertension, and increased strength and work capacity (American Diabetes Association 2004d; Duncan et al 2003; Cox et al 2001; Williams 2001);
- social benefits, such as increased interaction with family members and friends, and participation in organised, community-based activities (Farquhar 2003);
- psychological benefits such as reduced anxiety, depression, and stress and increased feelings of well-being (Farquhar 2003).

However the beneficial effects diminish quickly, implying that physical activity should be performed on a regular basis. The recommendation is that regular aerobic activity such as brisk walking for 30-60 minutes, should be performed on most days of the week (Goodpaster et al 1999). To assist with weight loss and maintenance an average of 1000 to 1200 kilojoules expended per day is recommended. Currently only one half of New Zealand adults meet this target (MoH 2004). Resistance training is now recommended for a broader group of people with diabetes following new data on its efficacy and safety (Cuff et al 2003; Sigal et al 2004). An activity programme should start slowly, build up gradually, and include exercises that are familiar, culturally-appropriate, and least likely to cause injury or worsening of long-term complications.

2.1.7.3 *Medications:*

Maintaining normal plasma glucose levels is a key factor in reducing the risk of developing diabetes complications (United Kingdom Prospective Diabetes Study 33 1998a, 34 1998b). Diabetes is a progressive disorder and the majority of patients need multiple therapies to meet glycaemic targets in the long term, as shown in Figure 2.6.

Figure 2.6: *Type 2 diabetes is a progressive disorder.*



* *OHA: oral hypoglycaemic agents*

Source: Turner et al 1999b

Current recommendations emphasise lifestyle management, diet and physical activity as the first line approach, followed by therapy with oral hypoglycaemic agents, either alone or in combination. Until recently the only significant pharmacological options for treatment of diabetes have been sulphonylureas (glipizide, gliclazide), biguanides (metformin) and insulin. The sulphonylureas stimulate endogenous insulin secretion, whereas the biguanides facilitate insulin action, hence they are often used in combination. Metformin is the agent of first choice for the overweight person with diabetes and insulin resistance. It reduces insulin resistance, has an anorexic effect and is cardioprotective.

Two new groups of oral agents have been developed over the past decade but are not currently funded in New Zealand, hence use is limited (Pharmac 2003). These are metiglinides (repaglinide, nateglinide) which stimulate insulin secretion, and thiazolidinediones (rosiglitizone, pioglitizone) which facilitate insulin action. Insulin therapy is commenced after failure of oral agents (see Figure 2.6), generally in combination with metformin (Turner et al 1999b). New insulin analogues, both short acting and long-acting have recently been introduced, and new methods of insulin delivery are being developed, most notably inhaled insulin.

Cardiovascular complications are now the leading causes of morbidity and mortality in people with diabetes. Hence there has been a change in emphasis from solely glycaemic control to the prevention of macrovascular disease as the predominant aim for patients with diabetes and lesser degrees of glucose intolerance (Drury 2003). Intensive blood glucose control has been shown to reduce rates of microvascular but not macrovascular complications of diabetes (United Kingdom Prospective Diabetes Study 33 1998a). Aspirin, as an antiplatelet therapy, is recommended for use in patients at risk of cardiovascular events such as stroke, particularly in those with diabetes (Hayden et al 2002), but is currently under-prescribed (Stafford and Radley 2003). Lipid-lowering therapy (with statins or fibrates predominantly) has been shown in numerous studies to reduce cardiovascular risk in patients with diabetes and impaired fasting glucose, with or without prior vascular disease (LIPID Study Group 1998; Haffner et al 1999; Goldberg et al 1998; Barzilay et al 2001). Hypertension therapy (with ACE inhibitor or angiotensin II receptor blockers predominantly) is important to delay the development

and progression of diabetic nephropathy (United Kingdom Prospective Diabetes Study 38 1998c).

2.1.7.4 *Nutritional Supplements:*

A systematic review found there was insufficient evidence to draw definitive conclusions about the effectiveness of any herbs or dietary supplements to improve glycaemic control in diabetes (Yeh et al 2003). However dietitians are now recommending folate pre-conception for protection against neural tube defects, and this has been found to be cardioprotective, by reducing serum homocysteine levels, although the effect on disease endpoints remains undetermined (Baliga et al 2000).

Fish oil supplementation of 3g per day lowers triglycerides (0.56 mmol/l) but larger amounts increase levels of LDL cholesterol (Farmer et al 2001). It has no significant effect on glycaemic control or on cardiovascular endpoints in diabetes. Plant sterols and stanol-fortified esters (2-3g per day) have been shown to inhibit cholesterol absorption and synthesis, lowering LDL- and VLDL-cholesterol in diabetes, over and above the effects of diet and pharmacotherapy (American Diabetes Association 2004c).

Supplements of soluble fibre such as psyllium or guar gum (2-10g per day) have been shown to lower LDL-cholesterol by 5-10% and aid overall glycaemic control (Anderson 1999) but require further study. These can be useful for people unable to tolerate the 40g per day of dietary fibre currently recommended.

A recent meta-analysis found inconclusive evidence of any benefit of dietary chromium supplements for people with diabetes (Althuis et al 2002).

Recent studies have shown that magnesium reduces the risk of diabetes and cardiovascular disease. The evidence is inconclusive, but sufficient to justify a randomised prospective clinical trial to test the effect of consuming major food sources of magnesium, such as whole-grains, nuts and green leafy vegetables, on the development of diabetes in a high-risk population. If magnesium is found to be beneficial it could provide a new cost-effective way to reduce the prevalence of diabetes (Nadler 2004).

In summary there is currently insufficient evidence for the use of nutritional supplements apart from fibre, folate and plant sterols, and those which may be required for comorbidities such as anaemia or osteoporosis.

2.1.8 Prevention of Diabetes

Three recent randomised controlled trials have demonstrated the potential for reduction in progression to diabetes in high-risk subjects with impaired glucose tolerance. The Diabetes Prevention Programme in the United States showed that over three years, lifestyle intervention (targeting diet and exercise) reduced the risk of progressing from impaired glucose tolerance to diabetes by 58% in the intervention group (Diabetes Prevention Program Research Group 2002). Two other large-scale studies, in DaQing, China (Pan et al 1997) and in Finland (Tuomilheto et al 2001), showed similar results. These studies demonstrate the importance of medical nutrition therapy and physical activity in preventing the development of diabetes.

Although less effective, treatment with metformin has also been shown to prevent progression from impaired glucose tolerance to diabetes (Knowler et al 2002). However for any of these strategies to work there is a need for both a population approach and political commitment. Also high-risk subjects with impaired glucose tolerance already have a reduction in B-cell function (see Figure 2.6), so intervention at this stage may be too late to prevent many cases of diabetes; in addition high relapse rates have been shown.

2.2 Prevalence of diabetes

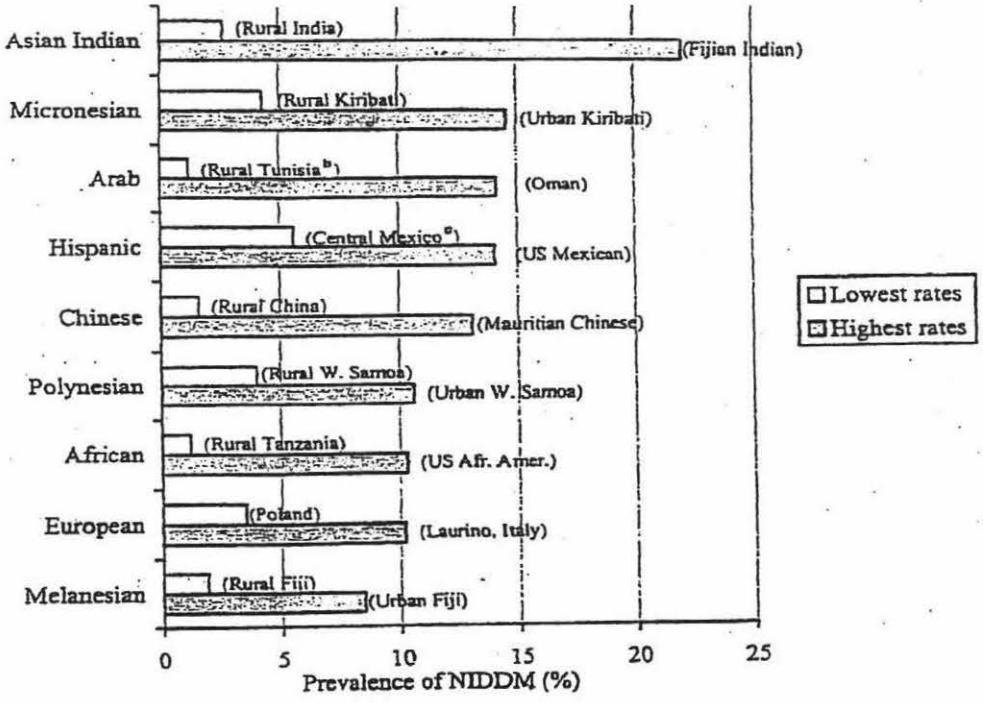
2.2.1 Prevalence of diabetes world-wide:

Diabetes can now be found in almost every population in the world and epidemiological evidence suggests that, without effective prevention and control programmes, diabetes will continue to increase globally (World Health Organisation 2003a; Appendix 2.9a,b). The World Health Organisation estimated prevalence of diabetes to be 143 million people world-wide, in 1997, reaching 300 million by 2025. The two countries with the largest prevalence of diabetes in 1997 were India (21 million) and China (17 million).

Other reports have arrived at similar global figures (Amos et al 1997). Distribution shows large variation between communities and ethnic groups. A disproportionate increase is anticipated in low- and middle-income countries, many of which are included in the Asia-Pacific region, where numbers are predicted to rise from 58 million in 1997 to 136 million in 2025 (King et al 1998).

By 2010 more than 3.0% of the total world population may have diabetes, 61% of these cases being in Asia. The regions with the greatest potential increase are Asia and Africa, where diabetes could become two to three times more common than it is today. Type 2 diabetes constitutes 85-90% of all diabetes in developed countries (Simmons 1996), but accounts for virtually all diabetes in developing countries, with impaired glucose tolerance prevalence being more than two times higher than diabetes (2, 6 or even 8-fold higher in India, Bangladesh, and Tanzania respectively). The ratio between diabetes and impaired glucose tolerance is considered an index of the 'epidemic' stage of the population; a high prevalence of impaired glucose tolerance may be a predictor of future increase in diabetes (King and Rewers 1993, see Figure 2.7).

Figure 2.7: *Differences in the prevalence of diabetes among selected ethnic groups:*



Source: Adapted from King and Rewers 1993

2.2.2 Prevalence of diabetes in New Zealand and in home country of subjects:

In New Zealand prevalence of diabetes has not been widely studied, and there are no official figures for Indian and Chinese New Zealanders, although the high prevalence in their countries of origin and in migrant populations elsewhere is well known. Prevalence estimates for the different ethnic groups are shown in Table 2.4.

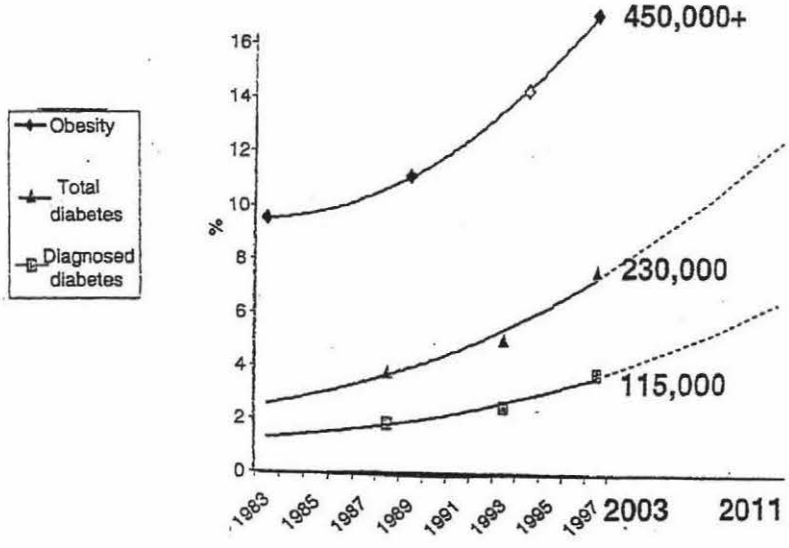
Table 2.4: *Prevalence of diabetes in New Zealand and in home country of subjects*

	New Zealand	Home Country
European	3% [1]	-
Maori	8% [1]	-
Pacific	8% [1]	11-18% [2]
Indian	8% [3]	12% [4]
Chinese	no official figures	China 3% [5]
		Singapore 9% [6]

[1] *MoH 1999b;* [2] *Colagiuri 2002, Zimmet et al 1991, Collins 1994;* [3] *Rush et al 2004 (unpublished);* [4] *Ramachandran et al 2001, 2003;* [5] *Pan 1996;* [6] *Amos et al 1997.*

The 2002/03 New Zealand Health Survey confirmed these figures, and showed an increase in prevalence in Pacific people (MoH 2004; Appendix 2.2). The prevalence of diagnosed and undiagnosed diabetes is shown in Figure 2.8.

Figure 2.8: *Prevalence of diabetes in New Zealand*



Source: Dawson 2003

Currently one in twelve New Zealand adults over 45 years of age reported that they have been diagnosed with diabetes (MoH 2003f). There are thought to be 115,000 people with diabetes (Dawson 2003). However it has been suggested that there may be more than 50,000 with undiagnosed diabetes and more than 300,000 with impaired glucose tolerance in New Zealand (PricewaterhouseCoopers 2001).

The New Zealand Ministry of Health has forecast diabetes incidence to grow by two thirds to 2011 (based on linear projection of obesity prevalence). Of this increase 30% can be attributed to obesity, 30% to increasing population size, 20% to our ageing population, 11% to ethnic mix, 5% to inadequate health care, and 4% due to the fact that we are all living longer. However, the 11% attributable to ethnic mix may be an underestimation. It has been reported that Maori, Pacific and Asian births will make up the majority of new-borns nationwide, and already exceed 50% of births in the greater Auckland area (PricewaterhouseCooper 2001). Diabetes occurs 10 years earlier in Maori, Pacific (Lunt et al 1990b) and Indian ethnic groups (Qiao et al 2003), and along with the rapidly increasing Chinese population, these are the high-risk groups for diabetes, with increasing levels of childhood obesity, and who under-utilise diabetes services. Diabetes in Maori and Pacific people is more likely to be poorly-controlled; although approximately 25% of those diagnosed are Maori, 35% of diabetes attributable deaths are in Maori (Dawson 2003). Diabetes complications account for 17% of deaths in Pacific people, compared to 4% of deaths for people with a European background (Cameron 2002). A Wellington study found that diabetes was the second most common cause of admission to hospital, and the fourth major cause of death for Pacific women aged 45 to 64 years (Bathgate et al 1994). Factors that are prevalent but potentially controllable among Pacific people are obesity, lack of exercise, poor diabetic control, consumption of high calorie foods, inadequate diabetes knowledge and education, and inadequate self-care such as self-monitoring of blood glucose (Mitikulena and Smith 1996). By 2020 it is anticipated that one in six Maori and Pacific adults will have diabetes, and the figure will be similar for Asian people in New Zealand (Dawson 2003)

In summary in New Zealand the growth of diabetes has been found to be higher in Maori, Pacific, Indian and Chinese people than in Europeans (New Zealand Dietetic Association 1997; Simmons et al 1994b, 1999b; Fear 1990), and forecast to increase by approximately 4% per year (MoH 2002a).

2.2.3 Prevalence of diabetes in the Asian community

Asian people are currently the second largest population group in Auckland, making up about 15% of the region's population, with 40% below 25 years of age compared to more than 50% of the Maori and Pacific population. Chinese are the largest Asian group comprising around 50% of all Asian people, followed by Indian at 26% then Koreans at 9%; smaller groups make up the remainder. (MoH 2003e). No official diabetes prevalence figures are available for Chinese or Indian groups, however mortality figures are available for the Asian group as a whole from 1996-1998, as outlined in Table 2.5 below. This table also shows the lower death rate from diabetes in Europeans.

Table 2.5: *Major causes of death in the Auckland Region (1996-1998)*

Ethnicity	IHD/Stroke n (%)	Diabetes n (%)
European	5916 (33.6%)	250 (1.4%)
Maori	343 (22.4%)	84 (5.5%)
Pacific	378 (23.6%)	101 (6.3%)
Asian	138 (25.6%)	27 (5.0%)

Source:Adapted from Asian Public Health Project Report for Ministry of Health, Appendix 5, p.96. 2003e

A rising prevalence of diabetes has been noted in migrant Indian populations in Singapore (Cheah and Tan 1980), Britain (Simmons et al 1991b), Mauritius (Dowse et al 1990) and New Zealand (Simmons 1996, 1997). Indian people living in New Zealand have been shown to have more abdominal fat than Pacific or Maori, and much more than Europeans (Rush 2002). In a study by Tan the high insulin resistance, hypertension, dyslipidaemia and central obesity found in Asian Indians in Singapore was consistent with data on migrant Indians elsewhere, suggesting a genetic susceptibility to diabetes and coronary heart disease (Tan et al 1999). Indians had three times the rate of myocardial infarction of Chinese in Singapore, yet there is a paucity of information on their health status and no official prevalence figures for heart disease or diabetes in the Indian population in New Zealand.

Migrant Chinese are at an increased risk for diabetes and cardiovascular disease due to obesity and dyslipidaemia (Hsu-Hage et al 1995). This is not necessarily attributable to the migration experience, but to the risk factors they bring with them: smoking, poor

diet, such as high saturated fat and salt intake, and previously undiagnosed or untreated communicable and non-communicable diseases (MoH 2003e). Again there is no official information regarding prevalence of diabetes for Chinese in New Zealand, although it is high elsewhere: Singapore 9%, Mauritius 10.5%, Taiwan 13% (Amos et al 1997).

2.3 Social and ethnic issues

This section addresses issues related to food habits and health that arise when people from traditional cultures migrate to countries where biomedical health values and beliefs dominate. It has been assumed in the past that immigrants would adopt the mainstream emphasis on physical health in a process of acculturation, but in fact most ethnic minorities retain their own values, beliefs and practices, holding a more holistic view to health, including social, mental and spiritual as well as physical well-being, more akin to Maori rather than European New Zealanders.

Members of traditional cultures have difficulty relating to the Western biomedical bias, in which food selection is based on the physical needs of the body only. In traditional cultures well-being is achieved by harmony and balance in body, mind and spirit (Bodeker 2001). An imbalance of these forces can cause disease, and treating the disease means bringing these forces back into balance and harmony. In both Indian and Chinese cultures this can be accomplished by avoiding some foods and consuming others.

Traditional societies tend to value body fat, viewing stored body fat as a sign of beauty, health and wealth, particularly for women (Sobal and Stunkard 1989). The harsher survival conditions of traditional societies involve food supplies that may be uncertain, concentrated fat sources are less available in usual foods, and everyday life involves considerable energy expenditure. Cross-cultural data about body preferences for women reveal that 85% of cultures prefer a plump shape (Anderson et al 1992). The strong rejection of body fat in Western, post-industrialised nations is very different from most other cultures, and anthropologists have described obesity as a culture-bound syndrome unique to Western societies.

Some cultural practices and beliefs may facilitate diabetes self-management, such as Tai Chi or Qi Gong (traditional Chinese movement and meditation) whereas others, such as Ramadan in the Moslem faith, requiring fasting through daylight hours for a month do not (Nwankwo and Tang 2000). The Maori, Pacific or Indian husband may insist on traditionally high-fat dishes similar to those prepared by his mother. Wives may succumb to avoid criticism. Needs of the family will invariably supersede the patient's self-care needs.

Effect of acculturation on diabetes incidence:

The term 'acculturation' is commonly used to denote the process by which a minority ethnic group adopts cultural patterns such as beliefs, religion and language of a dominant or host group. Acculturation occurs at two levels. At the individual level acculturation is described as psychological, referring to changes in attitudes, beliefs, behaviours (such as diet and physical activity) and values resulting from acculturation. At the group level acculturation results in physical, biological, political, economic, and cultural changes in the acculturating group. Younger immigrants from urban areas with a higher education and employment outside the home integrate into a new society more readily. Older immigrants and those who choose to live in ethnic enclaves may have economic, access and language barriers and acculturate with less speed and facility.

'Dietary acculturation' refers to the process that occurs when members of a minority group adopt the eating patterns of the host country (Satia et al 2002a,b). Several studies have documented changes in food habits of immigrant groups living in different parts of the world. Dietary changes usually occur more rapidly than other cultural characteristics when groups migrate; these may result in healthy and unhealthy dietary changes. For instance consuming fewer saturated fats and eating more fruit and vegetables would be regarded as healthy but an increase in confectionery and sweet soft drinks unhealthy. Instruments have been developed to measure diet and acculturation. To date none of these have included all exposure variables, however those that measured demographic and psychosocial variables found these factors to be important predictors of dietary intake (Bermudez et al 2000). In general the less-acculturated people with diabetes are not adopting lifestyle changes required for optimal self-management of the disease (Jaber et al 2003).

2.3.1 Health beliefs and dietary practices:

This section will explore traditional health beliefs and food practices of the five ethnic groups taking part in the study, and how these are adapted to the New Zealand setting.

The World Health Organisation definition of health states that:

> 'Health is a state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity' (World Health Organisation 1947).

Refinements to this definition have emphasised the individual's adaptation to his environment and his ability to realise his full potential, but little attention has been paid to understanding of a particular culture (Scotney 1981). In the West physical well-being has been overemphasised, with only token attention given to social, mental and spiritual well-being (Engel 1977). Food-related behaviour is part of the cultural background of all ethnic groups and is taught to succeeding generations. The consumption of food promotes social interaction; there is no culture that promotes solitary eating (Rozin 1996, Ikeda 1999). The cultural context determines in general how food is acquired, selected, prepared, and who eats what, when, how, and in what quantity. The availability, acceptability and cost of individual foods also determine what people eat. Religious requirements may have a profound effect on the diet in determining which foods are taboo and how and when to fast. In general, food of all cultures is based on a staple carbohydrate, protein, vegetables and fruit, with varying amounts and types of fat and sugar added.

In contemporary post-industrial societies such as New Zealand the food system provides ample access to a wide variety of foods, many of which are high in fat and thus calorie-dense. The social system provides easy access to many calories of inexpensive food, with a consequently high prevalence of obesity and diabetes and the parallel development of a fear of fatness (Beardsworth and Keil 1997; McIntosh 1996; Mennell 1996).

Maori health beliefs and dietary practices:

The Maori health perspective is integrative so separation of people from land, language and family is in itself a prescription for illness (Durie 1985a,b, 2000a,b; Pomare and de Boer 1988). Their perspective of health and well-being is holistic, embracing several

dimensions, of which physical well-being is only one part. The physical dimension (tinana) relates to suitable housing, clothing, employment, food, recreation, for physical survival. Other dimensions are spiritual well- being (wairua), manifested through thoughts, values and actions and is considered essential to a person's self-esteem (mana). Mental and emotional well-being (hinengaro) encompasses not only mental attitudes and spiritual influences, but interdependence within the extended family (whanau) and tribal kin (hapu, iwi), and custom (tikanga). Treatment modalities and education programmes that give recognition to these aspects will have greater acceptability by Maori. Family (whanau) should always be included when treating a Maori person with diabetes.

The concept of tapu (meaning sacred) was the basis of law and order in traditional Maori society, and illness was thought to be caused by a breach of tapu by the individual, unlike accidents which were caused by man (Durie 1977). Durie (1977) has written that Maori essentially regarded all illness as psychological. Certain parts of the body and aspects of personal hygiene are still regarded as tapu (Barlow 1991). Traditional healing includes herbal treatments (rongoa), massage (mirimiri) and spiritual prayer (karakia). The proportion of Maori with diabetes who use rongoa or consult traditional healers is not known.

Maori, like other ethnic groups in New Zealand, are not a homogeneous group (Durie 2001a). However traditional food has an important role at social functions, which are generally held on the marae, the centre for Maori communities. A qualitative study of Maori with diabetes in Southland found that 71% ate traditional food regularly (McKerchar 1998). The cost of healthy foods, such as lean meat and plenty of fruit and vegetables, was an issue for the many respondents who lived in low income households (New Zealand Network Against Food Poverty 2000). The food needs of family (whanau) also often come first. Families on low incomes tend to buy cheap, filling foods that are often very high in fat and salt and low in nutrients. In addition colonisation resulted in loss of access to traditional, healthier foods such as fish, game and plant foods found in their native forests.

Pacific health beliefs and food practices

Pacific people in New Zealand are a diverse population, coming from 22 different island nations, each with a distinct language and culture. Their interdependence within their extended family and customs is similar to the Maori, as is their holistic view of health (MoH 1997). Similarly illness is viewed as the result of breaching cultural rules or taboos either by the person who is ill, by their family, or by their ancestors. Illness is a matter for the whole family (Kinloch 1985). Traditional culture accepts that there is a cure for every illness, trusting healers to effect these cures (Whistler 1992). Pacific people commonly use traditional medicine, massage and prayer.

The church is the centre of many Pacific communities, and the majority of Pacific people in New Zealand stated an affiliation to a Christian denomination (83%) in the 2001 census (Statistics NZ 2002a). A minority are affiliated to the Mormon Church or the Seventh Day Adventist Church, both of which prohibit tea, coffee, alcohol and tobacco consumption, and encourage moderation (Smith 2002; General Conference Nutrition Council 1998). Fasting for one or more days each week is commonly practised by Pacific people due to religious beliefs.

There are psychosocial and behavioural barriers to diabetes care among this group (Simmons and Voyle 1996). For them 'being sick' may mean being unable to perform daily activities within the family and community context. This often means that medical care will not be sought until illness is quite advanced, a situation with serious implications for good management of diabetes in its early, often asymptomatic stage. A Pacific person may not believe that they have diabetes if not prescribed tablets or injections. Changing eating habits alone may not be seen as a convincing enough treatment. (Moata'ane et al 1996). Food is one of the most important expressions of Pacific culture of collective living and sharing. A person's sense of psychological wellbeing and sense of belonging can be eroded by being told to eat differently from their (extended) family (Vainikolo et al 1993).

In traditional medicine there is not any suggestion that food is unhealthy or is related to illness in any way. Traditional culture sees an abundance of food and large body size as a sign of health and status (Shovic 1994). However this traditional veneration of large body size is not apparent in today's 25 to 55 year age group as ideal body sizes are slim,

and body dissatisfaction and attempted weight loss apparent. An important difference in values to Western industrialised societies is the absence of a strongly negative view of obesity (Brewis et al 1998).

Traditional Pacific foods are those naturally occurring in the Pacific environment, however migration and Westernisation have resulted in a change in diet. Pacific people in New Zealand are often employed in unskilled or semiskilled labour. Low pay, large immediate families, and financial responsibilities for extended family members back in the islands often translate into a poor standard of living. Income is a barrier to eating recommended foods; meats such as corned brisket, mutton, lamb flaps, which are high in fat with little nutritional content, are cheap and will feed a large family. Sugar and white bread are a cheap form of energy. The healthier traditional foods are relatively expensive in New Zealand (Parnell et al 2001).

Indian health beliefs and food practices

The oldest surviving documents that record and describe human nutrition and dietetics are from ancient India. From pre-scientific times to the present, medical practitioners in India and China have treated illness in a very similar manner. Indigenous diseases in each region were assigned distinctive temperature attributes, whether hot or cold, based upon the observed symptoms and physiological effects on the body. Similarly all available foods were classified according to their potential heating or cooling properties. Practitioners treated disease by diet, assigning foods from the category opposite to that of the disease: cooling foods for a hot illness, warming foods for cold. This approach was known in antiquity by the Latin term *contraris contrariia*, meaning treatment by opposites, better known by its English term: allopathy. This originated in India around 4000 years ago, subsequently spreading eastward to China, and is widely-used throughout Asia today. It is known as Ayurvedic medicine, and is based on three concepts: recognition and evaluation of clinical signs and symptoms, acknowledgement that behaviour and environment influences health or disease, and the belief that proper food restores health (Grivetti 1991). Traditional medicine, incense, fasting and prayer are widely used in Indian communities today.

Indian food practices are influenced by two factors. Firstly, the area of origin determines their staple foodstuff and the foods with which they are familiar. Sugar, salt

and fat intake is high, being added to curries, dhal and pickles, with sugar also added to beverages, and sweets popular. Saturated fat in the form of ghee, or clarified butter, is commonly used particularly by those from North India, for fried chapati, savoury snacks and sweets.

Secondly, the religious group to which they belong will determine which foods are taboo and how and when they should fast. The most common religions are Islam, Hinduism and Sikhism. Sikh's dietary practices vary; most are not vegetarian, but alcohol is prohibited (Kittler and Sucher 2002).

There are currently more than 25,000 Muslims in New Zealand (Statistics New Zealand 2002a). They follow the rules laid down in the Koran and will only eat halal (clean) foods and consume no alcohol. They are expected to fast for Ramadan, the ninth month of the lunar year. This fast lasts for 30 days during which no food or liquid may be taken between dawn and sunset. People with diabetes can be exempted but most are reluctant despite medical advice. Adjustments to their medication is required, and it is generally taken in conjunction with the evening and pre-dawn meals.

Gujeratis, who make up the major Hindu community in New Zealand, also follow a strict set of dietary regulations. They believe in non-violence against any living thing and therefore will not eat any meat or fish, and some of the more orthodox abstain from egg which may be regarded as a source of life. Dairy products from cows are acceptable however, being considered spiritually pure (Kittler and Sucher 2002). Hindus also generally avoid foods such as onion and garlic which they believe stimulate the senses thus hindering spiritual development.

Hindus practice a unique form of fasting, however carbohydrate intake remains consistent and diabetes control is not compromised. The days on which they fast are largely determined by the individual. Some fast every 15 days to mark the waxing and waning of the moon, on important religious days, or on one or two specified days each week. It is also widely believed that fasting can determine the course of events, thus a woman may fast to make her sick child better.

Chinese health beliefs and food practices

Traditional Chinese medicine has existed for at least 2,000 years (Tan 1992), originating in India and thus very similar. It takes a holistic approach through diet and exercise for the physical as well as mental wellbeing with 'qi' being the life-force within the human organism, encompassing all the vital activities – spiritual, emotional, mental and physical. Extreme emotional responses (joy, anger, concentration, grief, fear, fright) are regarded as the primary internal causes of disease, just as the six evils of extreme environment energies (heat, dampness, dryness, wind, cold, fire) are regarded as the main external causes of disease. Chinese therapy focuses on correcting the basic internal imbalance of 'yin' and 'yang' thought to cause the external symptoms. Health is generally maintained by eating the proper balance of yin (cold) and yang (hot) foods, but there are also 'strengthening' pu, or bo foods, most of which fall into the yang category. Staples, such as rice and noodles, are typically placed in a neutral category. Yang foods are considered warming and stimulating and are a feature at feasts and celebrations, as well as being favoured in cold weather. Yin foods are considered calming and cooling, used for instance to treat a fever, and during hot weather. The Chinese believe that a good diet is critical for physical and emotional harmony and necessary to strengthen the body against disease. (So 1992).

Diabetes is called 'wasting and thirsting' syndrome in Chinese medicine. It is usually classified as upper (thirst), lower (profuse urination) or middle (great hunger) wasting syndrome. These are seen as arising from dysfunction of the lungs, kidney, stomach and spleen respectively; very often all three syndromes are involved. Treatment always requires long-term therapy, concentrating on reducing 'heat' and restoring normal function to the affected body organ. In Chinese medicine, as in Western medicine, diet plays an important part in the management of diabetes, but in addition Chinese use traditional medication, acupuncture, moxtibustion and other therapies.

Many Chinese are health conscious but generally are less knowledgeable than Europeans in medical details. Their knowledge of anatomy and physiology, for instance, is usually rudimentary (Ng 1994). The Chinese patient tends to have an over-expectation of getting well almost immediately after treatment.

The Chinese eat a wide variety of food and nothing is wasted. This may have developed out of necessity, as China has long been plagued with recurrent famine and political unrest. Chinese people will eat almost all types of meat and seafood, and nearly all parts of the creature – fish heads, chicken and duck feet, beef tendons, pig trotters and jellyfish (So 1992). Saturated fat intake is high, with fat trimmed from meat being incorporated in other dishes, and palm oil is often used in manufactured foods. Preserved meat, seafood and vegetables, soy sauce and monosodium glutamate contribute to a high salt intake. The Cantonese in the south-west Guangdong province use more salt and sugar in their cooking than any other region. Many fresh vegetables are eaten. When Chinese people eat together they usually share communally a number of meat and vegetable dishes and plain boiled white rice (So 1992; Leeming and Man-hui 1985).

Alcohol is consumed by Chinese people but alcoholism is said to be rare. This may be due to a lack of an alcohol dehydrogenase enzyme, common in Chinese populations, causing early flushing and intoxication (Ng 1994; Mizoi et al 1996). Most Chinese women do not drink alcohol, preferring Chinese tea. Consumption of dairy products is very low, due to cost and lactose intolerance, soy products being preferred (Elliott and Elliot 1997). A small minority of Chinese are of Buddhist faith and may be vegetarian; others may abstain from meat and eat only fish (Buddhism and Vegetarianism 2003).

With rapid economic development over the past 20 years food supply and per capita income has increased in China, with diet and lifestyle becoming more 'affluent'. (Popkin et al 1995; Zhang et al 1997). Migrant Chinese appear to reduce their intake of starch, plant protein and fibre and increase sugar, saturated fat and cholesterol intake, with subsequent rises in plasma cholesterol, triglycerides and total protein (Chen 1997). Soy protein and soy fibre are thought to have a vascular protective effect (Anthony et al 1998) and reduce total- and LDL-cholesterol (Truswell 1995). Intake of green tea is also often reduced, due in part to cost and availability, but also due to acculturation. Green tea, rich in antioxidants, is also thought to be cardioprotective (Kritchevsky et al 1995).

The characteristics of New Zealand Chinese are very diverse however, with adherence to traditional food practices depending on the degree of acculturation (Friesen and Ip 1997). Chinese women and older people may be less acculturated, and for them mental

health is one of the leading health issues (MoH 2003e). Overseas studies indicate that many Chinese are unfamiliar with depression and its treatment and complain about physical symptoms, resulting in its under-recognition and under-treatment. Low levels of utilisation of mental health services occur due to language problems and cultural values – the belief that the admission of emotional problems and the inability to work out one's own problems arouses shame and reflects poorly on the family name (MoH 2003e).

In summary, Eastern cultures recognise nutrition therapy as a safe and effective means of treating disease. Traditional Eastern and modern Western concepts of what constitutes a healthy 'balanced diet' differ greatly, however. The conventional Western balanced diet is a combination of all major food groups at each meal with focus on biochemical nutrients, whereas Eastern diets are formulated for optimum balance between the types of energy that food releases when it is digested and metabolised.

European health beliefs and food practice

European health systems follow the World Health Organisation model outlined at the beginning of this section, with emphasis predominantly on the physical component, based on scientific evidence. The United States Department of Agriculture (USDA) first established dietary guidelines in 1917 (Nestle 1993). Foods were grouped as a guide to meeting all nutritional needs, while encouraging the consumption of United States farm products. In 1977 the USDA issued the first of a new generation of guidelines, 'Dietary Goals for the United States', as a public health response to diet-related mortality and morbidity, encouraging a reduction in consumption of farm products that contributed to dietary fat, such as meat, eggs and dairy products (US Congress 1977). Due to pressure from commercial interests wording has been subtly changed over the years reflecting it's strategic importance for increasing food sales (Nestle 1993). Commercial interests in the United States are currently lobbying against the adoption of the World Health Organisation's Global Strategy on Diet, Physical Activity and Health primarily due to its recommendation to limit sugar and saturated fat intake (WHO 2003a).

As in traditional cultures most Western societies until the late 19th century valued at least moderate levels of body fat, but the 20th century brought about a change in attitude as modern ideals of thinness were established (Seid 1994; Stearns 1997). Most concern

about body weight in Western societies is now motivated by appearance, not by health, and dieting is commonplace (Crawford and Worsley 1998; Germov and Williams 1999). Vegetarianism is a relatively modern phenomenon in the Western world and is increasing. Few studies have been done but it appears that around 5% of traditionally meat-eating populations in the United Kingdom (Spencer 1995), America (Beardsworth and Keil 1997) and Australia (McLennan and Podger 1997) are self-defined vegetarians. The main reasons for this shift are thought to be philosophical or ethical, ecological or environmental, aesthetic, health-consciousness and economic. A minority have adopted further aspects from other cultures such as alternative medication, massage, acupuncture and yoga.

New Zealand Europeans have a predominantly Western meal pattern comprising three 'square' meals each day, generally following dietary guidelines. However meat and dairy products are readily-available in New Zealand, giving rise to excessive intakes of saturated fats and hence a high incidence of coronary heart disease and obesity. With the promotion of unsaturated fats in the form of oils and margarine, heart disease rates have declined but obesity and diabetes rates continue to increase.

With many more women in the workforce now lifestyle changes are inevitable. There is less time for recreational activities and meal preparation, bringing about an increase in 'grazing' or eating on the run, pre-prepared or 'fast food' meals and eating away from the home – with no control over the fat, salt, or sugar content of the food. Social expectations remain however, with food an essential component of hospitality, and alcohol consumption has increased. Food plays an integral part in family, social and business relationships in Western culture. Strong sentiment becomes attached to favourite dishes and foods that are traditionally served at celebrations (Bryant et al 1985).

2.3.2 **Recommendations for patient self-care**

Recommendations for patient self-care must recognise and respect the culture of each ethnic group. They would include practical ways to keep physically active and have regular meals, reducing intake of foods high in saturated fat, salt and sugar, and increasing intake of wholegrain breads and cereals, low fat dairy (or fortified soy) products, vegetables and fruit. People with diabetes are encouraged to enjoy their

favourite foods with modifications to amount and type of fat, fibre, and sweetening agent, and with low fat cooking methods. Awareness of appropriate carbohydrate foods is essential, with quantity individually determined and demonstrated by plate diagram, food models or photographs, along with a simple explanation of carbohydrate metabolism. Carbohydrate counting is a useful tool to be used when appropriate. Written guidelines are always given, in English, and in the mother tongue if required, to encourage family participation. A professional interpreter is offered in the appointment letter; this has been shown to be preferable to using a relative who may feel uncomfortable advising a more senior family member. However it is important to include the family (if this is agreed to by the person with diabetes), and to establish trust, indicate an understanding of the context of food in their culture, speak positively about traditional foods, name them, and give reassurance that traditional foods can be modified by low fat cooking methods, so that they will be healthier for all of the family.

The reality of diabetes care is that more than 98% of that care is provided by the patient; therefore the patient is the locus of control and decision-making in the daily treatment of diabetes. Adults are much more likely to make and maintain behaviour changes if those changes are personally meaningful and freely chosen (Anderson and Funnell 2000). Coping effectively with the challenges of life with diabetes can lead to enhanced motivation, more active self-care, improved metabolic outcomes, and a better quality of life (Rubin and Peyrot 2001; Watkins 2000). The health care team must provide ongoing diabetes expertise, education, and psychosocial support so that patients can make informed decisions about their daily diabetes self-management (Appendix 2.10). Kleinman's explanatory model (Appendix 2.11) can be applied to minority patients, regardless of ethnic, economic, social, spiritual and geographic background, to assess patients' personal understanding of diabetes. Hence effective diabetes care requires a collaborative relationship, which may be a new role for both health care professionals and patients (Funnell and Anderson 2000).

Diabetes affects every facet of family life so the family's ethnic and religious heritage must be considered. Cultural and/or religious beliefs and practices such as fasting may affect diabetes management. Family may experience a range of complex emotions including guilt, blame, fear, anger, frustration, financial concerns and loss of a 'normal' lifestyle. Family support can have a positive effect on the metabolic control of the

person with diabetes. However the family members need to know how to provide effective support and to have realistic and appropriate expectations concerning the patient's medical and behavioural goals. Social influences, such as family factors, that may enhance or interfere with diabetes self-management are important but little research has been done in this area in adult populations (Gonder-Frederick et al 2002). There is a growing appreciation of the role of sociodemographic variables, with lower socioeconomic status being a risk factor for poor metabolic control, recurrent hospitalisation and obesity (Wing et al 2001).

2.4 Psychological issues:

Diabetes is one of the most psychologically and behaviourally demanding of chronic medical illnesses, given its progressive nature. Polonsky describes how many people with diabetes feel overwhelmed and over-stressed because diabetes care is never-ending, involves a variety of unpleasant tasks, and produces uncertain results, even when pursued aggressively (Polonsky 2000a). There is also evidence that negative life events are associated with poorer diabetes control (Stenstrom et al 1995).

In recent studies in America approximately 60-70% of diabetes clinic patients sampled reported at least one serious diabetes-related concern (Polonsky 2000a). Many who reported chronic frustration and feelings of failure had markedly higher HbA1c levels and significantly-poorer self-care. This 'burnout' may be even more prevalent in patients who have dropped out of medical care. They may avoid appointments feeling that they will be judged. Health care providers may see many of these patients only when complications begin to emerge. Current strategies to assist patients in maintaining better self-care include 'normalising' their self-care problems, showing respect, negotiating achievable, patient-centred goals and encouraging the patient to seek both emotional and behavioural support from family and friends (Polonsky and Welch 1996; Peyrot 1999; Williamson et al 2000).

Depression

The term 'depression' denotes two distinctly different experiences. The first is the common experience: occasional periods of feeling down, irritable, stressed; these feelings are usually short-lived. The second is the experience of depression as a serious, sometimes life-threatening mental disorder (Lustman et al 2002; Anderson et al 2001b).

Depression in diabetes is a prevalent, chronic and very serious condition with consequences beyond the effects on emotional wellbeing (Talbot and Nouwen 2000; Lustman et al 2000a). The cause of depression in diabetes is presently unknown. However studies have suggested that depressive disorders are accompanied by increased sympathoadrenal system activity causing increased release of counter-regulatory hormones which are associated with impaired glucose tolerance and increased blood glucose levels (Golden et al 2004). Medical treatment for depressive disorders may also contribute; their use has been associated with reports of dramatic weight gain, diabetes, and an atherogenic lipid profile (increased LDL-cholesterol and triglyceride levels and decreased HDL-cholesterol). Obesity, physical inactivity and high rates of smoking common in people with depressive disorders are also risk factors for diabetes (American Diabetes Association 2004e).

A recent meta-analysis of 42 controlled studies concluded that depressive disorders are twice as common in people with diabetes as in those who do not have diabetes, and may be more chronic and severe (Anderson et al 2001b). The significant impact of depression on diabetes remained evident after adjustment for gender, diabetes type, subject source (community versus clinical), and assessment method (clinical interviews versus self-report scales). As in the general population, there were significantly higher rates of depression in women, those who were unmarried, and those with lower levels of education. In total, as many as one in every three patients with diabetes may be struggling with depression. These rates may be even higher in certain ethnic subgroups, including African-Americans (Gary et al 2000) and Hispanics (Polonsky et al 2000b).

Depression may negatively affect glycaemic control, causing a loss of motivation and poorer self-care, and increased occurrence of neuropathy, nephropathy, retinopathy, and macrovascular disease (Polonsky et al 2000c; Lustman et al 2000a). Several prospective studies have shown an increased and earlier incidence of coronary heart disease with

depression, especially in women. Recent cross-sectional data indicate that depressed patients are less likely to follow recommended guidelines for healthy eating, exercise, smoking cessation, blood glucose monitoring or medication use. This would suggest that effective treatment of depression could prevent or delay diabetes complications by improving mood, self-care and glycaemic control (Polonsky et al 2000c;De Groot 2001)

Conversely diabetes may exacerbate depression due to biological factors such as hyper- and hypoglycaemia and neurovascular changes associated with diabetes progression, causing limitations in function such as loss of vision or sexual capacity. Hyperglycaemia can lead to significant changes in mood, including feelings of melancholy and increased fatigue (Polonsky 2000b). Psychosocial factors such as diabetes-related stress (frustration, anger, guilt, denial, fear and loneliness) and the burden of long-term complications may also exacerbate depression and reduce quality of life (De Groot et al 2001). Researchers in America have found that diabetes patients with a high level of depressive symptoms (the top tertile of the distribution) had 51% to 73% higher health care costs compared to those with a low level of symptoms (the bottom tertile) (Ciechanowski et al 2000).

Depression is recognised and treated in less than one third of all diabetic cases, despite its relevance to the course of diabetes. Diagnosis can be difficult in that many common physical symptoms of depression (insomnia, fatigue, appetite disturbances, and decreased libido) are also symptoms of hyperglycaemia. Therefore the presence of affective symptoms such as guilt, anhedonia (diminished interest or pleasure in almost all activities), feelings of helplessness or worthlessness, memory impairment, and indecision are useful diagnostic tools. The World Health Organisation has recommended that every patient in primary care be screened for depression by completing the WHO-5, a five-item well-being index, as a standard first step, done in the waiting room (Henkel 2003; Appendix 2.12).

Treatment of depression is important because of its effects on mood and quality of life, as well as its potential benefits to glycaemic control and the reduction in diabetes complications. Research on effective treatments for psychological disorders in people with diabetes has just begun. Findings to date suggest that most treatments known to be effective for the general population are also effective for people with diabetes. (Lustman

et al 1997, 1998, 2000b). There is now substantive evidence that psychobehavioural interventions can have a positive impact on physical and emotional wellbeing for people living with diabetes (Gonder-Frederick et al 2002).

Anxiety Disorders

Research suggests that people with diabetes may suffer anxiety symptoms as frequently as they do symptoms of depression. Women, African-Americans, and those with less education were more likely to report symptoms consistent with a clinically-significant anxiety disorder. Anxiety disorders represent an exaggerated emotional response to fears of hypoglycaemia, complications, and the effects of diabetes on every-day life (Peyrot and Rubin 1997). These may be responsive to psychological treatments such as biofeedback-assisted relaxation training. No research has been done on the effectiveness of other stress management or psychotherapeutic interventions specifically in people with diabetes. Psychopharmacological agents such as a selective serotonin re-uptake inhibitor, benzodiazapine and busiprone can also be effective for both anxiety and depression, and may improve glycaemic control (Lustman et al 2000b). However serotonin re-uptake inhibitors are not recommended for people under 18 years of age, and can exacerbate anxiety in some cases, benzodiazapine may have problems with dependence, and tricyclic antidepressants may adversely affect metabolic control (Lustman et al 1997).

Attitude

Psychosocial variables are believed to play an increasingly important part in effective diabetes management, with attitude being one of the most important of these variables. Peyrot (1999) divided attitude into tolerance (an optimistic attitude), severity (a pessimistic attitude) and difficulty (a realistic attitude). Adequate adjustment involved an intermediate attitude that acknowledged the difficulty of a rigorous treatment regime and yet recognised the value of this effort. Education strategies based on achieving improved patient attitudes and motivation rather than just comprehensive knowledge have been found to be an effective way of improving patient diabetic knowledge (Anderson and Funnell 2000; Fitzgerald et al 2000). Krall (1985) stated that:

> 'Many diabetes programs founder on the reefs
> of insufficient motivation and poor attitude'.

Attitudes are powerful influences on human behaviour, and they can be learned. Therefore the diabetes educator has the opportunity to provide traditional diabetes education in a format that is conducive to improving the learner's attitude, by incorporating the principles of adult education theory and humanistic psychology.

Several important themes have emerged from this review of psychological issues:

- Diabetes care is self-care, with decisions made by the person with diabetes, based on that person's attitude, individual interaction style, relationships with diabetes care providers, coping abilities, emotional resources, needs, personal stresses and limitations.
- Effective diabetes care requires management and coping skills.
- Emotional distress undermines self-care, and effectively treating this distress can improve well-being and glycaemic control. This review suggests that depressive symptoms may identify a group at increased risk of diabetes who may benefit from screening and intervention strategies.
- All members of the health care team should be involved in the psychological support of patients and their families (Anderson and Rubin 2002; Sue 1998).

2.5 Conclusion

In conclusion, diabetes self-management can involve a complex balance of medications, diet, exercise and lifestyle, and education is a necessity. Future advances in the management of people with diabetes are becoming increasingly unlikely to take the form of new insulin preparations, delivery devices or drugs. Improvements in the management of diabetes may be more likely to come from an appreciation of how psychological well-being and attitude can have a major effect on an individual's ability to manage their diabetes, yet few psychologists are employed in the area of diabetes. The situation is unchanged today, so we must maximise the benefits of lifestyle interventions (Dawson 2003).

Medical research based on ethnicity remains a controversial and sensitive issue due to perceived stigmatisation and emphasis on differences rather than similarities (Schwartz

2001; Rivara and Finberg 2001). In the past year, the *New England Journal of Medicine* and the *International Journal of Epidemiology* have published several commentaries and editorials, some criticising and others arguing in favour of the use of race/ethnicity in medical research (Burchard et al 2003; Cooper et al 2003; Phimister 2003; Karter 2003; Cooper 2003). However epidemiological research on race/ethnicity facilitates the identification of subgroups with higher rates of disease, differing levels of risk factors, the detection of disparities in the quality of and access to care, and differing response to pharmacotherapy (Karter et al 2002; Davis et al 2001; Schneider et al 2002; Smedley et al 2002; Exner et al 2001). It has also provided potential leads about aetiology and the roles of genes and environment (Risch et al 2002).

There are few disease states that demonstrate such marked racial/ethnic variation as diabetes, and include such factors as prevalence, variability of glycaemic control, diabetes-related complications, risk factors, response to medication and quality of care (Karter 2003; de Rekeneire et al 2003; Karter et al 2002; Smedley et al 2002). Knowledge of these dominant explanatory factors would have public health value because it defines appropriate targets for interventions aimed at reducing racial/ethnic disparities. It is important that progress continues towards eliminating these disparities, as proposed by the Ministry of Health, even if the causes are not fully understood (MoH 2002b).

'Absence of evidence is not evidence of absence'
- Seti et al, BMJ

3 Methodology

Chapter three will outline the sampling method, procedure, questionnaire development and data analysis. Finally method of feedback of information to participants will be described.

This study was undertaken at the Auckland Diabetes Centre (Auckland District Health Board), a multidisciplinary service staffed by diabetes specialist doctors, nurses, dietitians, and a health psychologist, podiatrist and ophthalmologist. Patients are referred to the Auckland Diabetes Centre by their general practitioner for information when they are first diagnosed, or for assistance when they run into problems with their diabetes care.

The goal of the Auckland Diabetes Centre is to enable people with diabetes, with the support of their family and friends, to manage their condition and maintain optimal wellbeing within the broader context of their lifestyle (WHO 1986).

3.1 Ethical approval for the study

The study conformed to the requirements of the Auckland Diabetes Centre, Massey University Ethics Committee, the Maori Research Review Committee for the Auckland District Health Board, and the Auckland Ethics Committee (Appendix 3.1).

3.1.1. ***Auckland Diabetes Centre***: The study proposal was initially submitted to the team leader and the medical director, who granted approval with the following provisos: any time spent interviewing subjects must be made up to complete the researcher's eight-hour day, no assistance or study leave would be given, and a letter of official confirmation from Massey University supporting the proposal would be required.

3.1.2. ***Human Ethics Committee, Massey University, Albany Campus*** considered the study protocol at a meeting held on 22 August, 2002, and suggested:

- that participants be given a specific time up to which they may withdraw from the study;

- that the Likert Response Scales labelling be reversed (e.g. 1 – not at all, 5 – very);
- and that evidence of support from the Maori Research Review Committee for the Auckland District Health Board (ADHB) be provided.

Ethical approval was granted on 10 October 2002, upon receipt of the evidence of support from the Maori Research Review Committee, Auckland District Health Board.

3.1.3. ***The Maori Research Review Committee for the Auckland District Health Board*** considered the study proposal on 5 September, 2002, and asked for clarification of how patient ethnicity would be identified, and an explanation of any weakness of this in terms of the analysis and the conclusions drawn. The study proposal was resubmitted stating that ethnicity is identified by the patients themselves when they attend the Auckland Diabetes Centre, and the fact that this may affect the interpretation of the results would be duly noted (in the thesis). Approval was given on 24 September 2002.

3.1.4. ***The Auckland Ethics Committee*** considered the study proposal on 11 September 2002, and requested letters of approval from both the Massey University and the Maori Research Review Committee, Auckland District Health Board. It was also suggested that the study be discussed with a statistician at the University, and that a footer be included on all pages of the questionnaire, with a version number and date. Approval was granted on 24 October 2002.

3.2 Development of questionnaire

A draft questionnaire was developed by including validated, widely-used generic and diabetes-specific domains and by developing original questions as required, to seek the views of participants on diabetes, food and health, and how their diabetes affects their lifestyle. Reference was made to a paper by Wei Shen and others (Shen et al 1999), who developed and validated the Diabetes Quality of Life Clinical Trial Questionnaire, based on the Health-Related Quality of Life Questionnaire, for use in multinational clinical trials with type 1 and type 2 diabetes. They stated that there was no universally-accepted definition, but most agreed that quality of life is comprised of the domains of physical function, psychological function, social function, perceptions of well-being and health. Low quality of life and problematic psychosocial status of patients with diabetes may

affect metabolic control by impeding compliance (Waadt et al 1992; Eiser and Tooke 1993).

Three other questionnaires were referred to: the Diabetes Quality of Life measure used in the Diabetes Control and Compliance Trial (DCCT Research Group 1988), a questionnaire on Stress and Diabetes (Waadt et al 1992), and The Problem Areas In Diabetes (PAID) questionnaire (Polonsky et al 1995). The latter instrument was developed to capture problems in living with diabetes such as routine aspects of the self-care regime, including diet, blood glucose monitoring and medication; blood glucose fluctuations and their consequences; and diabetes-related interactions with family, friends and health care providers. Each category contains a number of common general problems, such as 'feeling deprived of food', and a much larger number of specific problems, such as 'cannot eat as much ice-cream as desired'.

3.2.1 *Questionnaire content and coding*

The questionnaire for this pilot study consisted of five sections.

- The first set of questions were designed to examine the patients' experience and beliefs about diabetes; whether it intruded in their family, work, sex and social life, frustrated them, caused anxiety, prevented them from doing the things they had previously enjoyed, could it be managed with dietary and lifestyle change, and how they felt when they made these changes.
- The second set of questions were used to ascertain the importance patients placed on attending appointments with health care providers, whether they felt the information given helped them manage their diabetes better, and finally whether that information was appropriate for their ethnic group and why.
- The third group of questions were designed to evaluate patients' nutrition and health knowledge, and also asked them to list their medications. If they smoked they were asked how important quitting was to them.
- The fourth question asked about personal priorities regarding mental and physical health, and how important the support of family and friends was to them.
- The final section of the questionnaire sought background information regarding occupation, income, education, marital status and family details.

Simplicity, brevity and cultural appropriateness were paramount. To this end no coding appeared on the questionnaire, in line with the 1997 National Nutrition Survey questionnaire (MoH 1999a). The questionnaire was primarily based on patients' issues that have arisen during the researcher's practice. The Likert Scale was used throughout, apart from the final section. This is a common method of attitude measurement, named after social psychologist Rensis Likert, who developed its use. It consists of several declarative statements expressing a viewpoint on a topic. Respondents are asked to indicate the degree to which they agree or disagree with the opinion expressed in the statement. Likert used five categories of agreement-disagreement (Polit and Hungler 1995). Approximately equal numbers of positively and negatively worded statements have been chosen to avoid bias, and ambiguous, leading or double-barrelled questions and medical jargon have been avoided in the interests of clarity.

3.2.2 *Questionnaire pretesting*

The questionnaire was tested and revised to ensure its acceptability and reliability.
Pre-testing of the version 1 questionnaire was carried out at the Auckland Diabetes Centre with colleagues to test accuracy, comprehension and time taken to complete the questionnaire. Colleagues included two dietitians, a nurse and a health psychologist, who work at the Auckland Diabetes Centre, the dietitian at Diabetes Auckland, and a Maori dietitian based in Northland. They approved the layout and content, and took 10 to 15 minutes to complete the questionnaire. As a result of their suggestions questions were slightly rearranged and instructions for answering them, with a labelled more graphic scale, was included at the top of each page, instead of only appearing on the first page. The word 'very' was deleted, i.e. 'a daily walk is very important', since the strength of importance would be indicated by the number which participants circle.

Version 2 was pretested with five patients attending the Auckland Diabetes Centre for a follow-up appointment with the researcher. For four of these patients English was their second language. All found the questionnaire easy and non-threatening, completing it in 10 to 20 minutes (the longer time of up to 20 minutes was required when an interpreter was used). No changes were made to version 2 after pre-testing with patients. This version was then submitted to the ethics committees and based on their advice version 3 of the questionnaire was completed, including a footer on all pages with a version number and date. A copy of this final questionnaire is included in Appendix 3.5.

3.3 Selection of sample

Subjects were adult females with type 2 diabetes, drawn from the Auckland Diabetes Centre register over a period of six months, as they became due for a follow-up appointment with a dietitian (the researcher). All had previously received dietary and lifestyle advice from the researcher. Ethnic groups with the highest prevalence of type 2 diabetes, namely Maori, Pacific, Indian and Chinese were targeted, along with European, ethnicity being that stated by the patient. The original proposal aimed to study both men and women, and Tongan and Samoan groups separately, but after discussion with a statistician at Massey University variables were reduced by including females only, and the ethnic groups also reduced by including Pacific women, not Tongan and Samoan separately. Recruiting took place between November 2002 and May 2003, with subjects being selected until approximately 20 with well-controlled and 20 with poorly-controlled diabetes in each ethnic group were obtained. This would give a total sample size of approximately 200 enabling study of significant differences in the group as a whole as well as at the ethnic group level.

An introductory letter, participant information sheet and consent form (Appendices 3.2, 3.3, 3.4) were posted to the researcher's patients in the ethnic groups under consideration, attached to the routine computer-generated letter reminding them of their appointment time. This gave potential participants one week to decide about taking part. Further explanation of the study and its purpose was given if requested. Those consenting to participate in the study signed the consent form at the completion of their follow-up appointment and were given the questionnaire to complete in their own time (Appendix 3.5).

3.3.1 ***Exclusion criteria*** applied only to those with severe complications of diabetes such as end stage renal failure, blindness or amputation.

3.4. Data Collection

3.4.1 *Method of collection*

Data was collected by way of the questionnaire and the patient records held at the Auckland Diabetes Centre.

3.4.1.1 *The questionnaire*

The questionnaire was explained verbally, patients were assured that there were no right or wrong answers, and confidentiality was reiterated. The majority completed this at the time but some preferred to take it home to get assistance from their family with the language. They were all given stamped addressed envelopes to facilitate return of the questionnaire to the researcher, but inevitably some were not returned. Since they had signed the consent form and received verbal explanation, one further questionnaire was mailed to them, with a stamped addressed envelope.

3.4.1.2 *Patient records*

These records include a nutrition assessment which is reviewed at follow-up.

Physical measurements: These are made during a patient's first visit to the Auckland Diabetes Centre, and again at their follow-up visit (with the exception of height, for adults) by trained personnel using standardised techniques (Lohman et al 1988). These include anthropometric and blood pressure measurements. (Anthropometric and biochemical details were obtained from patient files at the Auckland Diabetes Centre, and medications confirmed. The computer data-base revealed stated ethnicity, duration of diabetes and patient knowledge of any existing complications or comorbidities.)

- ***Anthropometric measurements:*** Height and weight were measured to the nearest 0.5 cm and 0.5 kg respectively, in light street clothes without shoes, on E101 electronic scales which were regularly calibrated, and a KaWe stadiometer. Body mass index was calculated as weight (kg) divided by height (m) squared. (BMI = kg/m2).

- ***Blood pressure*** was measured by the researcher with a standard mercury sphygmomanometer on the right arm in a sitting position at the end of the consultation, when the patient was rested. Hypertension was defined as blood pressure greater than 140/90 mmHg. Self-report and sighting of medications were also used for confirmation.

Biochemical measurements: Participants had generally attended the laboratory (Diagnostic Medlab Ltd. 2000) for blood tests prior to their appointments. Fasting

venous blood was taken and analysed commercially using Roche/Hitachi modular protocols. HbA1c was measured by Biorad Variant high performance liquid chromatography (HPLC) assay, and total cholesterol, HDL cholesterol and trigyceride levels were also measured by liquid chromatography. LDL-cholesterol level was calculated using the Friedewald equation, except when triglyceride levels exceeded 4.5 mmols/l. Total:HDL-cholesterol ratios were also calculated by the laboratory.

3.5 Data coding and analysis

Subjects were all assigned a unique numerical code. All patient data and their responses to the questionnaire were coded numerically and entered into an Excel spreadsheet. Each question was numbered, and responses coded as yes (1), no (2), not applicable (8), don't know (9). Work status was coded as part-time (1), full-time (2), not working (8). Income was rated from 1 to 6, 1 being less than $10,000 and 6 being more than $50,000. Marital status was coded as married (1), defacto (2), divorced (3), widowed (4), or single (5).

***Ethnicity*:** For the Census, and for the purpose of this study, ethnic group is defined as that stated by the individual.

Education: Education in this study was assessed in terms of years of schooling, and this information is presented in Chapter 4. The data were grouped into two categories: years of secondary school, and tertiary education.

Work status, occupation and socio-economic status: Occupations were classified using the International Standard Classification of Occupations, ISCO-88, work status assessed as full-time or part-time employment or not working. The socio-economic status (SES) variables included education (secondary and tertiary), occupation, size of family, number of school-aged children, and total household income (<$10,000 to >$50,000) from wages, salary or benefits.

Social, psychological, and behavioural indicators: Social health was assessed by social support from family and friends. Psychological health was assessed by questionnaire and self-report. Positive self-care indicators included attending appointments, regular physical activity and attention to diet; negative indicators included current smoking.

Medications: Patients were asked to bring all their medications, or an up-to-date list of them, to their appointment. These are documented in patient files and are a useful indicator of comorbidities such as hypertension, hyperlipidaemia and other conditions such as asthma, cancer, psychiatric conditions or, on occasion, nutritional deficiencies.

Severity of diabetes was defined according to duration of diabetes and medications used. Current treatment was categorised as insulin, oral hypoglycaemic agents, or no medication, with insulin treatment indicating more severe disease.

Dietary and lifestyle assessment: This is carried out during the initial consultation; modifications are advised if necessary, and reviewed at the follow-up visit.

Preliminary data checking and analyses were all done using Excel. Tables were designed and transported to a Word document. Finally the cleaned spreadsheet data was transferred to SAS for Windows, Version 8.0 (SAS Institute Inc., Cary, North Carolina, USA) for inferential statistical analysis. Proportions were compared using a Chi-square test or where the expected cell count was less than 5 a Fisher's exact test was used. One-way analysis of variance (ANOVA) was used to compare differences across ethnic groups. All analysis was performed on SAS release 8.0 and a p-value of 0.05 was considered statistically significant.

3.6 Feedback to subjects:

On completion of the study the register at the Auckland Diabetes Centre was scrutinised to check current patient status, and it was found that two had deceased (both were Maori women) and four had moved, although a forwarding address was available for two of these. Following this a letter of thanks, individual biochemistry with explanation, and a summary of the results were mailed to remaining participants (Appendix 3.6). They were asked to telephone the researcher should they have any questions.

'We have met the enemy and he is us'
- L'il Abner

4 Results

A total of 232 female participants were recruited between November 2002 and May 2003. All women had attended the Auckland Diabetes Centre over the previous six months, and received dietary and lifestyle advice from the researcher. Results are reported according to participants' level of diabetes control and ethnic group, where poorly controlled was a priori defined as HbA1c greater than 7.5% and well controlled as HbA1c less than or equal to 7.5%. (Although a level of 7% or below is recommended, a cut-off point of 7.5% was necessary in order to obtain an adequate number of subjects with well-controlled diabetes.) The sample consisted of five ethnic groups, European, Maori, Pacific, Indian and Chinese, and is described in detail in Table 4.1.

Table 4.1 *Patient ethnicity by diabetic control*

Ethnicity	**Total** N (%)	**Well Controlled** N (%)	**Poorly Controlled** N (%)
Total number:	232 (100%)	109 (100%)	123 (100%)
European	53 (23%)	27 (25%)	26 (21%)
Maori	44 (19%)	23 (21%)	21 (17%)
Pacific	53 (23%)	21 (19%)	32 (26%)
Indian	48 (21%)	19 (17%)	29 (24%)
Chinese	34 (15%)	19 (17%)	15 (12%)

Diabetic control ratio is the same across ethnic groups, p=0.390

4.1 Demographic Characteristics

The demographic characteristics of the subjects are shown for those with well – controlled and with poorly-controlled diabetes in Table 4.2a and by ethnic group in Table 4.2b.

Table 4.2a. *Socioeconomic characteristics by diabetic control*

	Total N (%)	Well Controlled N (%)	Poorly Controlled N (%)
Education			
Years at secondary school			
0	48 (20%)	23 (21%)	25 (20%)
1 – 2	32 (14%)	9 (8%)	23 (19%)
3 – 5	128 (55%)	61 (56%)	67 (54%)
> 5	12 (5%)	8 (7%)	4 (3%)
No response	12 (5%)	7 (6%)	5 (4%)
Tertiary Trained	105 (45%)	50 (45%)	56 (45%)
Work Status			
Full time employment	57 (24%)	27 (25%)	30 (24%)
Part time employment	37 (16%)	19 (17%)	18 (15%)
Not employed	137 (59%)	62 (57%)	75 (61%)
No response	1 (1%)	0	0
Occupation of those working (N=94)†			
Manager	7 (7%)	5 (11%)	2 (4%)
Professional	22 (23%)	14 (30%)	8 (17%)
Technical	9 (10%)	2 (4%)	7 (15%)
Clerk	17 (18%)	10 (23%)	7 (15%)
Service	16 (17%)	5 (11%)	11 (23%)
Trade	2 (2%)	1 (2%)	1 (2%)
Machinist	10 (11%)	4 (9%)	6 (13%)
Elementary	11 (12%)	5 (11%)	6 (13%)
Household income			
< $10,000	51 (22%)	22 (20%)	30 (24%)
< $20,000	40 (17%)	19 (17%)	21 (17%)
$20 – 40,000	65 (28%)	32 (29%)	33 (27%)
> $40,000	36 (16%)	14 (13%)	22 (18%)
No response	40 (17%)	23 (21%)	17 (14%)
Unemployed because of health	60 (26%)	30 (28%)	30 (24%)
Received income support in the last year	140 (60%)	66 (60%)	74 (60%)
Have a community services card	148 (64%)	64 (59%)	84 (68%)

† ISCO-88 International Standard Classification of Occupations, International Labour Office, Geneva

Table 4.2b. *Socioeconomic characteristics by ethnicity*

	European N (%)	Maori N (%)	Pacific N (%)	Indian N (%)	Chinese N (%)
Education					
Years at secondary school					
0	2 (4%)	12 (27%)	16 (30%)	10 (21%)	8 (24%)
1 – 2	11 (21%)	9 (20%)	5 (9%)	4 (8%)	3 (9%)
3 – 5	38 (71%)	20 (45%)	25 (47%)	32 (67%)	13 (38%)
> 5	1 (2%)	0	3 (6%)	0	8 (24%)
No response	1 (2%)	3 (7%)	4 (8%)	2 (4%)	2 (6%)
Tertiary Trained	27 (51%)	18 (41%)	19 (36%)	31 (65%)	10 (29%)
Work Status					
Full time employment	11 (21%)	11 (25%)	14 (26%)	15 (31%)	6 (18%)
Part time employment	14 (26%)	7 (16%)	9 (17%)	6 (13%)	1 (3%)
Not employed	28 (53%)	25 (57%)	30 (57%)	27 (56%)	27 (79%)
No response	0	1 (2%)	0	0	0
Occupation of those working (N=94)†					
Manager	3 (12%)	0	2 (9%)	2 (10%)	0
Professional	4 (16%)	2 (11%)	5 (22%)	9 (43%)	2 (29%)
Technical	3 (12%)	1 (6%)	3 (13%)	3 (14%)	0
Clerk	7 (28%)	4 (22%)	1 (4%)	2 (10%)	3 (43%)
Service	5 (20%)	4 (22%)	4 (18%)	4 (19%)	1 (14%)
Trade	0	1 (6%)	1 (4%)	0	0
Machinist	2 (8%)	3 (17%)	1 (4%)	1 (5%)	0
Elementary	1 (4%)	3 (17%)	6 (26%)	0	1 (14%)
Household income					
< $10,000	9 (17%)	12 (27%)	8 (15%)	7 (15%)	15 (44%)
< $20,000	7 (13%)	8 (18%)	13 (25%)	5 (10%)	7 (21%)
$20 – 40,000	23 (43%)	11 (25%)	14 (26%)	13 (27%)	4 (12%)
> $40,000	11 (21%)	4 (9%)	6 (11%)	11 (23%)	4 (12%)
No response	3 (6%)	9 (20%)	12 (25%)	12 (25%)	4 (12%)
Unemployed because of health	13 (25%)	16 (36%)	17 (32%)	8 (17%)	6 (18%)
Received income support in the last year	28 (53%)	32 (73%)	37 (70%)	21 (44%)	21 (62%)
Have a community services card	26 (49%)	33 (75%)	39 (74%)	27 (56%)	22 (65%)

† ISCO-88 International Standard Classification of Occupations, International Labour Office, Geneva

Education

In this group of women 20% had not attended secondary school, with around 34% attending for two years or less, more of these being with poorly-controlled diabetes. Around 55% had attended secondary school for three to five years; more of those with well-controlled diabetes had attended secondary school for more than five years.

There was a greater number Pacific, Maori and Chinese women compared to Europeans that did not have secondary education. Of the Chinese who did attend secondary school, 26% with well-controlled and 13% with poorly-controlled diabetes stayed for six years, longer than any other group, yet few received tertiary education. Most of the Indian women (65%) had attended a tertiary institution either in India or New Zealand. European women were in the next highest group, 51% with tertiary training. For the group as a whole tertiary education was not found to be a significant indicator of control of diabetes (p=0.88).

Work status and occupation

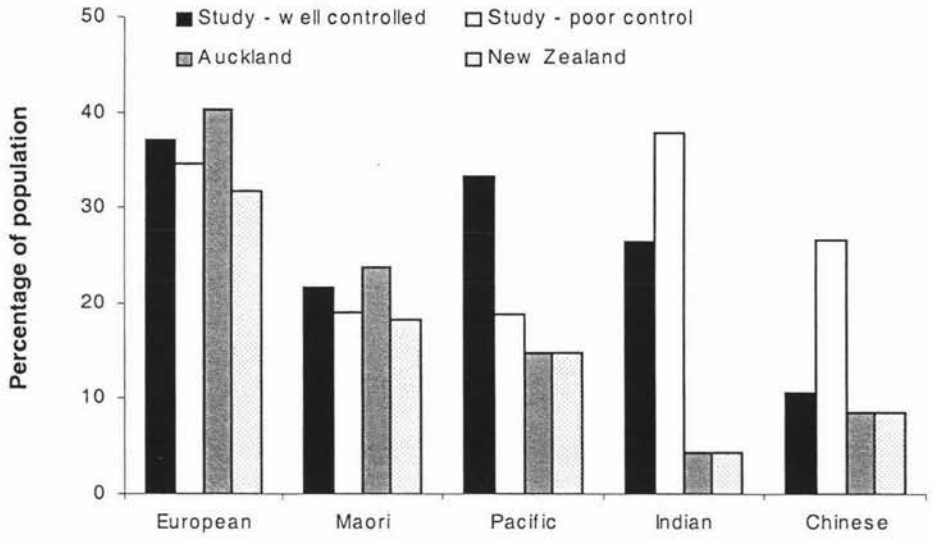
The majority of the women were not in the workforce. Of those working most were employed full-time, the exception being Europeans with more with both well- and poorly-controlled diabetes working part-time. The majority of this group of women work in a professional capacity as nurses and teachers, or as service workers, including shop, sales and marketing. Clerical work also predominates. More of those with well-controlled diabetes were in higher level occupations.

There was some variation between the different ethnic groups, however. More of the European, Indian and Chinese in this cohort were in higher level occupations, with more of the Maori and Pacific women in lower level occupations. European women were predominantly clerical and service workers. In contrast almost one third of Pacific women work in elementary jobs such as packing, yet one quarter work as professionals, as teachers and nurses. Almost one half of Indian women work as professionals. Very few Chinese women were in the workforce (20%), probably due to a language barrier; the majority work in a clerical, service worker or elementary capacity. The Maori women in the sample were mainly clerical or service workers.

Income and socio-economic status

Figure 4.1 provides a comparison by ethnicity of those subjects with income over $30,000 with the Auckland and New Zealand populations. This group of women were predominantly in the lower income bracket, with the exception of European and Indian women. Some two thirds of the Chinese women fell into this category, despite more than 75% being married. In this group of Chinese women more than 60% receive income support and hold a community services card. Pacific and Indian women were the largest groups of non-responders to this question. No significant association was found between income and diabetes control.

Figure 4.1. *Percentage of population with a personal income over $30,000 by ethnicity*



Presently unemployed because of their health

The majority of women in all ethnic groups stated that their unemployment was not because of their health.

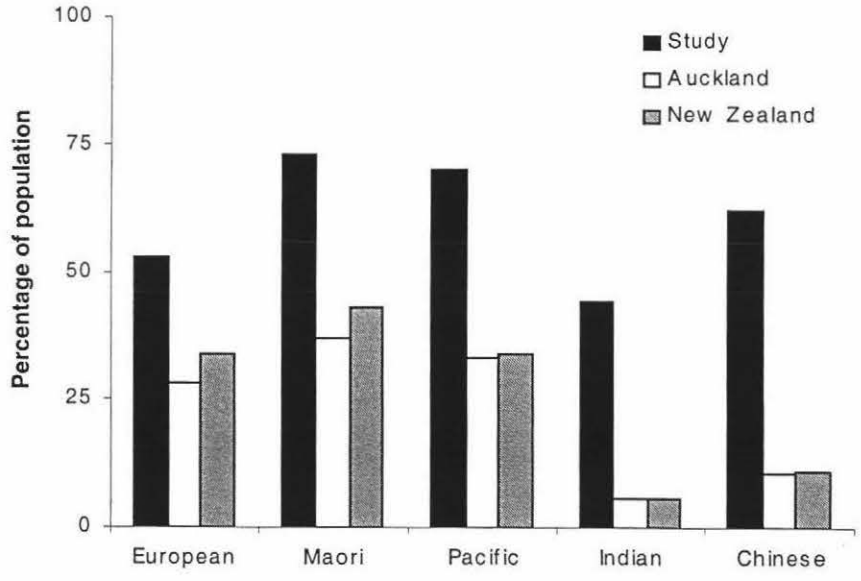
Income support received in the last year

The majority in all groups receive income support, with the exception of Indian women. Chinese women with well-controlled diabetes were the largest group of non-responders to this question.

Types of income support

There is a national trend towards a growing number of sickness/disability beneficiaries, with fewer unemployment beneficiaries, and this is reflected in these findings. There were a greater number of beneficiaries in the Pacific group, followed by the Maori and then Chinese and European women. Appendix 4.1 and 4.2 give a detailed breakdown of the income support received by the women; Appendix 4.3 gives an overall comparison with the national average. Figure 4.2 provides a comparison by ethnicity of those subjects receiving income support with Auckland and New Zealand populations.

Figure 4.2. *Percentage of population receiving income support by ethnicity*



Figures 4.3 and 4.4 illustrate similar comparisons for recipients of superannuation and the domestic purposes benefit.

Community Services Card

A higher proportion of Pacific, Maori and Chinese women were using a community services card. More of the women with poorly-controlled diabetes held a community services card.

Figure 4.3. *Percentage of population households with superannuitants by ethnicity*

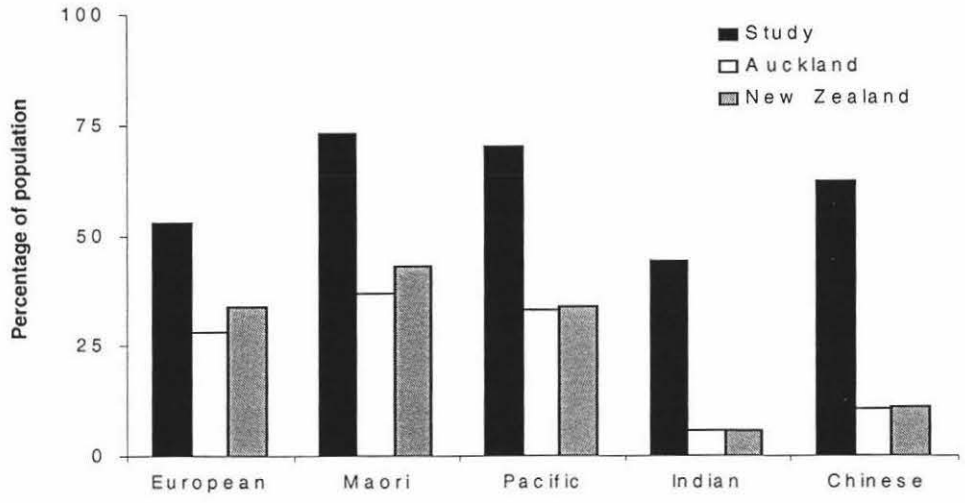
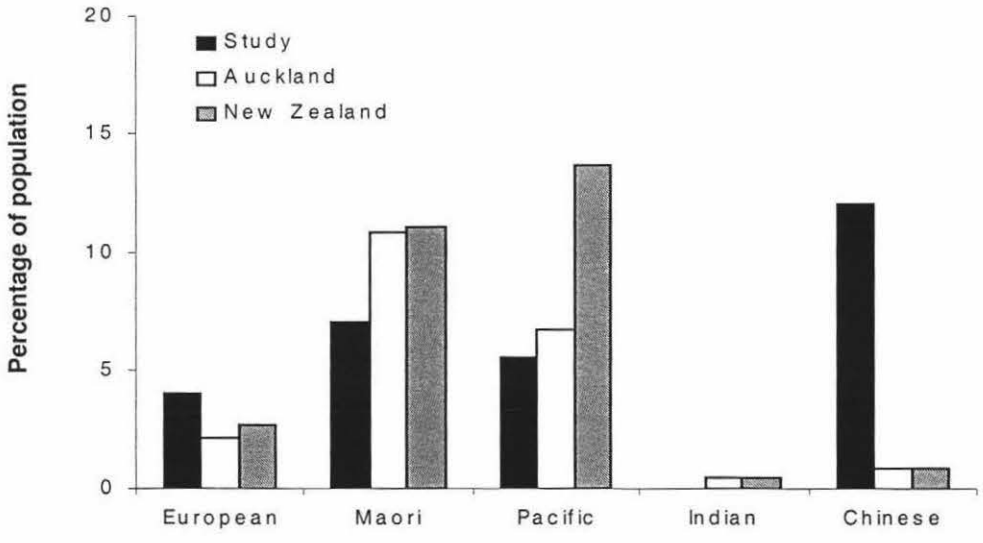


Figure 4.4. *Percentage of population receiving domestic purposes benefit by ethnicity*

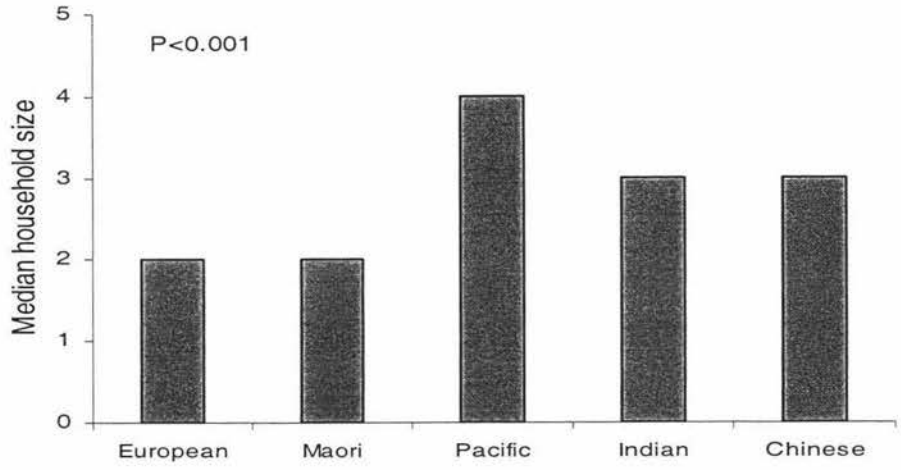


Family size

The median household size is shown in Figure 4.5. It was larger for subjects with poorly-controlled diabetes compared to those with well-controlled diabetes (3.0 vs 2.0, p=0.059). The majority of European and Maori subjects were living in a household of one to two members (77%, 59%) with Pacific, Indian, and to a lesser extent Chinese

subjects living in larger households of three to five members (79%, 64%, 53%, p<0.001). Some of the Pacific women live in extended families, with up to nine or ten members, several being children.

Figure 4.5. *Bar graph of median household size by ethnicity*



Marital status

Figures 4.6 and 4.7 show the marital status of subjects by ethnicity and by diabetic control. A mean of 55% of all subjects were married; however the number of Maori who were married was only 10% with poorly-controlled and 35% with well-controlled diabetes. More than 75% of the Indian and Chinese women were married (83%, 76%) and more European women were single in this cohort. More Maori were widowed than any other group, but prevalence is also high in Pacific women. Maori were the largest group living alone (66%) and to a lesser extent European and Pacific women (49%, 47%). Very few of these women were in defacto relationships, and most of the these had poorly-controlled diabetes. There were no Indian or Chinese women in this category. These ethnic differences were significant (p=0.004), however no significant association could be found between marital status and glycaemic control (p=0.683).

Figure 4.6. *Marital status by diabetic control*

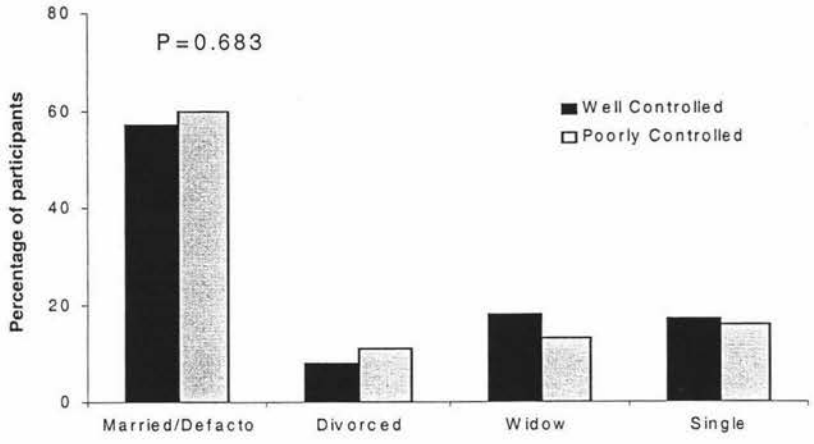
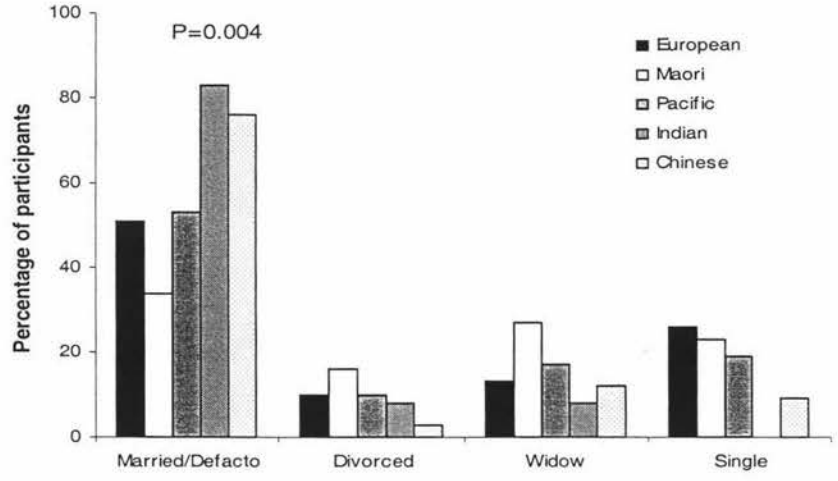


Figure 4.7. *Marital status by ethnicity*



4.2 Anthropometric description of sample

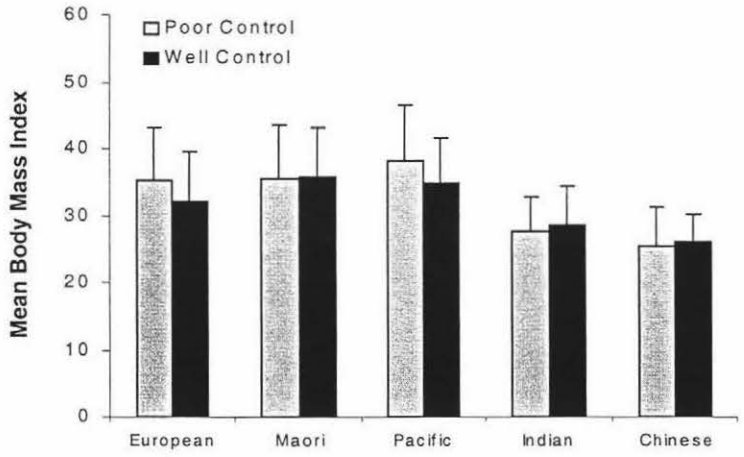
Tables 4.3a and 4.3b show the anthropometric measurements of the subjects by diabetic control and ethnicity.

Age: The mean age of participants was 56 years ± 11 with range of 24 to 78 years. There was no significant difference in age between those with well- and poorly-

controlled diabetes (p=0.389) but significant differences across the ethnic groups with Pacific and Indian women being slightly younger than other ethnic groups (p=0.033).

Height, weight and body mass index were significantly different across the ethnic groups, Maori mean height being higher and Chinese lower than other ethnic groups (p<0.001). The mean weight of Pacific and Maori women was significantly higher than other ethnic groups (p<0.001). Body mass index was also significantly higher in Pacific and Maori women (p<0.001). There was no significant difference in body mass index between those with well- and poorly-controlled diabetes (p=0.213). Figure 4.8 shows the mean body mass index by diabetic control and ethnicity.

Figure 4.8. *Mean body mass index by ethnicity and diabetic control.*



4.3 Biochemical and other medical measurements

Tables 4.3a and 4.3b show the most recent biochemical measures and blood pressures by diabetic control and ethnic group.

Table 4.3a *Patient characteristics by diabetic control (mean ± SD)*

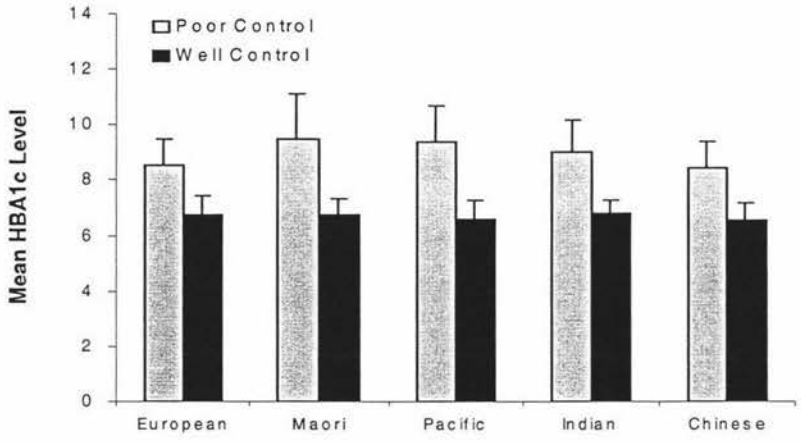
	Total N=232	N=109	**Poorly Controlled** N=123	**P value**
Age, years	56 ± 11	57 ± 11.0	56 ± 10.6	0.389
Duration of diabetes	7 ± 6.5	5.5 ± 6.3	9 ± 6.3	<0.001
Height , cm	160 ± 6.7	159 ± 6.3	160 ± 7.0	0.543
Weight , kg	83 ± 22.3	82 ± 21.4	85 ± 23.0	0.288
Body Mass Index, kg/m^2	33 ± 8	32 ± 7.3	33 ± 8.6	0.213
HbA1c, %	8 ± 1.5	6.7 ± 0.6	9.0 ± 1.3	<0.001
Blood pressure				
Systolic, mmHg	137 ± 21	137 ± 19.3	137 ± 22.4	0.991
Diastolic , mmHg	82 ± 12	82 ± 11.7	82 ± 12.2	0.826
Total Cholesterol, mmol/l	5.2 ± 1	5.3 ± 0.9	5.2 ± 1.1	0.934
HDL, mmol/l	1.3 ± 0.3	1.4 ± 0.3	1.3 ± 0.3	0.176
LDL, mmol/l	3.0 ± 0.8	3.0 ± 0.8	2.9 ± 0.9	0.410
TG, mmol/l	2.1 ± 1.3	2.0 ± 1.5	2.2 ± 1.2	0.238
Ratio, mmol/l	4.1 ± 1.1	4.0 ± 1.2	4.2 ± 1.1	0.389

Table 4.3b. *Patient characteristics by ethnicity (mean ± SD)*

	European N=53	**Maori** N=44	**Pacific** N=53	**Indian** N=48	**Chinese** N=34	**P value**
Age, years	60 ± 9.0	56 ± 12.4	54 ± 10.1	54 ± 10.0	58 ± 12.0	0.033
Duration of diabetes	9 ± 8.2	6.5 ± 5.0	6 ± 5.8	8 ± 6.4	7.5 ± 5.6	0.263
Height, cm	161 ± 7.1	162 ± 6.9	160 ± 5.6	158 ± 6.5	156 ± 5.7	<0.001
Weight, kg	88 ± 22.2	93 ± 20.1	95 ± 20.5	70 ± 14.6	64 ± 12.4	<0.001
Body Mass Index, kg/m^2	34 ± 7.7	36 ± 7.66	37 ± 7.8	28 ± 5.4	26 ± 4.9	<0.001
HbA1c, %	7.7 ± 1.2	8.1 ± 1.8	8.3 ± 1.8	8.0 ± 1.4	7.4 ± 1.2	0.032
Blood pressure						
Systolic, mmHg	139 ± 18.5	137 ± 18.7	139 ± 27.9	131 ± 17.7	138 ± 18.3	0.280
Diastolic , mmHg	80 ± 10.7	85 ± 13.4	83 ± 14.3	79 ± 8.6	81 ± 11.1	0.061
Total Cholesterol, mmol/l	5.2 ± 0.81	5.4 ± 1.14	5.2 ± 1.11	5.2 ± 0.86	5.3 ± 1.09	0.646
HDL, mmol/l	1.4 ± 0.31	1.2 ± 0.25	1.3 ± 0.28	1.3 ± 0.28	1.5 ± 0.40	0.003
LDL, mmol/l	2.8 ± 0.76	3.1 ± 0.86	3.0 ± 0.94	2.9 ± 0.74	2.9 ± 0.92	0.545
TG, mmol/l	2.0 ± 0.88	2.6 ± 1.53	1.9 ± 1.09	2.0 ± 0.91	2.0 ± 1.22	0.020
Ratio, mmol/l	3.9 ± 0.92	4.5 ± 1.24	4.2 ± 1.23	4.1 ± 0.88	3.9 ± 1.11	0.022

Mean HbA1c differed significantly across ethnic groups, being lower in the Chinese women than in all other groups (p=0.032). This is illustrated in Figure 4.9. No difference was seen in blood pressures by diabetic control or across ethnic groups.

Figure 4.9. *Mean HbA1c by ethnicity and diabetic control.*



Figures 4.10 and 4.11 show mean HDL and ratio of total:HDL-cholesterol levels by diabetic control and ethnicity. Significant differences were found in the lipid profiles of subjects. Mean HDL was highest in Chinese and European, and lowest in Maori women (p=0.003). Mean total:HDL-cholesterol ratios were highest in Maori women (p=0.022).

Figure 4.10. *Mean HDL levels by ethnicity and diabetic control.*

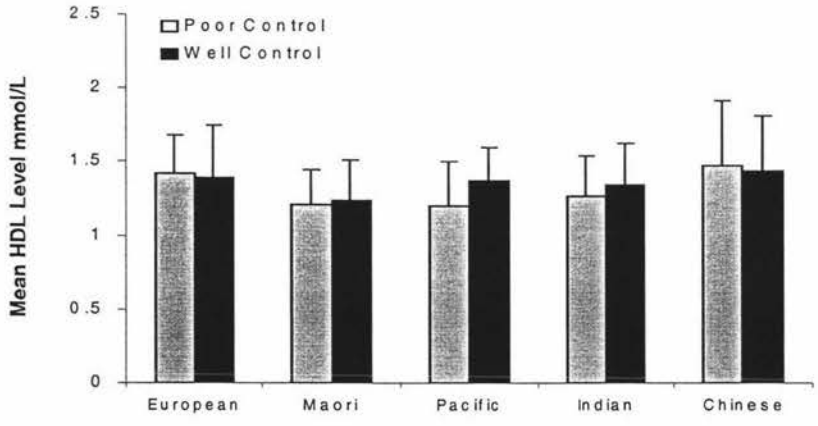


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Figure 4.11. *Mean total:HDL-cholesterol ratio levels by ethnicity and diabetic control*

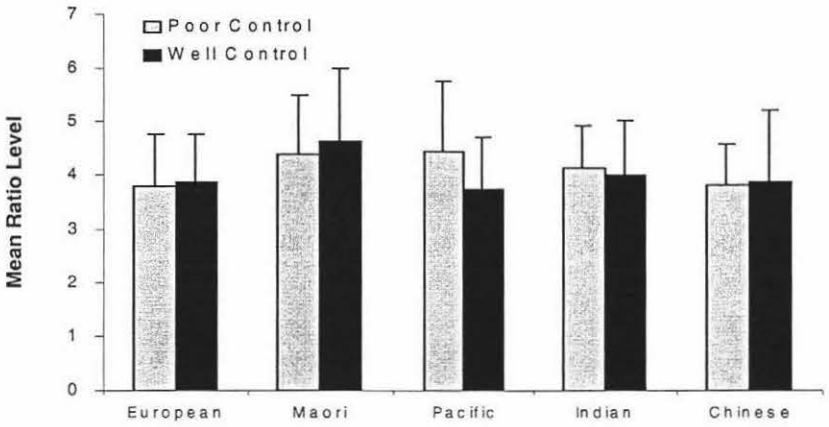
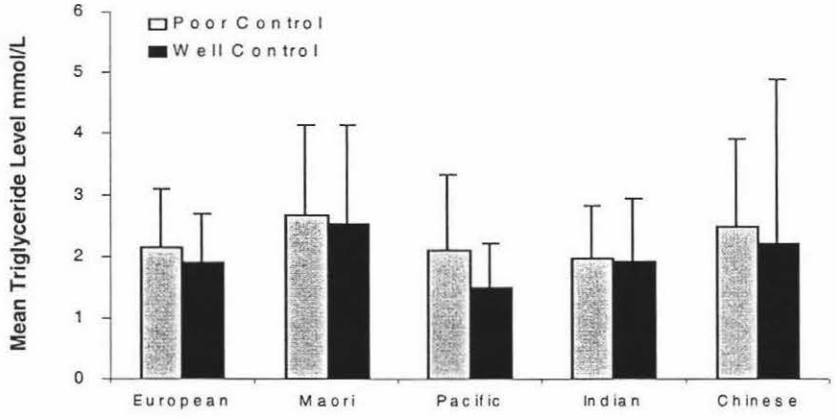


Figure 4.12 shows the mean triglyceride levels by diabetic control and ethnicity. Significant ethnic differences were found, with Maori women having the highest levels (0.020).

Figure 4.12. *Mean triglyceride levels by ethnicity and diabetic control.*



4.4 Health Status and Medication Characteristics

Duration of diabetes

Duration of diabetes is shown in Tables 4.3a and 4.3b. While participants with poorly controlled diabetes were more likely to have had diagnosed diabetes for longer than those with well-controlled diabetes (9 years vs 5.5 years, $p<0.001$) there was no

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evidence to suggest any significant difference in duration of diabetes across the ethnic groups. Figure 4.13 shows the duration of diabetes by diabetic control and Figure 4.14 shows duration by ethnicity and control.

Figure 4.13. *Box and Whisker plot of duration of diabetes by diabetic control*

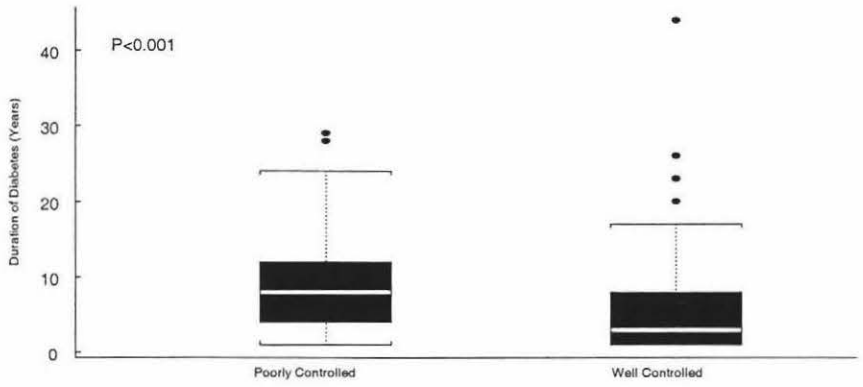
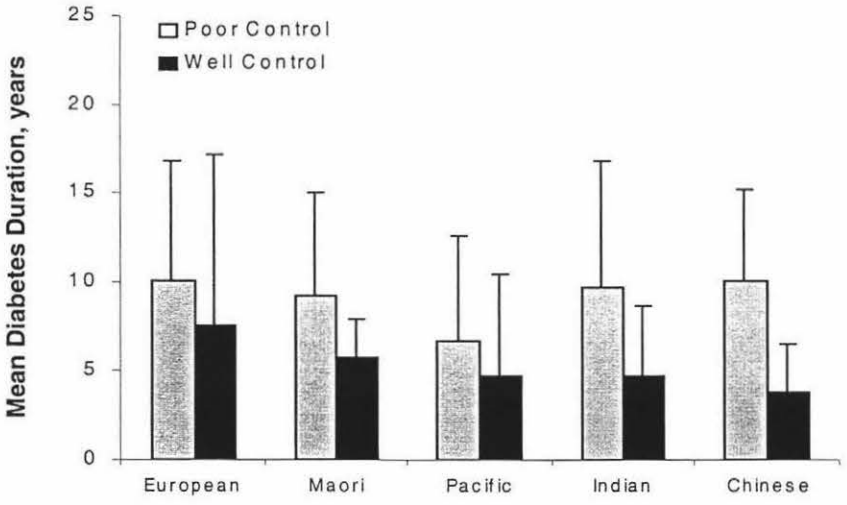


Figure 4.14. *Mean diabetes duration by ethnicity and diabetic control.*



Medication

Patients' medication data by diabetic control is presented in Table 4.4a and by ethnicity in Table 4.4b. This shows the number of subjects who knew they had a complication and those that had the complication and did not know. Table 4.4.c shows medications currently used by all subjects, and Appendix 4.4 shows medical treatment for diabetes in New Zealand, by ethnic group and sex.

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Table 4.4a. *Patient medication by diabetic control (subject numbers and percentage)*

	Total N=232	Well Controlled N=109	Poorly Controlled N= 123
N on Diabetic Medications	192 (83%)	76 (70%)	116 (94%)
Of these: Tablets			
Metformin	59 (31%)	34 (45%)	25 (22%)
Sulphonylurea	11 (6%)	4 (5 %)	7 (6%)
Both	49 (26%)	23 (30%)	26 (22%)
Insulin and tablets	51 (27%)	9 (12%)	42 (36%)
Insulin only	22 (11%)	6 (8%)	16 (14%)
Retinopathy			
Stated yes	91 (39%)	36 (33%)	55 (45%)
Nephropathy			
Stated yes	9 (3%)	4 (4%)	5 (4%)
Of these: albuminuria	6 (67%)	4 (100%)	2 (40%)
Stated no or don't know	223 (96%)	105 (96%)	118 (96%)
Of these: albuminuria	19 (9%)	9 (9%)	10 (8%)
Hypertension			
Stated yes	94 (41%)	47 (43%)	47 (38%)
Of whom N on medication	87 (93%)	44 (94%)	43 (91%)
Stated no or don't know	133 (57%)	62 (57%)	71 (58%)
Of whom N on medication	54 (41%)	20 (32%)	34 (48%)
Dyslipidaemia			
Stated yes	62 (27%)	28 (26%)	34 (28%)
Of whom N on medication	50 (81%)	23 (82%)	27 (79%)
Stated no or don't know	170 (73%)	81 (74%)	89 (72%)
Of whom N on medication	37 (22%)	18 (22%)	19 (21%)
Cardiovascular disease			
Stated yes	30 (13%)	13 (12%)	17 (14%)
Of whom N on medication	23 (77%)	10 (77%)	13 (77%)
Stated no or don't know	206 (89%)	96 (88%)	110 (89%)
Of whom n on medication	68 (33%)	27 (28%)	41 (37%)
Other medication for			
Depression	26 (11%)	16 (15%)	10 (8%)
Asthma	26 (11%)	14 (13%)	12 (10%)
Thyroid deficiency	13 (6%)	3 (3%)	10 (8%)
Gastrointestinal conditions	38 (16%)	16 (15%)	22 (18%)

6 subjects were taking Prednisone (nil for asthma):well controlled N=3, poorly controlled N=3.

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Table 4.4b. *Patient medication by ethnicity (subject numbers and percentage)*

	European N=53	Maori N=44	Pacific N=53	Indian N=48	Chinese N=34
N on Diabetic Medications	41 (77%)	38 (86%)	46 (87%)	42 (88%)	25 (74%)
Of these:Tablets:					
Metformin	9 (22%)	14 (37%)	18 (39%)	14 (33%)	4 (16%)
Sulphonylurea	1 (2%)	0	2 (4%)	4 (10%)	4 (16%)
Both	12(29%)	7 (18%)	10 (22%)	12 (29%)	8 (32%)
Insulin and tablets	12 (29%)	12 (32%)	13 (28%)	9 (21%)	5 (20%)
Insulin only	7 (17%)	5 (13%)	3 (7%)	3 (7%)	4 (16%)
Retinopathy					
Stated yes	13 (25%)	13 (30%)	25 (47%)	16 (33%)	24 (71%)
Nephropathy					
Stated yes	2 (4%)	3 (7%)	2 (4%)	1 (2%)	1 (3%)
albuminuria	1 (50%)	2 (67%)	0	0	0
Stated no or don't know	51 (96%)	41 (93%)	51 (96%)	47 (98%)	33 (97%)
albuminuria	4 (8%)	7 (17%)	7 (14%)	1 (2%)	0
Hypertension					
Stated yes	24 (45%)	16 (36%)	27 (51%)	17 (35%)	10 (29%)
Of whom N on medication	23 (96%)	15 (94%)	26 (96%)	15 (88%)	8 (80%)
Stated no or don't know	29 (55%)	28 (64%)	26 (49%)	31 (65%)	24 (71%)
Of whom N on medication	12 (41%)	15 (54%)	9 (35%)	8 (30%)	10 (42%)
Dyslipidaemia					
Stated yes	17 (32%)	13 (30%)	14 (26%)	11 (23%)	7 (21%)
Of whom N on medication	14 (82%)	11 (85%)	10 (71%)	8 (73%)	7 (100%)
Stated no or don't know	36 (68%)	31 (70%)	39 (74%)	37 (77%)	27 (79%)
Of whom N on medication	11 (30%)	9 (29%)	6 (15%)	6 (16%)	5 (19%)
Cardiovascular Disease					
Stated yes	13 (24%)	8 (18%)	3 (6%)	4 (8%)	2 (6%)
Of whom N on medication	11 (85%)	7 (88%)	3 (100%)	1 (25%)	1 (50%)
Stated no or don't know	44 (83%)	36 (82%)	50 (94%)	44 (92%)	32 (94%)
Of whom N on medication	19 (43%)	14 (39%)	14 (28%)	11 (25%)	10 (31%)
Other medication, for					
Depression	14 (26%)	4 (9%)	3 (6%)	3 (6%)	2 (6%)
Asthma	8 (15%)	8 (18%)	4 (8%)	3 (6%)	3 (9%)
Thyroid deficiency	4 (7%)	4 (9%)	3 (6%)	2 (4%)	2 (6%)
Gastrointestinal conditions	8 (15%)	6 (14%)	5 (9%)	12 (25%)	7 (21%)

6 subjects were taking Prednisone (nil for asthma): European N=1, Pacific N=1, Indian N=3, Chinese N=1

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Table 4.4.c *Medications currently used by the subjects*

Medication	N (%/medication)	% of total 232
Hypoglycaemic agents		
Tablets:	170	73.5
Sulphonylureas	13 (7.6)	5.5
Biguanide (Metformin)	59 (35)	25.5
Sulphonylurea + biguanide:	51 (30)	22
Use of insulin only	21	9
Nil medication for diabetes	38	16.5
Lipid-lowering agents	87	37.5
Statins	66 (76)	28.5
Fibrates	20 (23)	8.5
Nicotinic acid	1 (1)	0.4
Nil medication for lipids	145	62.5
Antihypertensive agents	141	61
Of these >1 medication	68 (48)	29
ACEI *	100 (71)	41.5
Ca2+ channel blocker	47 (33.3)	20
Diuretics	36 (25.5)	15.5
Slow K	3 (2)	1
Others *(a-(3), b-blockers(27), ATIIRB(10)**)*	40 (28)	17
Cardiovascular	83	36
Aspirin	79	34
Angina medication *(GTN, duride, betaloc)*	19	8
Others (warfarin,digoxin, persatin)	6	2.5
Psychotropic agents	29	12
Antidepressants: Tricyclic	6	2.6
SSRI***	7	3
Antipsychotics	6	2.6
Anxiolytics	4	2
Hypnotics	6	2.6
Other medications, for		
asthma	26	11
gastrointestinal conditions *(mainly losec)*	38	16.5
thyroid deficiency	13	6
prednisone *(nil for asthma)*	6	2.6

* ACEI, ACE inhibitor
** a-blocker, a-adrenoceptor blocker
b-blocker, b-adrenoceptor blocker
ATIIRB, angiotensin II receptor antagonist
*** SSRI, selective serotonin reuptake inhibitor

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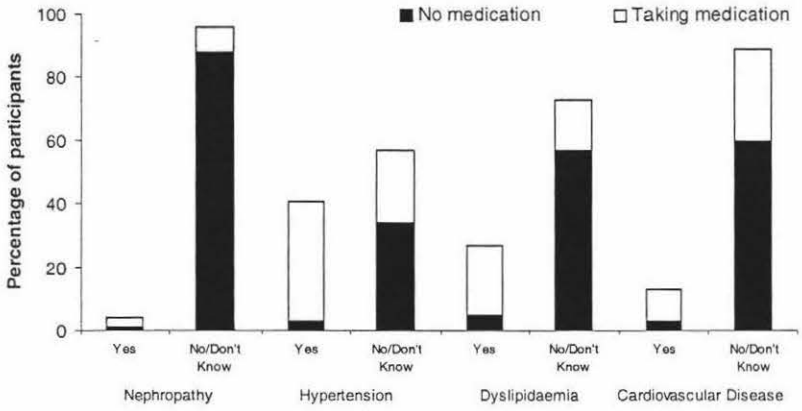
Figure 4.15 illustrates the patients' understanding of the purpose of their medication.

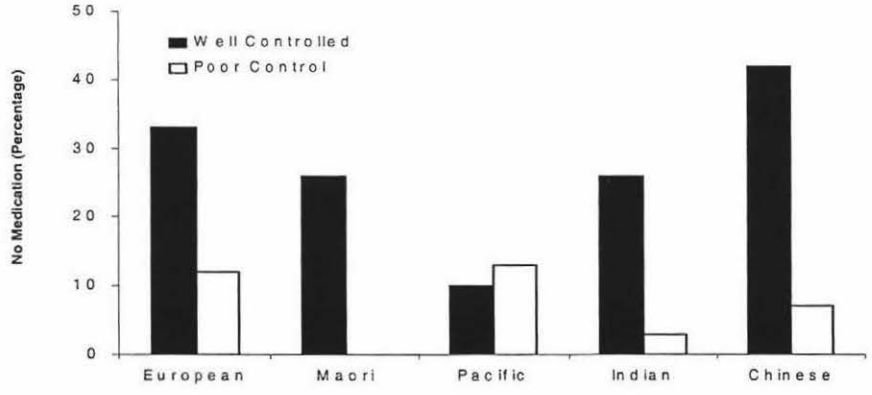
Figure 4.15: *Patients diagnosed with diabetes complications and their understanding of the purpose of their medication.*



Diabetes medication

One third of the Europeans with well-controlled diabetes were on no medication for diabetes, whereas more than one half of those with poorly-controlled diabetes had failure of oral medication, requiring insulin. In all ethnic groups more of those with well-controlled diabetes were managing their condition without diabetes medication, with more of those with poor control requiring insulin. Up to 12% of Pacific and European women with poor control were on no medication. This is illustrated in Figure 4.16, showing medication by diabetic control and ethnicity.

Figure 4.16. *Patients on no diabetes medication by ethnicity and diabetic control*



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Retinopathy

Those with poorly controlled diabetes had a slightly higher incidence of retinopathy, but this did not reach statistical significance (55/123 vs 36/109, p=0.069). There were significant differences across the ethnic groups, with Chinese and Pacific having higher rates than European, Maori and Indian women (p<0.001).

Nephropathy

Only nine women stated that they had nephropathy; of these six had albuminuria. Of those who denied having nephropathy or didn't know 19 (9%) had albuminuria.

Hypertension

One hundred and thirty-three (57%) subjects stated they had no hypertension or didn't know, of whom 54 (40%) were on antihypertensive medication. Across the ethnic groups more than one half of the Maori women and approximately one third of the other ethnic groups did not know they had hypertension yet were on antihypertensive medication.

Dyslipidaemia

One hundred and seventy (73%) subjects stated that they had no dyslipidaemia or didn't know, of whom 37 (22%) were on lipid-lowering medication. More European (47%) and Maori (45%) women were on medication for this condition.

Cardiovascular Disease

Of the 30 women who stated that they had cardiovascular disease 23 (77%) were on medication, predominantly aspirin, but seven (23%) were not, and of the 206 women who denied having cardiovascular disease or didn't know 68 (33%) were on medication. More of both positive and negative responders were in the group with poorly-controlled diabetes. More European and Maori were aware of cardiovascular disease, and more in these ethnic groups were taking medication for this condition.

Comorbidities

More than one quarter of the European women were receiving antidepressants, more of the Maori women suffered from asthma, and more Indian and Chinese women were prescribed medication for gastrointestinal conditions.

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4.5 Questionnaire Results

The questionnaire was designed to assess the views of the patients on diabetes, how it affects their lifestyle, and also their views on food and health. Responses showed no significant association with diabetes control, apart from the perceived importance of clinic visits to subjects with poorly-controlled diabetes (p=0.049). However there were significant ethnic differences in a number of responses.

Attitudes towards diabetes

The first section of the questionnaire sought attitudes towards diabetes, and the results are shown in Tables 4.5a and 4.5b.

I think that diabetes

- *makes me frustrated*

Pacific women found diabetes most frustrating, followed to a lesser degree by Maori, and also by Chinese with poorly-controlled diabetes. This ethnic difference was significant (p=0.007).

- *makes people treat me differently*

Pacific women were also the most concerned that people would treat them differently because of their diabetes (p=0.01). More women with well-controlled diabetes had this concern but no statistical significance was found regarding glycaemic control (p=0.86).

- *Control can improve if I lose weight*

There were no significant differences in response to this question. All groups were aware that their diabetes control can improve with weight reduction, but some Indian (27.6%) and Chinese (20%) women with poorly-controlled diabetes did not agree with this statement.

- *Can usually be managed with regular meals, exercise and medication*

The majority in all ethnic groups agreed with this statement, indicating that this important message has been understood.

- *Complications can be avoided*

The majority agreed with this statement, but it was evident that some 15% of this cohort did not appear to understand the complications that can result from poorly-controlled diabetes. Indeed when asked whether they had high blood pressure or cholesterol, heart or kidney disease a number gave a 'no' or 'don't know' response yet were on medication for these conditions (Tables 4.4a, 4.4b).

- *Makes me worry about my job*

There was a significant ethnic difference in concern about work, with European and Maori women least concerned (p=0.005), and the Indian women with well-controlled diabetes and the Pacific women with poorly-controlled diabetes most concerned. Ability to do their job was of particular concern to Pacific women, almost one third of whom work in elementary jobs such as packing, cleaning and as machinists, with perhaps less job security and often larger families to support. In the group as a whole, 42% felt that diabetes was not an issue where their work was concerned, with 26% giving a 'not applicable' or nil response, giving a total of 68%.

- *Stops me going out to eat with friends*

The majority did not feel that their diabetes would disadvantage them socially. Those concerned were mainly Indian women with well-controlled diabetes and Pacific women with poorly-controlled diabetes (p=0.016).

- *Stops me from being physically active*

The majority did not feel that their diabetes would limit their physical activity although Pacific and Chinese women had some concerns (p=0.086).

Perceived effects of diabetes

This section sought perceptions of diabetes and its impact on subjects and their families, and the results are shown in Tables 4.6a and 4.6b.

I think that diabetes

- *Makes me worry about having a low blood sugar in public*

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The majority did not have this concern, with the exception of Pacific women with well- and poorly-controlled diabetes and also the Chinese with well-controlled diabetes ($p<0.001$).

- *Puts a burden on my family*

Pacific and Chinese women felt their diabetes to be a burden on their families (57%, 47%); this was not a concern for European, Indian or Maori (8%, 20%, 20%) ($p<0.001$).

- *Interferes with my sex life*

The majority, and particularly those with poorly-controlled diabetes, felt that diabetes did not interfere with their sex life. There was evidence of an ethnic difference, with European women least concerned.

- *Takes up a lot of my time*

Pacific and Chinese women (46%, 45%) found time for diabetes self-care a bigger problem than other ethnic groups ($p<0.001$).

- *Costs me more for food*

Pacific women with both well-and poorly-controlled diabetes (48%, 65.5%), and Chinese women with poorly-controlled diabetes (47%) felt that diabetes cost them more for food. This ethnic difference was significant ($p<0.006$). Response from other groups was relatively consistent (~33%).

- *Improves my social activities*

The majority did not agree with this statement, as was expected. Pacific and Chinese women were the exception ($p=0.001$).

- *Makes me feel so down in the dumps that nothing could cheer me up*

There was an ethnic difference in response to this question; Pacific and Chinese women were the main group to agree with this statement ($p<0.001$). Psychological issues overall were found to be of greater concern for these two ethnic groups ($p<0.001$).

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- *Actually makes me feel healthier, when I eat good food and walk daily*

The majority agreed with this statement which was encouraging.

Perceived importance of clinic visits

Tables 4.7a and 4.7b show the perceived importance of clinic visits by diabetes control and ethnicity. In the questionnaire participants were asked if they thought :

- *It is important that I attend my appointments with doctor, nurse and dietician*

- *Information from them helps me manage my diabetes better*

- *Information from them is easy for me to use in my culture/ethnic group*

The majority agreed with the first two statements above (89%, 89%), with stronger agreement by the group with poorly-controlled diabetes regarding the importance of attending clinic appointments (p=0.049), and the fact that information received was helpful for their diabetes management (p=0.078). However a smaller majority (62%) agreed with the third statement, indicating that health professionals still have work to do in this area. Participants' comments are recorded in Appendix 4.5. There was no significant difference across ethnic groups.

Dietary knowledge

Tables 4.8a and 4.8b show dietary knowledge of subjects. There was no significant difference between those with well- and poorly-controlled diabetes, but a significant difference between ethnic groups in nutrition knowledge, with European and Indian showing greater awareness than other ethnic groups (p=0.02). Specific aspects included eating foods high in fibre (p=0.01), and limiting intake of sugar (p=0.04) and alcohol (p=0.01), the latter being considered most important by Indian and Chinese women, and least important by Pacific women. The Chinese did not consider adequate fibre and limiting of sugar to be important.

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Health awareness

Tables 4.9a and 4.9b show health awareness of subjects. Awareness of health issues including maintaining a healthy weight was not significantly different between those with well- and poorly-controlled diabetes or across ethnic groups. The majority considered health issues very important.

Smoking

The majority of subjects (63%) stated that this question was not applicable to them, indicating that they did not smoke. This particularly applied to Indian and Chinese (92%, 83%), and to European (82%) women with well-controlled diabetes. Of those who responded, presumably smokers, most said that it was important for them to give up. Responders were predominantly Maori and Pacific women with both well- and poorly-controlled diabetes, and Europeans with poorly-controlled diabetes. There was no significant ethnic difference in response to this question and no association with diabetes control.

Personal Priorities

Tables 4.10a and 4.10b show the personal priorities of the women. No association could be found with their diabetes control, but there were ethnic differences regarding the importance they placed on fitness and body weight. Participants were asked how important were the following to them at the moment:

- *The way you feel emotionally*

Considerably more of the Pacific women with well-controlled diabetes (81%) felt this to be very important than those with poorly-controlled diabetes (63%). Conversely more of the Maori with poorly-controlled diabetes felt this to be important (86%), as did European women in both groups (89%, 89%). Fewer Indian and Chinese women found this important (64%, 65%).

- *Your overall appearance*

European (88%) and Pacific (84%) women in both groups stated that appearance was very important.

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- *Your fitness*

Most agreed with this statement, however there were ethnic differences; fewer of the Maori and Pacific women with poorly-controlled diabetes, and Chinese with well-controlled diabetes felt personal fitness to be important (p=0.080).

- *Your weight*

The majority of all groups felt that their weight was important. As with the previous question fewer of the Maori and Pacific women with poorly-controlled diabetes, and Chinese with well-controlled diabetes, considered their weight to be important (p=0.025).

- *Taking care of future health*

Future health was important to all groups, with no significant difference between ethnic groups.

- *Support of family/friend*

Maori, Pacific and European women with well-controlled diabetes, and Chinese and Indian women with poorly-controlled diabetes, felt support of family and friends to be very important to them. However there was no statistically significant ethnic difference in response to this question.

Similar questions were grouped together in two categories for statistical analysis. Firstly psychological issues affecting self, such as frustration, worry, emotions, feeling 'down', and secondly issues affecting others, such as being treated differently, being a burden on the family, being unable to eat out, have social activities and a sex life. Psychological issues overall were statistically significant ($p<0.001$) across ethnic groups. The majority of these psychological aspects were felt most strongly by the Pacific women, but Chinese women also often felt 'down' and worried about being a burden on their family. Indian women also felt that diabetes made them worry about their job and prevented them from eating out with friends.

Likert scores are shown on the following pages.

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Table 4.5a. *Attitude to diabetes: Likert scores by diabetic control (mean ± SD)*

I think that diabetes:	Well-controlled n=109	Poorly-controlled n=123	P value
Makes me frustrated	3.2 ± 1.3	3.4 ± 1.4	0.29
Makes people treat me differently	2.3 ± 1.4	2.3 ± 1.4	0.86
Control can improve if I lose weight	4.2 ± 1.2	4.0 ± 1.2	0.42
Can usually be managed with regular meals, exercise and medication	4.4 ± 1.0	4.4 ± 0.9	0.67
Complications can be avoided	4.1 ± 1.0	4.1 ± 1.0	0.76
Makes me worry about my job	2.6 ± 1.4	2.4 ± 1.3	0.23
Stops me from going out to eat with friends	2.5 ± 1.4	2.2 ± 1.3	0.11
Stops me from being physically active	2.5 ± 1.5	2.5 ± 1.5	0.73

Scores range from 1 to 5 with 1 representing strongly disagree and 5 strongly agree.
Mean scores ± standard deviation

Table 4.5b. *Attitude to diabetes: Likert scores by ethnicity (mean ± SD)*

I think that diabetes:	European n=53	Maori n=44	Pacific n=53	Chinese n=34	Indian n=48	P value
Makes me frustrated	3.0 ± 1.4	3.3 ± 1.4	3.9 ± 1.1	3.3 ± 1.2	3.0 ± 1.4	0.007
Makes people treat me differently	2.2 ± 1.2	1.8 ± 1.2	2.8 ± 1.5	2.4 ± 1.3	2.3 ± 1.4	0.011
Control can improve if I lose weight	4.2 ± 1.0	4.2 ± 1.2	4.1 ± 1.2	4.1 ± 1.3	3.9 ± 1.4	0.779
Can usually be managed with regular meals, exercise and medication	4.6 ± 0.8	4.3 ± 1.0	4.4 ± 0.9	4.4 ± 0.9	4.4 ± 1.1	0.749
Complications can be avoided	4.2 ± 1.0	4.1 ± 1.0	4.0 ± 1.0	3.9 ± 1.0	4.2 ± 1.0	0.526
Makes me worry about my job	2.1 ± 1.1	1.9 ± 1.1	2.9 ± 1.4	2.7 ± 1.3	2.6 ± 1.5	0.005
Stops me from going out to eat with friends	2.0 ± 1.2	1.9 ± 1.2	2.7 ± 1.4	2.4 ± 1.3	2.5 ± 1.5	0.016
Stops me from being physically active	2.0 ± 1.2	2.5 ± 1.5	2.8 ± 1.6	2.7 ± 1.5	2.5 ± 1.4	0.086

Scores range from 1 to 5 with 1 representing strongly disagree and 5 strongly agree.
Mean scores ± standard deviation

Table 4.6a. *Perceived effects of diabetes: Likert scores by diabetic control (mean ± SD)*

I think that diabetes:	Well-controlled n=109	Poorly-controlled n=123	P value
Makes me worry about having a low blood sugar in public	2.9 ± 1.5	2.8 ± 1.4	0.708
Puts a burden on my family	2.7 ± 1.4	2.5 ± 1.4	0.152
Interferes with my sex life	2.2 ± 1.3	2.0 ± 2.1	0.146
Takes up a lot of my time	2.7 ± 1.4	2.6 ± 1.4	0.369
Costs me more for food	3.1 ± 1.5	2.9 ± 1.6	0.440
Improves my social activities	2.4 ± 1.2	2.3 ± 1.3	0.493
Makes me feel so down in the dumps that nothing could cheer me up	2.4 ± 1.3	2.3 ± 1.3	0.725
Actually makes me feel healthier, when I eat good food and walk daily.	4.1 ± 1.2	4.0 ± 1.2	0.416

Scores range from 1 to 5 with 1 representing strongly disagree and 5 strongly agree.
Mean scores ± standard deviation

Table 4.6b. *Perceived effects of diabetes: Likert scores by ethnicity (mean ± SD)*

I think that diabetes:	European n=53	Maori n=44	Pacific n=53	Chinese n=34	Indian n=48	P value
Makes me worry about having a low blood sugar in public	2.3 ± 1.3	2.4 ± 1.4	3.5 ± 1.4	3.1 ± 1.4	2.8 ± 1.5	<0.001
Puts a burden on my family	2.0 ± 1.1	2.2 ± 1.4	3.2 ± 1.4	3.4 ± 1.3	2.3 ± 1.4	<0.001
Interferes with my sex life	1.7 ± 1.1	2.0 ± 1.2	2.3 ± 1.4	2.3 ± 1.1	2.2 ± 1.4	0.114
Takes up a lot of my time	2.1 ± 1.1	2.6 ± 1.5	3.3 ± 1.4	3.1 ± 1.4	2.3 ± 1.4	<0.001
Costs me more for food	3.0 ± 1.5	2.8 ± 1.6	3.6 ± 1.5	3.1 ± 1.4	2.4 ±1.5	0.006
Improves my social activities	1.9 ± 1.0	2.4 ± 1.4	2.8 ± 1.2	2.5 ± 1.2	2.0 ± 1.0	0.001
Makes me feel so down in the dumps that nothing could cheer me up	2.1 ± 1.2	1.9 ± 1.1	3.0 ± 1.3	2.7 ± 1.1	2.1 ± 1.3	<0.001
Actually makes me feel healthier, when I eat good food and walk daily.	4.1 ± 1.1	4.1 ± 1.2	4.0 ± 1.2	3.8 ± 1.3	4.0 ± 1.1	0.905

Scores range from 1 to 5 with 1 representing strongly disagree and 5 strongly agree.
Mean scores ± standard deviation

Table 4.7a. *Perceived importance of clinic visits: Likert scores by diabetic control (mean ± SD)*

I think that	Well-controlled n=109	Poorly-controlled n=123	P value
It is important that I attend my appointments with the doctor, nurse and dietitian	4.4 ± 1.1	4.7 ± 0.8	0.049*
Information from them helps me manage my diabetes better	4.3 ± 1.1	4.6 ± 0.8	0.078*
Information from them is easy for me to use in my culture/ethnic group	3.9 ± 1.3	4.0 ± 1.3	0.456

*Non parametric test of statistical significance used to generate p-value.
Scores range from 1 to 5 with 1 representing strongly disagree and 5 strongly agree.
Mean scores ± standard deviation

Table 4.7b. *Perceived importance of clinic visits: Likert scores by ethnicity (mean ± SD)*

I think that	European n=53	Maori n=44	Pacific n=53	Chinese n=34	Indian n=48	P value
It is important that I attend my appointments with the doctor, nurse and dietitian	4.6 ± 0.9	4.5 ± 1.1	4.5 ± 1.1	4.5 ± 0.9	4.7 ± 0.8	0.864
Information from them helps me manage my diabetes better	4.5 ± 1.0	4.4 ± 1.1	4.4 ± 1.0	4.4 ± 1.0	4.5 ± 0.9	0.973
Information from them is easy for me to use in my culture/ethnic group	3.9 ± 1.6	3.9 ± 1.4	4.0 ± 1.3	3.8 ± 1.1	4.0 ± 1.1	0.914

Scores range from 1 to 5 with 1 representing strongly disagree and 5 strongly agree.
Mean scores ± standard deviation

Table 4.8a. *Dietary knowledge: Likert scores by diabetic control (mean ± SD)*

How important to you is:	Well-controlled n=109	Poorly-controlled n=123	P value
Eating low-fat foods	4.3 ± 1.1	4.3 ± 1.0	0.864
Eating foods high in fibre like wholegrain bread and cereals	4.3 ± 1.0	4.4 ± 0.9	0.183
Limiting your intake of sugar	4.5 ± 0.9	4.4 ± 1.1	0.385
Eating 5+ vegetables and fruit every day	4.4 ± 0.9	4.4 ± 0.9	0.696
Having some milk, yoghurt or low-fat cheese	3.8 ± 1.1	3.8 ± 1.2	0.743
Reducing the amount of salt you use	3.8 ± 1.2	3.8 ± 1.4	0.753
Limiting alcohol	4.1 ± 1.3	4.2 ± 1.4	0.521

Scores range from 1 to 5 with 1 representing not at all important and 5 very important.
Mean scores ± standard deviation

Table 4.8b. *Dietary knowledge: Likert scores by ethnicity (mean ± SD)*

How important to you is:	European n=53	Maori n=44	Pacific n=53	Chinese n=34	Indian n=48	P value
Eating low-fat foods	4.4 ± 0.9	4.2 ± 1.1	4.3 ± 1.2	4.1 ± 1.0	4.6 ± 0.9	0.227
Eating foods high in fibre like wholegrain bread and cereals	4.5 ± 0.7	4.2 ± 0.9	4.3 ± 1.0	3.9 ± 1.2	4.6 ± 0.8	0.010
Limiting your intake of sugar	4.6 ± 0.8	4.5 ± 0.9	4.3 ± 1.2	4.1 ± 1.3	4.7 ± 0.6	0.047
Eating 5+ vegetables and fruit every day	4.6 ± 0.8	4.3 ± 0.9	4.3 ± 1.0	4.3 ± 1.0	4.5 ± 0.8	0.521
Having some milk, yoghurt or low-fat cheese	3.9 ± 1.2	3.7 ± 1.0	3.6 ± 1.4	3.7 ± 1.1	4.1 ± 1.0	0.122
Reducing the amount of salt you use	4.0 ± 1.2	3.6 ± 1.3	3.7 ± 1.5	3.7 ± 1.2	4.0 ± 1.2	0.473
Limiting alcohol	4.2 ± 1.0	4.1 ± 1.4	3.6 ± 1.7	4.3 ± 1.3	4.6 ± 1.0	0.014

Scores range from 1 to 5 with 1 representing not at all important and 5 very important.
Mean scores ± standard deviation

Table 4.9a. *Health awareness: Likert scores by diabetic control (mean ± SD)*

I think that:	Well-controlled n=109	Poorly-controlled n=123	P value
It is important for me to be a healthy weight	4.6 ± 0.7	4.6 ± 0.8	0.895
It is important to know about heart disease	4.5 ± 0.9	4.6 ± 0.9	0.703
Controlling my blood pressure is important	4.6 ± 0.8	4.6 ± 0.9	0.964
Controlling my cholesterol level is important	4.6 ± 0.8	4.6 ± 0.8	0.569
Daily activity is important	4.5 ± 0.8	4.6 ± 0.9	0.889
Medication must be taken every day	4.7 ± 0.8	4.7 ± 0.7	0.665
For those that smoke:*			
It is important for me to give up smoking	3.9 ± 1.4	3.9 ± 1.7	0.898

Scores range from 1 to 5 with 1 representing not at all important and 5 very important.
*Well controlled n=32, Poorly controlled n=35
Mean scores ± standard deviation

Table 4.9b. *Health awareness: Likert scores by ethnicity (mean ± SD)*

I think that:	European n=53	Maori n=44	Pacific n=53	Chinese n=34	Indian n=48	P value
It is important for me to be a healthy weight	4.8 ± 0.6	4.5 ± 0.9	4.6 ± 0.8	4.5 ± 0.9	4.8 ± 0.7	0.287
It is important to know about heart disease	4.5 ± 0.9	4.6 ± 0.9	4.5 ± 1.0	4.5 ± 0.9	4.7 ± 0.7	0.760
Controlling my blood pressure is important	4.7 ± 0.7	4.5 ± 0.9	4.6 ± 0.8	4.6 ± 0.9	4.7 ± 0.9	0.890
Controlling my cholesterol level is important	4.6 ± 0.8	4.4 ± 1.1	4.6 ± 0.8	4.5 ± 0.9	4.8 ± 0.7	0.130
Daily activity is important	4.7 ± 0.6	4.4 ± 0.9	4.5 ± 0.8	4.5 ± 1.1	4.7 ± 0.8	0.375
Medication must be taken every day	4.9 ± 0.4	4.8 ± 0.6	4.6 ± 0.9	4.5 ± 1.0	4.8 ± 0.8	0.066
For those that smoke:						
It is important for me to give up smoking	3.9 ± 1.7	4.0 ± 1.4	3.9 ± 1.6	3.2 ± 1.8	4.0 ± 2.0	0.824

Scores range from 1 to 5 with 1 representing not at all important and 5 very important.
Mean scores ± standard deviation

Table 4.10a. *Personal priorities: Likert scores by diabetic control (mean ± SD)*

How important are these to you at the moment?	Well-controlled n=109	Poorly-controlled n=123	P value
The way you feel emotionally	4.2 ± 1.0	4.2 ± 1.0	0.760
Your overall appearance	4.2 ± 0.9	4.2 ± 1.0	0.741
Your fitness	4.4 ± 0.8	4.3 ± 0.9	0.632
Your weight	4.5 ± 0.7	4.4 ± 0.9	0.448
Taking care of future health	4.7 ± 0.6	4.6 ± 0.7	0.508
Support of family/friend	4.4 ± 1.0	4.3 ± 1.0	0.726

Scores range from 1 to 5 with 1 representing not at all important and 5 very important.
Mean scores ± standard deviation

Table 4.10b. *Personal priorities: Likert scores by ethnicity (mean ± SD)*

How important are these to you at the moment?	European n=53	Maori n=44	Pacific n=53	Chinese n=34	Indian n=48	P value
The way you feel emotionally	4.5 ± 0.8	4.3 ± 0.9	4.1 ± 1.0	3.9 ± 1.1	4.2 ± 1.2	0.108
Your overall appearance	4.3 ± 1.0	4.1 ± 0.9	4.4 ± 0.9	3.9 ± 0.9	4.3 ± 1.0	0.223
Your fitness	4.4 ± 0.8	4.1 ± 1.0	4.4 ± 0.9	4.3 ± 1.0	4.6 ± 0.7	0.080
Your weight	4.6 ± 0.6	4.3 ± 0.9	4.4 ± 0.9	4.1 ± 1.1	4.6 ± 0.6	0.025
Taking care of future health	4.7 ± 0.6	4.6 ± 0.7	4.5 ± 0.8	4.5 ± 0.9	4.8 ± 0.5	0.382
Support of family/friend	4.3 ± 1.0	4.3 ± 1.1	4.4 ± 1.0	4.3 ± 1.0	4.5 ± 0.9	0.781

Scores range from 1 to 5 with 1 representing not at all important and 5 very important.
Mean scores ± standard deviation

5 Discussion of results

The purpose of this study was to identify factors that influence food and lifestyle choices in women with well-controlled and poorly-controlled type 2 diabetes from different ethnic groups. These factors included perceptions about diabetes care, the perceived importance of healthy food and lifestyle choices, attitudes towards personal health and the influence of mood on diabetes care. It is evident from the literature that the traditional 'universal approach' of 'one size fits all' does not recognise ethnic disparities (Pearce et al 1984). Potential barriers to health care identified in the literature include the cultural appropriateness of services, broad structural barriers and the increased impact of socioeconomic barriers.

5.1 Demographic characteristics:

Education.

In this group of older women 20% had not attended secondary school, and 34% had attended for two years or less, more of these with poorly-controlled diabetes. In the literature increasing age and lower educational achievement has been associated with less diabetes knowledge (Simmons et al 1994b). Level of education and diabetes control did not reach statistical significance in this study.

More Pacific, Maori and Chinese women in this cohort had no secondary education. They were predominantly in a lower income bracket, with less dietary knowledge and health awareness than European and Indian women ($p=0.02$). Simmons et al (1994b) found a significant difference in diabetes knowledge across ethnic groups, with only 23% Pacific, and 48% Maori, compared to 62% European patients, able to answer 'what is diabetes?' or name symptoms or complications ($p=0.001$), similar to the lack of knowledge he found in British Indians (Simmons et al 1991a). Other studies have found that with increasing age progressively smaller proportions of women in these ethnic groups had received a secondary or tertiary education (Satterthwaite 1995; Statistics New Zealand 1992).

Education has been shown in some studies to be positively associated with diabetes control, with scientific knowledge being a distinct advantage in understanding the pathophysiology of diabetes, its complications, and the biochemical indices of metabolic control. Self-management of diabetes requires complex thinking and problem-solving skills (Bonnet et al 1998).

Lack of knowledge of health issues and how to access health information has been identified in the literature to be a barrier to diabetes care (Lunt 1993; MoH 2002a,b; Simmons 1991a, 1994c, 1998). To address this Diabetes New Zealand manages an annual 'Diabetes Awareness Week' with extensive media coverage and initiatives such as informal screening and supermarket tours. Diabetes New Zealand also provides support for people with diabetes and lobbies government on their behalf; the New Zealand Society for the Study of Diabetes fosters medical research funded by pharmaceutical companies; and the Ministry of Health has produced numerous publications based on current research.

Work status and occupation:

The majority of these women (60%) were not working, a far greater proportion than in the general population, where 6% European, 18.5% Maori, 17.6% Pacific and 13.6% Asian were found to be unemployed in the 2001 census. Of those working, more with well-controlled diabetes were working in higher level occupations (68%), and more with poorly-controlled diabetes were working in lower level occupations (51%). More than 50% of Pacific women in this study were working in lower level occupations. In terms of type of employment Pacific women in general are at the lower income end of the New Zealand standard classification of occupations, with more than one quarter working as cleaner, packer, general clerk or in sales in the 2001 census (Statistics New Zealand 2002b). Increased casualisation in low-paid female occupations has lead to 'precarious' employment for Maori and Pacific women in particular, meaning that taking time off for medical appointments may jeopardise their position.

Income and socioeconomic status (SES):

Income was not found to be significantly associated with glycaemic control in this study, despite annual income for more than one-third of households being less than $20,000. Diabetes complications have been shown to be more prevalent in lower SES

groups, as are lifestyle risk factors such as poor diet, inactivity and smoking. A British study found that poverty (less than 10,000 pounds per annum) was linked to obesity, physical inactivity and a higher prevalence of diabetes in 11% European, 19% Afro-Caribbean and 32% of Indian people in a low SES area (Riste et al 2001).

Financial barriers to health care have been identified in the literature (Simmons 1999; MoH 2000; Karter et al 2003; Piette et al 2004). Responses aimed at socioeconomic barriers include the government-funded community services card, free annual diabetes check ('Get Checked') by primary care providers and free diabetes specialist services by District Health Boards, which include satellite services. Diabetes New Zealand manages a government-funded Diabetes Supply Scheme offering free blood glucose monitoring meters and strips to community services card holders, and at minimal cost to all others. Of those eligible for the community services card 21% did not have one (Ministry of Social Policy 2001). Many people with diabetes are not aware of the Diabetes Supply Scheme or the 'Get Checked' initiative (personal observation).

The lack of basic economic resources can be a barrier to self-care, with medical attention and supplies needed for diabetes care becoming secondary to the need for food, clothing and shelter. Hence it is important to assess resources available, in a culturally-appropriate manner, connecting the patient to social services when necessary. In this study slightly more women with poorly-controlled diabetes were receiving income support and using a community services card, indicating that financial constraints may contribute to poor diabetes control. More than 60% of the Chinese women were receiving income support, which is to be expected in those from Mainland China, but not in those from Hong Kong, Singapore, Malaysia and Taiwan. However the latter tend to keep their capital offshore. Very few women stated that they were unemployed because of their health. Personal costs of diabetes are outlined briefly in Appendix 2.5. These costs will be significantly higher for people without a community services card or a high user card, and may represent more than 5% of the disposable income of someone on the average wage. These are direct costs, potentially reflecting less than 50% of the real personal costs of diabetes in terms of premature death, poor health, stresses on family and community life and reduced productivity.

Family size:

One half of the subjects were living in a household of one to two members, and 40% in households of three to five members. Pacific, Indian and Chinese women were the only groups living in households of more than five members; more of these having poorly-controlled diabetes (p=0.059). In these cultures the extended family is common, and for these women family may be of higher priority than their diabetes. Some of the Pacific women were living in extended families with up to nine or ten members, several being children.

Marital Status: In this cohort there were a large number of women living alone, who may not have adequate social and family support. More Maori women were widowed or single, with prevalence also high in Pacific and European women, whereas the majority of Indian and Chinese women were married (p=0.004).

No association could be found between income, marital status or tertiary education and glycaemic control or across ethnic groups.

5.2 Anthropometric description of sample:

Age

The mean age of study participants was 56 years ± 11. This is the age group at which obesity peaks and is subsequently the group with the highest prevalence of diabetes (MoH 2002c). The literature shows that diabetes is diagnosed at an earlier age in Maori and Pacific people (Simmons 2003) but this was evident only in the Indian cohort of this study. The Indian women were younger with the longest mean duration of diabetes (p=0.033). The Pacific group were slightly younger but their diabetes was of shorter duration than in other groups.

Height, weight and Body Mass Index varied across ethnic groups with that of Indian and Chinese women being considerably lower (p<0.001), however mean body mass indices for all groups were in the obese range according to the proposed new classification (Pi-Sunyer et al 1998; Inoue and Zimmet 2000). The European women

had a mean body mass index of 34, compared to mean of 26.9 in the general population, a clear indication of the role of obesity in type 2 diabetes (MoH 1999a). Although Indian and Chinese women had a lower mean body mass index (28, 26) these groups, Indian women in particular, have a higher percentage of body fat for a lower weight, and this is centrally-distributed, putting them at a higher cardiovascular risk (Ramachandran et al 2001; Rosenthal et al 2004). A lower cut-off point of 25 is now officially considered to indicate obesity in these groups (Deurenberg et al 1998). The Maori and Pacific women, with a mean body mass index of 36 and 37 respectively, tend to have a lower body fat percentage at a higher body weight so for some time now a higher cut-off point has been used as a more realistic indication of obesity in these groups (Swinburn et al 1996). A wider range of body mass index is considered appropriate with advancing age, across all ethnic groups, increasing from 20 to 25 in the 19 to 35 age group to 20 to 28 in the 55 to 64 age group and 20 to 29 in those over 65 years of age (Public Health Commission 1993). There was no significant difference in body mass index between those with well- and poorly-controlled diabetes. It is interesting to note that mean body mass indices of this cohort are higher than a 1990 study which found mean body mass indices of European 27.6, Maori 33.5, Pacific 32.6, Indian 27 and Chinese 24.4 kg/m2 respectively (Lunt et al 1990a) indicating that overweight and obesity is increasing in the New Zealand population.

5.3 Biochemical and other medical measurements:

An important United Kingdom Prospective Diabetes Study finding was that intensive blood glucose control (HbA1c<7.0%) in patients with diabetes significantly reduces the risk of diabetes-related complications (UKPDS 33 1998a, 34 1998b). Intensive blood glucose control has been shown to reduce rates of microvascular but not macrovascular complications of diabetes (UKPDS 34 1998b).

For the purpose of this study HbA1c was used as a measure of blood glucose, since not all subjects were self-monitoring their blood glucose levels. Although a level of 7% or below is recommended, in this study a cut-off point of 7.5% was used in order to balance groups with well- and poorly-controlled diabetes. Individual targets may differ

depending on circumstances, for instance in order to avoid hypoglycaemia in older insulin-treated adults a slightly higher HbA1c may be appropriate. The upper quartile range in the groups with poorly-controlled diabetes was 10.5% in Maori and Pacific, 9.5% in Indian, 9.1% in European and 8.5% in Chinese women, putting them at high risk of developing complications.

Mean blood pressures in the main met the new recommendation of 130/80 mmHg (MoH 2003a), although there was some variation across ethnic groups. Diastolic pressure was highest in Maori and Pacific, and lowest in Indian women (p=0.061). Indian women also had the lowest mean systolic pressure. Median blood pressures were slightly higher in those with poorly-controlled diabetes in all cases apart from the Chinese women.

Mean total cholesterol levels ranged from 5.0 to 5.5 mmol/l, exceeding the recommendation of less than 4 mmol/l. However mean HDL levels of over 1.2 mmol/l in all groups, with mean total:HDL cholesterol ratios from 3.7 to 4.6, met the guidelines. Ratios were slightly higher in Maori and Pacific women. This ratio is an indicator of cardiovascular risk, and a useful motivational tool, not only for reducing fat intake but for increasing activity level, and subsequent results can encourage an on-going effort. Mean LDL ranged from 2.9 to 3.2 mmol/l and triglyceride from 1.5 to 2.7 mmol/l, the latter being slightly higher in the groups with poorly-controlled diabetes, as expected; HbA1c is positively correlated with triglyceride.

These levels were considered satisfactory when they were measured, but are in excess of the new guidelines released in December 2003, with the exception of mean HDL levels which vary across ethnic groups (p=0.003) but meet current guidelines (MoH 2003a). In the general population 23% have total cholesterol of more than 6.5 mmol/l, down from 30% in 1989. Levels tend to be lower in Maori and Pacific women, a trend not evident in this cohort. Also in the general population, as in the study population, mean HDL for women is 1.3 mmol/l, similar for all ethnic groups, but levels are noted to decrease with degree of deprivation (MoH 1999a).

None of the metabolic measures could be shown to be related to glycaemic control.

5.4 Health status and medication characteristics:

Duration of diabetes was found to be significant in relation to glycaemic control, with those with poorly-controlled diabetes likely to have had diabetes longer (a mean of 8 vs 3 years, $p<0.001$). It is well documented that glycaemic control deteriorates with longer duration of diabetes (UKPDS 33 1998a).

Diabetes medication

Current medications for diabetes and its complications and comorbidities were shown in Table 4.4c. The majority of participants in this study were receiving medication for diabetes (83%), with more of those with poorly-controlled diabetes (94%) compared to those with well-controlled diabetes (70%) receiving diabetes medication. More of the group with poorly-controlled diabetes were on insulin plus tablets (36%) or on insulin alone (14%), however 6% were receiving no diabetes medication which was a concern.

Metformin, an insulin sensitizer, was the most commonly-prescribed medication for this overweight population, with 31% being prescribed metformin alone and another 53% metformin combined with sulphonylureas or insulin. However in a Scottish study 25% of the subjects prescribed metformin had contraindications to its use (Emslie-Smith et al 2001). Newer insulin sensitizers such as rosiglitizone or pioglitizone are safer but are not subsidised in New Zealand so therefore seldom prescribed, yet have captured 17% of the American market since their release in 1999. Co-prescribing of insulin sensitizer plus insulin secretagogue or insulin is also common, being shown by the United Kingdom Prospective Diabetes Study to increase the probability of achieving glycaemic control (Turner et al 1999b). An encouraging 30% of those with well-controlled diabetes received no diabetes medication, more of these being European (23%) and Chinese (26%) women, indicating that they were likely to be following dietary and lifestyle advice.

Retinopathy

Chinese and Pacific women were found to have significantly higher rates of retinopathy in this cohort ($p<0.001$). It has been found that language difficulties and lack of knowledge are barriers to seeking medical care in these groups (MoH 2003e; Simmons

et al 1994c). Maori and Pacific people have been found to have a higher prevalence of retinopathy than Europeans (Simmons 1996); no data is available for Chinese and Indian New Zealanders other than that reported in this study. Every patient with diabetes attending the Centre is screened for retinopathy at diagnosis and at regular intervals thereafter. If retinopathy is present laser treatment is undertaken. When patients attend for retinal screening they are asked if they have high blood pressure, high cholesterol, eye, heart, or kidney disease, and whether they are taking medications for these.

Nephropathy

In this cohort patient awareness of nephropathy was low: only nine (4%) women stated that they had nephropathy, six of whom had albuminuria. Of the negative responders, predominantly Maori and Pacific women, 19 (9%) had albuminuria, apparently not understanding the significance of this. Control of blood glucose levels, blood pressure, and weight are essential to prevention of kidney damage; for Maori and Pacific people there is an additional genetic component (Lunt et al 1990b). End stage renal failure is four to eight-fold higher in Maori and Pacific people than in the European population. Treatment is costly, at $45,000 per year for clinic-based haemodialysis (Thomas 2004). In South Auckland patients referred for renal replacement therapy diabetes was present in 55% of Maori and 48% of Pacific but only in 17% of Europeans (Simmons 1996). Poor health in Maori and Pacific people is not related to socioeconomic status alone; they do not access general practitioner services as often as their overall patterns of morbidity, mortality and hospital use indicate. Their source of wellbeing is their family, a collective wellbeing.

Hypertension

Management of hypertension is essential for avoidance of cardiovascular and renal complications. There were 141 (61%) receiving medication for hypertension, slightly more in the group with poorly-controlled diabetes. Approximately two thirds of the European, Maori and Pacific, and one half of the Indian and Chinese women were receiving antihypertensive medication. More than one half of these were on more than one medication for hypertension, with the exception of Pacific women. Cost may be a factor; Pacific women in this study had higher mean blood pressures than other ethnic groups. In South Auckland Pacific patients with hypertension were less likely to be

receiving medication (53%) than Maori (84%) and European (93%); also Pacific patients were less likely to recall having received diabetes education. (Simmons et al 1994c; Scott and Simmons 1995). Of concern were the large number of respondents in this study who stated that they had no hypertension or didn't know (133) of whom 54 (40%) were on antihypertensive medication, indicating that treatment for hypertension is not well-understood.

Dyslipidaemia

Control of lipids is also essential for avoidance of cardiovascular complications. There were 87 (38%) receiving medication for dyslipidaemia, again slightly more in the group with poorly-controlled diabetes; almost one half in the European and Maori, and one third in Pacific, Indian and Chinese women. It was apparent that 37 (16%) of subjects were not aware that they had dyslipidaemia yet were receiving lipid-lowering medication.

Cardiovascular disease

Medication for cardiovascular disease was predominantly aspirin, taken by only 79 (34%) of the women. Despite its proven efficacy it is well-documented that aspirin is under-prescribed (American Diabetes Association 2004a) yet the risk of stroke is high in people with diabetes, and treatment costly (Hayden et al 2002). In South Auckland known diabetes was present in 37% of Polynesian patients but only 15% of European patients with a confirmed myocardial infarction (Bhoopatkar and Simmons 1994). However hospital statistics using international classification of diseases (ICD 9) coding have been shown to underestimate the number of in-patients with diabetes, and hence the impact of diabetes has been under-represented in official statistics (National Advisory Committee on Core Health and Disability Support Services 1995). The ICD-10 coding has recently been adopted in New Zealand. This uses a broader range of classifications and will provide more accurate diabetes statistics.

Diabetic foot disease

Diabetic foot disease has not been included in this study. However it is one of the most expensive complications of diabetes worldwide, requiring long hospital stays in South Auckland (19 days) and Christchurch (31 days) in 1983. Mortality among patients with diabetic foot disease was at least 33% over two years in South Auckland (Thompson et

al 1993). Outpatient podiatrist hours are currently extremely limited due to cost constraints.

Comorbidities

Depression has been diagnosed and treated in only 11% of this cohort, yet questionnaire responses indicate psychological issues to be very significant (p=0.001) particularly among Pacific women who tend not to request help in this area. More than one quarter of European women were receiving antidepressants, compared to only 9% of Maori and 6% of Pacific, Indian and Chinese subjects. Polynesian, Indian and Chinese may internalise a lot of issues due to a lack of congruency between their holistic approach to health and Western models of care. The antidepressants prescribed to these women are, in the main, the second-generation anti-psychotics, which cause weight gain with increased visceral fat, dyslipidaemia and hyperglycaemia in some patients, although research is still inconclusive (American Diabetes Association 2004e).

Mental health has been found to be a leading health issue in Asian New Zealanders (Ho et al 2002), particularly in older women. Overseas research suggests that many Asian people are unfamiliar with depression and its treatment, and complain about physical symptoms, resulting in under-recognition and under-treatment (Bhugra et al 1999). Research on recent Chinese immigrants in New Zealand shows a similar level of mental health problems to the general population, but low English proficiency, older age, and rejection by locals has exacerbated the problem in some groups (Abbott et al 1999). Cultural values of shame and family name appear common to all ethnic groups where emotional problems are concerned; health professionals need to be aware of symptoms and negotiate referral to a health psychologist in a culturally-appropriate manner, ideally introducing them personally.

In this cohort more Maori women suffered from asthma, possibly due to smoking, and more Indian and Chinese women were prescribed medication for gastrointestinal conditions, possibly due to their highly-seasoned cuisine (Table 4.4b).

It was apparent that a number of subjects had little comprehension of complications and comorbidities, were confused about medication, and unsure of its purpose. The majority did not respond to the question regarding medications they were currently taking. For

optimal diabetes control all patients must be made aware of why they are taking their medication. The perceived purpose of a medicine affects adherence, as does the cost. Although a significant number of subjects stated that it was very important to take their medication regularly (if prescribed) in reality cost and family priorities can be a barrier. For practical purposes it is important that twice daily (rather than thrice daily) subsidised medication be prescribed where possible, with its purpose and importance explained fully. Clinicians should actively identify patients with diabetes who are facing medication cost pressures and assist them by modifying their medication regimes (Piette et al 2004). Combined medications in one tablet have reduced patient costs and increased adherence overseas, but are not yet available in New Zealand.

In summary Maori and Pacific people have a higher risk profile than Europeans, with prevalence of obesity, hyperglycaemia, hypertension, microalbuminuria, smoking and triglyceride level markedly higher, and diabetes knowledge and standards of footcare lower than Europeans. Their risk of complications such as nephropathy and retinopathy is markedly higher, and cardiovascular disease, cerebrovascular disease and peripheral vascular disease similar to that of Europeans (Simmons 1996). Similar differences are seen in American racial minority groups; when access to care is comparable, microvascular complications, macrovascular disease, and subsequent death occur with different frequencies among various racial groups (Young et al 2003). This study supports these findings, and contributes further evidence of risk in other racial minority groups in New Zealand.

5.5 Questionnaire results:

***Attitudes towards diabetes*:**

The first section of the questionnaire sought attitudes towards diabetes. Pacific women found diabetes most frustrating and were also most concerned that people would treat them differently because of their diabetes. In a culture where family and community are more important than the individual, and food an integral part of kinship, a reluctance to behave differently is understandable. Pacific women with poorly-controlled diabetes

were also most concerned about their job, and felt that diabetes stopped them going out to eat with their friends; the Indian women with well-controlled diabetes shared these concerns. Given the large number in this cohort who not work the 68% with no concern about their job or nil response was not surprising. More than one third of Pacific and Chinese women felt that diabetes stopped them from being physically active. Other research has found that only 31% of 'Asian' and 44% of Pacific women have an appropriate physical activity level, compared with 50% in the general population (Bell et al 2001b; MoH 2003e,f). Pedometers were promoted during the 2003 diabetes Awareness Week in New Zealand, with the recommendation that 10,000 steps per day would be optimal. This promotion was well-received by some sectors of the population, and is on-going.

The majority of subjects felt that diabetes could usually be managed with regular meals, exercise and medication, but those with ongoing poor control may have difficulty in putting their knowledge into action. Most felt that complications could be avoided, however it was evident that many did not appear to understand the complications that can result from poorly-controlled diabetes. Indeed when asked whether they had high blood pressure, high cholesterol, heart or kidney disease a number said no or that they didn't know, yet were on medications for these conditions.

Perceived effects of diabetes:

Pacific and Chinese women felt their diabetes took up a lot of their time, cost them more for food, and made them feel 'down'; these ethnic differences were significant ($p< 0.001$). They also felt that their diabetes put a burden on their families ($p<0.001$), and made them worry about having a low blood sugar in public ($p<0.001$), as this would shame their family (Moata'ane et al 1996). The family would be seen as being careless, in not feeding the person with diabetes well enough. The majority, and particularly those with poorly-controlled diabetes, felt that their diabetes did not interfere with their sex life. There was evidence of an ethnic difference, with European women least concerned ($p=0.04$).

Most agreed that diabetes made them feel healthier, when they ate good food and walked daily. The slightly lower response from the Chinese women may indicate their

lack of understanding of the health message. However there was no significant difference in awareness of health issues between ethnic groups.

Perceived importance of clinic visits:

More subjects with poorly-controlled diabetes stated that visits to the Diabetes Centre were very important (p=0.049) and that the information received was helpful (p=0.078). This can be considered a good sign, in that health professionals are not just seeing the 'worried well'. The majority agreed that it was important that they attend their appointments with doctor, nurse and dietitian (89%), and that information from health professionals helped them manage their diabetes better (88%). There were no significant ethnic differences.

However, of those referred to the Auckland District Health Board free diabetes specialist services up to 30% do not attend appointments, despite reminder letters, interpreters' telephone reminders, and eight regular satellite services. This figure increases to 50% for Maori and Pacific women alone (Auckland Diabetes Centre database 2003). The situation may improve when the service moves to the Greenlane Clinical Centre in August 2004, where telephone reminders by clerical staff will be available. These have achieved an 80% attendance rate in outpatient and other ambulatory services already onsite.

Geographic and transport barriers to reaching services have been identified in the literature (MoH 2001a; Valdmanis et al 2001; Mayfield et al 1999). A South Auckland study found that the main reasons for not attending appointments were that the patient forgot (28%), the service made a mistake (28%), or the patient lacked transport (14%) (Vanderpyl et al 2001). Support groups with transport provided have proved successful in South Auckland, as have the satellite clinics provided by diabetes services across Auckland.

There are also barriers within the healthcare system (MoH 2000, 2001c; El Kebbi 1999; Fitzgerald 2000; Crengle 2000; Renders 2001; Reid 2000). A study investigating financial and non-financial (communication, lack of regular provider) barriers concluded that the health system affects the processes and quality of care, and therefore influences outcomes (The Translating Research Into Action for Diabetes Study 2002).

The New Zealand government has made diabetes a priority, however it is the District Health Boards which have the final say. Currently funds allocated for diabetes care by the Auckland District Health Board are limited to annual one on one consultations, with no opportunity now for group education or training of ethnic community health workers, although these initiatives have proved extremely successful in the past.

Ease of use of diabetes information by different ethnic groups:

Subjects were then asked whether the information given was easy for them to use in their culture or ethnic group, and a smaller majority (62%) agreed with this statement, indicating that health professionals still have work to do in this area. When asked why, there emerged considerable cultural variation. Responses have been loosely categorised as preventative (either for self, family or others), language barriers, and whether they found the Auckland Diabetes Centre a good source of information (Appendix 4.4).

The Pacific women (68% responded) were predominantly concerned with preventative aspects of the information, for their extended family. One stated that she wanted to live long to see her family grow up. A large number said that the information helped them enlighten their relations: not wanting them to get diabetes, telling them to look after themselves and eat the right food, and that they can do something to prevent diabetes. Many felt they could be a very good example, and encourage family and friends who are not fully updated with diabetes information to be aware of its consequences, and that they can do something to prevent them from getting diabetes. Only two commented on the language barrier, stating that explanation in their mother tongue would have been helpful. All are offered an interpreter in their appointment letter; only one Pacific woman in this cohort requested an interpreter. They generally found the information useful. One responded that:

> 'they explain everything properly and they also have a pamphlet in my language, which shows pictures of the food that I should be eating more of – and less of.'
>
> Another :
>
> 'felt better informed about food and intake. As an Island person our diet consists of a lot of fatty foods, and with a lot of coconut cream. We get information from them about what we can eat and in moderation.'

The European women (60% responded) did not have the same concern for preventative aspects. Family was only mentioned by one respondent, who stated that the information doesn't help her because she doesn't discuss her condition with anyone except her immediate family. Another said she 'had no group to be concerned about', and another, older woman, said that 'her groups understand everyone has health problems'. The majority found the information received was easy to understand, clear, practical, focused on normal food, and helped them manage diabetes and diet better.

The Maori women (64% responded) also did not have the same concern for preventive aspects, and only one mentioned being able to advise her *whanau* (family), one could teach others in Church, and one felt able to 'answer questions on diabetes confidently and reassure others - encourage them to follow the Clinic's advice'. Language barriers were not an issue although one stated that she'd have 'better understanding coming from someone of her own culture'. The majority found the information helped them manage diabetes 'for peace of mind'. One said 'most of the time I can go through my ethnic food and say 'no thanks, not good for my diabetes', and another 'when I go on *marae huis* and the food is wrong for me I just will not eat it'. However some responses were unique to this ethnic group:

> 'If I don't understand it's no use going to the doctors and dietitian'.
>
> 'I don't worry so much about my diabetes as we are doing what we love, *kapahaka,* etc.', and
>
> 'I am fully aware of the consequences of my choices and am able to modify my behaviour if I choose to'.

Of the Indian women who responded (52%) preventative aspects concerned only three of them, regarding educating others; there was no mention of family. However the majority found the information helpful to them personally, one stating that it was 'professional and useful information which was not readily given to me in my own country'. Another stated that 'they don't restrict me from eating my type of food. They tell me how to work around my lifestyle'. In contrast with the previous group one stated that:

> 'our diet (Hindu) is such that it easy to follow the recommended diets, especially vegetables and fruit, and our culture is such that it's easy to follow instructions

by persons of authority, as it's inculcated in us from childhood to listen to others'.

There were no apparent language barriers, although this group had the lowest response rate, perhaps indicating a problem.

Chinese women (68% responded) did not mention preventative aspects or family, although one stated that she could explain diabetes to non-English-speaking immigrants. Most appreciated the professional advice from diabetes specialists to gain better understanding of the nature of the disease. One stated that 'knowledge is power'; another that her Chinese doctor speaks her language but doesn't say much about diet. Cultural barriers were predominant in this group, the majority of whom requested interpreters. It appeared that many patients and their interpreters did not fully understand the question, and two respondents stated this.

In summary, the Pacific women were most concerned with the preventative benefits of the information they received, wishing to take care of their own health and that of their family and friends. Three Maori women felt the information helped them teach others, and one Chinese woman felt she could help new immigrants with diabetes. Some respondents in each group found that their visit to the Centre improved their understanding of diabetes, and appreciated receiving the information from 'experts'. Language barriers were mainly evident in the Chinese women, although one Maori and two Pacific women commented that they would have preferred to receive information in their 'mother tongue'.

The importance of marae-based healthcare delivered by Maori has received much attention (Pomare 1986; MoH 2001c), although in the South Auckland Diabetes Survey no subjects preferred marae-based education, possibly due to this being an urban population (Simmons et al 1994c). In a Christchurch study only 10 of 51 subjects indicated that they would prefer marae-based healthcare, and only five of the 51 subjects indicated that they would prefer a Maori healthcare professional (de Lore et al 1993). Pacific women were found to prefer the South Auckland Diabetes Centre with lay educators of specific ethnicities, supervised by a diabetes nurse specialist, with

access to a dietitian and diabetologist (Simmons et al. 1994c). This would appear a good model for other areas with a broad ethnic mix.

It is important that services are culturally appropriate and acceptable to clients. Responses to cultural barriers to access have included the development of Maori and Pacific healthcare provider services. These are in place in some areas, but the 2002/2003 New Zealand Health survey revealed that only one in eight Maori adults had seen a Maori provider in the past year, and only one in twelve Pacific adults had seen a Pacific provider in the past year (MoH 2003f). Hence these cannot be considered the only response to addressing barriers to access to healthcare. The Auckland Diabetes Centre now has facilities at Greenlane and at some satellite sites which would be ideal for group education of different ethnic groups using an interpreter where necessary. Group education has been shown to be time and cost effective, and successful. This could permit more resources to be directed towards an improved level of care and a closer liason with primary care, hospitals and health promotion agencies.

Dietary knowledge:

There was a difference between ethnic groups in nutrition knowledge, with European and Indian women showing greater awareness than other ethnic groups ($p=0.02$). Specific aspects included eating foods high in fibre like wholegrain breads and cereals ($p=0.01$), and limiting intake of sugar ($p=0.04$) and alcohol ($p=0.01$), the latter being considered most important by Indian and Chinese women, who tend to avoid alcohol. The Chinese women were least concerned with limiting sugar, possibly since it is an ingredient of many of their dishes, but only in small amounts. The concept of fibre was not well understood by the Chinese which could explain why they did not consider it important. Apart from vegetables and fruit they tend to prefer highly-refined carbohydrate foods. For all groups an adequate vegetable and fruit intake was important.

A Wellington study found that approximately 70% of subjects understood the importance of limiting fat and sugar, but only 28% understood that fruit and vegetables were important (Mitikulena and Smith 1996). A study of Samoan teenagers found that they had a definite knowledge base about which foods were good and which were not, with a preference for the latter. Peer pressure, low cost, easy accessibility and taste influenced their perceptions and subsequent food consumption (Fuamatu 1997).

Intention to make dietary changes in the future decreases with age, from 40% of women at 19 to 24 years to 15% at 45 to 64 years and only 8% at 65 to 74 years. Intention to make changes increased with NZDep96 quartile area (Salmond et al 1998), from 20% in the least deprived to 29% in the most deprived area. The most common intended changes were to eat more fruit and vegetables, less fat and saturated fat, and more bread and cereals (although 55% of women over 45 years of age intended to eat less bread and cereals) (MoH 1999a). It is important that these good intentions are facilitated by appropriate education and support.

Personal priorities:

When asked the importance of emotional well-being more of the Pacific women with well-controlled diabetes, Maori women with poorly-controlled diabetes, and European women in both groups felt this to be very important. Physical appearance was important to European and Pacific women in both groups. Physical fitness and body weight were more important to European ($p=0.08$) and Indian ($p=0.02$) women. Future health was important to all groups, as was support of family or friend. The Diabetes Attitudes, Wishes and Needs (DAWN) study showed that people without networks of support, especially those living alone, felt worse in themselves and did not manage their diabetes as effectively as those with support. However the study also showed that family or social networks that put too much pressure on people with diabetes, through well-meant but constant interference for example, have a marked negative effect on how people deal with their condition (DAWN Study 2002).

Psychological issues:

Similar questions were grouped together in two categories for statistical analysis. Firstly psychological issues affecting self, such as frustration, worry, emotions, feeling 'down', and secondly issues affecting others, such as being treated differently, being a burden on the family, worry that having a low blood glucose in public would reflect badly on family, being unable to eat out, have social activities and a sex life. Psychological issues overall were statistically significant ($p<0.001$) across ethnic groups. The majority of these psychological aspects were felt most strongly by the Pacific women, but Chinese women also often felt 'down' and worried about being a burden on their family. Indian women also felt that diabetes made them worry about their job and prevented them from eating out with friends.

Several stressful processes are involved in living with diabetes, including functional limitations, restrictions of lifestyle, threats to health. Feelings of hopelessness and helplessness may contribute to a cycle of poor self-care and glycaemic control, and deepened depression. Depression and anxiety disorders are twice as common in people with diabetes, and rates may be even higher in certain ethnic minority groups (Anderson et al 2001b).

Two significant challenges facing dietitians in the immediate future are firstly, the increasingly diverse population of this country, and secondly the increased emphasis on patient/client behavioural changes as evidence of effectiveness. Changes in the traditional model of care that increase patient understanding of their diabetes while improving provider adherence to best practice guidelines are needed (Zulkowski et al 2003).

Motivational interviewing techniques and multicultural counselling models are essential to effective practice and are thus an integral part of dietetic training and on-going competence Prochaska and DiClemente 1986). Health care professionals need further training to assess the psychological needs of their patients, or have access to multidisciplinary teams that have psychological expertise. Of the healthcare professionals surveyed in the DAWN Study (2002) fewer than half felt able to identify and evaluate patients' psychological needs, including their fears of worsening disease, fears of hypoglycaemia, weight concerns and stress. Currently used diabetes protocols, including those recently released in New Zealand, do not include evidence-based approaches for dealing with psychological issues (MoH 2003a).

Contact with a registered dietitian is recommended at least twice per year to monitor metabolic parameters and assess effectiveness of the nutrition therapy, more frequently if problems or lifestyle changes arise (Monk et al 1995). Obstacles include institutional pressures to see more people in less time, in addition to the cultural and economic barriers described above (American Diabetes Association 2003b). A British study found that most health care professionals consider diabetes harder to treat than other chronic

conditions, and 70% felt that they did not have adequate time or resources to treat their patients with diabetes effectively (Clark and Hampson 2002).

Nutrition issues are complex; family members and significant others should be involved in the nutrition education process and encouraged to follow the same lifestyle recommendations as the person with diabetes. Patients may feel isolated when adopting new behaviours or diets. If health-promoting activities are initiated within the broader community, patients will have a wider support network, for example walking clubs, craft classes, and community-based healthy food stores (Wang et al 1998). Effective practice requires an understanding of each ethnic group – their culture, health beliefs, environment, lifestyle, socio-economic status and degree of acculturation (Curry 2000; Harris-Davis and Haughton 2000).

Ideally the ethnic composition of the dietetic profession needs to equate with that of the general population. The American Dietetic Association has established a minority mentoring programme, which, it is anticipated, will lead to the training of more dietetics professionals from the minority ethnic groups at highest risk for nutrition-related problems such as diabetes. This has been funded by the Health Resources and Services Administration (White 2001). In New Zealand, where only 8 % of practising dietitians are from minority ethnic groups, a similar initiative would be invaluable. In 2003 the majority of practising dietitians (261 or 81.6%) identified themselves as belonging to the New Zealand European ethnic group. There were only eight Maori (2.5%), two Tongan (0.6%), three South East Asian (0.9%), two Indian (0.6%) and 11 Chinese (3.4%) out of a total of 320 (MoH 2003c). These figures include more from minority ethnic groups than any previous figures, but are woefully inadequate for the task. In fact fewer dietetic students are being trained in 2004. New Zealand has only 320 practising dietitians for a population of four million, and only 60% of these are employed by the District Health Boards. It would be timely for District Health Boards to recruit and train more diabetes specialist dietitians, given the diabetes epidemic New Zealand is currently experiencing.

However research shows that simply increasing knowledge (by the traditional didactic approach) may not be sufficient to improve compliance or metabolic control. Interventions require ongoing evaluation to identify need for additional strategies to

increase participation and motivation (Simmons et al 2004). The South Auckland Diabetes Project (Simmons et al 2000) and the Ola Fa'autauta Project (Bell et al 2001a; Swinburn et al 1997), both designed to reduce coronary heart disease and diabetes risk factors in church communities, were successful in increasing diabetes knowledge, but this alone was not necessarily associated with healthier lifestyle choices. Dr Boyd Swinburn's landmark research on the obesogenic environment ceased due to lack of funding, but has been taken up by the lobby group 'Fight the Obesity Epidemic' (FOE) (Toomath 2004). Much more information and research is required however, on specific levels and mechanisms. The importance of health outcomes as an objective provides an incentive for innovative and progressive responses by health services to the challenge of reducing barriers. Such initiatives require support and commitment at all levels within the health services. This report has identified barriers of access to healthcare for those with known diabetes. There are also significant health gains to be achieved by addressing primary prevention and access to effective early detection services. The Counties Manukau District Health Board's diabetes strategy 'Let's Beat Diabetes' plans to build on previous initiatives in South Auckland with evidence-based strategies and a long-term vision. It will be launched on their website in November, 2004.

It has been well-documented in these systematic reviews that health professionals play an important collaborative role in helping patients to change unhealthy life-styles and behaviours (Mulrow et al 2002; Silagy and Stead 2002; Hooper et al 2002; Thorogood et al 2001). It is evident that this requires empathy for those dealing with the daily demands of diabetes, cultural awareness and ability to connect with people from all ethnicities and walks of life, patience, a positive attitude, teaching skills and a repertoire of motivational techniques. Unfortunately our current health care system is not designed to provide a continuum of treatment that is optimal for chronic disease management, and this remains a major obstacle to patients' adequate self-management of diabetes.

The World Health Organisation has recently published a draft strategy for improving diet, physical activity and health, the final version of which will be presented to the World Health Assembly later in 2004 (Ferro-Luzzi 2003). A progress report will be submitted to the 59th World Health Assembly in 2006. This framework will provide the basis for the effective prevention of chronic diseases (WHO 2003).

The European Nutrition and Health Report will be also published in 2004, giving an overview on all nutrition-related health problems in the European community. It will deliver information on the development of food consumption during the past decades including nutrient intake on a population level and the parameters of nutrition and health status on an individual level. This project, which is part of the Health Monitoring Programme of the European Commission, will serve as a tool for planning further activities and provide the basis for standardised future health and nutrition reports (Elmadfa 2003).

Translation of these recommendations into a global framework will require a multisectoral approach, with sustained political commitment and the collaboration of many stakeholders. Evaluation of all current diabetes service initiatives needs to be on-going to identify their effectiveness in reducing barriers to access, and to prioritise accordingly.

5.6 Outcomes

This study is one of the first in New Zealand to look at cultural and psychosocial issues in the five ethnic groups with the highest prevalence of type 2 diabetes. The significant differences found across ethnic groups suggest that a more holistic approach and a wider knowledge of cultural, social and psychological issues are required for successful diabetes education. Health professionals need to be cognisant of the individual's health beliefs, cultural practices, any psychological issues and economic or time constraints, to better assist people of different ethnic groups in management of diabetes. To this end a five-item questionnaire (WHO-5) has been trialled at the Auckland Diabetes Centre, in which patients define their main concerns while waiting for their appointment, and discuss these with their health professional (Appendix 5.1). This was found to contribute to a more effective 'patient-led' consultation and improved partnership. Dietitians have developed resources in a range of languages, including food photographs with no text. They are currently developing a culturally-appropriate and graphic diabetes nutrition package for use by practice nurses in primary care, for

educating patients at diagnosis, since this has been shown to contribute to better outcomes.

The researcher is now working with a Primary Health Organisation, offering a free dietetic service for all patients with, or at risk of, chronic conditions, at local marae and general practitioner clinics, with no non-attenders to date. A mobile retinal screening service is in operation, and there are plans to employ a health psychologist. An important component of this position is the provision of nutrition education, resources and support to general practitioners and practice nurses.

The commitment to diabetes education has, and will continue to grow, but diabetes will always belong to the person with diabetes, and education will be most effective when patient-centred and empowering, with the educator in the role of supportive facilitator.

5.7 Limitations of the study:

Sample selection

This was not a true random sample, consisting of those consecutively-attending follow-up patients who consented to participate. Numbers are insufficient for extrapolation of these results to the wider diabetes population. There is a paucity of information pertaining to diabetes in the Chinese, Indian and European populations in New Zealand.

Questionnaire design:

The questionnaire was designed to obtain qualitative information however on analysis it was apparent that a quantitative component would have resulted in more useful data. Some of the questions were very general; more useful information may have been obtained from more precise questioning. For instance it was evident that the subjects had a good knowledge of requirements for good self-care of diabetes but no indication that they were putting this knowledge into practice.

Questionnaire interpretation:

There was some misunderstanding due to the fact that English was a second language for the majority of the subjects yet not all requested an interpreter. This was readily detected by the catch question 'I think that diabetes improves my social activities' which had a positive response from Pacific and Chinese women ($p=0.001$). Affirmative responses may well have been given through courtesy, as an indication that they had heard, but not necessarily understood, the questions. Regarding psychological issues, the question asking subjects how they felt emotionally did not elicit a statistically-significant response, whereas more simply-worded questions about feeling worried and 'down in the dumps' did. This could suggest that emotion, implying strong feelings, is a word not commonly used, or possibly taboo, in women of some cultures.

Lifestyle questions:

The wording of the question regarding smoking was not clear enough to draw any firm conclusion, although most responses were from Maori and Pacific women, the groups with the highest tobacco use among these ethnic groups. Likewise, the question regarding the importance of limiting alcohol had more affirmative responses from the ethnic groups for whom alcohol is traditionally 'taboo' for women. The dietary knowledge question regarding dairy products would have been more culturally appropriate had soy products been included, the majority of Chinese being lactose-intolerant.

Ethnic identity:

Ethnicity is defined as that stated by the individual as their perception or personal choice rather than by genetic heritage, which could distort the analysis and conclusions of the study. However the use of specific genetic markers is not yet practical for large epidemiological studies (Wacholder et al 2002), and could fail to capture the confluence of social, cultural, behavioural and environmental variables that are associated with self-identified race/ethnicity (Risch et al 2002). Race-neutral studies could not detect any important population differences in genetic susceptibility.

5.8 Summary of results

Demographic characteristics

- Less education was associated with poorer self-management of diabetes.
- Women working in higher level occupations had better diabetes control.
- Lower SES was associated with poorer diabetes control and more complications.
- Larger family size was associated with poorer diabetes control.

Anthropometric measurements

- Increasing age was associated with poorer self-management of diabetes.
- Mean body mass indices for all ethnic groups were in the obese category indicating a high risk for co-morbidities.

Biochemical and other medical measurements

- Mean HbA1c was significantly lower in the Chinese women. The upper quartile value in those with poorly-controlled diabetes was 10.5% in Maori and Pacific, 9.5% in Indian, 9.1% in European and 8.5% in Chinese women.
- Total:HDL-cholesterol ratio, and triglyceride levels were significantly higher in Maori women, and HDL significantly lower, than in other ethnic groups.
- Mean cholesterol levels were greater than 5 mmol/l in all ethnic groups, and hence do not meet the new guidelines of less than 4 mmol/l (MoH 2003a).
- Mean triglyceride levels were greater than 2 mmol/l in all ethnic groups apart from the Pacific women (1.9 mmol/l), and do not meet the recommended <1.7 mmol/l.

Health status and medication characteristics

- Longer duration of diabetes was associated with poorer diabetes control.
- More with poor diabetes control were receiving diabetes medication with more requiring insulin.
- Thirty percent of those with good diabetes control were managing their condition with no diabetes medication. More European and Chinese women were on no diabetes medication.
- More with poor diabetes control were receiving medication for hypertension and dyslipidaemia.

- Only one third of subjects were prescribed aspirin for prevention of stroke.
- Poor understanding of the function of prescribed medication was evident.
- More than one quarter of the European women were receiving antidepressants.
- More of the Maori women suffered from asthma.
- More of the Indian and Chinese women were prescribed medication for gastrointestinal conditions.

Attitudes to diabetes

- Pacific women found diabetes most frustrating, were more concerned that people would treat them differently because of their diabetes, and were more concerned about family than themselves.
- Pacific women with poorly-controlled diabetes and Indian women with well-controlled diabetes responded that diabetes made them worry about their job, and felt that diabetes stopped them going out to eat with their friends.
- Pacific and Chinese women felt that diabetes stopped them from being physically active, indicating that they may have got the wrong idea about physical activity.

Perceived effects of diabetes

- Pacific and Chinese women felt that diabetes took up a lot of their time, cost them more for food, and made them feel 'down'. They also felt that diabetes put a burden on their families, and made them worry about having a low blood sugar in public, which would shame their families.
- European women were least concerned that diabetes would affect their sex life.

Perceived importance of clinic visits

- More women with poorly-controlled diabetes felt that it was important to attend their appointments with doctor, nurse and dietitian and that the information received was helpful. Overall fewer felt that the information was easy to use in their culture/ethnic group.

Dietary knowledge

- European and Indian women showed greater nutrition knowledge than other ethnic groups.
- Significant aspects were eating foods high in fibre, and limiting intake of sugar and alcohol.

Health awareness

- Health awareness was not significantly different across ethnic groups, the majority considering health issues very important.

Personal priorities

- Emotional well-being was important to Pacific, Maori and European women.
- Physical appearance was important to Pacific and European women.
- Physical fitness and body weight were important to European and Indian women.
- Future health and social support were important to all groups.

Psychological issues

- Psychological barriers to care are prevalent.
- Significant differences were found between ethnic groups, with psychological issues felt most strongly by Pacific and Chinese women.

5.9 Recommendations from this study:

Improving outcomes:

The following measures could improve the outcomes for people with diabetes by earlier diagnosis:

- Targeted screening in primary care to identify those at risk.
- Adequate services such as group diet and lifestyle education to treat individuals at risk of developing diabetes, for example those with a family history of diabetes, impaired glucose tolerance, impaired fasting glucose, gestational diabetes or metabolic syndrome.

- Increased awareness of diabetes in the media.
- Health promotion within the broader community, by ethnic health workers with input from diabetes specialist services.
- More appropriate immigration policies with chronic disease screening mandatory.

Prevention of complications:

The following measures could reduce the risk of developing complications after diagnosis:

- Diabetes education at diagnosis for better outcomes.
- Referral for retinal screening and laboratory tests at diagnosis, since diabetes onset occurs at least 4-7 years prior to diagnosis, and complications may already be established.
- A more frequent service could delay or prevent complications in people with diabetes, especially for those who are poorly-educated and with low socio-economic status for whom shorter, more frequent education sessions may be more beneficial.
- A national register to provide linkage between diagnosis, treatment and outcomes.

Service provision:

The following measures would improve the efficacy of diabetes clinics:

- The service needs to be delivered in the communities with a high prevalence of diabetes (in marae or church), to improve access and facilitate attendance.
- The service should not only be accessible, but also improve outcomes for people with diabetes.
- Awareness of the service should be increased by use of the Maori, Pacific, Chinese and Indian media.
- Group diabetes education sessions should be provided for different ethnicities with interpreter.
- A questionnaire should be mailed to the patients who do not attend appointments to identify their barriers to healthcare utilisation, with a covering letter outlining services. Non-attendance remains a burden on clinic efficiency.
- A brochure outlining services available should be developed and distributed to primary care, hospital, community centres and non-government organisations.

- The development of culturally appropriate written information to increase family awareness and support of the person with diabetes should be on-going.
- An audit of professional development and accountability would ensure best practice for all health care professionals, in line with the Dietitians' Board requirement of documented continuing competency in order to maintain an annual practising certificate.

Health professionals:

Better care by health care professionals would be provided if the following measures were adopted:

- More health professionals are required in order to provide an adequate service within best practice guidelines.
- Health professionals need to be trained so they have holistic views of health, culturally-appropriate counselling skills, motivational interviewing skills, and the ability to detect depression and refer patients on to a health psychologist or other appropriate specialist service.
- Greater use of health psychologists in the diabetes services.
- Use of a brief questionnaire such as the WHO-5 in the waiting room to assist patients in identifying their main issues of concern in order that these may be addressed and the consultation be patient-led (Appendix 5.1).
- Increased use of Quitline, Green Prescription, National Heart Foundation risk formula and other motivational tools by physicians and nurses.
- Dietitians should be permitted to give patients a Green Prescription, since their focus is on lifestyle modification.
- Greater use of exercise physiologists in diabetes services.

5.10 Recommendations for further study

Further research and development of patient-centred healthcare models and systems of care are needed, that better support people with diabetes to achieve a desirable quality of life. Any strategies for improving diabetes outcomes would reduce cardiovascular

disease, hypertension and other chronic conditions, especially if linked to community-based awareness programmes and screening.

This study has suggested numerous potentially useful projects.
Ongoing research is required to further elucidate barriers to effective self-care as perceived by people with diabetes, particularly in ethnic minority groups, and develop ways to address these. Furthermore, a questionnaire seeking New Zealand health care professionals' barriers to optimal care of people with diabetes, as has been done elsewhere, could define their needs more clearly in order that these may be addressed.

An important area of investigation will be to determine why people with diabetes do not access services, and ways in which this may be overcome. Needs-based assessments may elicit funding for transporting patients to satellite clinics and community initiatives (such as exercise classes) in high-risk areas, and for the training of ethnic community health workers which has proved successful in South Auckland, and received government funding (Simmons 2004). Feasibility of health promotion by these workers through Maori, Pacific, Indian and Chinese media requires investigation.

An audit of all health professionals' use of Green Prescription, Quitline, and National Heart Foundation Risk Formula, and general practitioners' use of the 'Get Checked' programme, their screening of high-risk patients, and their methods of detecting depression may contribute to better practice.

An assessment of the optimal number of diabetes specialists per head of the diabetes population may be instrumental in obtaining further funding for training. Furthermore, a feasibility study of the application in New Zealand training institutions of the mentoring scheme for ethnic minorities used in America, could lead to an increase in health professionals from the ethnic groups most affected by the diabetes epidemic.

'Make everything as simple as possible, but not simpler'
- Albert Einstein.

6 Conclusion

The hypothesis of this pilot study was that attitude to food and lifestyle choices may have an impact on diabetes control, and this has been clearly demonstrated. Attitudes are a powerful influence on human behaviour and motivation, and can be learned. Diabetes care is self-care, with decisions made by the person with diabetes, based on that person's attitude, so education will be most effective when patient-centred and empowering, to instil a positive attitude. This pilot has identified more precisely the requirements for effective counselling.

The study has also highlighted the importance of demographic, socio-economic, psychological and cultural effects on diabetes control, and identified barriers to healthcare utilisation in women with well-controlled and with poorly-controlled diabetes in the ethnic groups with the highest prevalence of diabetes in New Zealand. Hence changes in the traditional model of care to incorporate these ethnic differences are indicated.

The aim of this study was to identify differences in health beliefs and perceptions of diabetes in Maori, Pacific, Indian, Chinese and European women, and to examine whether these beliefs can predict adherence to diabetes self-care regimes. Health beliefs have been shown to play an important part in diabetes self-management, particularly in the social versus therapeutic value of food. For example, diet therapy has been used in India and China for thousands of years, whereas for Polynesians no food is considered harmful, with large quantity being an indicator of prosperity and hospitality.

The first objective was to identify demographic, anthropometric and socio-economic factors influencing diabetes control. Social issues such as low income, less education, low level occupation and large household size contributed to a low socio-economic status which was found to be associated with poorer diabetes control and more complications. This was particularly evident in the Maori and Pacific women, and they had a significantly higher mean HbA1c. This supported previous research in the literature. Other studies have found increasing age and duration of diabetes to be associated with poorer diabetes control. However in this study the Maori and Pacific women had a shorter duration of diabetes but poorer diabetes control. This was not

statistically significant, and they may in fact have had diabetes for some years prior to diagnosis, since these ethnic groups have been shown to access health services less frequently, and often only when complications emerge.

A significant finding in this study was that Indian women were diagnosed with diabetes at an earlier age than women in other ethnic groups. This has not previously been shown in New Zealand. Increasing body mass indices (BMI), shown in the literature to be associated with poorer diabetes control, were not shown to be significant in this study. However mean BMI was in the obese range in all ethnic groups, with both well- and poorly-controlled diabetes. This supports the new classification of obesity proposed by World Health Organisation, in recognition that risk factors are manifested at lower levels of BMI in Indian and Chinese ethnic groups.

The second objective was to determine whether values held by the different ethnic groups impact on diabetes control. European and Indian women showed a greater nutrition knowledge. It could be said that these groups value education, more having received tertiary training in this cohort. Mean duration of diabetes was longer in these groups yet diabetes control was significantly better than all other groups apart from the Chinese women. All three groups have a long tradition of diet therapy.

The third objective was to investigate the psychological impact of diabetes across ethnic groups. Depression and anxiety disorders are twice as common in people with diabetes. It has been suggested that one in three people with diabetes have depression, yet relatively few (11%) in this study were receiving treatment. Psychological issues have been shown in the literature to cause a loss of motivation and poorer self-care, negatively affecting diabetes control. Rates have been shown in the literature to be higher in certain ethnic minority groups. This study has also found significant differences between ethnic groups, with psychological issues felt most strongly by Pacific and Chinese women. These women have perhaps found settling in New Zealand more challenging, they are mainly in the lower income bracket, and tend to live with their extended family. Negative perceptions of diabetes, such as frustration, worry, inactivity due to fear of hypoglycaemia, and feeling stigmatised were more evident in the Pacific and Chinese women, as were anxieties about maintaining their contribution and not bringing shame to their extended family. These groups have been shown in the

literature to have less diabetes knowledge, and to be less active. This has not previously been shown in New Zealand, and suggests that a more holistic approach and a wider knowledge of cultural and psychological issues are required for diabetes education.

The fourth objective was to measure dietary knowledge and health awareness, and identify barriers to their implementation. Ethnic differences emerged regarding the uptake of education, with Indian and Maori attitudes differing significantly. Maori, Pacific and Chinese women in this cohort had significantly less dietary knowledge and health awareness than European and Indian women.

These subjects attend appointments, considering education important to their diabetes management. Nevertheless knowledge, attitudinal, cultural and financial barriers exist. A lack of understanding of complications, comorbidities and the purpose of their medications was evident in all groups. The majority appeared to have a good knowledge of requirements for diabetes care, especially improvements in lifestyle, although this differed across the ethnic groups, with significant negative attitudes apparent, particularly in Pacific and Chinese women. They were more concerned than other groups that their diabetes was a burden and source of shame to their families. In their culture of collective living and sharing, being told to eat differently from their extended family can erode their sense of belonging and psychological wellbeing.

Many other barriers to the implementation of this knowledge have been demonstrated. These include lack of support at home and in the workplace, time, cost, and access to services. Social support was considered important to all ethnic groups. To this end family members and significant others need to be involved in the nutrition education process, and encouraged to follow the same lifestyle as the person with diabetes. There are also system issues with inadequate staffing to give the level of care recommended, with on-going diabetes expertise, education and psychological support so that patients can make informed decisions about their daily diabetes self-management. For example, there is no after-hour service for people with diabetes who may have job insecurity and who are reluctant to take time off work to attend appointments. There are few dietitians from the high-risk ethnic groups, and very few health psychologists employed.

However there are the many people with diabetes who do not attend appointments, and many who are not referred for education at diagnosis despite evidence from the

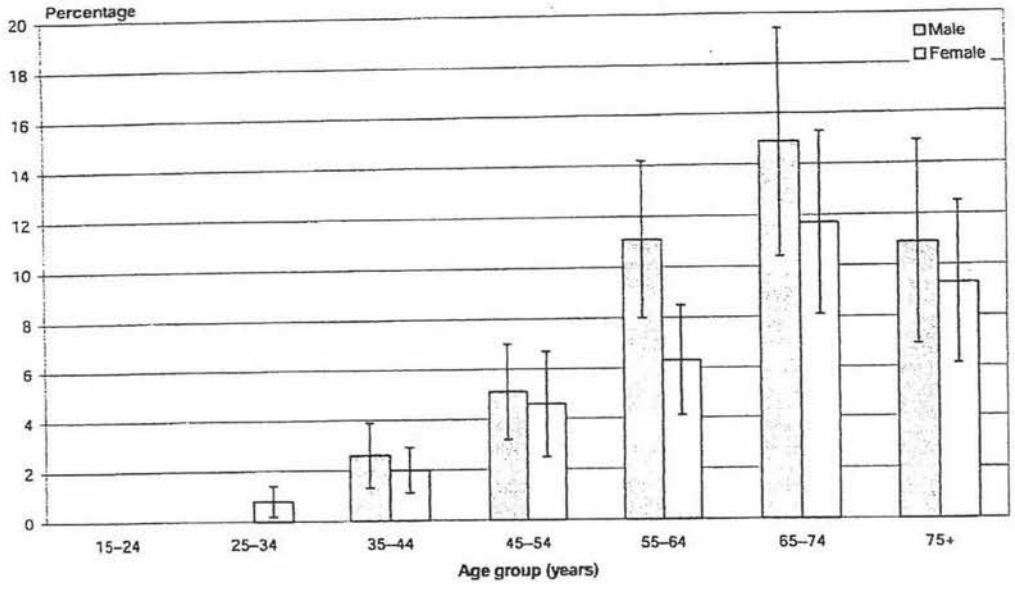
literature that this is the optimal time for best outcomes. Hence it is important for Primary Health Organisations to screen all their high-risk patients at routine appointments to identify those with impaired glucose tolerance, carry out routine checks of all patients with diabetes, and employ dietitians to provide education to their patients and staff. The potential for a 58% reduction in progression to diabetes in those with impaired glucose tolerance with lifestyle intervention (diet and exercise) has been demonstrated, which would more than halve the predicted costs of diabetes in New Zealand. Their affiliation with local marae, Pacific churches and Asian support networks, with provision of education and support for leading people in these communities to impart in a culturally appropriate way, may improve access to care. The growth of diabetes is higher in Maori, Pacific and Asian people, and these are the groups which are frequently not accessing health services. Close monitoring of the health status of new migrant groups is important. Furthermore it is essential that a register of all people with diabetes be established, with ethnicity specified, so that accurate prevalence and mortality statistics can be obtained, and all high-risk ethnic groups targeted.

The epidemic of type 2 diabetes is growing – and it will get worse. The World Health Organisation has estimated that by 2025 the number of people with diabetes world-wide will more than double, from 140 million to 300 million. Gains continue to be made in the improvement of New Zealanders' health and life expectancy, but if something is not done to contain the epidemic, it is hard to believe these gains will hold.

If the epidemic is to be contained these issues will need to be forcefully addressed.
A change in community attitude and behaviour towards nutrition and physical activity is required to halt the growth in population obesity and hence the diabetes epidemic.

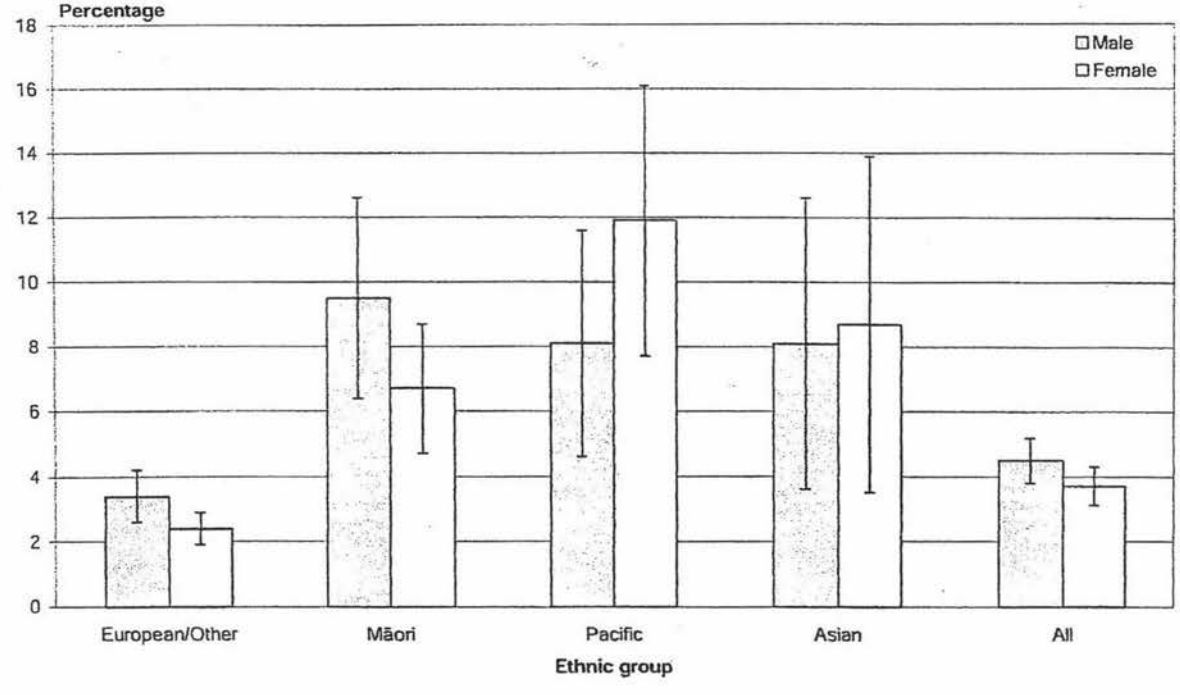
'We can't undereat enough to compensate for our underactivity'
- Dr Martin Tobias, Ministry of Health

Appendix 2.1 *Diabetes in adults, by age group and sex*



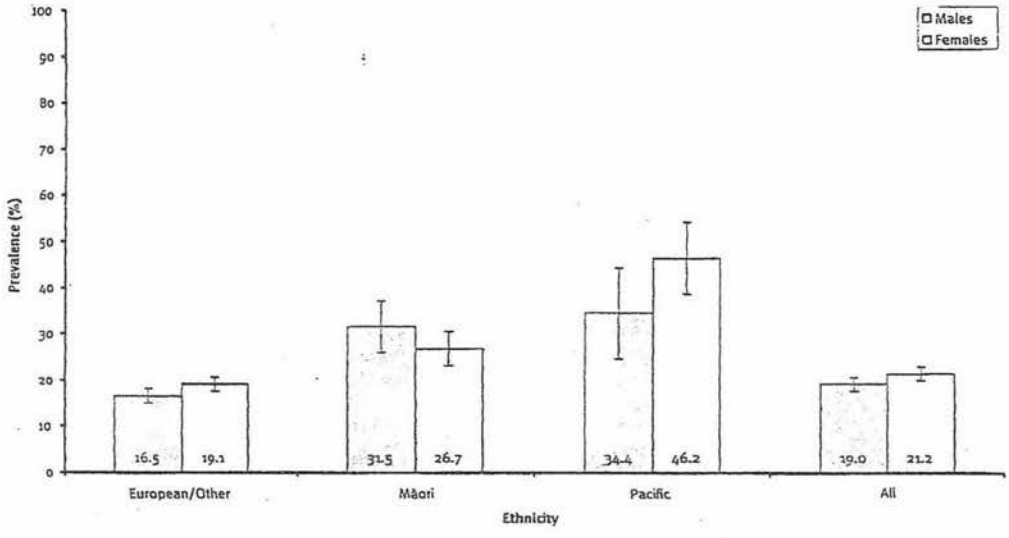
Source: A Portrait of Health: Key results of the 2002/03 NZ Health Survey

Appendix 2.2 *Diabetes in adults, by ethnic group and sex (age-standardised)*



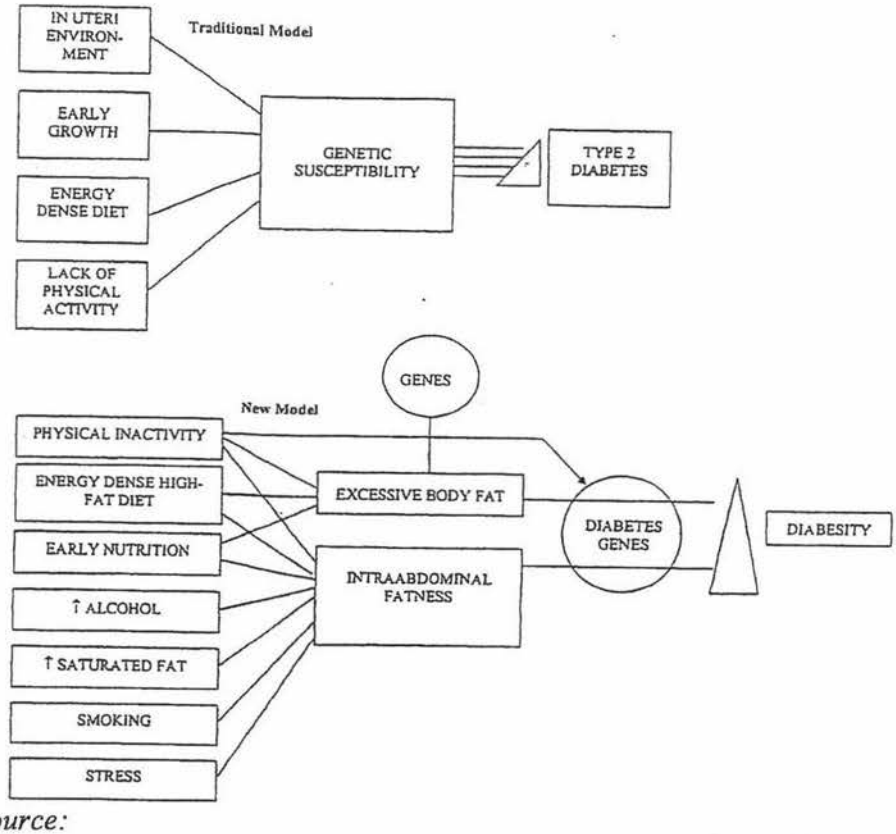
Source: A Portrait of Health: Key results of the 2002/03 NZ Health Survey

Appendix 2.3 *Prevalence of obesity in adults, by gender and ethnicity*



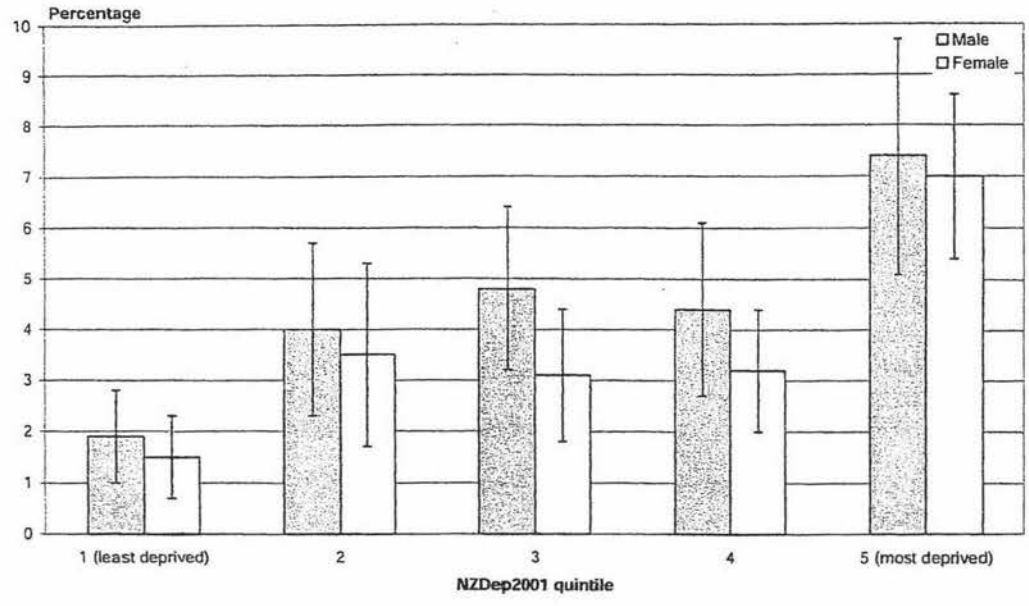
Source: A Snapshot of Health: Provisional results of the 2002/03 NZ Health Survey

Appendix 2.4 *Contribution of environmental factors to type 2 diabetes*



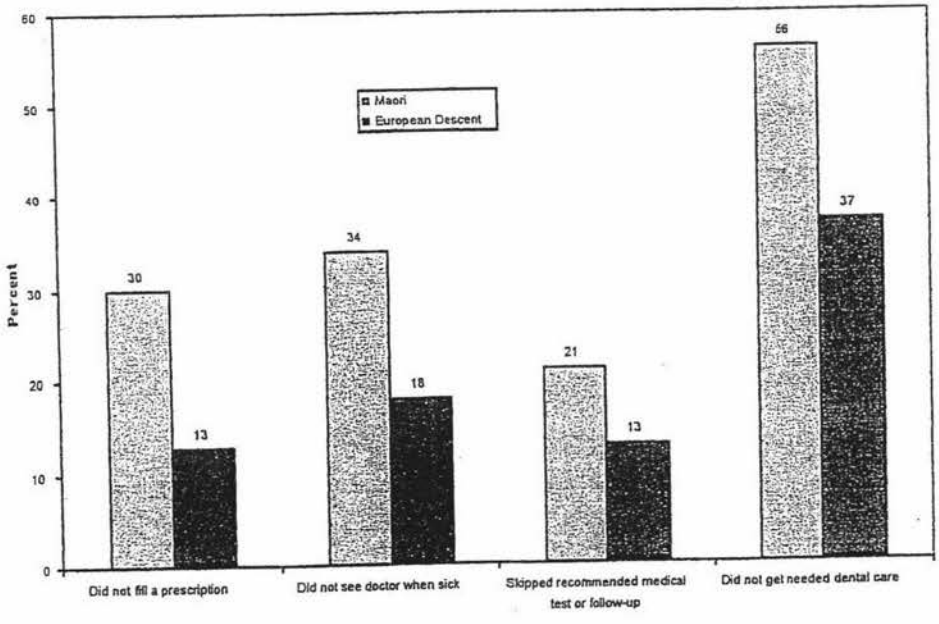
Source:
The International Association for the Study of Obesity. Obesity Reviews 1: 57-9. 2000

Appendix 2.5 *Diabetes in adults, by NZDep2001 quintile and sex (age-standardised)*



Source: A Portrait of Health: Key results of the 2002/03 NZ Health Survey

Appendix 2.6 *Rates of adults going without needed care in the past year due to cost*



Source: The Commonwealth Fund 2001 International Health Policy Survey

Appendix 2.7 *Personal costs of diabetes*

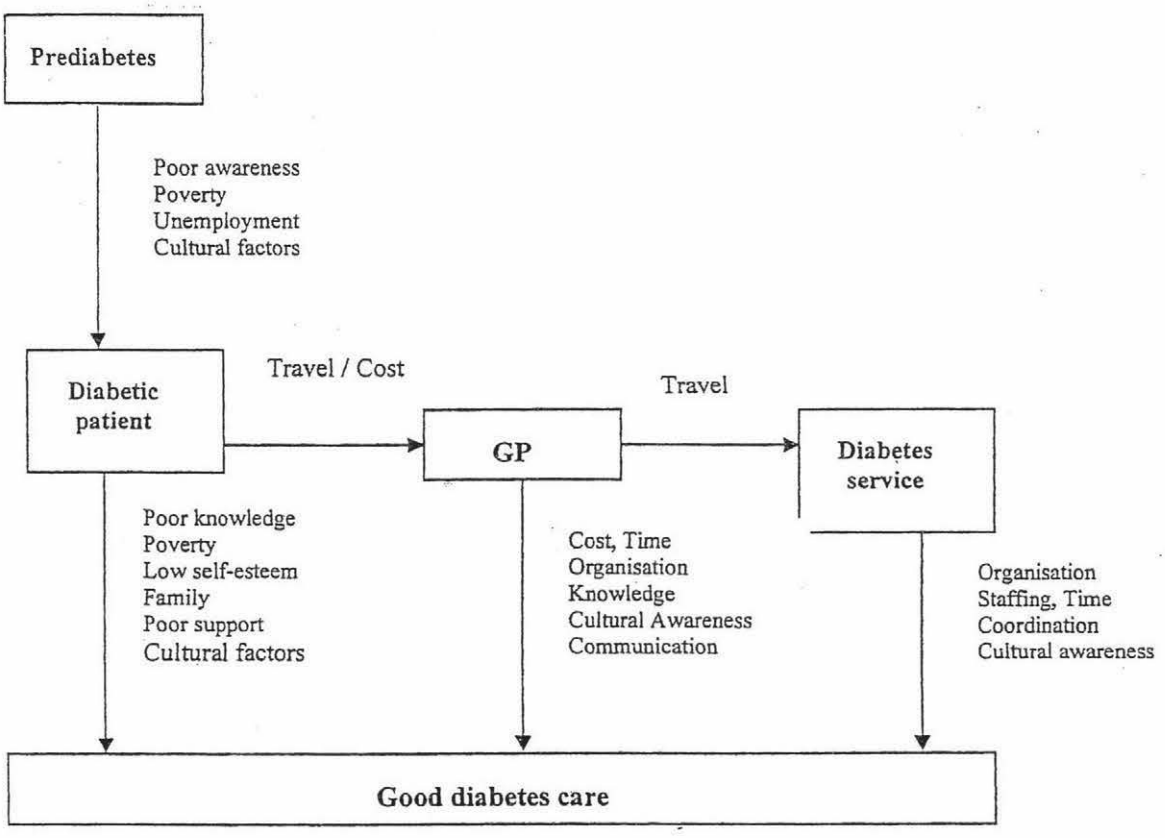
Item	Cost per year with HUHC and CSC	Remarks
Membership to Diabetes NZ	$20	For Diabetes Supply Scheme
Medic Alert	$20	To avoid mistreatment
Visit to doctor x 4	$100	For prescription renewals and diabetes related problems
Lancets	$0	Blood Glucose management. Free from Diabetes Supply Scheme
Testing Strips (supply scheme otherwise up to $17 per week)	$0	Blood Glucose management. Free from Diabetes Supply Scheme
Blood glucose meter	$0	Blood Glucose management
Leather shoes x 2	$200	Soft leather shoes may help to reduce foot ulcers and discomfort
Natural fibre socks x 3	$20	Same as above
Batteries for meters x 2	$10	
Healthier food (based on $20 per week)	$1,040	Lower fat foods, more fresh fruit and vegetables[(a)]
Common Extras		
Glasses	$300	Eye sight problems develop
Dressings	$10	For foot abrasions
Total	**$1,600**	

(a) *Some dietitians put together budgets which show cost savings*

These figures are based on the opinion of a single member of Diabetes New Zealand – this is similar to costs quoted in the USA of US$1000 for personal non-medical items for people with diabetes.

Source: PricewaterhouseCoopers 2001

Appendix 2.8 *Model to collate all barriers to care*



Source: Simmons and Voyle 1996

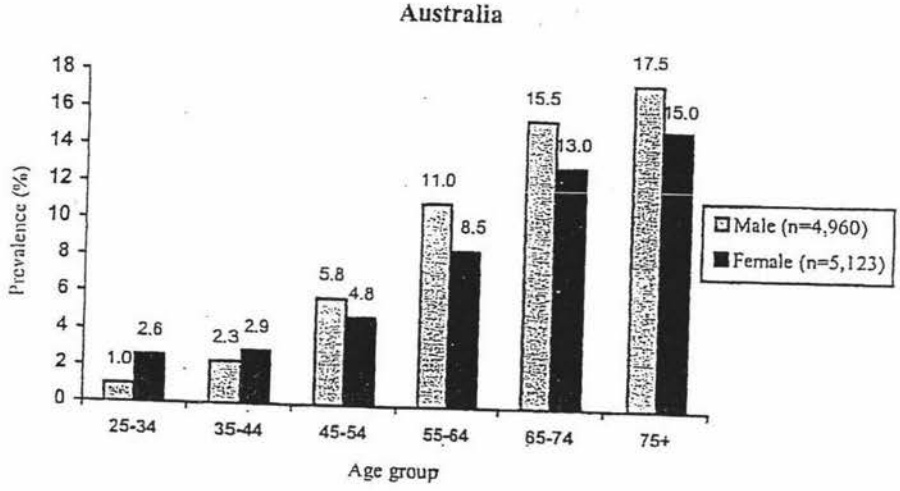
Appendix 2.9a *Global estimates of diabetes from 1995 to 2010 (in thousands)*

Global estimates of diabetes from 1995 to 2010 (in thousands)

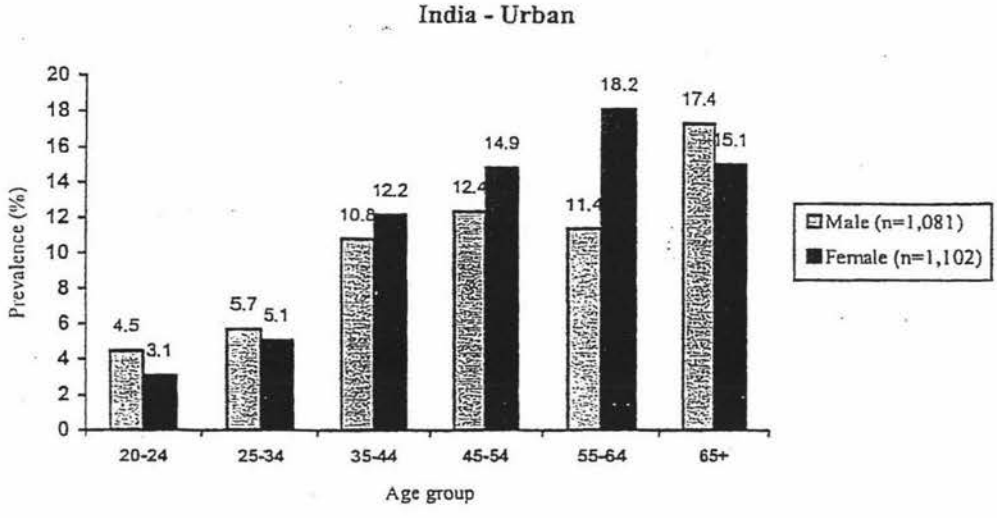
	1995				2000			2010		
Region	Population	Type 1	Type 2	Total	Type 1	Type 2	Total	Type 1	Type 2	Total
World	5697 038	3539	114 878	118 417	4423	146 804	151 227	5446	215 272	220 718
Africa	731 470	85	7 209	7 294	142	9 270	9 412	219	13 933	14 152
Asia	3437 786	1030	61 752	62 782	1608	82 902	84 510	2241	130 056	132 297
North America	296 517	879	12 098	12 977	1019	13 174	14 193	1175	16 360	17 535
Latin America	475 704	309	12 094	12 403	389	15 177	15 566	479	22 062	22 541
Europe	727 787	1155	20 885	22 040	1182	25 325	26 507	1245	31 620	32 865
Oceania	27 774	81	840	921	83	956	1 039	87	1 241	1 328

Source: Amos et al 1997

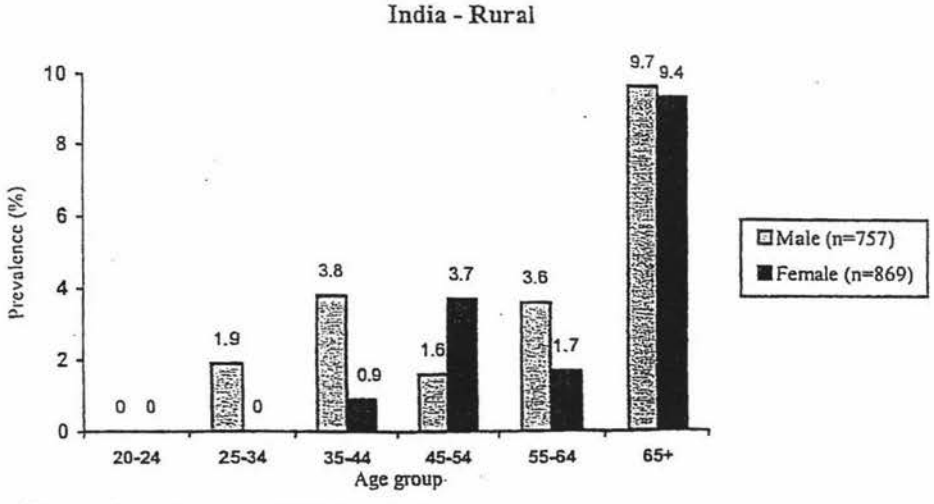
Appendix 2.9b *Diabetes prevalence in Australia, India, China and the Pacific*



Source: Welborn et al 1989; McCarty et al 1996

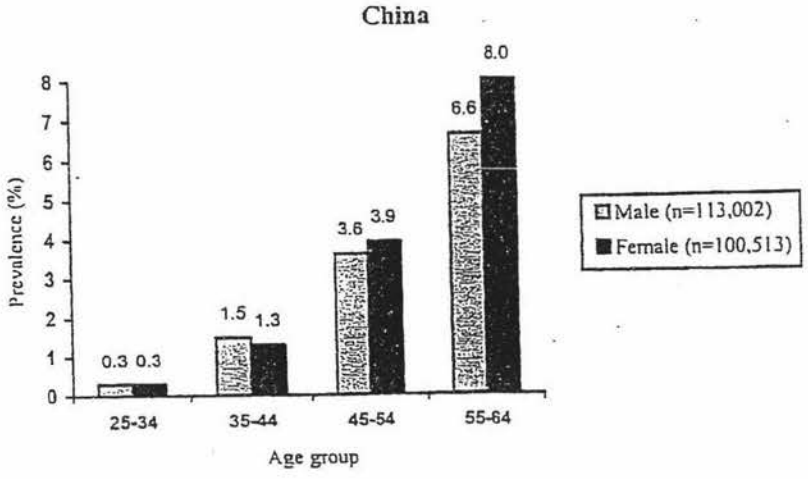


Source: Ramachandran et al 1997

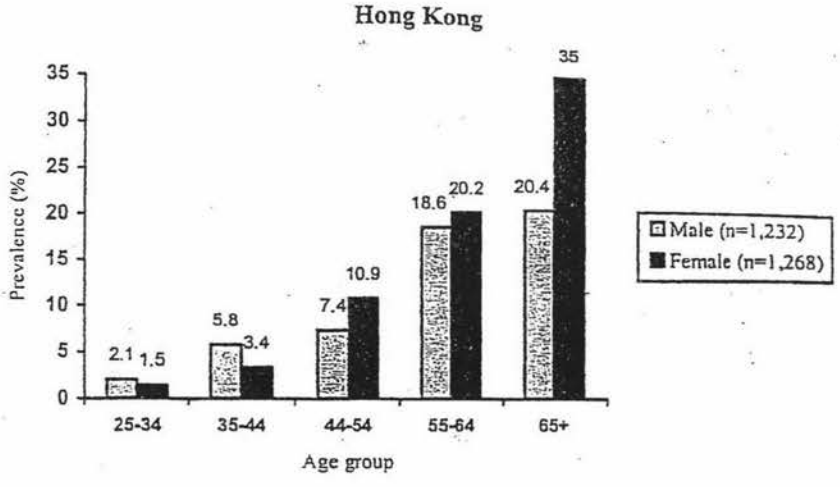


Source: Ramachandran et al 1992, 1994

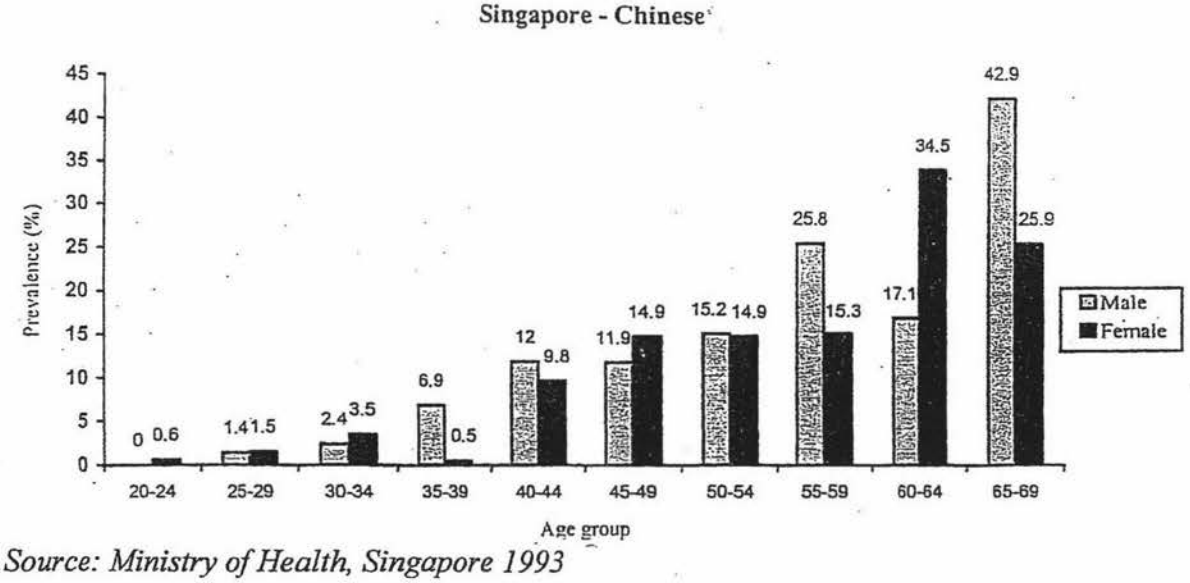
Appendix 2.9b *continued*



Source: Pan 1996



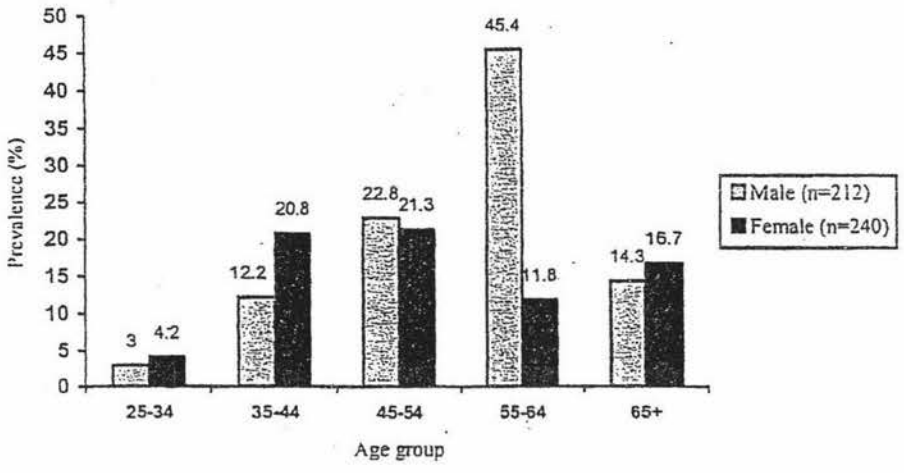
Source: Janus et al 1996



Source: Ministry of Health, Singapore 1993

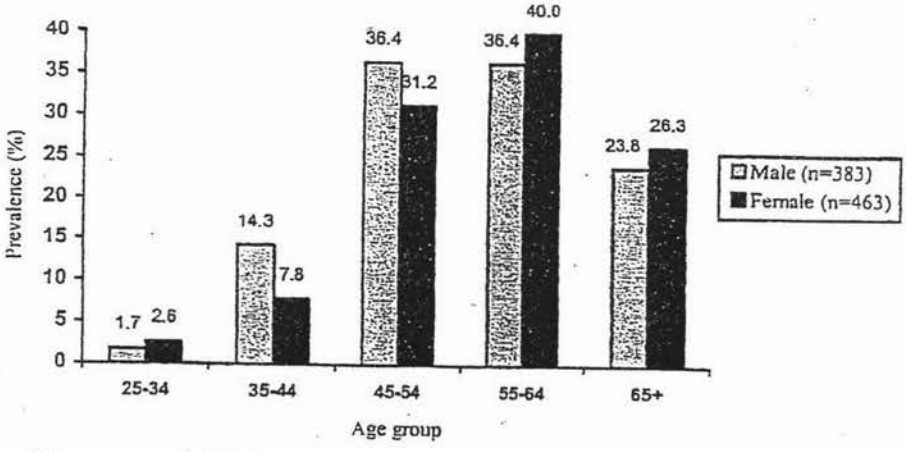
Appendix 2.9b *continued*

Fiji - Rural Indian



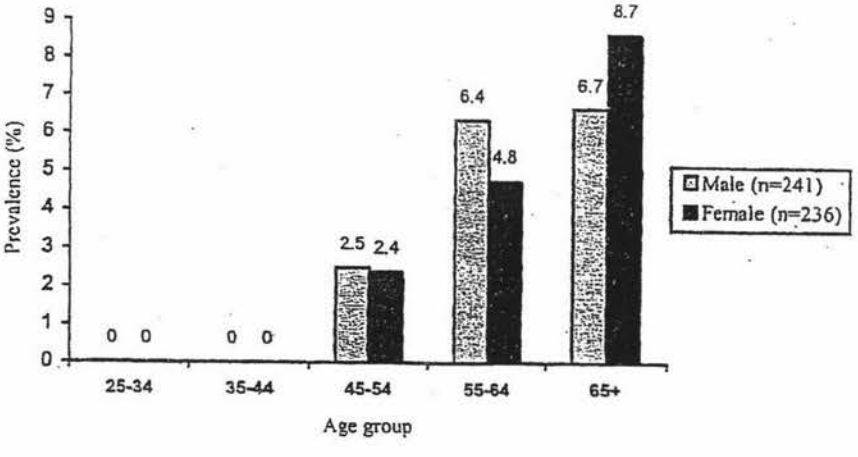
Source: Zimmet et al 1983

Fiji - Urban Indian



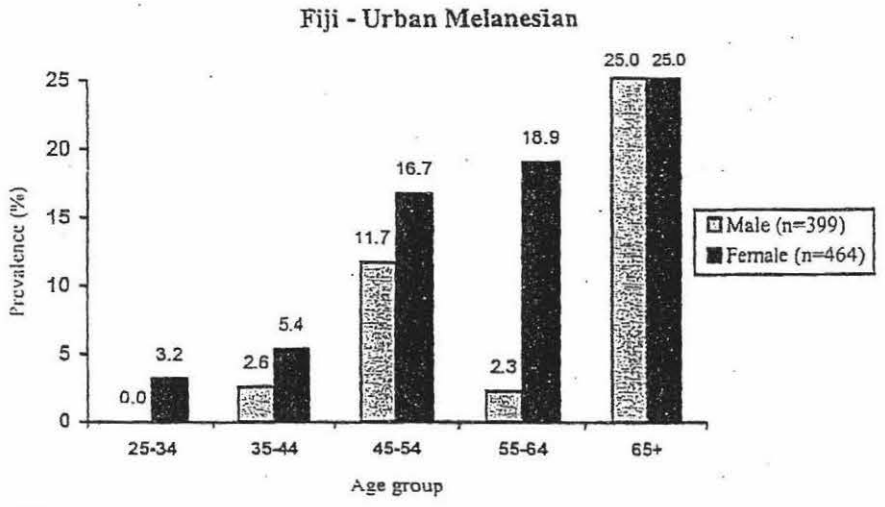
Source: Zimmet et al 1983

Fiji - Rural Melanesian

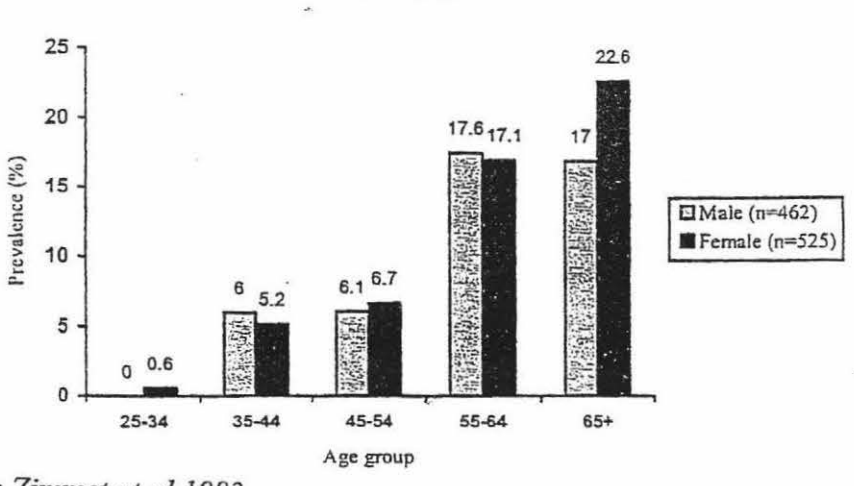


Source: Zimmet et al 1983

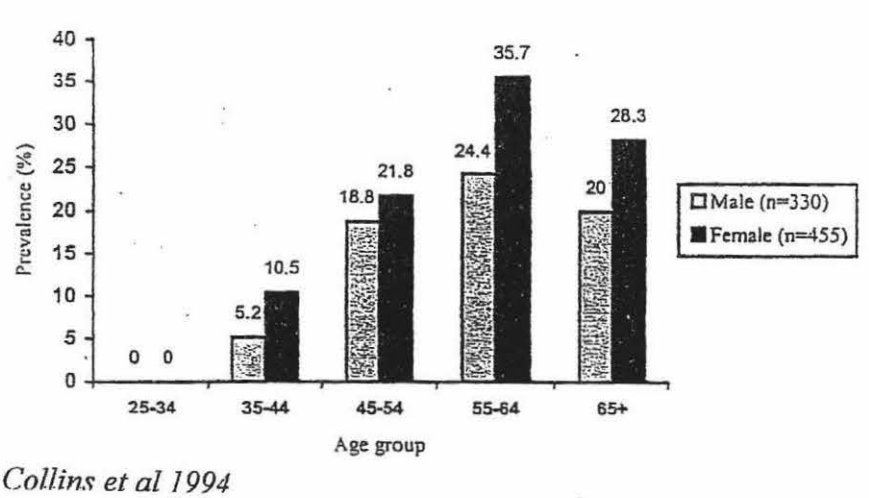
Appendix 2.9b *continued*



Source: Zimmet et al 1983



Source: Zimmet et al 1983



Source: Collins et al 1994

Appendix 2.10 *A psychobehavioural model of variables influencing diabetes self-management and clinical outcomes.*

Source: DAWN Study 2001

Appendix 2.11 *Kleinman's Explanatory Model*

Provider questions	What patient responses tell the health care provider
What do you think caused your problem?	• Is the cause biologically, spiritually, emotionally-based? • External or internal source? • Related to God's will, patient's behavior, environment, etc.?
Why do you think it started when it did?	• Does patient believe diabetes is associated with a critical event?
What do you think your sickness does to you? How does it work?	• Patient's interpretation of what diabetes does to him or her • What symptoms patient identifies related to the diabetes • Meaning patient attaches to symptoms
How severe is your sickness? Will it have a long or short course?	• Does patient believe it is a chronic, lifelong illness or something that can be cured with the appropriate treatment? • Patient's perception of seriousness–may explain current self-management behaviors or lack thereof
What kind of treatment do you think you should receive?	• Types of treatments patient believes will be effective • Is patient willing to use pharmacological approaches? • Does patient embrace alternative approaches? • Is patient willing to use both Western and alternative approaches?
What are the most important results you hope to receive from this treatment?	• Specific areas of life patient prioritizes as important • Symptoms and issues that are of less concern for patient
What are the chief problems your sickness has caused for you?	• Most distressing symptoms for patient–providers can leverage treatment goals
What do you fear most about your illness?	• Quality of life as defined by the patient

Source: Funnell and Anderson 2000

Appendix 2.12 *Patient information sheet for assessment of well-being*

NAME:_____ DATE:_____

Patient Information Sheet

This sheet will help your diabetes team (doctor, nurse, dietitian) to understand how you are managing your diabetes.

This will help them to provide better treatment for you.

They do not always have enough time during the appointment to ask you all these questions so filling in this form is helpful.

How have you been in the last two weeks?

	Over the last two weeks	All of the time	Most of the time	More than half of the time	Less than half of the time	Some of the time	At no time
1	I have felt cheerful and in good spirits	☐ 5	☐ 4	☐ 3	☐ 2	☐ 1	☐ 0
2	I have felt calm and relaxed	☐ 5	☐ 4	☐ 3	☐ 2	☐ 1	☐ 0
3	I have felt active and vigorous	☐ 5	☐ 4	☐ 3	☐ 2	☐ 1	☐ 0
4	I woke up feeling fresh and rested	☐ 5	☐ 4	☐ 3	☐ 2	☐ 1	☐ 0
5	My daily life has been filled with things that interest me	☐ 5	☐ 4	☐ 3	☐ 2	☐ 1	☐ 0

Is there anything about your diabetes that has been worrying you lately?

What is the hardest thing about looking after your diabetes?

PLEASE TURN OVER

Appendix 2.12 *continued*

NAME:_____ DATE:_____

How is diabetes affecting your life at the moment? (for example work, school, recreation, relationships, etc)

Do you have any goals/aims in terms of your diabetes care?

Are there any questions you would like to ask the doctor/nurse/dietician today? Please write these down:

Is there anything else you would like to tell us?

Thank-you for answering these questions. Please take this form in with you to your appointment.

Source: Adapted from World Health Organization 1998 .

Appendix 3.1 *Ethical approval for the study: Auckland Diabetes Centre, Auckland District Health Board*

Auckland District Health Board
Green Lane Hospital, Green Lane West
Auckland 3, New Zealand
Telephone 09 638 9909
Website: www.adhb.govt.nz

Service: Research Development Office

Phone: 630-9943
Ext: 4085, 4077 and 3122
Fax: 630 - 9796 or 4996
Email: JoanD@adhb.govt.nz

11 November 2002

Ms Lesley Sanderson
Auckland Diabetes Centre
18 Compton Street
Northcote
Auckland

Dear Ms Sanderson

RE: Research project 2002/216 - Pilot Study on Attitudes to Food and Lifestyle Choice in Well Controlled and Poorly Controlled Patients with Type 2 Diabetes from Different Ethnic Groups

Gaye Tozer, General Manager, Community & Ambulatory Services, has given approval for the above research project.

This approval is given based on the materials submitted for ADHB management approval. If there are any amendments to be made, it is **important that** you send a copy of the amendments to the Research Development Office (RDO) as well as to the Ethics committee.

Please send a copy of the final report to RDO on completion of the project.

Good wishes for your study.

Yours sincerely

Joan Dodd
Research Co-ordinator
RESEARCH DEVELOPMENT OFFICE
AUCKLAND DISTRICT HEALTH BOARD

Appendix 3.1 *Ethical approval for the study: Human Ethics Committee, Massey University, Albany Campus*

Massey University

Office of the Principal
Massey University
Albany Campus
Private Bag 102 904,
North Shore MSC,
Auckland, New Zealand
Principal: 64 9 443 9700 ext 9517
Regional Registrar: 64 9 443 9700
ext 9516
Facsimile: 64 9 414 0814

10 October 2002

Lesley Sanderson
C/o Patsy Watson
Institute of Food Nutrition and Human Health
Massey University
Albany

Dear Lesley

HUMAN ETHICS APPROVAL APPLICATION – MUAHEC 01/066
"Pilot Study on food and Lifestyle Choices in Well-controlled and Poorly-controlled Patients with Diabetes "

Thank you for your application. It has been fully considered, and approved by the Massey University, Albany Campus, Human Ethics Committee.

If you make any significant departure from the Application as approved then you should return this project to the Human Ethics Committee, Albany Campus, for further consideration and approval.

Yours sincerely

Associate-Professor Kerry Chamberlain
Chairperson,
Human Ethics Committee
Albany Campus

cc Patsy Watson
Institute of Food Nutrition and Human Health,
Massey University, Albany

Te Kunenga ki Pūrehuroa
Inception to Infinity: Massey University's commitment to learning as a life-long journey

75 YEARS of Innovation Ahi Ka Always

Appendix 3.1 *Ethical approval for the study: The Maori Research Review Committee for the Auckland District Health Board*

Auckland District Health Board
Green Lane Hospital, Green Lane West
Auckland 3, New Zealand
Telephone 09 638 9909
Website: www.adhb.govt.nz

Service: Research Development Office

Phone: 630-9943
Ext: 4085, 4077 and 3122
Fax: 630 - 9796 or 4996
Email: CandyP@adhb.govt.nz

24 September 2002

Ms Lesley Sanderson
18 Compton Street
Northcote
Auckland 9

Dear Ms Sanderson

RE: Research project 2002/216 (A+2557) - Pilot Study on Attitudes to Food and Lifestyle Choice in Well Controlled and Poorly Controlled Patients with Type 2 Diabetes from Different Ethnic Groups

Thank you for the letter dated 20 September 2002. The Committee acknowledges that you have responded to its concern, and approves your research.

You and your research team are encouraged to consult Maori Health Services for follow-up liaison and support for any Maori participants you may recruit. Please call Mata Forbes, Maori Health Services Co-ordinator/Advisor, Auckland Hospital: (mobile) 021 348432; 3074949 Extn 7292.

Please send a copy of the final report to Maori Health Services at the conclusion of the study.

We wish you the very best in your research.

Sincerely,

Candy Pettus

Candy Pettus
Manager of Research
On behalf of the Maori Research Review Committee
AUCKLAND DISTRICT HEALTH BOARD

cc: Dr Jonathan Koea, Maori Research Review Committee, ADHB
Mata Forbes, Maori Research Review Committee, ADHB

Appendix 3.1 *Ethical approval for the study: The Auckland Ethics Committee*

Please include the reference no. and study title in all correspondence/telephone calls.

Auckland Ethics Committees

Private Bag 92522
Wellesley Street
Auckland
Delivery Address:
C/O Ministry of Health
3rd Floor, Unisys Building
650 Great South Road, Penrose
Phone (09) 580 9105
Fax (09) 580 9001
Committee X Email: pat_chainey@moh.govt.nz
Committee Y Email: yvonne_erixon@moh.govt.nz

24 October 2002

Ms Lesley Sanderson
18 Compton Street
Northcote
Auckland 9

Dear Lesley

AKY/02/00/216 **Pilot study on attitudes to food and lifestyle choice in well controlled and poorly controlled patients with Type 2 diabetes from different ethnic groups. PIS/Cons V#3, 30/09/02.**

The above study has been given ethical approval by the Auckland Y Ethics Committee.

Approved Documents
Introductory Letter V#3, 30/09/02
Patient Information Sheet V#3, 30/09/02
Consent Form V#3, 30/09/02.

Yours sincerely,

pp

Pat Chainey
Administrator

Cc: Auckland DHB

Appendix 3.1 *Ethical approval for the study: Declaration 1*

PART V: DECLARATIONS

Full Project Title : Attitudes to food and lifestyle choices and the impact these have on diabetes control

Short Project Title : Food and lifestyle choices and the impact these have on diabetes control.

1. Declaration by Principal Investigator

The information supplied in this application is, to the best of my knowledge and belief, accurate. I have considered the ethical issues involved in this research and believe that I have adequately addressed them in this application. I understand that if the protocol for this research changes in any way I must inform the Ethics Committee.

NAME OF PRINCIPAL INVESTIGATOR (PLEASE PRINT): LESLEY SANDERSON

SIGNATURE OF PRINCIPAL INVESTIGATOR: L. M. Sanderson

DATE: 05-08-02.

A separate declaration will be required for each multi-centre site, signed by the principal investigator for that site.

2. Declaration by Head of Department in which the Principal Investigator is located or appropriate Dean or other Senior Manager

I have read the application and it is appropriate for this research to be conducted in this department I give my consent for the application to be forwarded to the Ethics Committee.

NAME AND DESIGNATION (PLEASE PRINT): PATSY WATSON

SIGNATURE: P Watson

INSTITUTION: MASSEY UNIVERSITY, ALBANY

DATE: 5/08/02

DESIGNATION: PROGRAMME LEADER IN HUMAN NUTRITION.

- *Where the head of department is also one of the investigators, the head of department declaration must be signed by the appropriate Dean, or other senior manager.*
- *If the application is for a student project, the supervisor should sign here.*

3. Declaration by the General Manager of the Health Service in which the research is being undertaken (if applicable)

Anthony Cashmore Manager Ambulatory Services Auckland DHB

Appendix 3.1 *Ethical approval for the study: Declaration 2*

FORM A

DECLARATION OF ELIGIBILITY OF A CLINICAL TRIAL FOR CONSIDERATION OF COVERAGE UNDER ACCIDENT COMPENSATION LEGISLATION

Instructions: This form is to be completed and the statutory declaration signed by the applicant. It should be forwarded to the primary Ethics Committee together with the documents seeking ethical approval for the proposed study.

If the study is a multi-centre proposal, this form should only be sent to the primary committee.

The information provided must be sufficiently detailed to enable the Ethics Committee to be satisfied that the proposed research is not conducted principally for the benefit of the manufacturer or distributor of the medicine or item in respect of which the research is carried out.

The provision of this information will enable the ethics committee to be satisfied that participants in the clinical trial will be considered for coverage under accident compensation legislation, for injury caused as a result of their participation in the research.

DETAILS OF PROPOSED RESEARCH STUDY

- Title of research project: Attitudes to food and lifestyle choice and the impact these have on diabetes control
- Name of Research Director/Investigator: Lesley Sanderson
- Is the Investigator a Registered Health Professional — Yes / No *tick or circle as appropriate*
- Location/s of proposed study: Auckland Diabetes Centre
- State number of participants: 240
- Organisations providing support ($ or "in kind") for the direct and indirect costs of the research. Please provide names of organisations and the type of support provided.
  No monetary support has been provided.
- Relationship of proposed research to the pharmaceutical industry or other company involved in health research. Please describe the involvement of industry in your proposed research, and provide details of support to be received from them.
  Industry has no involvement in the proposed research, apart from some pens and pads which have been provided for participants by two pharmaceutical companies (neither has a vested interest in this research project)

STATUTORY DECLARATION:

I Lesley Sanderson (name, of town/city) Auckland solemnly and sincerely declare that as director of the proposed research, the proposed study is not conducted principally for the benefit of the manufacturer or distributor of the medicine or item in respect of which the trial is carried out.

And I make this solemn declaration conscientiously believing the same to be true and by virtue of the Oaths and Declarations Act 1957.

Lesley Sanderson — L.M. Anderson — 5th day of August 2002.

Name (please print) — Signature — this day of

before me A.E.B. ANDERSON
OFFICE MANAGER-AUCKLAND
JUSTICE OF THE PEACE
FOR NEW ZEALAND — A.E.B. Anderson

Name (please print) — Signature

A Justice of the Peace, or
~~A Solicitor of the High Court~~
~~or other person authorised to take a statutory declaration.~~

Warning: Please note that it is an offence under part VI subsection 111 the Crimes Act 1961 to make a false statutory declaration.

Appendix 3.2 *Letter of introduction*

MASSEY
UNIVERSITY

ALBANY

To: _____,

As part of my Master of Science Degree at Massey University, I am conducting a pilot study of food and lifestyle choices and the impact these have on diabetes control.

This letter is to advise that you have been randomly selected as a potential participant of this study, and thus I am inviting you to take part. However, like all invitations you have the choice of accepting or declining.

Attached is an information sheet that outlines what will be involved. Please read this information thoroughly before making your decision.

If you have any questions, please do not hesitate to contact me at the Auckland Diabetes Centre, on 379 8305, extension 8749.

Thank you for your time.

Yours sincerely,

Lesley Sanderson,

Dietitian

Appendix 3.3 *Participant information sheet.*

MASSEY
UNIVERSITY

ALBANY

Study of food and lifestyle choices and the impact these have on diabetes control

Participant information sheet

Researcher background:

This study is being conducted by Lesley Sanderson, who works as a dietitian at the Auckland Diabetes Centre; the only full-time dietitian at the Centre. She is currently completing her Master's degree of Nutritional Science at Massey University. Her supervisor is Patsy Watson, a nutritionist and programme leader in Human Nutrition in the Institute of Food, Nutrition and Human Health, Massey University, Albany Campus.

Study outline:

Type 2 diabetes has reached epidemic proportions in New Zealand, as it has globally. There has also been a dramatic rise in numbers from different ethnic groups attending the Auckland Diabetes Centre. The groups with a

higher prevalence of Type 2 diabetes, namely Maori, Pacific, Chinese and Indian will be targeted in this study, along with Europeans.

Lesley's goal is to give you information on food and physical activity that best suits your own personal needs, to help you manage your diabetes well, in order to live a normal life and avoid complications. This study will help her and other dietitians to serve you better, with culturally-relevant and acceptable information tailored to your individual lifestyle.

At your routine follow-up visit, a 5-10 minute questionnaire will be given, along with a form for a blood test if you haven't had one in the past two months, and a blood pressure check. Later on you will receive a letter with your results, and a summary of the study findings.

What you will get out of taking part:

- help and advice on how to manage your diabetes well .
- referral on to other diabetes specialists if necessary
- medical tests, including blood pressure.

Your rights:

Volunteers

- receiving this information sheet may decline to take part in this study;
- may withdraw from the study prior to completing the questionnaire;
- have the right to ask questions about the study at any time;
- provide information on the understanding that their name will <u>not</u> be used;
- will be given a summary of the findings of the study when completed.

Confidentiality:

The results of this study will of course be CONFIDENTIAL. Anything a volunteer tells the researcher will be anonymous and remain confidential. Each volunteer will be identified by a code number only, not by name, in the collection and analysis of all information. All data collected will be filed in a locked cabinet in a locked and alarmed room. A master list of the names, addresses and code numbers will be kept by the project supervisor under lock and key in a separate location. The analysis of the information will focus on the results for the group as a whole, not the individual.

Publication of Results:

Results of this study will be written up as a thesis, and presented at dietetic and diabetes conferences.

If you are interested in taking part in this study please complete the enclosed Consent Form and bring it with you to your Clinic appointment.

Thank you!

- If you have any queries or concerns regarding your rights as a participant in this study, you may contact the Health Advocate Trust, Phone (09) 638 9638
- If you have questions about the study please phone Lesley Sanderson: (09) 379 8305, ext.8749, or Patsy Watson (supervisor): (09) 443 9755

Appendix 3.4 *Consent form*

MASSEY
UNIVERSITY

ALBANY

Consent form

- I have read and understood an explanation of the study I have been invited to take part in.

- I read and understood the letter sent from the researcher, Lesley Sanderson.

- I agree to her accessing my medical notes at the Auckland Diabetes Centre for the purpose of this study.

- I have had the opportunity to ask questions and to have them answered, and I understand that I may ask any further questions at any time.

- I understand I have the right to withdraw from the study prior to completing the questionnaire, and have the right to decline to answer any particular questions.

- I agree to provide information to the researcher on the understanding that my name will not be used.

- I understand that my consent to take part does not alter my legal rights.

- I agree to take part in this study, under the conditions set out in the information sheet.

- I wish to receive a summary of the results of the study. Yes / No

REQUEST FOR INTERPRETER

English	I wish to have an interpreter.	Yes	No
Maori	E hiahia ana ahau ki tetahi kaiwhakamaori/kaiwhaka pakeha korero.	Ae	Kao
Samoan	Ou te mana'o ia i ai se fa'amatala upu.	Ioe	Leai
Tongan	Oku ou fiema'u ha fakatonulea.	Io	Ikai
Mandarin	我希望有翻译员	是	否

(please see over)

I_____(full name) hereby consent to take part in this study.

Signed:_____ Date: _____

Witness:

In my opinion consent was given freely and with understanding.

Signed:_____ Date: _____

Project explained by Lesley Sanderson, investigator

Signed:_____ Date: _____

Thank you !

Lesley Sanderson

Auckland Diabetes Centre

Level 5, 48 Greys Avenue

Auckland 1

Phone: 379 8305 ext. 8749

Fax: 358 2613

Email: lesleys@adhb.govt.nz

Appendix 3.5 *Questionnaire*

INSTITUTE OF FOOD NUTRITION AND HUMAN HEALTH
ALBANY CAMPUS

Questionnaire and Measurement Sheet

PILOT STUDY OF FOOD AND LIFESTYLE CHOICES AND THE IMPACT THESE HAVE ON DIABETES CONTROL

Subject Code Number: _____

Time of Interview: _____

Date of Interview: _____

Blood Pressure Measurement: _____

Version 3: 9/02

Your views about diabetes ...

How to answer: Circle the number which best corresponds with your answer

Strongly disagree				*Strongly agree*
1	*2*	*3*	*4*	*5*

I think that diabetes .....

- makes me frustrated.....1.....2.....3.....4.....5
- makes people treat me differently ....1.....2.....3... .....4..... ..5
- control can improve if I lose weight..... .1..... 2..... ...3.....4..... .5
- can usually be managed with regular meals, exercise and medication .....1 .....2.....3.....4.....5
- complications can be avoided..... 1.....2..... ..3.....4..... .5
- makes me worry about my job ....1.....2..... . .3.....4..... 5
- stops me from going out to eat with friends .....1.....2.....3.....4.....5
- stops me from being physically active.....1.....2.....3.....4.....5

Version 3: 9/02

***How to answer**: Circle the number which best corresponds with your answer*

Strongly disagree				*Strongly agree*
1	*2*	*3*	*4*	*5*

- makes me worry about having a low blood sugar in public.....1.....2.....3.....4.....5
- puts a burden on my family .....1.....2.....3.....4.....5
- interferes with my sex life .....1.....2.....3.....4.....5
- takes up a lot of my time ..... 1.....2.....3.....4.....5
- costs me more for food ....1.....2.....3.....4.....5
- improves my social activities .....1.....2..... .3.....4.....5
- makes me feel so down in the dumps that nothing could cheer me up .....1.....2.....3.....4.....5
- actually makes me feel healthier, when I eat good food and walk daily .....1.....2.....3.....4.....5

I think that ....

- it is important that I attend my appointments with Dr, nurse and dietitian.....1.....2.....3.....4.....5

.

- information from them helps me manage my diabetes better.....1.....2.....3.....4.....5
- information from them is easy for me to use in my culture/ethnic group.....1.....2.....3.....4.....5

Why?

.....

.....

Version 3: 9/02

Your food ....

How to answer: circle the number which best corresponds with your answer

Not at all				*Very*
1	*2*	*3*	*4*	*5*

How important to you is:

- eating low-fat foods? .....1.....2.....3.....4.....5
- eating foods high in fibre like wholegrain bread and cereals?.....1.....2.....3.....4.....5
- limiting your intake of sugar?.....1.....2.....3.....4.....5
- eating 5+ vegetables and fruit every day?.....1.....2.....3.....4.....5
- having some milk, yoghurt or low-fat cheese every day? .....1.....2.....3.....4.....5
- reducing the amount of salt you use?.....1.....2.....3.....4.....5
- limiting alcohol? .....1.....2.....3.....4.....5

...and your health ....

I think that ....

- It is important for me to be a healthy weight..... 1.....2.....3.....4.....5
- It is important to know about heart disease .....1.....2.....3.....4.....5
- Controlling my blood pressure is important..... 1.....2.....3.....4.....5
- Controlling my cholesterol level is important .....1.....2.....3.....4.....5
- daily activity is important..... 1.....2.....3.....4.....5
- medication must be taken every day.....1.....2.....3.....4.....5

Please could you list all your medications below

Version 3: 9/02

How to answer: Circle the number which best corresponds with your answer

Not at all				*Very*
1	*2*	*3*	*4*	*5*

If you smoke please answer this next question:

- It is important for me to give up smoking. ..... 1.....2.....3.....4.....5

How important are these to you at the moment?

the way you feel emotionally.....1..... 2.....3.....4.....5

.

your overall appearance.....1.....2.....3.....4.....5

your fitness .....1.....2.....3 .....4.....5

your weight .....1.....2.....3.....4.....5

taking care of future health .....1.....2.....3.....4.....5

support of family/friend .....1.....2.....3.....4.....5

.

Background information

(This information is needed for statistical purposes only)

1. Occupation:_____

2. Do you work part-time _____ Or full-time _____

3. Total household income: *(Please circle one of the following)*

<$10,000 <$20,000 $20-30,000 $30-40,000 $40-50,000 >$50,000

4. Are you presently unemployed because of your health?

(Please circle Yes or No) Yes No

Version 3: 9/02

5. Have you received any of these types of income support in the last year?
(Please circle Yes or No)

Family assistance	Yes	No
Family support	Yes	No
Unemployment benefit	Yes	No
DPB	Yes	No
ACC	Yes	No
Sickness or invalids benefit	Yes	No
Student allowance	Yes	No
Independent use benefit	Yes	No
Widows benefit	Yes	No
Transitional retirement benefit	Yes	No
Other government benefits (disability allowance, etc.)	Yes	No

6. What is the total income from benefits/bursary per week for your household? $_____

7. Do you have a community services card?
(Please circle Yes or No) Yes No

8. Marital status: *(Please circle one of the following)*

Married defacto divorced widow/widower single

9. How many years of secondary school did you complete? _____

10. Have you done further education/training since you left school?

(Please circle Yes or No) Yes No

If yes, please specify: _____

11. How many people are presently in your household? _____

12. How many are school children? _____

How many are pre-schoolers? _____

Thank you
Your contribution to this study is greatly appreciated

Version 3: 9/02

Appendix 3.6 *Feedback to participants*

MASSEY
UNIVERSITY

ALBANY

Dear

Pilot study of food and lifestyle choices and the impact these have on diabetes control.

The interviews and final analysis have now been completed, and a summary of the study findings are attached for your interest, along with your personal results.

I would like to convey my utmost appreciation and gratitude for your time and enthusiasm while participating in this study. I could not have done it without you.
I hope that the questionnaire really got you thinking about how you feel about your diabetes, your food, and your health... and that you learned as much as I have.

Remember that you are entitled to a free diabetes check with your family doctor each year - just ask for a 'Get Checked' appointment. I strongly suggest that you take advantage of this.

Please feel free to telephone if you have any questions. Thank you again,

Yours sincerely

Lesley Sanderson
Researcher
Auckland Diabetes Centre
Phone:379 8305
ext. 8749

Patsy Watson
Project Supervisor
Massey University
Phone: 443 9755

How to interpret your results:

It is important to get as near as you can to the ideal range to reduce your risk of diabetes complications and heart disease. However <u>any</u> reduction is beneficial, and individual targets may be different with good reason.

Blood glucose levels can be improved with healthy eating and daily exercise such as a 1/2 hour walk ..... and with tablets (and/or insulin) as well, if necessary. The <u>HbA1c</u> test gives an average of blood glucose levels over the previous 2 - 3 months, a good 'backup' test for you, to determine your overall level of control.

Blood fats can also be improved by:

- <u>Cholesterol:</u> reduce fat intake, especially saturated fat, and improve blood glucose levels;
- <u>HDL</u> : daily exercise, reduce weight and stop smoking;
- <u>LDL</u> : daily exercise and reduce fat intake;
- <u>Triglycerides</u> : reduce alcohol, fat and sugar intake and improve blood glucose levels;
- <u>Ratio of Cholesterol:HDL</u> is an indicator of your risk for heart disease.

Blood pressure may be improved with weight reduction and using less salt.
High blood pressure or hypertension = more than 140/90 mmHg.

Weight reduction of just 5 Kg, (if overweight) can really help your diabetes.

If your results are higher than the ideal do the best you can with the suggestions above and get them rechecked in 3 months - if still high you may need medication.

To: _____ Date: _____

Your results: (at the time of the study) Ideal*

Blood glucose (sugar) (for diabetes)	mmol/l	_____	-	fasting: 4 - 6
	mmol/l	_____	-	random: 4 -10
HbA1C: (for diabetes)	%	_____	-	less than 7

Fasting blood lipids (fats):

Total cholesterol:	mmol/l	_____	-	less than 4.0
HDL cholesterol:	"	_____	-	more than 1.0
LDL cholesterol:	"	_____	-	less than 2.5
Triglycerides:	"	_____	-	less than 1.7
Ratio of Cholesterol:HDL:	"	_____	-	less than 4.5

Blood pressure:	mm Hg	_____	-	130/80 or below
Healthy weight range:	kg	_____ - _____		
Body mass index (BMI):		_____ - _____		

(ratio of height to weight)

* NZ Guidelines Group, Ministry of Health. December, 2003.

Summary of the pilot study of food and lifestyle choices and the impact these have on diabetes control:

A total of 232 women attending the Auckland Diabetes Centre took part in this study. Ages ranged from 24 to 78 years, the average being 56 years. Duration of diabetes ranged from 1 to 44 years, with an average of 7 years.

All had received dietary and lifestyle advice, and questionnaire responses indicated a good dietary knowledge, particularly regarding limiting intake of sugar, fat and alcohol, and eating foods high in fibre such as whole-grain breads and cereals, vegetables and fruit.

It was evident from comments made that most felt the information given by the dietitian at the Centre was practical and focused on normal food. It was easy to understand and gave them confidence - which was extremely encouraging. Most agreed that not smoking, regular meals, daily activity, and taking medication (if prescribed) were very important. Putting this knowledge into effect can however prove difficult at times.

The questionnaire asked about concerns people had about diabetes and there were some ethnic differences, with Pacific and Chinese women being more concerned that their diabetes put a burden on the family and that diabetes sometimes made them feel 'down'. They also found that diabetes takes up a lot of their time as did Maori women. Pacific women were more concerned about having a low blood sugar in public, and found diabetes most frustrating. Weight and level of fitness were more important to European and Indian women; Pacific, Chinese and Indian women found diabetes made them worry about their job. Future health was important in all groups.

In the group as a whole 170 (73%) were on tablets for diabetes, and 72 (31%) were on tablets plus insulin or insulin alone. There were 87 (37%) on tablets to keep cholesterol levels correct, 141 (61%) on tablets to keep blood pressure controlled; and 79 (34%) were taking aspirin to prevent strokes.

No statistical association was found between diabetes control and age, income, marital status, education, weight or cholesterol levels. However

more of those with good diabetes control (HbA1c less than 7.5%) had had diabetes for a shorter length of time.

Most felt that it was very important to attend appointments at the Centre, and that information received helped them manage their diabetes better. Not all agreed that the information was easy to use for their ethnic group however, and it is unfortunate that the Centre has ongoing difficulty in recruiting health professionals from other ethnic groups.

From the questionnaire it was evident that psychological issues such as worry, frustration, and diabetes making one feel 'down' were common. In addition to nurses, doctors and dietitians the Diabetes Centre has a health psychologist available to discuss any problems you may have - this is a free service, and interpreters are available if requested prior to the appointment.

Appendix 4.1 *Types of income support received by diabetic control*

	Total N=232	**Well-controlled** N=109	Poorly-controlled N=123
Family assistance	20 (9%)	5 (5%)	15 (12%)
Family support	26 (11%)	8 (7%)	18 (15%)
Unemployment benefit	17 (7%)	4 (4%)	13 (11%)
DPB	8 (3%)	2 (2%)	6 (5%)
ACC	5 (2%)	3 (3%)	2 (2%)
Sickness or Invalid benefit	49 (21%)	25 (23%)	24 (20%)
Student allowance	2 (1%)	1 (1%)	1 (1%)
Independent use benefit	3 (1%)	1 (1%)	2 (2%)
Widows benefit	8 (3%)	5 (5%)	3 (2%)
Transitional retirement benefit	6 (3%)	2 (2%)	4 (3%)
Disability allowance	33 (14%)	16 (15%)	17 (14%)
Pension	36 (16%)	26 (24%)	10 (8%)

Appendix 4.2. *Types of income support received by ethnicity*

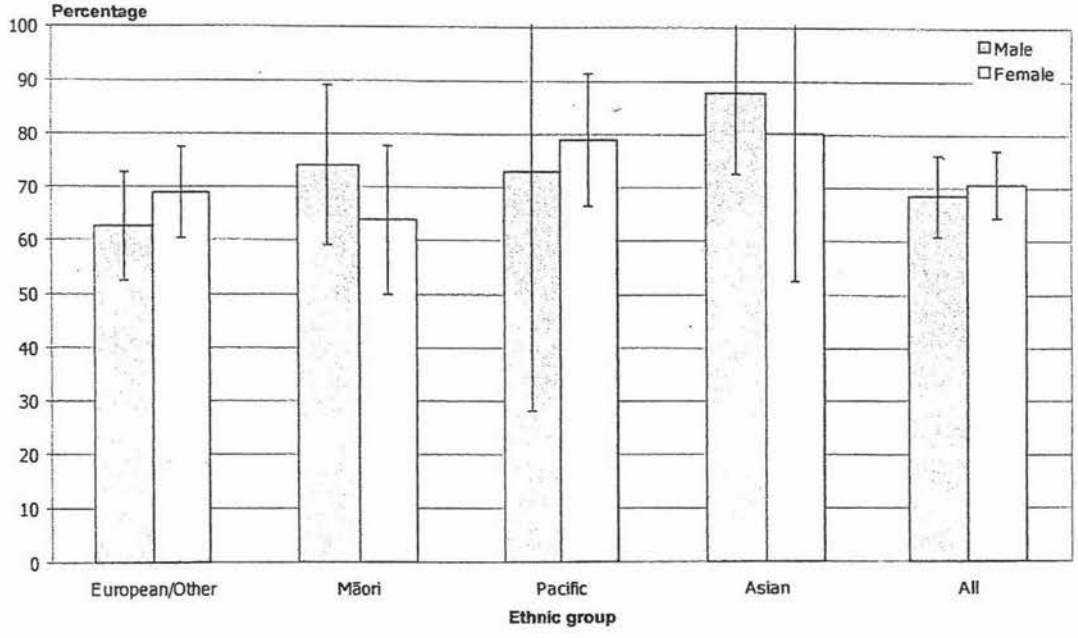
	European N=53	**Maori** N=44	**Pacific** N=53	**Indian** N=48	**Chinese** N=34
Family assistance	3 (12%)	7 (16%)	5 (9%)	5 (10%)	0
Family support	2 (8%)	6 (14%)	10 (19%)	5 (10%)	3 (9%)
Unemployment benefit	1 (4%)	3 (7%)	9 (17%)	0	4 (12%)
DPB	1 (4%)	3 (7%)	3 (6%)	1 (2%)	0
ACC	1 (4%)	0	2 (4%)	2 (4%)	0
Sickness or Invalid benefit	11 (21%)	14 (32%)	12 (23%)	7 (15%)	5 (15%)
Student allowance	0	1 (2%)	0	1 (2%)	0
Independent use benefit	0	0	1 (2%)	1 (2%)	1 (3%)
Widows benefit	1 (4%)	3 (7%)	3 (6%)	0	1 (3%)
Transitional retirement benefit	1 (4%)	2 (5%)	1 (2%)	0	2 (6%)
Disability allowance	11 (21%)	6 (14%)	7 (13%)	4 (8%)	5 (15%)
Pension	17 (32%)	7 (16%)	4 (8%)	3 (6%)	5 (15%)

Appendix 4.3 *Census 2001: Percentage of women receiving key types of social assistance by ethnicity (modified to include study subjects).*

Ethnicity	NZ Superannuation/ Veterans Pension	Job Seeker	DPB	Sickness/Invalid (Incl Widows benefit)
	%	%	%	%
European	19.6	4.9	5.4	3.9
Maori	5.9	12.7	19.8	7.6
Pacific	4.5	10.2	12.9	7.1
Asian	2.9	6.7	3.2	9.8
Other	3.0	15.3	6.2	5.5
TOTAL	17.0	5.9	6.7	4.3
Study Subjects	**16.0**	**7.0**	**7.0**	**21.0**

Source: Department of Statistics 2002

Appendix 4.4 *Medical treatment for diabetes in adults, by ethnic group and sex (age-standardised)*



Source: A Portrait of Health: Key results of the 2002-03 NZ Health Survey

Appendix 4.5 *Comments by participants*

Respondents were asked whether the information given by the dietitian at the Auckland Diabetes Centre easy to use in their cultural/ethnic group.

European (60% response)

- It doesn't help me, because I don't discuss my condition with anyone except for my immediate family.
- My nurse and dietitian – I would be unable to do any management at all without their assistance. When you're feeling this 'out of control' with health problems you need 'one on one' help. Because everyone is different.
- Because everything is explained so well and I can ring any time for information.
- Control = information.
- Because it's clear and practical.
- I can explain my dietary needs.
- Focused on normal food.
- Because my groups understand everyone has health problems.
- To be more informed, keep up-to-date with recent info and to be encouraged.
- Eat same foods.
- Makes life easier with proper support.
- Explained to me clearly the benefits of good, healthy food and benefits of daily walking.
- Advise on different types of food.
- Because I'm a New Zealander who likes fairly basic food and occasional Indian or Chinese and feel happier without too much sugary food.
- They are professionals.
- Things are explained clearly without being talked down to.
- To compare opinions.
- To further my knowledge on diabetes condition and diabetes as a whole.
- Easy to understand info.
- I am European.
- As I come from Barbados in the West Indies, some of the foods there differ from here; they are in the same category as Pacific Islands food, so it is nice to learn that some of the foods are acceptable.
- To keep optimum control of my diabetes and good health.
- Information, education and 'understanding' of both is most important to my culture/ethnic group.
- Changes nothing.
- I am Euro-Australian and have no problems with culture or language.
- I don't belong to a group.
- Because the information given to me is easily understood.
- I learn the correct foods to eat.
- I have a good relationship with doctor and staff here; they are helpful and informative.
- No real groups as such to concern myself about.
- Information given to me helps me manage diabetes and diet better.

Maori (64% response)

- If I don't understand it's no use going to the doctors and dietitian.
- Good focus, and further my educational reading, writing, spelling, hearing, when things are normal and control my diabetes.
- Haven't thought about it.
- Well explained.
- I don't worry so much about diabetes as we are doing what we love, *kapahaka*, etc.
- I am fully aware of the consequences of my choices and am able to modify my behaviour if I choose to.
- Taking care of themselves, especially eating habits.
- The help and information I receive helps me greatly in managing my diabetes.
- I can explain how I feel.
- All of the above helps me stay on top.
- When I go on *marae huis* and the food is wrong for me I just will not eat it. I also sometimes get questioned 'why aren't you eating that?" – I just answer 'I can't because I'm a diabetic'
- Neither agree or disagree, as long as it's easy for me to understand.
- Because teaching others in church.
- Most of the time I can go through my ethnic foods and say 'no thanks, not good for my diabetes'.
- Gives me better insight into managing my diabetes.
- I am informed and knowledgeable – can answer questions on diabetes confidently and reassure others – encourage them to follow clinic's advice.
- At present just investigating diabetic so do not have strong opinion as yet.
- To know where I can improve – weight control. Their information helps me manage diabetes, for peace of mind.
- Advise my *whanau*.
- Because they know about diabetes.
- Because they have all the information that is needed.
- Because I know how to choose the right foods.
- Better understanding coming for someone of there own culture.

Pacific Island (68% response)

- To tell my family to look after them not to get sick like me.
- There are lots of relations (*whanau*) who are in the same situation as I am and I explain my situation to enlighten them.
- Because the information isn't easily gleaned elsewhere.
- Sometimes I can't understand my own language (Niuean).
- Because it helps my diet.
- Helps whole family eat right food so they won't get diabetes.
- The information is improving as you continue to understand communities with high oral use and changing behaviour patterns due to their environment.
- Awareness.
- Make me understand my sickness better.
- Language barrier; can understand when spoken to, but hard to grasp the concept. My own language heaps better.
- To make it more understanding for those who have no idea about it.
- Because I want to live long to see my children grow up.
- It's important for me to learn as much as I can about my condition.
- Because without their help I knew nothing about my sickness.
- They explain everything properly and they also have pamphlet in my own language, which shows pictures of the food that I should be eating more of – and less of.
- Better informed about food and intake. As an Island person our diet consist of a lot of fatty foods, and with a lot of coconut cream. We get information from them about what we can eat and in moderation.
- It help me live a normal day-to-day life.
- Because I have to follow the rules for diabetes.
- A very good example to share and to be aware of what diabetes means to our life.
- Because everyone is different.
- Because my culture is the opposite of the information given.
- Because I want to be healthy.
- To learn about it and how to keep it.
- So I will know what is wrong with me.
- Tell my family.
- Because I feel better.
- Because it is about health and how to take care.
- Information is aimed at the dominant culture in Aotearoa – I identify with this culture therefore information is easy to disseminate.
- To inform others.
- I'm happy to do so.
- I can encourage my families and friends who are not fully updated with diabetes information to be aware of its consequences and that they can do something to prevent them from getting diabetes.
- Friends don't worry about the diabetes.
- Make others aware there is help to manage diabetes better.
- They help me a lot to understand my sickness better & try to cope with it & to live a normal life.
- Explanation in mother tongue.
- I do not join in cultural/ethnic group.

- Because sometimes we didn't control ourself properly.
- They are competent on the subject.
- Information given to me helps me manage diabetes and diet better.
- Explanation in mother tongue.

Indian (52% response)

- To know and understand helps better to cope.
- Because it helps me to control my sugar levels. Such appointments should be had once a year for patients who do not have very high sugar levels and who do not have a weight problem.
- Helps other people to understand.
- Information is also based on scientific research.
- Professional and useful info which was not readily given to me in my own country.
- People agree when I tell them about the good and the bad effect of diabetes.
- Because I cannot speak English.
- Because it helps to understand diabetes and keep you on track with diet and the importance of monitoring the condition.
- So that things go easy for me healthwise; feel more comfortable in managing myself healthwise and keeping myself active in social activities and enjoy time for myself.
- Help them to eat healthy food.
- Educate and inform others.
- Our diet (Hindu) is such that it's easy to follow the recommended diets (esp. veges. and fruit), and our culture is such that it's easy to follow instructions by persons of authority, as it's inculcated in us from childhood, ie. 'listen to others'.
- Because their information are correct and helpful.
- Explained in a simple form.
- They don't restrict me from eating my type of food. They tell me how to work around my lifestyle, food (cultural/ethnic).
- We can tell people how to avoid getting diabetes.
- I do not believe this.
- They are competent on the subject.
- Does not change the type of food or does not affect in any way.
- They have worked hard to get specialised in this field.

Chinese: (68% response)

- So that we can compare and evaluate our actions and progress.
- Talking about it is easier.
- My Chinese doctor speaks my language and explains what to do. He doesn't say much about diet.
- Knowledge is power.
- Because I can explain to Chinese-speaking immigrants about diabetes and encourage them to seek more help from diabetes specialists if they've been diagnosed with diabetes.
- Because English is my first language.
- Better understanding the nature of diabetes.
- Because it is very clear to me.
- Because my friends (from the same ethnic group) also has diabetes.
- I don't know English.
- Don't understand this question.
- They are specialists.
- To make me easy understand about sugar or diabetes.
- Because we can communicate easily with them about my condition.
- Because they give professional advice.

TRIAL OF A DEPRESSION SCREEN IN AN OUTPATIENT DIABETES CENTRE

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Introduction

Depression in diabetes is a prevalent, chronic and serious condition affecting as many as one in four diabetic patients[1]. A recent meta-analysis of forty-two studies of adults with type 1 or type 2 diabetes concluded that the prevalence of depression in patients with diabetes is at least twice as high as that of the US adult population.[1]

Depression interferes with adjustment to and management of diabetes, preventing effective self-care and lowering adherence to medication, lifestyle changes and attendance to medical appointments.

The World Health Organisations' recent DAWN conference in London (2003) has recommended that the WHO-5 Well-Being Scale be used as a screen for depression in diabetic outpatient clinic settings.[2]

Aim

This preliminary study, carried out at the Auckland Diabetes Centre, trialed the WHO-5 depression screen for a period of two weeks to assess the practicality and usefulness of the tool in an out-patient clinic setting. Both clinician and receptionist feedback was obtained.

Method

The Patient Questionnaire included the WHO-5[3] and an additional 5 questions (see box below). On arrival to reception the clinic patients were asked to read through the sheet and decide if they would like to complete it. Instructions at the end of the questionnaire informed the patient to take the sheet in with them to their appointment.

Patient Questionnaire - WHO-5 [3]

Please circle the number that is closest to how you have been feeling in the past two weeks?

Over the last two weeks	All of the time	Most of the time	More than half of the time	Less than half of the time	Some of the time	At no time
1 I have felt cheerful and in good spirits	5	4	3	2	1	0
2 I have felt calm and relaxed	5	4	3	2	1	0
3 I have felt active and vigorous	5	4	3	2	1	0
4 I woke up feeling fresh and rested	5	4	3	2	1	0
5 My daily life has been filled with things that interest me	5	4	3	2	1	0

Additional Questions:

Is there anything about your diabetes that has been worrying you lately?

What is the hardest thing about looking after your diabetes?

How is diabetes affecting your life at the moment? (for example work, study, recreation, relationships)

Is there any part of your diabetes care you would like to improve?

Are there any questions you would like to ask the doctor/nurse/dietitian today?

Results

- 306 patients were seen in the two week period by either a medical specialist, nurse educator or dietitian
- 24.5% of the patients took the sheet

Clinicians Feedback

- 1/3 of clinicians encountered patients who brought the sheet into their appointment (half of the clinicians have only one or two clinics in any two-week period with 4 to 6 patients in each clinic)
- 15% of patients were estimated by these clinicians to have brought the sheet into their appointment
- 50% of these clinicians found the WHO-5 useful for the screening of depression
- 87.5% of these clinicians found the sheet helpful Reasons for this included: detection of patients with depression that would not normally have been suspected; helped to focus on patient issues; easy to follow format; questions raised by patients that may not otherwise have been addressed.

The generall impression of what patients thought of the sheet was good and that patients seemed happy enough to fill in the sheet. No negative impressions were reported by the clinicians.

Receptionists Feedback

- 50% of patients took the sheet from reception
- 30% filled in the sheet
- 25% took the sheet into their appointment

These estimates are higher than the actual number of sheets taken and clinicians estimates

- 0% of patients were confused with or complained about the sheet
- 30% of patients didn't fill the sheet in because of language barriers or due to a lack of time before their appointment.

Conclusions

Although a small percentage of patients took th questionnaire into their appointment, of those that di promising results were found. The study highlights th need for more in-depth explanation at reception s that patients are made aware of the benefits c completing the form and taking it into thei appointment. Further staff education may be of valu in order to increase the use of the screen i appointments and to ensure referrals are made to th psychologist when WHO-5 scores are low.

Outcome

The sheet was relatively effective in screening fc depression and very helpful in prompting psychosocl discussion in clinic appointments. A revised one pag version of the sheet is currently in use at the Aucklan Diabetes Centre, and further assessment of i effectiveness is being carried out.

Future Research

Overall, the outcome of this preliminary study positive with feedback to suggest further study wou be beneficial in clarifying and extending the curre results and gaining the patients perspective of t WHO-5 in an outpatient clinic setting. We have enter the WHO Novo Nordisk competition in an attempt secure funds to take this project further, with one the main priorities to translate the sheet into differe languages relevent to those cultures with high rates diabetes in NZ. These would include Maori, Tonga Samoan, Niuean, Japanese, Chinese, and Gujurati.

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Thank-you to the patients and staff of the Auckland Diabetes Centre for their co-operation in this study.

Auckland Diabetes Centre

Health Psychology University of Auckland

THE UNIVERSITY OF AUCKLAND NEW ZEALAND

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