

***Review of
Primary Prevention of
Type 2 Diabetes
in Western Australia***



THE UNIVERSITY OF
WESTERN AUSTRALIA

***Review of
Primary Prevention of
Type 2 Diabetes
in Western Australia***

Prepared by

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ABBREVIATIONS

ABS	Australian Bureau of Statistics
ACT	Australian Capital Territory
AMS	Aboriginal Medical Service
ATSIC	Aboriginal and Torres Strait Islander Commission
BMI	Body Mass Index
CADS	Community Awareness Diabetes Strategy
CALD	Culturally and Linguistically Diverse
DALY	Disability Adjusted Life Years
DAWA	Diabetes Australia Western Australia
HDWA	Health Department of Western Australia
IDDM	Insulin dependent diabetes mellitus
IGT	Impaired Glucose Tolerance
NHF	National Heart Foundation of Australia
NDDP	National Divisions Diabetes Project
NIDDM	Non-insulin dependent diabetes mellitus
PHU	Public Health Unit
UWA	University of Western Australia
WHO	World Health Organisation
YLD	Years Lost due to Disability
YLL	Years Life Lost

EXECUTIVE SUMMARY

Background

The Health Department of Western Australia (HDWA) commissioned the Health Promotion Evaluation Unit at the University of Western Australia (UWA) to review the prevalence and trends in risk factors associated with the onset of Type 2 diabetes both in Western Australia and nationally. In addition, the effectiveness of primary prevention interventions and activities that are currently being undertaken by Western Australian and national organisations were reviewed.

The data collection phase was from June 1999 to February 2000. Data was collected through published and unpublished sources, as well as through telephone and face-to-face interviews. A series of consultative interviews with public health professionals involved with the primary prevention of Type 2 diabetes were conducted to ensure wide representation.

Diabetes Mellitus - Type 2

Type 2 diabetes is a heterogeneous disorder due to a combination of genetic and environmental factors adversely influencing glucose metabolism. This heterogeneity may be reflected not only in the degrees to which impaired pancreatic b-cell function and insulin resistance may be present, but also in the degree to which environmental and genetic factors may contribute. The strongest predisposing factors for Type 2 diabetes are obesity and a family history. While there is continued debate on whether insulin resistance is the main genetic factor associated with Type 2 diabetes, or whether there is a genetic predisposition for the obesity generally associated with glucose impairment, several studies have found that weight loss is capable of completely normalising insulin sensitivity in obese patients.

Primary Prevention Directions

Primary prevention programs aimed at long-term weight control and lifestyle modifications are likely to be most successful in delaying or preventing Type 2 diabetes. However, it has been acknowledged that very few Type 2 diabetes primary prevention intervention trials have been conducted with few published results available. Amongst those published, approaches targeting both high-risk people and the general community have demonstrated positive results in the primary prevention of Type 2 diabetes. Presently, the best guide to the potential benefits to be gained from Type 2 primary prevention intervention programs can be learnt in community-based cardiovascular risk reduction trials, with large-scale community campaigns to promote physical activity having been conducted over the past three decades (Marcus et al. 1998). An early review of these programs and other community-wide programs to promote exercise reached the conclusion that the provision of a variety of physical activity facilities by various community organisations does enable people to be more active. Mass media appeared to be successful in promoting awareness and interest in exercising, but had not been shown to be successful in actually changing exercise behaviour (Iverson et al. 1985).

A review of 127 primary prevention physical activity studies was conducted by Dishman and Buckworth, 1996, concluded that behaviour modification interventions were more effective when compared with other approaches such as cognitive behavioural modification, health education/risk appraisal and physical education curriculum programs. In addition, mediated programs were more effective than face-to-face or combination programs. Physical activity programs that aimed to increase activity during leisure time of low to moderate intensity, in general community settings and unsupervised, had the most effect on behaviour change. Whereas programs that related to strength training and specific aerobic instruction were found to be least effective on behaviour change. Successful programs were associated with combined ages, group programs and healthy study participants (Sallis & Owen 1999).

Nutrition, Physical Activity and Tobacco

In Australia in 1996, the highest ranked factors contributing to the burden of disease were tobacco use, physical inactivity, diet and hypertension. In 1998, Codde and Unwin reported that diet-attributable disease accounted for nearly one fifth of all deaths in Western Australia. Furthermore, when accounting for lifestyle factor contribution to major disease categories, diet was found to be responsible for a greater proportion of all deaths than either tobacco or alcohol (Codde & Unwin, 1998).

Of the adult population 56% were overweight and 19% were obese. One-third of the population was either physically inactive or participating at inadequate levels for cardiovascular benefit. These figures parallel the increased prevalence of Type 2 diabetes in the Australian community. For example, in people over 65 years, the prevalence is approaching 10%, while in some Aboriginal communities the prevalence in adults was reported to be up to 30% (Australian Institute of Health and Welfare & National Heart Foundation of Australia 1999).

In Western Australia, the prevalence of Type 2 diabetes in the 25-74 year age group was reported to have doubled between 1990 and 1995. This is amongst the highest in Australia and is particularly pronounced in the Kimberley region, where Aboriginal people comprise 45% of the region's population (Kimberley Public Health Unit - Derby 1997). The Kimberley population has the fourth highest prevalence of Type 2 diabetes in the World (McCarty et al. 1996).

Like other Australian States and territories, Western Australians have gained weight, with 42% either overweight or obese. Physical activity levels are similar to the rest of Australia, although rural areas, such as the Kimberley and Coastal Wheatbelt region report more than 40% of people as inactive, with Aboriginal populations reporting very little leisure time physical activity.

The dietary habits of most Western Australians were similarly high in fat content as with the rest of Australia, although amongst the Aboriginal population the consumption of high-energy dense foods, especially 'fast foods' was markedly higher than in non-Aboriginal Australians. These dietary habits appear to be linked to the higher level of obesity (25%) in the Aboriginal population compared with non-Aboriginals (18%). In particular, 60% of Aboriginal women were considered overweight in 1995, compared with 49% for non-Aboriginal Australian women.

Overall, a significant number of Western Australians, particularly the Aboriginal population, exhibit health behaviours (poor diet, inadequate physical activity etc) that increase their likelihood of acquiring Type 2 diabetes.

Primary Prevention Programs

Programs that attempt to manage, treat and prevent Type 2 diabetes were identified throughout Western Australia. Most programs have focused upon the management and treatment of diagnosed Type 2 diabetic patients, with limited opportunities to conduct primary prevention programs. This approach is probably a reflection of limited resources and opportunities.

Presently, three programs, “Food Cent\$”, “Supermarket Sleuth” and “Be Active” are conducted in all Western Australian regions. These programs are centrally supported by their respective health organisations, through the provision of material resources, although their implementation is not centrally coordinated. Amongst each Western Australian Health Region, the number and type of Type 2 diabetes primary prevention programs varies considerably.

Each Western Australian Health Region has developed or modified existing programs to meet the local needs of its community for the primary prevention of Type 2 diabetes. While these programs vary in their level of effectiveness and attention to evaluation, few appear to be built upon a theoretical framework underpinning a coordinated approach of achieving longer-term behaviour change of individuals or policy and structural changes in the community. In addition, identified regional programs were unlikely to be integrated into a longer-term strategy or be a part of an overall healthy lifestyle program.

In recent years, Type 2 diabetes has received an increased national profile. In 1996, diabetes was added as the 5th National Health Priority. There are a number of relevant primary prevention programs currently being implemented, including the Community Awareness Diabetes Strategy (CADS); the Active Australia: Framework; the National Divisions Diabetes Program; Acting on Australia’s Weight: A Strategic Plan for Prevention of Overweight and Obesity and the National Diabetes Strategy 2000-2004.

Recommendations

The findings of this report have led to the following major recommendations:

- That the prevalence and incidence of Type 2 diabetes and associated risk factors be systematically and periodically collected at a Statewide level, with special consideration for rural and remote communities and the indigenous population.
- That a coordinated Statewide primary prevention strategic plan addressing Type 2 diabetes risk factors be established within the Health Department of Western Australia.
- That a well-structured Statewide evaluation strategy to measure the process, impact and outcome of primary prevention programs be implemented.
- That increased collaboration amongst health organisations working in the primary prevention of health risks such as diet and physical activity (ie NHF, Cancer Foundation, Sport and Recreation, Department of Transport) be actively encouraged.
- That research funding for longitudinal research trials on the primary prevention of Type 2 diabetes be made available.

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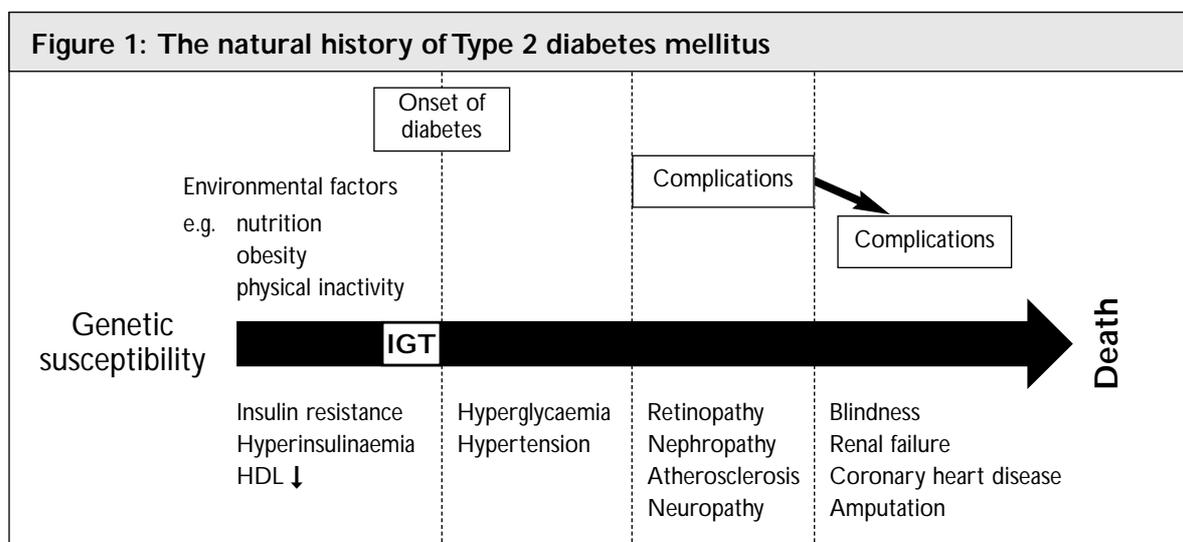
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1.0 INTRODUCTION

Diabetes is a condition in which the body makes too little of the hormone insulin or cannot use it properly. The two most common types are Type 1 (also known as insulin dependent diabetes mellitus, or IDDM) and Type 2 (also known as non-insulin dependent diabetes mellitus or NIDDM) (Australian Institute of Health and Welfare & National Heart Foundation of Australia 1999).

Type 2 diabetes is a disorder which shows resistance to the action of insulin. It accounts for about 85-90% of all diabetes cases and usually appears in adulthood, although it may be present without symptoms or remain undiagnosed for many years. It is also usually associated with obesity and other cardiovascular risk factors (Australian Institute of Health and Welfare 1998; Australian Institute of Health and Welfare & National Heart Foundation of Australia 1999). Type 2 diabetes can lead to a progressive failure of the pancreatic beta cells and relative insulin deficiency as well Western Australian Diabetes Services. The natural history of Type 2 diabetes is depicted in figure 1.



HDL, high-density lipoprotein; IGT, impaired glucose tolerance

WHO 94393

Source: World Health Organisation 1994

Primary prevention aims to reduce or even eliminate disease incidence in whole populations. In the case of non-communicable diseases such as diabetes mellitus, cardiovascular disease and cancer, the current recommended strategies include individual and community efforts aimed at improving nutritional status, enhancing physical activity and maximising environmental safety. Integrated community-based interventions aimed at improving recognised social and behavioural health hazards are presently believed to have the greatest potential for the primary prevention of major non-communicable diseases, including diabetes (King & Dowd 1990).

Unless otherwise stated, this report refers to Type 2 diabetes.

2.0 OBJECTIVES

The objectives of this project were to provide a report addressing the following Terms of Reference:

- The trends in the prevalence of risk factors associated with the onset of Type 2 diabetes both in Western Australia and nationally, including explanations for the trends where these are known.

Risk factors examined included

- Demographic determinants;
- Sex;
- Age; and
- Ethnicity (including indigenous Australians).

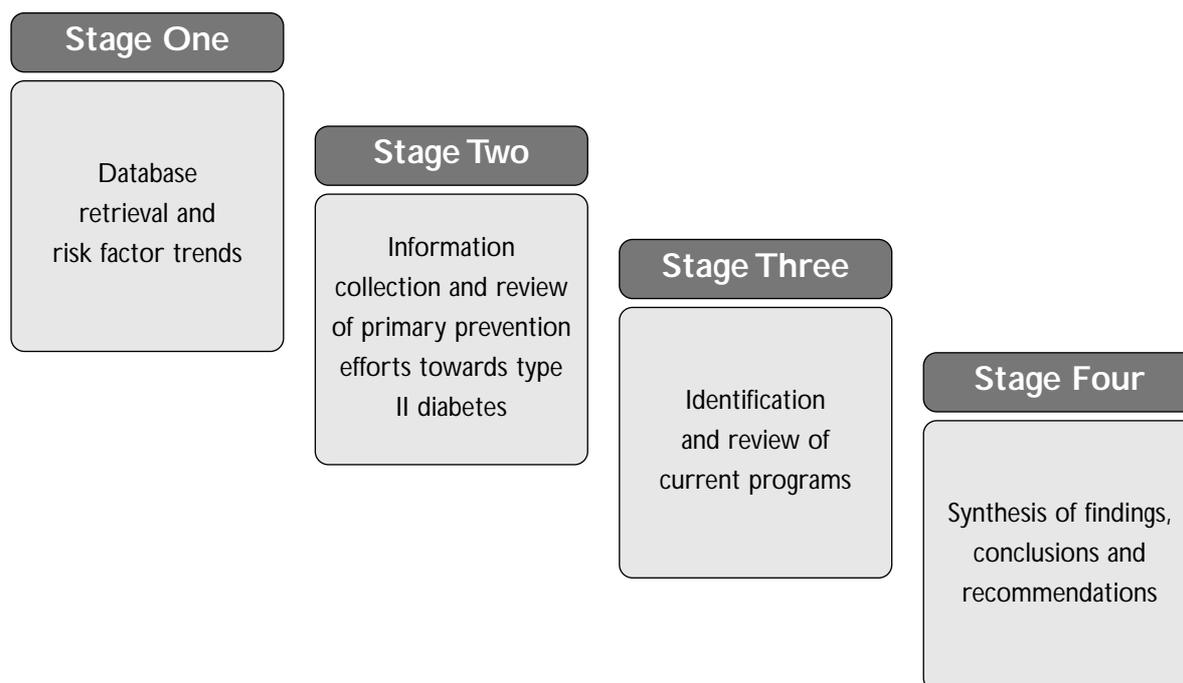
Behavioural and lifestyle-related risk factors included

- Obesity (particularly central obesity);
- Physical inactivity;
- Poor Diet (that can result in obesity);
- Hypertension; and
- Dyslipidaemia.

- The effectiveness of interventions that have been used to reduce the prevalence or level of the known risk factors for diabetes, including interventions applied to populations, small groups and individuals.
- Activities currently being undertaken by national and Western Australian organisations (Government and non-Government) which contribute to the primary prevention of Type 2 diabetes, to identify gaps in current programs and suggest options for improvement. This included conducting a Statewide survey and encompassed organisations for ethnic and indigenous peoples.

3.0 METHODOLOGY

The following four-stage methodology was used to satisfy the objectives of this project.



3.1 Stage one

3.1.1 Objective 1:

To identify the prevalence and trends of risk factors associated with the onset of Type 2 diabetes both in Western Australia and nationally. This included analysis of trends.

This stage consisted of two parts. Firstly the identification and retrieval of all relevant Statewide and national data sources (published and unpublished data, reports, papers) relating to risk factors associated with Type 2 diabetes was conducted. Information sources included computer literature searches using databases such as Medline and Eric and reports from the Australian Bureau of Statistics, Divisions of General Practice, Health Departments, Australian Institute of Health and Welfare and the Commonwealth Department of Health and Aged Care. Statewide telephone surveys or interviews and meetings were conducted with all Public Health Units, Aboriginal Medical Services, Community Health Units, Diabetes Australia, National Heart Foundation and Divisions of General Practice. The second part involved collating the information to develop an understanding of the status of known risk factors for Type 2 diabetes. At the completion of this stage, information on areas (locations) where associated Type 2 diabetes risk factors and subgroups in the population where these risk factors were most prevalent was identified.

3.2 Stage two

3.2.1 Objective 2

To identify the effectiveness of interventions that have been used to reduce the prevalence or level of the known risk factors for diabetes, including interventions applied to populations, small groups and individuals.

This stage was achieved in three steps, described below.

3.2.2 Step 1

3.2.2.1 Identify all relevant published literature

In order to assemble published articles, library database searches were conducted in medical and health care fields for relevant papers and reports. A database of all relevant published data was created in hardcopy and Endnote reference software.

Studies identified in the literature were classified and summarised according to a set of criteria which included:

- Design of the study (randomised controlled trials, population surveys, case-control studies);
- Type of study (medical vs behavioural prescription);
- Size of the study (sample size);
- Methodology;
- Significance/power of the results;
- Generalisability of results;
- Research population;
- Setting;
- Limitations and potential biases;
- Outcomes;
- Findings; and
- Interpretation of differences between studies.

The following databases were used:

- Medline;
- Eric;
- Current Contents.

Searches used several key words individually and in combination in the title index. These included:

- Diabetes (Type 2);
- Cardiovascular health;
- Prevention;
- Primary prevention;
- Exercise/physical activities;
- Diet/Nutrition;
- Breastfeeding;
- Tobacco; and
- Hypertension/blood pressure.

3.2.3 Step 2

3.2.3.1 Access available to published and unpublished reports

A collection of published and unpublished reports and communications from the following organisations were accessed via a search of each organisation's web page for publications, literature searches within the above mentioned databases, telephone conversations with the appropriate personnel and through meetings with personnel from some of these organisations, including:

- Health Department of Western Australia;
- Diabetes Australia (including State branches);
- National Heart Foundation of Australia;
- Regional Public Health Units;
- Divisions of General Practice;
- Local, National and International University Public Health Departments;
- Department of Sport and Recreation;
- Department of Health and Aged Care.

Information regarding previous and current primary prevention Type 2 diabetes interventions were also accessed via information obtained from the database of literature as well as from searches in program-specific databases such as the Health Education and Promotion System (HEAPS).

3.2.4 Step 3

To increase the scope of the information collected in published and unpublished forms, a series of informal interviews (telephone and face-to-face) with health promotion professionals identified within an organisation or identified by another health agency in stage 2, was conducted. This ensured that comprehensive information relating to primary prevention of Type 2 diabetes was collected. Furthermore, interviews provided qualitative information to lend support to the findings from the literature.

In addition to collecting information relating to unpublished information, the interviews also discussed any evaluation results, and where possible their implications for future primary intervention programs. Every Public Health Unit in Western Australia was contacted by telephone and informed about the project. Where possible, research staff interviewed the Director of the Health Unit, otherwise they spoke to a staff member who worked in the area of Type 2 diabetes prevention and/or healthy lifestyle. From this initial contact, staff were asked to nominate colleagues who could contribute to the review, otherwise known as a snow-ball recruitment procedure. This process increases the efficiency of recruitment and is ideal in a well-defined subject area.

A total of 70 people from all regions of Western Australia and other Australian States and territories working in the area of Type 2 diabetes prevention and/or healthy lifestyle, were interviewed either over the telephone or through a meeting. This number was required to ensure a representative response from all minority groups, especially remote Aboriginal populations.

3.3 Stage Three

3.3.1 Objective 3

To identify activities currently being undertaken by national and Western Australian organisations (Government and non-Government) which contribute to the primary prevention of Type 2 diabetes, identify gaps in current programs and suggest options for improvement. This included a Statewide survey and also included organisations for ethnic and indigenous peoples.

3.3.1.1 Survey of health-related agencies

In order to identify Type 2 diabetes primary prevention activities currently being undertaken by national and Western Australian Government and non-Government organisations, all agencies identified in the achievement of objectives one and two of this project, formed the study cohort.

This study involved a telephone survey of the CEO or appropriate executive officer of each organisation. Respondents were asked for details of any Type 2 diabetes primary prevention programs that their organisation was currently conducting. The organisations contacted for Western Australian programs included:

- Public Health Units;
- Community Health Units;
- Aboriginal Medical Services;
- Regional Hospitals;
- Diabetes Australia Western Australia;
- National Heart Foundation WA;
- Department of Sport and Recreation; and
- Health Department of WA.

The organisations that were contacted regarding national Type 2 diabetes primary prevention programs were:

- Diabetes Australia;
- The Centre for Research and Clinical Policy in New South Wales;
- Department of Human Services (Victoria);
- VicHealth;
- Queensland Health;
- Tropical Public Health Unit Network (Cairns);
- Health Promotion South Australia – Department of Human Services;
- Diabetes Outreach Service (SA);
- Mid North Regional Health Service (SA);
- Diabetes Australia (ACT);
- Territory Health Services;
- National Heart Foundation (NT);
- Tasmanian Health Promotion Council; and
- Tasmania Department of Health and Human Services.

The information sought included the aims and objectives of the primary prevention program, the intended target audience, its duration, available resources, funding agencies (where relevant) and any evaluation conducted. Further clarification of information sought was derived from the findings in objective one and two of this study.

In addition to requesting information relating to the activities of their organisation, CEO's or appropriate executives were asked if they were aware of any primary prevention activities being conducted by other organisations. This information was used to cross-reference the list of organisations in the telephone survey interview and updated when additional organisations were identified as potentially involved in primary prevention programs for Type 2 diabetes. This process ensured a comprehensive coverage of all relevant programs currently conducted nationally and in Western Australia.

3.4 Stage Four

The final stage of this project involved synthesis of the information collected in the first three stages of this project. This involved the demographic characteristics of Type 2 diabetes patients, and the known risk factors associated with the disease. Information from stage two formed the theoretical and best practice guidelines for primary prevention programs, and how different population groups and risk factors should be addressed, in what order and by whom. Stage three formalised the current national and Western Australian activities related to primary preventive programs for Type 2 diabetes. When the current primary preventive activities are stratified by population and risk factor groups and considered with best practice guidelines, the final component of the report was able to identify the gaps in the current programs and provide clear options for improvement or additional services.

4.0 RISK FACTORS FOR DIABETES TYPE 2 AND INTERVENTIONS TO REDUCE THESE

A literature search was conducted of databases such as Medline and Eric using the keywords, Type 2 diabetes, prevention, primary prevention, physical activity/exercise, diet, overweight/obesity, tobacco smoking, hypertension/high blood pressure, and cardiovascular disease risk factors. The following is an overview of the primary prevention and risk factors for Type 2 diabetes.

The strongest predisposing factors for Type 2 diabetes are obesity and a family history of diabetes (Helmrich et al. 1991). In addition, many of the risk factors for the development of Type 2 diabetes are similar to those for the development of cardiovascular disease. (Standl 1999) Therefore, successful prevention programs for Type 2 diabetes most commonly promote a balanced diet, a healthy weight and regular physical activity (Helmrich et al. 1991; Eriksson & Lindgarde 1991). Improved diet and exercise behaviours are also associated with reductions in risks associated with other chronic diseases such as cardiovascular disease and cancer. Preventive programs that place an emphasis on life-style changes (diet and exercise) hold the greatest potential for reducing the burden of these diseases in the future (Eriksson & Lindgarde 1991; King & Dowd 1990).

Interventions aimed at modifying these risk factors began in the 1960s using a medical model approach that focused on the identification and treatment of high-risk individuals (Susser 1994). Even though this approach was effective at the individual level and raised the awareness of risk factors among health practitioners and the general public, it had little impact on the social factors that influenced diabetes and cardiovascular disease risk (Susser 1994). A primary prevention health model that attempted to change the distribution of risk factors at the community level was considered the best approach (Susser 1994). While limited short-term studies addressing one or more of the risk factors for Type 2 diabetes have shown that it is possible to prevent the disease on the individual level, (Bjaras et al. 1997) there is limited data demonstrating the effectiveness of population-based interventions in the prevention of Type 2 diabetes. However, despite cardiovascular disease prevention programs having had a small positive influence on addressing lifestyle risk factors over a 20-year period, in general the population is still gaining weight and exercising less.

4.0.1 *Prevention of Cardiovascular Disease and Type 2 Diabetes*

Cardiovascular disease risk factors are present with greater frequency in diabetic subjects than those with normal vascular glucose tolerance. The inter-dependence of cardiovascular risk factors in the general population in both the USA and Finland has been advanced in support of the population approach to the prevention of cardiovascular disease. Invoking the same argument, the high frequency and degree of coexistence of cardiovascular disease risk factors in diabetic subjects may indicate merit in an intensified approach to the primary prevention of

cardiovascular disease in populations at high risk of diabetes (King & Dowd 1990). This is because the primary prevention of both cardiovascular disease and Type 2 diabetes involves an improved diet, weight management and regular exercise (Standl1999). The link between these two diseases becomes evident from the underlying predisposing factors associated with the development of Type 2 diabetes.

4.0.2 Primary Risk Factors

Primary prevention programs addressing risk factors associated with Type 2 diabetes have been conducted in a wide variety of settings in different population groups. Most programs aimed to reduce the risk of cardiovascular disease, rather than Type 2 diabetes. Given the substantial evidence that Type 2 diabetes, is predominantly a lifestyle disease and that interventions to address obesity and sedentary lifestyles can reduce the incidence of Type 2 diabetes it is appropriate to consider cardiovascular disease programs that address these issues. However, for obesity, diet and exercise, nothing short of dedicated motivation is likely to lead to a permanent change in behaviour (King & Dowd 1990).

The primary prevention of Type 2 diabetes can occur at the individual, group or community level and may include structural or environmental change. While greater success in behaviour change has been associated with programs designed for individuals, it has proven difficult to detect truly at-risk individuals (Borch-Johnsen 1999), and has had a limited impact on the behaviour of the community. Furthermore, patient knowledge of risk does not automatically lead to behavioural changes. Programs that targeted the whole population initially focused on one risk factor. The effect of these campaigns was often disappointing, probably because they were so broad that they were not relevant to the individual. Subsequent community-based programs have considered a multifactorial risk factor approach, as well as community empowerment and changes in the environment which both promote and sustain health-related behaviours.

4.1 Demographic Risk Factors

A number of demographic factors have been identified as high risk for the development of Type 2 diabetes. These include gender, increasing age and ethnicity, (especially indigenous Australians and migrant populations from Southern Europe, Asia, Arabia, India or the Pacific Islands) (Commonwealth Department of Health and Aged Care & Australian Institute of Health and Welfare 1999 & Health Department of WA 1999).

4.1.1 Gender

Data from a Western Australian survey reported no significant gender difference when comparing the overall prevalence of Type 2 diabetes (Milligan & Daly 1996). However, in people under 50 years, a significantly higher percentage of females have diabetes (Milligan & Daly 1996).

According to the 1994 National Aboriginal and Torres Strait Islander Survey, the prevalence of Type 2 diabetes is almost 30% higher among indigenous females than among indigenous males. The prevalence of Type 2 diabetes in women from culturally and linguistically diverse populations has also been found to be higher than in their male counterparts (Commonwealth Department of Health and Aged Care & Australian Institute of Health and Welfare 1999).

4.1.2 Age

Increasing age has been consistently observed as a major risk factor for the development of Type 2 diabetes (Commonwealth Department of Health and Aged Care & Australian Institute of Health and Welfare 1999). Approximately 10% of the Australian population over 65 years of age have Type 2 diabetes, compared with 3% for the overall population (Commonwealth Department of Health and Aged Care & Australian Institute of Health and Welfare 1999). In 1995, the percentage of Western Australians aged 50 years and over with diabetes was significantly higher than that of people aged under 50 years (Milligan & Daly 1996). Given that Australia's population is ageing, the burden of Type 2 diabetes is expected to rise (Commonwealth Department of Health and Aged Care & Australian Institute of Health and Welfare 1999).

4.1.3 Ethnicity *(Indigenous and Culturally and Linguistically Diverse Populations)*

Even though Type 2 diabetes is strongly familial, the high prevalence in migrant populations and populations experiencing rapid adaptation to a westernised lifestyle (low physical activity, high fat/low fibre diets) strongly suggests that environmental and behavioural factors expose the disease to varying degrees, dependent on genetic susceptibility (de Courten et al. 1998).

4.2 Predisposing Risk Factors

4.2.1 Genetics

The development of Type 2 diabetes has been shown to have a strong genetic component, based on twin and family studies (Commonwealth Department of Health and Aged Care & Australian Institute of Health and Welfare 1999 & World Health Organisation 1994). However, as previously mentioned, it appears that the development of Type 2 diabetes is the consequence of an interaction between genetic susceptibility and exposure to environmental factors (World Health Organisation 1994).

4.3 *Behavioural/Lifestyle Risk Factors*

Several lifestyle behaviours and conditions have been identified as major risk factors for the development of Type 2 diabetes. These include physical inactivity, overweight/obesity (especially centrally distributed body fat), dietary habits (especially high fat, low fibre diets), not being breastfed as a child, cigarette smoking and hypertension (Commonwealth Department of Health and Aged Care & Australian Institute of Health and Welfare 1999 & Colagiuri, Colagiuri & Ward 1998).

4.3.1 *Physical Inactivity*

The US Surgeon General's report on physical activity and health (U.S. Department of Health and Human Services, 1996) recommended 'that 30 minutes of physical activity at a moderate intensity be carried out on most days if not all days of the week to obtain a health benefit. Moderate physical activities include brisk walking, swimming, jogging, digging in the garden and cycling.'

Increasing physical activity levels in the community is a single intervention which would help to reduce the risk of multiple diseases including diabetes (McCarty et al. 1996). 'Regular physical activity is important in the maintenance of good health, and prevention of many health conditions including ischaemic heart disease, hypertension, diabetes, osteoporosis and obesity' (Australian Bureau of Statistics 1999b). Increased physical activity is effective in preventing Type 2 diabetes. It has been demonstrated that the protective effect of physical activity on the development of Type 2 diabetes is due to the increase in insulin sensitivity, improvement in glucose tolerance and the reduction of central obesity (Helmrich et al. 1991; National Diabetes Data Group, National Institute of Health & Diseases. 1995; McCarty et al. 1996; World Health Organisation 1994 & Sallis & Owen 1999). This is partly because active muscles use glucose as fuel (Sallis & Owen 1999).

Cross-sectional studies have shown that least active individuals have two to four times the prevalence of Type 2 diabetes compared with the most active people. This finding appears to hold across a large number of ethnic groups (McCarty et al. 1996; World Health Organisation 1994). Adjusting for other risk factors, people who undertake regular exercise have a 30-60 per cent lower risk of developing diabetes than those who do not, though the effect has been found to be somewhat weaker in females and in those who are not overweight (Commonwealth Department of Health and Aged Care & Australian Institute of Health and Welfare 1999 & Milligan et al. 1998).

Physical activity is part of the accepted treatment mechanism for Type 2 diabetes along with dietary changes and weight loss. According to Sallis & Owen (1999), pg 27 'physical activity is sometimes said to be as effective in reducing blood glucose levels as a dose of insulin and physical activity has a particular important role to play in long-term weight management.'

4.3.2 Overweight/Obesity (including distribution)

The 1985 WHO Study Group on Diabetes named obesity as the single most important risk factor in the development of Type 2 diabetes (World Health Organisation 1985). In addition to the degree of obesity, the location of body fat is also a strong risk factor for Type 2 diabetes. Centralised body fat (referred to as abdominal, upper body, truncal, or central obesity) independent of general obesity, has been shown to increase the risk of Type 2 diabetes in both cross-sectional and prospective studies (de Courten et al. 1998; National Diabetes Data Group, National Institute of Health & Diseases. 1995; McCarty et al. 1996; Ohlson et al. 1985; National Health and Medical Research Council (NHMRC) 1996 & World Health Organisation 1994).

Overweight and obesity are risk factors for many health conditions including Type 2 diabetes. Obesity has been implicated as a major contributing factor in the development of Type 2 diabetes (Australian Bureau of Statistics 1998; McGrath et al. 1991). The risk of developing Type 2 diabetes is approximately 5-10 times greater in those classified as obese than among people with an acceptable weight (Commonwealth Department of Health and Aged Care & Australian Institute of Health and Welfare 1999). Body mass index (BMI) is the most common method used when assessing levels of overweight or obesity in the population. BMI is calculated by weight in kilograms divided by height in metres squared (Australian Institute of Health and Welfare & National Heart Foundation of Australia 1999). The National Guidelines suggest a BMI of 25 or greater indicates overweight and over 30 indicates obesity. This report is consistent with these guidelines. Lifestyle changes in the Australian population show an increase in obesity and overweight, which in turn has led to an increased risk of conditions related to obesity, such as Type 2 diabetes (McGrath et al. 1991).

Metabolic studies have shown that obesity is accompanied by a reduced number of insulin receptors as well as insulin resistance. This alteration in glucose metabolism is reversible with weight loss (Cassano et al. 1992 & Chan et al. 1994). Among those who are overweight, weight loss reduces the incidence and severity of Type 2 diabetes (Australian Institute of Health and Welfare & National Heart Foundation of Australia 1999). Long et al, (1994) also found that 'weight loss prevents the development of Type 2 diabetes in an extremely high-risk population for the disease.' Due to these findings, Chan et al, (1994) states that, 'public health recommendations should primarily emphasise the prevention of overall obesity to reduce the occurrence of Type 2 diabetes.'

4.3.3 Dietary Habits (including breastfeeding)

Food and nutrition have long been identified as fundamental contributors to health (Australian Bureau of Statistics 1999a & Milligan, Daly & Codde 1997h). Nutrition or diet is associated with several conditions and diseases such as diabetes, heart disease, stroke, high blood pressure, high cholesterol levels, antioxidant levels, overweight and some cancers (Australian Institute of Health and Welfare & National Heart Foundation of Australia 1999).

Both laboratory and epidemiological studies suggest that an increased dietary intake of refined carbohydrates, saturated fats and decreased intake of dietary fibre can result in obesity, decreased insulin sensitivity and abnormal glucose tolerance, which in turn can lead to Type 2 diabetes (McCarty et al. 1996; World Health Organisation 1994). Two cohort studies which examined the relationship between dietary intake and the development of Type 2 diabetes reported diets with a high glycaemic load and a low cereal fibre content, were associated with a two to three-fold increase in the risk of developing Type 2 diabetes (Colagiuri, Colagiuri & Ward 1998).

'Recently breast feeding has also been proposed as a possible factor in preventing the development of Type 2 diabetes' (Colagiuri, Colagiuri & Ward 1998). Explanations for this focus on differences in energy intake between bottle and breastfed infants (de Courten et al. 1998). The amount of energy metabolised and the protein intake of breastfed children is significantly below the intake of infants who are fed formulas (von Kries et al. 1999). According to de Courten, (1998) pg 60 'breastfeeding leads to a caloric intake more suited to the child's needs during a critical stage in development, whereas it is suggested that bottle-feeding might lead more often to overfeeding and overweight and this may worsen the insulin resistance and obesity encountered in adolescents and young adults'. Von Kries et al, (1999) reported that 'data from a cross-sectional study in Bavaria suggest that the risk of obesity in children at the time of school entry can be reduced by breastfeeding: a 35% reduction occurs if children are breastfed for 3 to 5 months.'

4.3.4 Cigarette Smoking

Recent studies have shown that cigarette smoking is a significant, modifiable independent risk factor for Type 2 diabetes (Colagiuri, Colagiuri & Ward 1998). A cohort study of Japanese male employees (Kawakami et al. 1997) found that 'the population attributable risk percentage for current smoking was greater than the percentages for obesity, leisure time physical activity, alcohol drinking and family history of diabetes.'

There is also a dose-response relationship between smoking and the risk of Type 2 diabetes. Studies have shown that those who smoke more than 20-25 cigarettes a day have approximately two to three-times higher risk of developing Type 2 diabetes. However, this risk can be reduced by quitting, as there is a time dependent decrease in the risk of Type 2 diabetes for those who quit smoking (Mikhailidis, Papadakis & Ganotakis 1998 & Colagiuri, Colagiuri & Ward 1998).

4.3.5 Hypertension

'High blood pressure and diabetes often occur together' (Commonwealth Department of Health and Aged Care & Australian Institute of Health and Welfare 1999, pg 41). In all age groups, blood pressure is found to be higher in people with Type 2 diabetes (National Diabetes Data Group, National Institute of Health & Diseases 1995). Several critical risk factors are shared by Type 2 diabetes and hypertension, including dietary fat, physical inactivity, and upper body

obesity. Dietary and metabolic factors related to this are probably linked to insulin resistance (National Diabetes Data Group, National Institute of Health & Diseases 1995).

According to the Commonwealth Department of Health and Aged Care and the Australian Institute of Health and Welfare, (1999) pg 132, 'high blood pressure is known to be associated with diabetes, presenting often with central obesity and dyslipidaemia. High blood pressure may be a risk factor for diabetes and could be present for up to 10 years before the detection of diabetes. The evidence is accumulating that the two may have a common aetiological factor.'

4.4 Approaches to the prevention of Type 2 diabetes

4.41 Overview

Prevention of diabetes can be considered at three different levels. Primary prevention covers activities aimed at preventing diabetes from occurring. Secondary prevention is aimed at early diagnosis and effective control of diabetes in order to avoid or delay progress of the already existing disease (Commonwealth Department of Health and Aged Care & Australian Institute of Health and Welfare 1999). Tertiary prevention includes those measures undertaken to prevent complications and disability due to diabetes. In primary prevention there are two major approaches to implementing strategies: the population-based approach and the high-risk approach. The population-based approach aims to improve risk factor levels in the population as a whole, whereas the high-risk approach targets interventions at individuals and populations at higher risk and then aims to reduce that risk (Commonwealth Department of Health and Aged Care & Australian Institute of Health and Welfare 1999). Those with impaired glucose tolerance are at high risk of developing Type 2 diabetes, and form the primary group for the high-risk approach. Certain groups are also at higher risk of developing diabetes, either due to clinical reasons, such as pregnant women, or for socially disadvantaged reasons, such as indigenous Australians and people from various CALD migrant groups (Commonwealth Department of Health and Aged Care & Australian Institute of Health and Welfare 1999).

As the risk factors for Type 2 diabetes and cardiovascular disease (CVD) are similar, examination of programs related to the prevalence of obesity, diet and physical exercise should include those targeted at both conditions. However, differences in how these risk factors are presented within program messages and strategies, especially with respect to the perception of disease risk and health benefits for participation within the target population, should be considered. The community and individuals may be motivated more by CVD risk reduction than Type 2 diabetes prevention, although similar behaviour changes are required. Therefore, CVD programs that successfully modify the behaviour of the target group may not always apply to Type 2 diabetes prevention programs. In addition, most CVD-based interventions do not measure glucose tolerance or insulin resistance as part of their evaluation and therefore, the benefits of the program on Type 2 diabetes can only be estimated as a result of improved weight control, diet and exercise levels. Nevertheless, there are valuable lessons to be learnt from CVD-based primary prevention programs aimed at modifying the behaviours associated with Type 2

diabetes. In a review of the cost-effectiveness of the primary prevention of Type 2 diabetes, Segal et al (1996) suggested that the prevention of Type 2 diabetes, through appropriate interventions could represent a highly efficient use of the community's resources. Programs for the prevention of Type 2 diabetes can achieve a substantial improvement in health status at little cost, or even with a potential net saving in the utilisation of health care resources.

4.4.2 Strategies to Prevent Type 2 Diabetes

4.4.2.1 Community/population-based interventions

The community approach is considered the most likely to have the greatest impact on risk reduction amongst people with Type 2 diabetes. According to Harris, (1998) 'greater benefits are accrued by targeting the total population with an integrated program rather than attempting to screen and treat high-risk individuals.' The Commonwealth Department of Health and Aged Care & Australian Institute of Health and Welfare, (1999) reviewed the status of primary prevention of diabetes and concluded that there was limited data demonstrating the effectiveness of population-based interventions in the prevention of Type 2 diabetes. In addition, the effectiveness of very few community-based primary prevention programs for Type 2 diabetes have been evaluated.

The most commonly cited is a six-year study of the prevention of Type 2 diabetes mellitus by a diet and physical exercise intervention (Eriksson & Lindgarde 1991). This feasibility study offered intervention subjects dietary and exercise advice for between six and 60 months, or a self-directed program. The program successfully maintained 90% of subjects for a five-year period with improvements in the level of physical activity and weight control observed amongst both intervention group subjects.

More recently, a randomised control trial in China with impaired glucose tolerance patients, reported that progression to diabetes over six years, was reduced by 31% through dietary interventions and by 46% through exercise (Pan et al. 1997). Using a population approach, Bjaras (1997), reported on the development of a community-based diabetes primary prevention program in Sweden. The program used a staged approach to achieve its objectives, and was based upon Sanderson's model of management of intervention program preparation (MMIPP), which recognises that several types of program activities can take place concurrently, but that certain features depend on the completion of previous steps (Sanderson, Svanstrom & Eriksson 1988). The main strategy used is community intervention. The traditional type of community intervention involves a comprehensive approach focusing on the entire community. The objective is to create a supportive environment for interventions. On this level, local taskforces and local project leaders are important when the networks for changes of a healthy lifestyle are going to be built up. Voluntary organisations, organisers of physical activity, purveyors of food, and employers need to be involved in order to implement strategies relating to dietary change, weight reduction and physical activity. (Sanderson, Svanstrom & Eriksson 1988).

4.4.2.2 Small group-based interventions

The Kahnawake schools diabetes prevention project was presented by Macaulay, (1997) who rationalised that lifestyles associated with chronic diseases such as Type 2 diabetes are learned early in life and are well ingrained by adulthood. The project incorporates the concepts of social learning theory and behaviour change theory into its three-year community-based, primary prevention program for non-insulin dependent diabetes mellitus in a Mohawk community near Montreal, Canada. The school-based health education program was reinforced by school events, a new community advisory board, a recreation path and community-based activities promoting healthy lifestyles. While a comparison group was not included, results from the trial indicated positive outcomes for those who participated in the program (Macaulay et al. 1997).

Another school-based primary prevention program is the Zuni Diabetes Prevention Program in Western New Mexico (Teufel & Ritenbaugh 1998). The program aims to enhance knowledge of diabetes and to support increased physical activity, increased fruit and vegetable intake and reduced soft-drink consumption among Zuni high school-aged youths. Preliminary mid-project results suggest that 'using an insidious and pervasive intervention model can result in physiological and behavioural change. Within two years of the intervention, Zuni high school students had decreased their BMI, decreased consumption of sugared beverages, increased consumption of dietary fibre, decreased sitting pulse rates and increased glucose/insulin ratios' (Teufel & Ritenbaugh 1998).

4.4.2.3 Individual-based interventions

Polley et al, (1997) investigated health beliefs and the effect they have on weight loss in individuals at high risk for Type 2 diabetes. It was suggested that high-risk individuals could be motivated to take preventive action by education efforts aimed at modifying their health beliefs, however this study found that 'health beliefs did not predict attendance, dietary intake, weight loss or fasting glucose levels at any point in a two year behavioural weight loss program'. It was recommended that further research is needed to examine what factors will increase the likelihood that high-risk individuals will take preventive action to lower their risk (Polley et al. 1997).

4.4.3 Cardiovascular-Based Campaigns

While limited interventions on the prevention of Type 2 diabetes exist, primary prevention programs aimed at cardiovascular disease through lifestyle modification have been conducted. As part of this review, programs aiming to prevent cardiovascular disease are considered, as exercise and diet risk factors are similar to Type 2 diabetes prevention.

4.4.3.1 Community-based interventions

Various large-scale community campaigns to promote physical activity have been conducted over the past three decades (Marcus et al. 1998). An early review of these programs and other

community-wide programs to promote exercise, reached the conclusion that the provision of a variety of physical activity facilities by various community organisations does enable people to be more active. Amongst various strategies, mass media appeared to be successful in promoting awareness and interest in exercise, but has not been shown to be significant in actually changing exercise behaviour (Iverson et al. 1985).

Contemporary primary prevention programs emphasise the move from inactivity to moderate levels of daily activity for 30 minutes or more. This level of physical activity is considered to hold the greatest improvement in cardiovascular disease risk reduction for currently inactive people (Sallis & Owen 1999).

4.4.3.2 Individual-based interventions

Individual methods of health promotion are usually associated with either secondary or tertiary prevention. One-to-one strategies are not as appropriate in the area of primary prevention because of the cost-effectiveness among large target audiences, many of whom may never develop the specific disease. Dishman & Buckworth (1996) published a meta analysis review of 127 individually focused primary prevention physical activity studies. Sallis & Owen (1999) summarised these findings and concluded that behaviour modification interventions were most effective when compared with cognitive behavioural modification, health education, risk appraisal and physical education curriculum programs. In addition, mediated programs were more effective than face-to-face or combination programs. Physical activity programs that increased activity during leisure time of low to moderate intensity, in general community settings and unsupervised, had the most positive effect on exercise behaviour. Programs that related to strength training and specific aerobic instruction were least effective. Successful programs were associated with mixed ages, group programs and healthy study participants (Sallis & Owen 1999). Health programs that offer participants fitness and health-risk testing alone are likely to have a short-term effect on behaviour at best.

4.4.3.3 Social marketing theory

At the heart of community interventions is an understanding of the processes of social behaviour. Social marketing is a program planning process which promotes voluntary behaviour change, based upon offering benefits people want, reducing barriers people face and using persuasion and not just information (Egger et al. 1999). Walking is the activity that has been promoted most heavily, with social cognitive and social marketing theories used to guide design and delivery of most campaigns (Sallis & Owen 1999).

4.4.3.4 Mass media strategies

Most commonly, multiple media channels, including television, radio, public service announcements, print materials, health screenings, and community events are used for physical activity interventions (Marcus et al. 1998). Mass media studies often find that recall of messages tends to be quite high, around 70%, indicating at least a basic communication of the message (Booth et al. 1992). The ability of mass media campaigns to influence behaviour remains

debatable. However, using strategies that target segments of the population increases the efficacy of the intervention (Marcus et al. 1998). Process evaluation of the Minnesota Heart Health Program revealed that community events were more likely to attract participants when they were held within existing organisations such as worksites (Crow et al. 1986). Social marketing and mass media are powerful tools in health promotion, being most effective when combined as part of a strategy of behaviour change (Egger et al. 1999).

4.4.3.5 Interventions with sub-groups

Cardiovascular prevention programs have also concentrated on different sections of the community (Baranowski, Anderson & Carmack 1998). Youth, for example, have been targeted, usually at school with most programs introducing new curricula or activities into schools. While knowledge and attitude changes towards physical activity has been observed to increase and participation in school physical activity is positively influenced, very few studies have shown an increase in physical activity participation outside school (Rosenberg et al. 1996). There is some evidence to suggest that longer-term participation in out-of-school exercise can be achieved through school-based programs, that encourage sport and recreation club participation amongst students (Rosenberg et al. 1996). Only about 50% of adults without heart disease who begin an exercise program will maintain participation in the program beyond three months (King, Rejeski & Buchner 1998). People who are 50 years of age and older represent the most sedentary group in the population (King, Rejeski & Buchner 1998).

A number of studies have looked at the benefits of weight loss on cardiovascular disease, especially in obese and severely obese people. Golan, (1999) investigated two behavioural approaches for the treatment of childhood obesity on parental weight, eating and activity habits, as well as risk factors for cardiovascular disease. The study compared family-based approaches using the parents as agents of change to treat childhood obesity with weight reduction programs targeting only children. The study found that 'treatment of childhood obesity using a cognitive behavioural intervention in six to 11-year-old children is more effective when parents are the exclusive agents of change compared to approaching children directly' (Golan, Weizman & Fainaru 1999). In another study, a 'ten-year follow-up of behavioural family-based treatment for obese children showed that when both children and parents were targeted for weight loss, a significantly greater decrease in children's percentage of overweight was noted after five and 10 years, while children in the child-only group showed increases in percentage of overweight after five and 10 years' (Epstein, Valoski & Wing 1990).

Another obesity control program investigated by Sjoström et al, (1999) tested the short and long-term effectiveness of a four-week residential program for primary health care patients to control obesity and related risk factors for cardiovascular disease. Patients were recruited during a 10-year period. The program was found to be effective in both the short term (measured at four weeks and 12 months) and in the long term (measured after five years). The study also illustrated an effective application of the Precede-Proceed model of health promotion planning (Sjoström et al. 1999).

Other weight-loss programs have reported that participants initially lose weight but when followed up after a period of time they generally regain their weight to baseline levels or may even exceed initial baseline levels. For example, Wing et al, (1998) assessed the effect of lifestyle intervention over two years on changes in weight, coronary heart disease risk factors and incidence of diabetes in overweight individuals with a parental history of diabetes. It was reported that 'the effectiveness of interventions and the differences among the interventions deteriorated after six months, such that by one year the only physiological difference among conditions was in weight loss, and by two years, all physiological parameters had returned to or exceeded baseline levels' (Wing et al. 1998).

4.4.4 Nutrition programs in the treatment of obesity

The prevention and treatment of obesity is crucial to prevent, delay the onset of and treat Type 2 diabetes, with high BMI and large waist circumference being strongly associated with the development of the disease (Falkenberg 1999). It is estimated that about one quarter of all Australian men are trying to lose weight. Despite this, Williamsen, (1999) reports that no randomised controlled studies of intentional weight loss and mortality have been conducted in either men or women. Similarly Coultson, (1998) reported that despite our understanding of the physiology of weight loss, few weight loss plans have demonstrated significant success in weight management beyond six and 12 months. Amongst more successful weight loss programs, a common component is lifestyle or long-term behaviour change that incorporates a physical activity component. In a contrasting argument, Oster, (1999) proposes that it is genetic factors that determine obesity and complex biochemical systems that tend to maintain body weight, and the condition should be treated as a chronic disease, rather than a consequence of lifestyle choices.

4.4.4.1 Behavioural self-control treatments

The early pioneering studies on behavioural self-control treatments for overweight and obesity concentrated exclusively on attempting to modify eating habits (Ferster, Nurnberger & Levitt 1962). Therefore, the major treatment components were self-monitoring, stimulus control and behavioural practice (Brodie & Slade 1990). These approaches were found to be effective by comparison with other widely available treatments, such as drug treatments, particularly in the long term (Brodie & Slade 1990). However, in recent years, the limitations of behaviour therapy for obesity have become increasingly apparent (Perri 1989). Weight loss accomplished during treatment is usually modest, and few participants attain goals or desired weights (Wadden 1994). After treatment, participants often abandon behavioural techniques and by the time of long-term follow-up, many have regained much of the weight they lost in treatment. Oster, (1999), also reported that 'intervention studies suggest that patients can achieve a 10% weight loss with a reduced calorie diet, exercise, behavioural modification, pharmacological therapy, or programs that combine more than one of these approaches. Relatively few patients however, seem to be able to maintain their reduced weight over time'. 'Weight loss attempts appear to increase the risk of long-term major weight gain in adults' (Korkeila et al. 1999).

4.4.4.2 *Very low-caloric diets*

The introduction of the very low-caloric diet that results in relatively large initial weight losses averaging 15 to 20kg in 12 weeks raised hopes that an effective treatment was available for the moderately and severely obese (Agras 1996). Unfortunately, weight gain following this treatment occurs in almost all cases, and is as much as 50% of the initial weight loss within the first 12 months (Agras 1996). Furthermore, repeated episodes of weight loss followed by regain may be damaging to the physiological and psychological well being of obese individuals (Venditti 1996). Physiologically, the pattern of weight cycling, has been associated with increased food efficiencies for subsequent attempts, resulting in weight loss rates decreasing and weight regain increasing throughout these cycles (Foreyt 1987). Psychologically, weight cycling has been associated with emotional and cognitive distress, disturbance in self concept, and more specifically, lower self efficacy in eating situations, as well as dysfunctional eating behaviour and binge-eating disorder (Venditti 1996). In particular, binge eating has been the most consistent psychological consequence of weight cycling. These findings may help to explain why many obese individuals who have dieted unsuccessfully for years have great difficulty in losing weight, and suggest early preventive measures may be best.

Many reasons have been given for the increase in obesity rates throughout the world such as the increase of food dollars spent away from the home, increases in availability of fast foods and the availability of televised entertainment, which could contribute to obesity by making eating more attractive and physical activity less attractive (Jeffery & French 1998). Jeffery and French, (1998) questioned whether fast foods and television viewing contribute to the epidemic of obesity in the United States. They found that 'hours of television viewing per day and number of meals eaten at fast food restaurants per week were both positively associated with body mass index cross sectionally.' Furthermore, they reported that 'energy intake and percentage of energy from fat were positively associated with television viewing and fast food eating'.

Pritchard et al, (1999) investigated the clinical and cost outcomes of providing nutritional counselling to patients with either overweight, hypertension and/or Type 2 diabetes. They found that within a general practice, dietary advice can be provided by a dietitian to improve patient overweight and hypertension status at a reasonable cost over a 12-month period, with the combined skills of the dietitian and the patient's general practitioner (Pritchard, Hyndman & Taba 1999).

In another study investigating the health and economic benefits of weight loss among persons who are obese, Oster et al, (1999) suggested that modest sustained weight loss may yield substantial health and economic benefits. However, it was also reported that 'while weight loss yields important benefits, recidivism is inordinately high. On average, two-thirds of the weight that is lost by patients who complete weight-loss programs is regained within one year and almost all of it is regained within five years' (Oster et al. 1999).

In a long-term study of dieting on weight development over follow-up periods of six and 15 years in a Finnish adult population, Korkeila et al, (1999) reported that 'risk of major weight gain increased, although not always significantly so, in nearly all groups of initially normal-weight subjects who were attempting to lose weight at baseline' (Korkeila et al. 1999). A similar finding was observed in another study conducted by Bild et al, (1996) who investigated the link between dieting and weight gain in an observational study of 4278 young adults, in which self-reported weight loss attempts were associated with weight gain over two years.

While there is evidence that indicates there is a large variation in individual response to weight reduction programs, enough evidence exists to support the utility of adding exercise to weight-reduction programs (Kiernan et al. 1998). Kiernan, (1998) has shown that in people attempting to lose weight, those in diet-only groups are unsuccessful in long-term weight loss, which contrasted those in the diet and exercise group. In their conclusion, Kiernan et al, (1998) identified that weight-loss programs offered to the public focussing only on dietary change were unlikely to be effective.

4.4.4.1 Social support in weight-loss programs

The importance of involving family and friends in weight-loss efforts has been noted (Black & Lantz 1984 & Sallis & Owen 1999). A significant relationship has been demonstrated between the amount of family and environmental support for weight loss efforts and amount of weight lost (Epstein et al. 1987). Self-help groups, such as Weight Watchers and interventions conducted in the workplace, use 'similar peers' as one type of social support intervention. Another type of intervention to mobilise support systems optimises the quality of existing support that people give and receive in their natural environment (Glanz et al. 1995). The basic premise is that family members and friends, if cognisant of appropriate eating habits and skills, may model, suggest, support and reinforce positive behaviours for the individual trying to lose weight (Kalodner & DeLucia 1990). Social support weight-loss interventions vary in the amount of involvement, content and techniques included in their programs. The amount of spousal involvement in treatment has been reported to range from simple directions to the spouse, to attendance and adherence to the entire program, to a separate program for significant others. The mere presence of a significant other, however, is not sufficient to enhance weight loss; and it is important that appropriate target behaviours be chosen.

4.4.4.2 Nutrition education in weight-loss programs

Nutrition education is an important aspect of comprehensive weight-loss programs (Kalodner & DeLucia 1990). Nutrition education teaches the skills necessary to interpret information to make informed decisions about the nutritional content of food and to promote the development and maintenance of positive attitudes towards eating nutritious foods and the behaviour of eating a nutritionally balanced diet (Johnson & Johnson 1985). In spite of its importance, nutrition education is frequently mentioned as a missing component of nutrition information (Egger et al. 1999). The distinction between nutrition information and nutrition education is important. While information about the nutrition composition of foods is available, there is

evidence that providing information without an educational framework is often lacking (Wing et al. 1998). Nutritional information should enable participants to select and consume a nutritionally sound low-calorie diet. The provision of a framework that will allow participants to make individual decisions about food is important. Topics frequently included in an educational program are basic food groups, recommended daily allowances, guidelines for evaluating the nutritional value of foods, fad diets, and low-cost nutritious foods (Kalodner & DeLucia 1990).

4.4.5 Physical activity programs/strategies

The majority of the benefits of physical activity can be gained by performing moderate-intensity activities (U.S. Department of Health and Human Services 1988). Moderate level activities must be performed regularly to maintain these benefits. Contemporary primary prevention programs emphasise the move from inactivity to moderate levels of daily activity for 30 minutes or more (Sallis & Owen 1999). This level of physical activity is considered to hold the greatest improvement in cardiovascular disease risk reduction for currently inactive people (Sallis & Owen 1999).

Physical activity programs have been evaluated in exercise classes or fitness centers (Dunn, Andersen & Jakicic 1998). Most people prefer to exercise at home, in their neighborhood and alone (King, Taylor & Haskell 1993 & King et al. 1988). A study in 1987, which used a correspondence course to teach participants cognitive behavioural skills for regular exercise participation, recruited sedentary adults through the media. At the end of the program, those who received the single mailing were exercising more than those who received multiple mailings or who refused the course. At 10-month follow-up there was no difference amongst the groups (Owen et al. 1987).

Interventions delivered by telephone have also been attempted, as they are relatively low cost. Lombard et al, (1995) evaluated if the content and length of a telephone call made a difference. In the high content calls, counsellors helped participants set goals and gave them feedback on recent performance. In the low content calls, counsellors only touched base. At the end of six months it was found that the content of the calls made no difference. However, the frequency of calls was significant. Of those who received weekly calls, 46% were walking regularly compared with only 13% of those who were called every three weeks (Lombard, Lombard & Winett 1995).

4.4.5.1 Lifestyle physical activity

Lifestyle physical activity interventions have been developed in response to the public health problem of promoting regular amounts of physical activity to the majority of adults who remain inadequately or completely inactive. These lifestyle interventions allow a person to individualise his/her physical activity programs to include a wide variety of activities that are of at least moderate intensity and to accumulate bouts of these activities in a manner befitting his her life circumstances.

In a review of lifestyle physical activity programs, Dunn et al, (1998) reported that only a small number (n = 14) of studies have been published in this area. Collectively they were effective at increasing and maintaining levels of physical activity that meet or exceeded public health guidelines for physical activity in previously sedentary adults. The majority of interventions had been delivered as face-to-face contact in small groups, which limits their public health impact. However, a small number aimed at modifying the environment, such as signs posted to increase stair climbing have proved effective in the short term (Dunn, Andersen & Jakicic 1998). From her review, Dunn et al (1998) recommended that more studies aimed at manipulating the environment to increase physical activity needed to be tested over one or more years.

4.4.5.2 Environmental and policy interventions to promote physical activity

The strongest evidence that environment and physical activity are related comes from observational studies of pre-school children (Baranowski et al. 1993 & Sallis, Nader & Broyles 1993). In all three studies, being outdoors was the most powerful correlate of physical activity. Children's activity levels were also associated with the number of play spaces near their home and the amount of time children used those play stations. Because participation in physical activity declines with age, initial interventions may target improvements in adolescents' organised and informal activities. According to Sallis et al, (1993) and Robinson et al, (1993) even though it would be expected that time spent watching television takes time away from physical activity, associations between television viewing and physical activity are either weak or non-existent. This may be explained by the fact that there is time in the day for both physical activity and television. However, as mentioned previously, Jeffery and French, (1998) looked at the relationship between number of meals eaten at fast food restaurants per week and hours of television watched per day and subsequently found that they were both positively associated with body mass index. Interventions in controlled settings that specifically decrease the time children spend in sedentary behaviours led to increased physical activity (Sallis, Bauman & Pratt 1998).

4.4.5.3 Physical activity programs with the obese

Physical activity, either alone or in conjunction with dietary restrictions, typically has only a small effect on initial weight loss in obese participants (Sallis & Owen 1999). This is believed to be mainly because of the limited caloric expenditure reported in most studies (Sallis & Owen 1999). However, physical activity during weight loss tends to have the favourable effects of promoting fat loss while preserving lean body mass. The data provides much stronger support for the effects of physical activity on weight loss maintenance, and physical activity is often the only predictor of a long-term maintenance of weight loss (Oster et al. 1999).

Specific interventions are needed to promote physical activity after initial weight loss. A study by Perri and colleagues, (1998) showed that a self-management exercise program needed to be added to a general maintenance program to increase adherence to physical activity. Another study compared maintenance programs to enhance diet or physical activity after a one-year weight loss intervention. Participants in the diet or exercise weight loss program were randomly assigned to receive no intervention after the initial first year or to receive periodic contacts by

mail and telephone. The maintenance intervention was more effective in keeping weight off for the exercisers than the dieters. During the maintenance year, the exercise intervention group regained only 0.8 kg compared with 3.9 kg for the exercise with no maintenance intervention and 3.2 kg for dieters with a maintenance program. The exercise maintenance group ate more calories and exercised more than did the diet maintenance group, showing that exercisers do not have to be as careful with their dietary restrictions (Perri 1988).

The acceptance of intermittent exercise sessions throughout the day, as equally beneficial as one single exercise session per day of the same total duration, has given rise to the present recommendation of splitting exercise bouts into several shorter sessions of moderate intensity physical activity on most days of the week. For example, Dunn, (1996) showed improvements in exercise adherence with three to four short 10-minute bouts of moderate exercise compared with one 30 minutes bout of continuous exercise. Obese women assigned to intermittent exercise also showed similar improvements in fitness and slightly greater weight loss compared with women in continuous exercise conditions. Studies with smaller sample sizes show similar effects of intermittent exercise on exercise adherence and trends towards improvement in cardio respiratory fitness, loss of fat weight, and improved insulin uptake (Wing 1985). These studies have been conducted for up to 32 weeks, but longer-term studies are needed to determine the maintenance effects of these types of intermittent interventions (Sallis & Owen 1999).

4.4.5.4 Physical activity in older adults

Older adults represent the most sedentary segment of the adult population, although many chronic diseases are preventable through appropriate lifestyle interventions. In addition, the vast majority of intervention studies have focused on younger populations (King, Rejeski & Buchner 1998). Amongst adult populations who have been targeted, it has been observed that only about 50% of adults without heart disease who begin an exercise program will maintain participation in the program beyond three months (Buchner & Wagner 1992 & U.S. Department of Health and Human Services 1996). Few studies in this population have utilised specific behavioural, educational, social, cognitive, or program-based strategies aimed at promoting physical activity (King, Rejeski & Buchner 1998).

4.4.5.5 School-based physical activity

Egger and colleagues, (1998) in a review of school-based physical activity programs, reported that school-based physical education interventions can produce positive physiological and behavioural outcomes. There was little indication that health education programs alone increase physical activity levels. The evidence suggests that through curriculum modification it is possible to significantly decrease sedentariness during physical education sessions and to increase the amount of time doing moderate to vigorous physical activity. Curricula based upon vigorous aerobic activities have been shown to improve cardiovascular fitness and cardiovascular risk factors and there is also some evidence that well-designed school-based physical education curricula can increase physical activity both in and out of schools. Egger et al, (1998) concluded from their review of interventions aimed at increasing physical activity in youths, that school-based interventions were more effective than interventions conducted in other settings.

4.5 Chapter Four Summary

The main risk factors associated with Type 2 diabetes are age, family history, ethnicity, overweight/obesity, physical inactivity, poor dietary habits, cigarette smoking and hypertension. In reviewing their relationship with Type 2 diabetes through the published literature, family history, age, ethnicity, Aboriginality, obesity and physical inactivity were the most important risk factors associated with the disease. Of these risk factors, obesity and physical inactivity are considered modifiable, with obesity identified as the most important modifiable risk factor for developing Type 2 diabetes. This review found little evidence to suggest gender as an important risk factor, with cigarette smoking at the level of 20 or more cigarettes a day associated with Type 2 diabetes. In addition, poor dietary habits were found to be predictive of obesity, and not an independent risk factor for Type 2 diabetes.

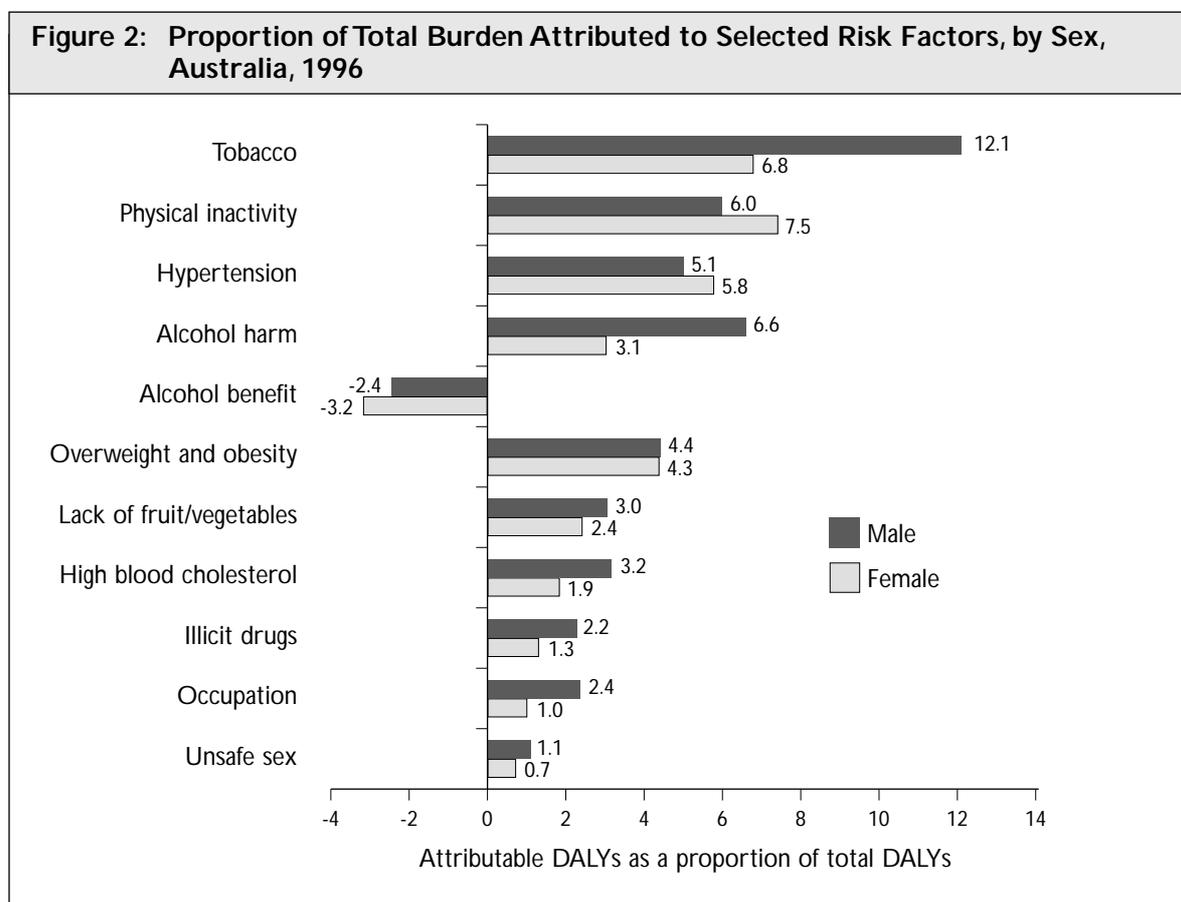
There is substantial evidence to suggest that the prevention or delay of the onset of Type 2 diabetes can be achieved amongst the majority of the population. However, apart from well-controlled interventions where these effects have been observed, the primary prevention approach has not yet revealed long-term success. In part, this reflects the limited success in influencing obesity and physical inactivity; the two main modifiable risk factors associated with type 2 diabetes.

Whether obesity and physical inactivity are addressed within the context of Type 2 diabetes, cardiovascular disease or as independent risk factors, the greatest likelihood of short or long-term success has been observed when both risk factors are targeted together. However, even under well-controlled conditions, few people have maintained their weight loss, or satisfactory levels of participation in physical activity beyond two years in any of the diet or physical activity interventions. The results of less well controlled community cardiovascular trials have shown that achieving even moderate levels of weight and physical activity modification at the population level is also difficult and expensive. It is the complex and dynamic nature of human behaviour compounded by the role that weight, diet and exercise has on our lives, that in part, explains the difficulty in modifying and sustaining longer-term behaviour change.

While there are numerous barriers to decreasing obesity and physical inactivity, there is common agreement that the prevention of obesity and inactivity needs to be tackled early in life because the risk of obesity is associated with age. Furthermore, the prevention of Type 2 diabetes, obesity and physical inactivity, would ideally be addressed throughout the lifecycle as part of a person's lifestyle. In regards to lifestyle modification for weight and exercise management, there is a need to identify and address barriers or settings that lead to poor dietary and exercise habits. People also need to be taught cognitive restructuring to focus on well-being and healthful behaviour patterns and they need social support that can be found in different activities and settings.

5.0 NATIONAL PREVALENCE AND TREND DATA FOR RISK FACTORS AND TYPE 2 DIABETES

As discussed previously, the main health risk factors for Type 2 diabetes are physical inactivity, overweight/obesity, poor diet (that can result in obesity), hypertension and tobacco smoking. Figure 2 shown below shows the proportion of total burden attributable to all diseases to these selected risk factors and others. The three highest ranked risk factors in Australia in 1996 were tobacco, physical inactivity and hypertension, all of which are risk factors for the development of Type 2 diabetes (Mathers, Vos & Stevenson 1999).

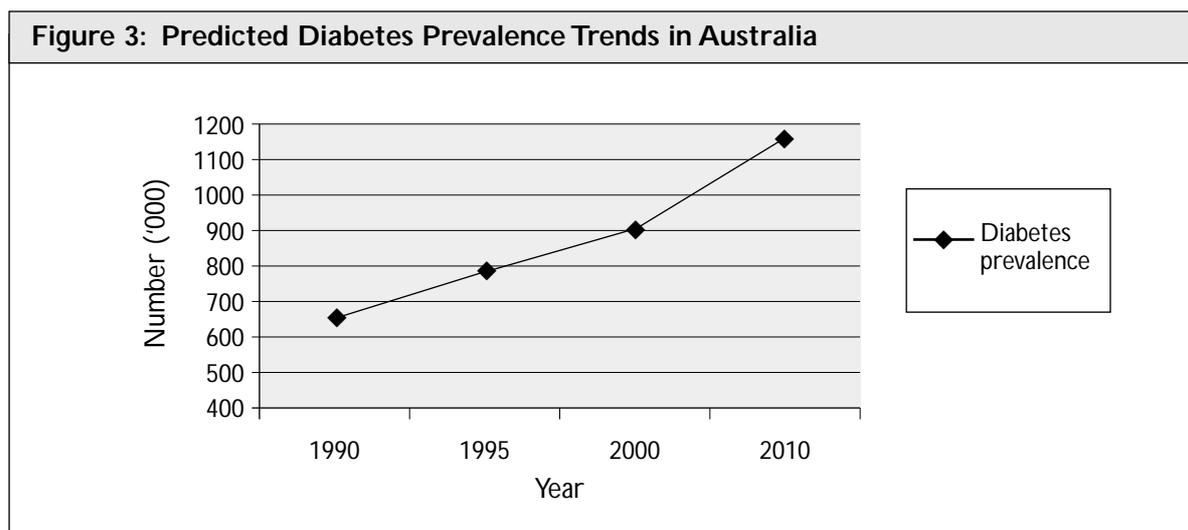


Source: Mathers, Vos & Stevenson 1999

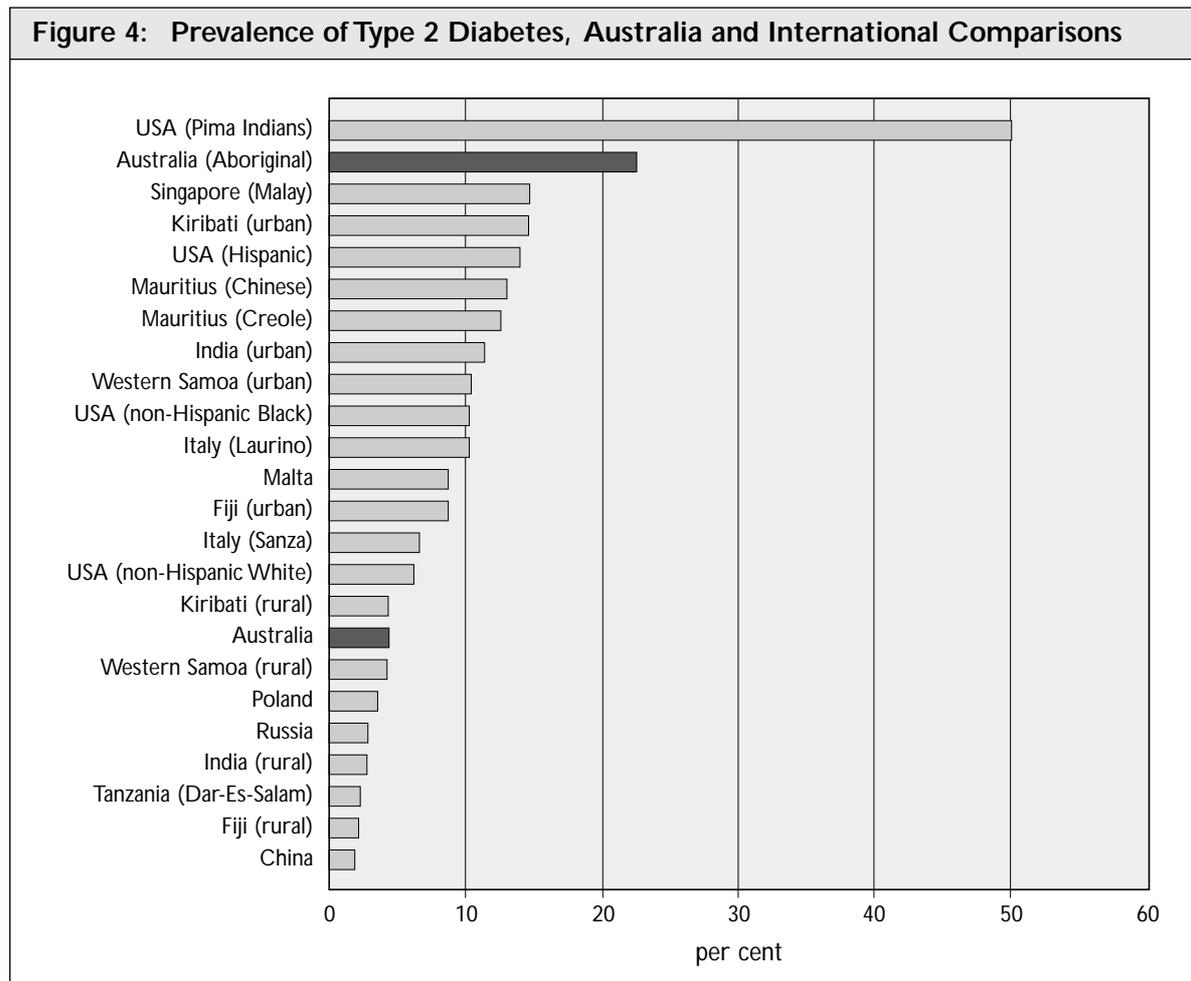
5.1 Type 2 diabetes

There are no national estimates of prevalence and incidence of Type 2 diabetes in Australia based on blood glucose testing. All prevalence data comes from self-report surveys (Commonwealth Department of Health and Aged Care & Australian Institute of Health and Welfare 1999). In 1995, the prevalence of Type 2 diabetes in Australia was estimated to be 4.3% (Colagiuri, Colagiuri & Ward 1998), however, this varies among sub-populations. For example, in people over 65 years the prevalence is approaching 10%, while in some Aboriginal communities the prevalence of Type 2 diabetes was reported to be up to 30% (Australian Institute of Health and Welfare & National Heart Foundation of Australia 1999).

In the 1995 ABS National Health Survey, 430,700 Australians self-reported having diabetes (both Type 1 and Type 2). However, large population-based studies of Caucasians in the United States and smaller Australian studies and surveys identifying diagnosed and undiagnosed Type 2 diabetes in a population sample, suggest that for every diagnosed case of Type 2 diabetes, there is likely to be another undiagnosed case (Colagiuri, Colagiuri & Ward 1998). Therefore, the total diabetic population is estimated to be around 780,000, of whom approximately 80,000 have Type 1 and 700,000 have Type 2 diabetes. As shown in Figure 3, the number of diabetes in Australia has risen since 1990 from 650,000 to 780,000 in 1995. By the end of the year 2000, diabetes is predicted to affect 900,000 Australians and 1.15 million by 2010 (Colagiuri, Colagiuri & Ward 1998 & McCarty et al. 1996).

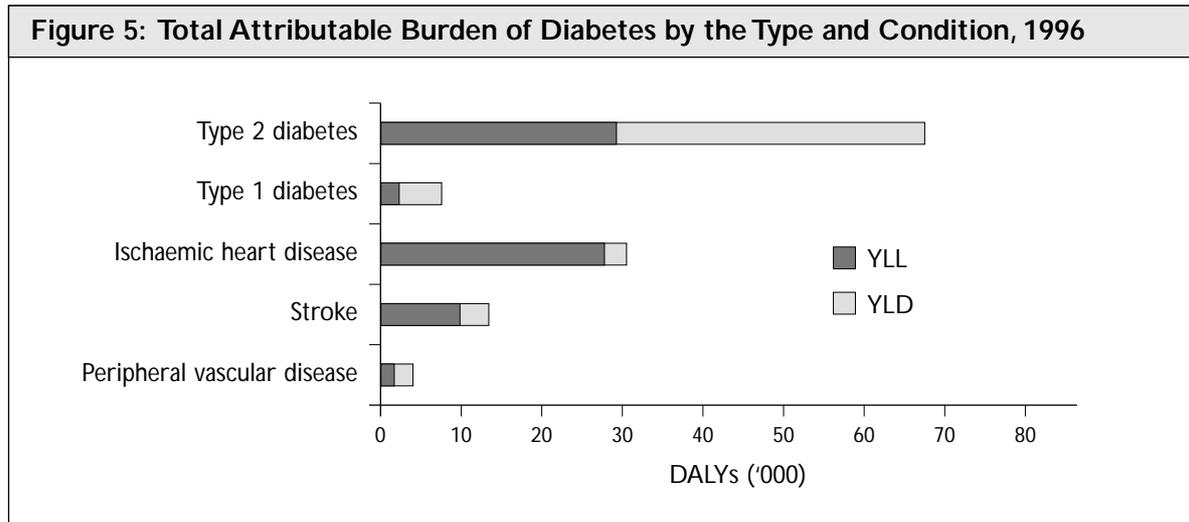


The estimated number of Type 2 diabetes in Australia in 1996 was 469,380 and the estimated prevalence of Type 1 diabetes was 73,590 (Mathers, Vos & Stevenson 1999). The prevalence of Type 2 diabetes in Australia, compared internationally is depicted in Figure 4. The estimated total incidence rate in 1996 for Type 2 diabetes was 35,503 and 1,841 for Type 1 diabetes (Mathers, Vos & Stevenson 1999).



Source: Commonwealth Department of Health and Aged Care & Australian Institute of Health and Welfare 1999

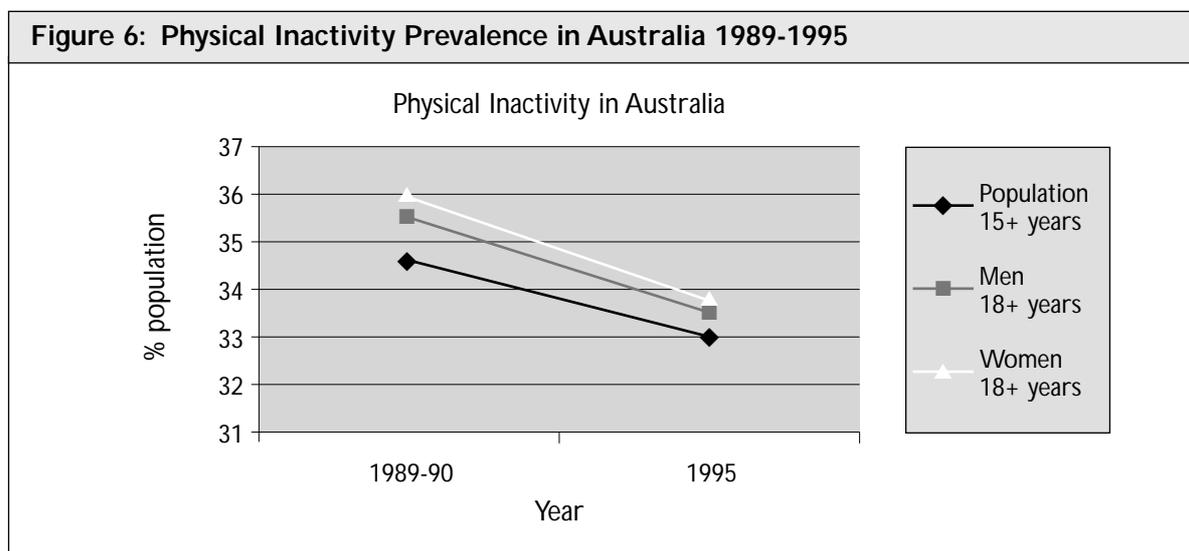
Diabetes (Type 1 and Type 2), with its complications, is one of the leading causes of death in Australia. It ranked seventh as the primary cause of death in 1996, being cited as the underlying cause of 2,991 deaths (2.3% of deaths from all causes), a rank it has held for many years (Commonwealth Department of Health and Aged Care & Australian Institute of Health and Welfare 1999 & Australian Institute of Health and Welfare & National Heart Foundation of Australia 1999). Diabetes mellitus (Type 1 and 2) is one of the leading causes of burden of disease in Australia. It is ranked seventh in males and eighth in females. Diabetes (Type 1 and 2) was ranked sixth in Australia in 1996, as the leading cause of years of life lost due to disability (Mathers, Vos & Stevenson 1999). The total attributable burden of diabetes by type and condition, 1996, is depicted in Figure 5, where YLL is the Years of Life Lost (due to mortality), YLD – Years of Life lost due to Disability and DALY – Disability Adjusted Life Year.



Source: Mathers, Vos & Stevenson 1999

5.2 Physical Inactivity

A high proportion of adult Australians do not exercise regularly. Over one-third of the adult population in Australia in 1995 did not participate in any physical activity (Commonwealth Department of Health and Aged Care & Australian Institute of Health and Welfare 1999 & Australian Institute of Health and Welfare & National Heart Foundation of Australia 1999). In 1989-90, 36% of the Australian population did not engage in physical activity. This dropped slightly in 1995 to 34% but this was mainly due to the increased participation in physical activity by people aged 35-54 years (Australian Institute of Health and Welfare & National Heart Foundation of Australia 1999). Measurement issues have also been thought to be a reason for



Source: Australian Institute of Health and Welfare & National Heart Foundation of Australia 1999 & Australian Bureau of Statistics 1992

the perceived increase in physical activity levels because walking for leisure and transport are now being measured in self-report surveys. However, the proportion of people undertaking physical activity either at low, moderate or high levels remained fairly stable between 1989-90 and 1995 (Commonwealth Department of Health and Aged Care & Australian Institute of Health and Welfare 1999). Figure 6 shows physical inactivity rates declining in Australia between 1989 and 1995.

A study conducted by Active Australia in 1997 found that approximately 49% of the adult Australian population surveyed reported sufficient physical activity for a health benefit. That is participating in at least five sessions of at least 30 minutes of physical activity per week (Bauman 1997).

Physical inactivity is ranked second behind tobacco smoking, when comparing risk factors responsible for the greatest burden of disease in Australia. Physical inactivity is responsible for approximately 7% of the total burden of disease (Mathers, Vos & Stevenson 1999).

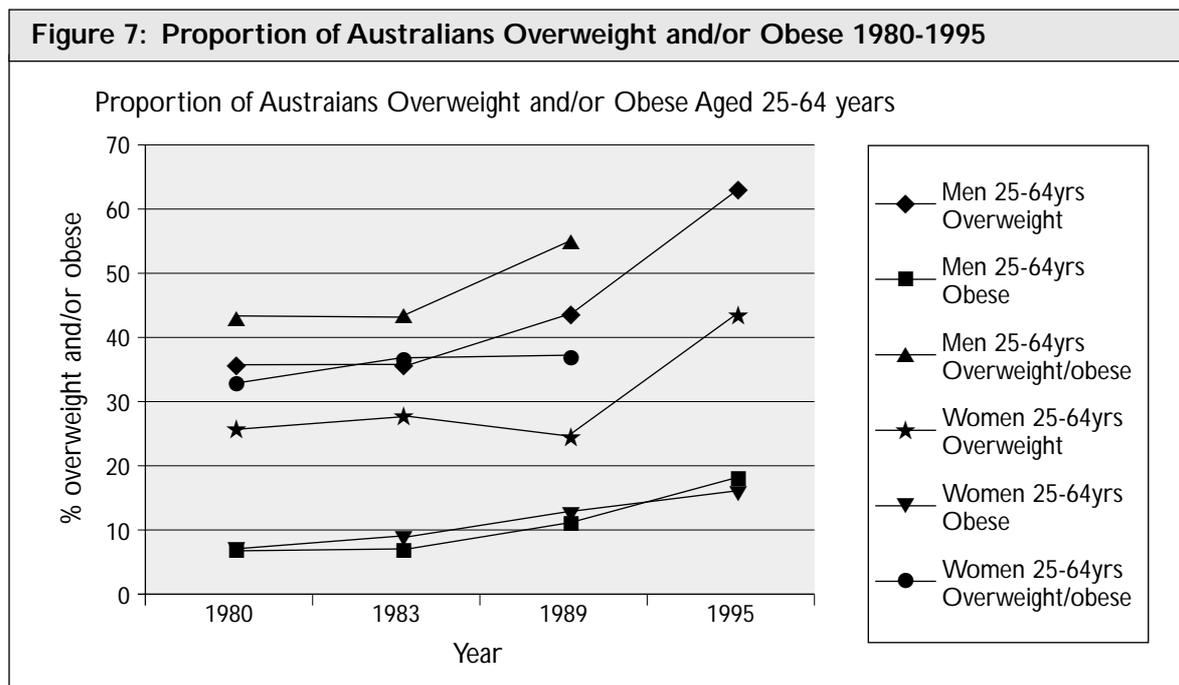
A variety of factors have been found to be associated with sedentary behaviour. Those most at risk are generally older, male, employed, living in rural areas and married. Lifestyle and health factors associated with sedentary behaviour are poor food habits, currently smoking and being overweight (Milligan 1998).

5.3 *Overweight/obesity*

In 1995, approximately 56% of the adult Australian population was overweight (BMI \geq 25). Nearly 19% of these were obese (BMI \geq 30) (Australian Institute of Health and Welfare & National Heart Foundation of Australia 1999). As shown in Figure 7, the proportion of obesity in Australians aged 25-64 years has increased from 8% of men in 1980 to 18% in 1995 and 7% of women to 16% in the same time period (Australian Institute of Health and Welfare & National Heart Foundation of Australia 1999). In the past 15 years, there have been significant increases in the proportion of overweight and obese Australians. Trend data indicate that the proportion of overweight women aged 25-64 years increased from 27% in 1980 to 43% in 1995. The proportion of overweight men in the same age group also increased from 48% in 1980 to 63% in 1995. Figure 7 shows the proportion of Australians who were overweight and/or obese in the years 1980-1995.

BMI is commonly used to classify overweight and obesity. However, it has limitations because the measurement for BMI comes from comparing an individual's height to weight and does not measure distribution of body fat and adipose tissue, plus highly muscular individuals and groups with differing body proportions may be misclassified (World Health Organisation 1997).

Overweight and obesity are risk factors responsible for more than 4% of the total burden of disease in Australia (Mathers, Vos & Stevenson 1999). Cardiovascular diseases and hypertension account for 40% of the total burden of obesity, followed by diabetes 28% (Mathers, Vos & Stevenson 1999).

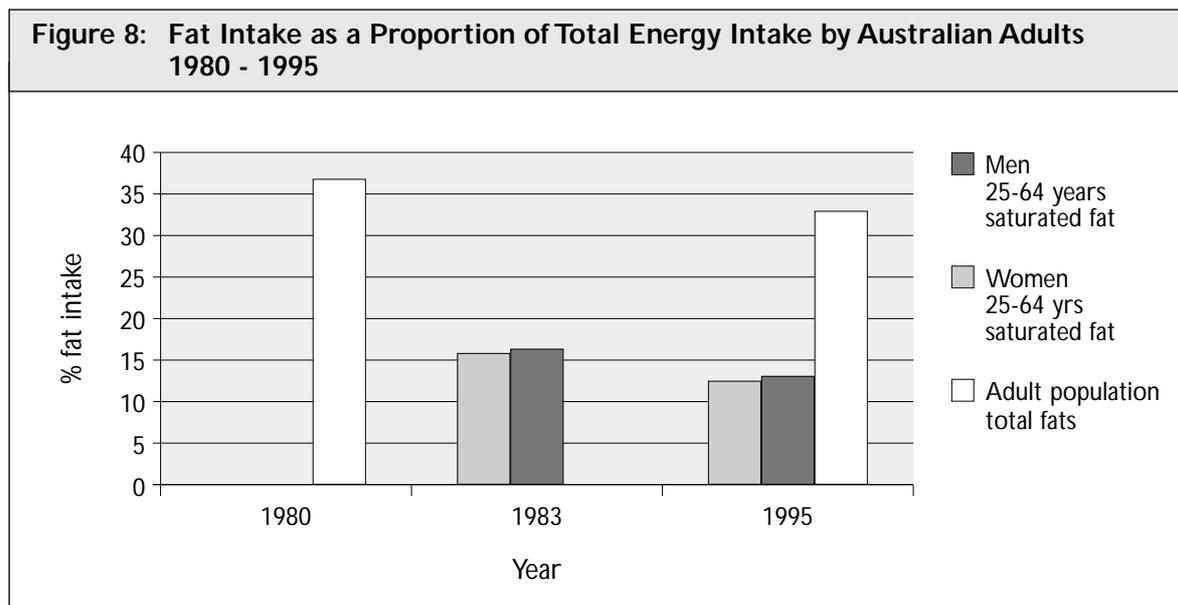


Source: *National Heart Foundation of Australia 1980; National Heart Foundation of Australia 1983; National Heart Foundation of Australia 1990 & Australian Institute of Health and Welfare & National Heart Foundation of Australia 1999.*

5.4 Dietary Habits (including breastfeeding)

In 1995, total fats (e.g., saturated, monounsaturated and polyunsaturated) accounted for approximately 33% of the total energy intake of Australian adults, as depicted in Figure 8. This fell from around 37% in the 1980s, but is still above the National Health and Medical Research Council's recommended level of 30%. The contribution of saturated fats as a proportion of total energy intake has fallen over the past decade to around 13%, however, this is still higher than the recommended maximum level of 10% (Australian Institute of Health and Welfare & National Heart Foundation of Australia 1999).

The contribution of oils and fats to the total energy available declined slightly in the 1960s but increased in the 1970s and 1980s before falling again at the beginning of the 1990s. Currently, oils and cooking fats (dripping) represent a little over one half of the energy contributed by this group and fat spreads (margarine, butter) the other half. Consumption of milk and other dairy products (excluding butter) has increased slightly, however, there has been a shift away from liquid milk towards cheese and other milk products. Meat (beef, lamb, pork) as a contribution to the total energy in the diet, fell markedly in the 1980s. Beef/veal and mutton/lamb fell by a quarter and a third respectively when compared with the quantities consumed in the 1940s, whereas pork has increased nearly six-fold. As a consequence of a reduction in red meat consumption, poultry and seafood have become more important in the diet (Australian Institute of Health and Welfare 1998).



Source: Australian Institute of Health and Welfare & National Heart Foundation of Australia 1999; National Heart Foundation of Australia 1980; National Heart Foundation of Australia 1983 & National Heart Foundation of Australia 1990.

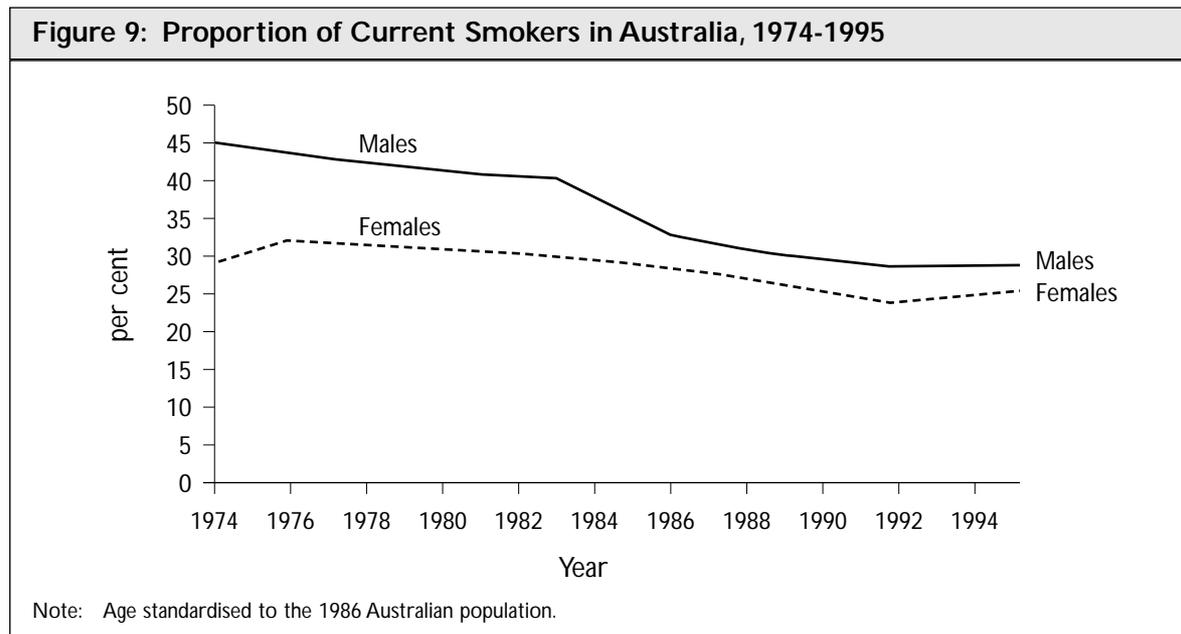
The consumption of cereal (grain) foods declined gradually from the 1940s until the end of the 1970s. However, in the past 15 years cereal foods have returned to the levels of the 1940s, with a shift towards more breakfast cereals and rice. The contribution of vegetables to the total energy in the national food supply has been steady since the 1940s, although the per capita amount available for consumption has increased by 50%. The increase in energy-dense foods such as alcohol and added fats has reduced the relative contribution of vegetables to total energy. The quantity of fruits consumed since the late 1950s has increased by 50% (Australian Institute of Health and Welfare 1998).

Inadequate fruit and vegetable intake is responsible for approximately 3% of the total burden of disease in Australia. (This burden relates to average consumption of less than five serves of fruit or vegetables per day) (Mathers, Vos & Stevenson 1999).

5.5 Cigarette Smoking

Tobacco smoking is responsible for approximately 12% of the total burden of disease in males and 7% in females. When comparing health risk factors, tobacco smoking is the health risk factor responsible for the greatest burden of disease in Australia (Mathers, Vos & Stevenson 1999).

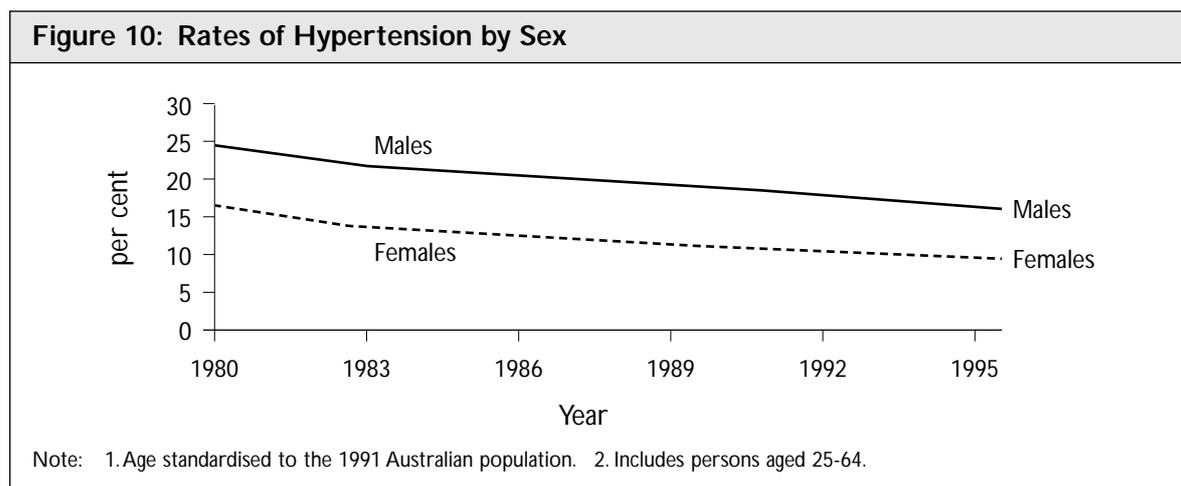
In 1995, approximately 24% of the adult Australian population smoked tobacco products. Adult smoking rates have been declining since the 1960s, however, recent surveys show that the rate of decline of current smokers has slowed (Australian Institute of Health and Welfare & National Heart Foundation of Australia 1999). Figure 9 shows the proportion of current smokers in Australia in the years 1974-1995.



Source: Mathers, Vos & Stevenson 1999.

5.6 Hypertension

The prevalence of high blood pressure in Australian men and women has fallen from 24.6% to 16.7% (men) and from 16.7% to 9.5% (women) between 1980 and 1995, as depicted in Figure 10 (Australian Institute of Health and Welfare 1998).



Source: Mathers, Vos & Stevenson 1999.

Hypertension is a risk factor that causes over 5% of the total burden of disease in Australia. In 1995, around 2.2 million adult Australians (approximately 17%) had high blood pressure and/or were on treatment for the condition (Australian Institute of Health and Welfare & National Heart Foundation of Australia 1999 & Mathers, Vos & Stevenson 1999).

There has been a marked improvement in blood pressure levels among both men and women in Australia. During the period from 1980 to 1995, average systolic blood pressures declined from 133 mmHg to 126 mmHg in men and from 127 mmHg to 123 mmHg in women. Diastolic blood pressures declined from 86 mmHg to 79 mmHg in men and from 80 mmHg to 76 mmHg in women (Australian Institute of Health and Welfare 1998).

Based on the National Association Diabetes Centres survey 1998, the prevalence of high blood pressure in people with Type 2 diabetes under the age of 60 years was estimated as 266 per 1000 males and 347 per 1000 females. The average blood pressure levels in Australia have shown a downward trend in past years and this trend is continuing, which has positive implications for a reduction in the prevalence of diabetes and its related outcomes in Australia (Commonwealth Department of Health and Aged Care & Australian Institute of Health and Welfare 1999).

5.7 Chapter Five Summary

In 1995, approximately 400,000 Australians reported they had Type 2 diabetes. However, in the absence of national estimates based upon blood glucose testing in this country, an opinion exists that for every self-reported diagnosed case of Type 2 diabetes another undiagnosed case exists. This has led to estimates of Type 2 diabetes prevalence reaching 1.15 million Australians by 2010.

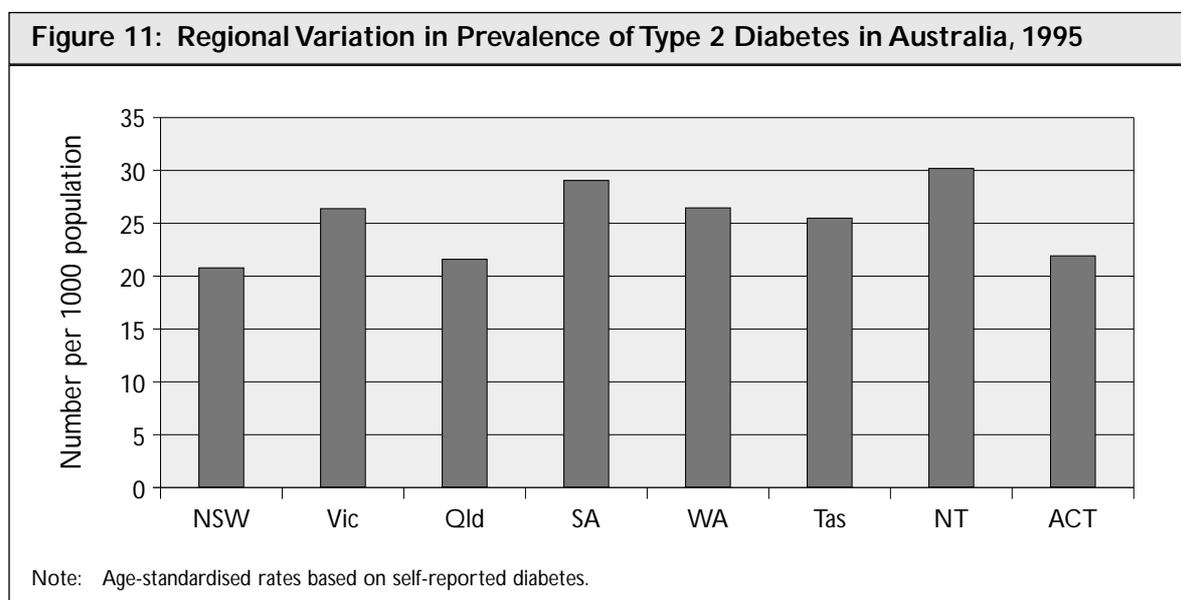
In addition to the burden of Type 2 diabetes in Australia, this chapter presented current trends in physical inactivity, obesity, dietary habits, tobacco smoking, and hypertension. Trends were compiled from multiple data sources, and comparisons between the information sought, age group classifications used, and the year data were collected, resulted in significant variations in measures of the same risk factor. In regards to weight for example, prevalence levels of overweight and obese Australians has significantly increased in the past 15 years. However, overweight and obesity was determined in most instances by BMI, which comprises self-reported estimates of height and weight and does not give a measure of adiposity, such as centralised adipose tissue which is considered significant in the development of Type 2 diabetes. In contrast, the level of physical inactivity has decreased over the past decade, with approximately 10% of the population currently inactive, and most likely to be the elderly or infirmed. However, the relatively recent inclusion of walking for recreation or transport in measuring physical activity partly explains this trend. Whether total energy expenditure through physical activity has changed is difficult to determine with current data, as is determining whether the benefits from physical activity have been translated into real health benefits to the community.

One health related behaviour that has declined over the past decade was cigarette smoking. Despite more recent indications that smoking rates have increased, overall, they are still lower than 10 to 20 years ago. Similarly, lower rates of hypertension have occurred over the past 15 years, in both males and females, although the ease of detecting hypertension and medication to control it, are likely to have contributed towards this trend.

6.0 PREVALENCE AND TREND DATA FOR TYPE 2 DIABETES RISK FACTORS IN WA

6.1 Type 2 Diabetes

Between 1989-90 and 1995, the prevalence of Type 2 diabetes nearly doubled in Western Australia among those aged between 25-74 years of age (Health Department of WA 1999). When Western Australia is compared with other states and territories within Australia, the prevalence of Type 2 diabetes is at the higher end of the scale (see Figure 11).



Source: Commonwealth Department of Health and Aged Care & Australian Institute of Health and Welfare 1999

In WA, self-reported diabetes in 1995 was found to be highest in the Kimberley, Great Southern and South-West regions of the State (Health Department of WA 1999).

6.2 Physical Inactivity

In 1995, 66.8% of the Western Australian population (67.0% nationally) participated in no or low physical activity (Australian Bureau of Statistics 1997b). In 1995, rural areas of WA generally had substantially higher percentages of people reporting no physical activity than in the metropolitan area. The Kimberley and Midlands regions had the highest percentages (>40%) of males doing no physical activity, whereas the North Metropolitan zone had below 20% doing no physical activity (Milligan 1998).

6.3 Overweight/Obesity

In 1995, 41.7% of Western Australians (42.8% nationally) were classified as either overweight and/or obese (Australian Bureau of Statistics 1997b). Trend data suggest obesity levels for Western Australians have increased from 7.8% in 1989 to 8.2% in 1995 (Health Department of WA 1999).

In WA, the highest prevalence of overweight was in the Pilbara, Midwest and Midlands regions of the State. The Pilbara had the highest prevalence for both males and females being classified as overweight (Milligan 1998).

6.4 Dietary Habits

6.4.1 Cereal consumption

In 1995, 30% of Western Australians ate the recommended seven serves of cereal products per day and 53% consumed between two and six serves per day. The Great Southern had the highest percentage of people consuming the recommended seven serves of cereals per day, with the Kimberley having the lowest percentage who ate the recommended number of serves (Milligan, Daly & Codde 1997h).

6.4.2 Amount of butter or margarine spread on bread

In 1995, 57% of people in WA reported spreading their bread with butter or margarine thinly or not at all, and 9% reported spreading butter or margarine thickly. The Kimberley, Pilbara and Great Southern regions had the highest prevalence of people who reported thickly spreading their bread with butter or margarine (Milligan, Daly & Codde 1997h).

6.4.3 Type of oil or fat used for cooking

In 1995, 5% in WA used no fat or oil, 9% used saturated fat and 86% reported using poly or monounsaturated fats. The highest use of fat for cooking was in the Kimberley, but the Goldfields were found to have the highest percentage of people who used saturated fats (Milligan, Daly & Codde 1997h).

6.4.4 Trimming visible fat from meat

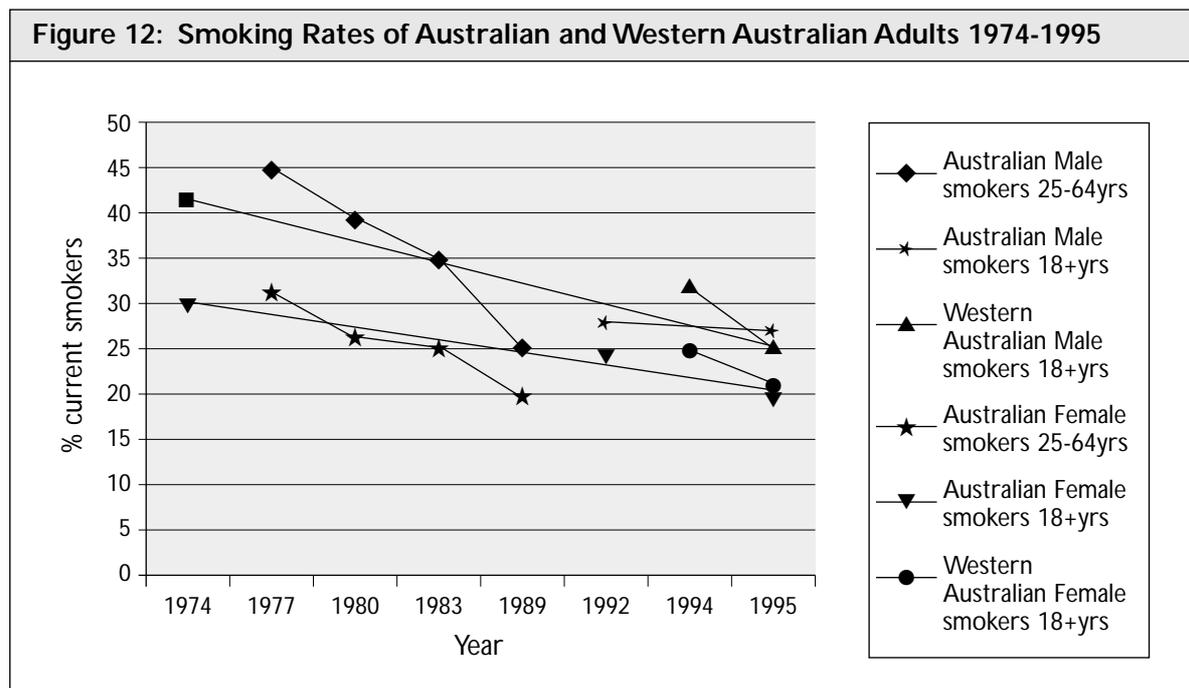
Overall, 62% of Western Australians reported trimming all of the fat off their meat, 26% trimmed some of the fat and 11% trimmed little or no fat in 1995. Respondents in the Kimberley region reported the highest prevalence of those eating most or all of the fat on their meat, whereas those in the South Metropolitan region reported the highest percentage who trimmed all of the fat off their meat (Milligan, Daly & Codde 1997h).

6.4.5 Overall food habits

Within WA, the Kimberley and the Pilbara food habits score (involves the combination of 10 food consumption variables into quantitative measure of diet quality, the higher the food habit score, the closer to the desirable food consumption pattern), was statistically significantly lower than any other regions in the State. The South-West and East Metropolitan regions had scores significantly higher than the state average. It has been suggested that the reason for the low score in the Kimberley and Pilbara may be due, in part, to issues such as availability, cost, quality and seasonality of nutritious food (Milligan 1998).

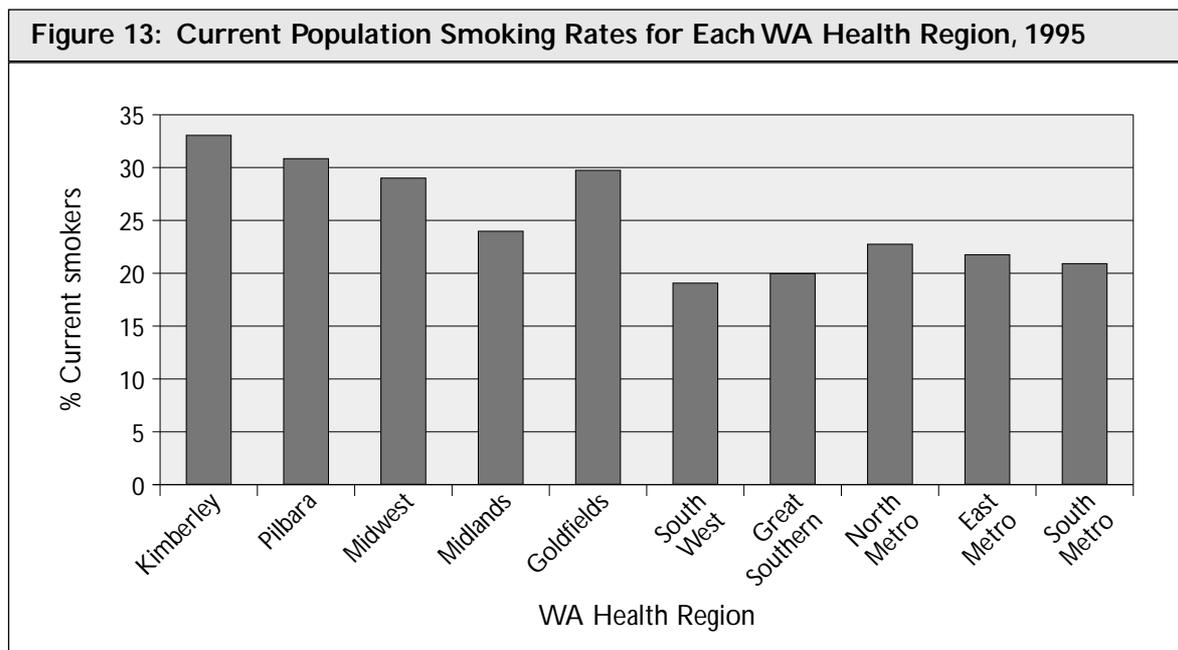
6.5 Cigarette Smoking

In 1995, 22.6% of Western Australians (24.0% nationally) were classed as current smokers (Australian Bureau of Statistics 1997b). Current smokers in Western Australia included 25.0% of males (27.0% nationally) and 21.0% of females (20.0% nationally). The current smoking prevalence was highest in the 18-24 year age group, especially among females (over one-third were current smokers). Figure 12 shows smoking rates in males and females between 1974-1995, comparing Western Australia with Australia.



Source: *Ridolfo & Codde 1997; Milligan 1998; National Heart Foundation of Australia 1980; National Heart Foundation of Australia 1983 & National Heart Foundation of Australia 1990.*

When comparing health regions within Western Australia, in 1995 the percentage of current smokers was highest in the Kimberley, Pilbara, Midwest and Goldfields (Milligan 1998). Figure 13 shows the current population smoking rates for each WA health region.



Source: Milligan 1998

6.6 Hypertension

The prevalence of hypertension in WA increased with age. In 1995, low prevalence in the 15-44 year age group was observed, with a substantial increase in the prevalence amongst the 45-64 year and 65-year and over age groups. The prevalence of Hypertension was higher in the Midlands, Midwest, South-West and Great Southern regions (Milligan 1998).

6.7 Chapter Six Summary

This chapter presents trends in risk factors for Type 2 diabetes for the State of Western Australia and within State health regions. It was found that prevalence of Type 2 diabetes within the State doubled in the five years prior to 1995 and when compared with other States and territories, Western Australia was at the higher end of Type 2 diabetes prevalence. Self-reported health risk factors such as physical inactivity, overweight/obesity, dietary habits, tobacco smoking and hypertension were all compared between health regions, with the prevalence of physical inactivity found to be highest in the Kimberley and Midland regions. While over 40% of Western Australians were classified as either overweight and/or obese, the Pilbara, Midwest and Midlands had the highest prevalence in the State. Dietary habits were found to be worse in the Kimberley and Pilbara; percentage of current tobacco smokers were highest in the Kimberley, Pilbara, Midwest and Goldfields; and hypertension was highest in the Midlands, Midwest, South West and Great Southern regions. A strong association between Western Australian health regions having the highest levels of overweight/obesity, poor dietary habits, smoking levels and hypertension and those with significant Aboriginal communities exists. The effect of these differences on the morbidity and mortality in these regions and the Aboriginal community is described in the next section.

7.0 HIGH RISK POPULATIONS

7.1 *Aboriginal/Torres Strait Islander*

It is not clear why diabetes among indigenous Australians is so common, however, it is thought to be the combination of genetic predisposition and the rapid change from traditional ways of life to a more 'Westernised' lifestyle (Australian Institute of Health and Welfare & National Heart Foundation of Australia 1999).

The affluent or Western diet (low carbohydrate, low fibre, high fat) is also accompanied by other changes such as arterial hypertension, dyslipidaemia and obesity, which lead to a deterioration in glucose tolerance. Australian Aboriginals have high rates of obesity, cardiovascular disease and Type 2 diabetes, which have been attributed to the adoption of this Western lifestyle and diet. However, studies on Australian Aboriginals moving back from such a diet to a traditional one, showed a dramatic improvement in glucose tolerance (Braun et al. 1996; World Health Organisation 1994 & Gault et al. 1996). Field and laboratory studies conducted in the Kimberley in WA by Professor Kerin O'Dea demonstrated that, 'the abnormalities of glucose and lipid metabolism in obese Aboriginals with diabetes could be reversed by a combination of a traditional diet, high in carbohydrate and exercise to produce weight loss (Martin 1998, pg 144).

Availability and affordability of nutritious food is a potential problem for people living in remote areas. This affects indigenous Australians because they are more likely than non-indigenous people to live in remote areas and mainly rely on a westernised diet (McGrath et al. 1991 & Australian Bureau of Statistics 1997a).

7.1.2 *Prevalence and trend data for risk factors for Type 2 diabetes in the Australian indigenous population*

7.1.2.1 *Type 2 diabetes*

Australian Aboriginals suffer the fourth highest levels of Type 2 diabetes in the world (McCarty et al. 1996). Evidence suggests that the overall prevalence of diabetes among indigenous adults could be as high as 10-30% (Australian Institute of Health and Welfare & National Heart Foundation of Australia 1999). Diabetes is directly responsible for almost 5% of all Aboriginal deaths. In comparison, the proportion of direct mortality caused by diabetes was less than 2% among non-Aboriginals in 1992 (Bhatia & Anderson 1995). The disease also affects the Aboriginal and Torres Strait Islander populations at much younger ages than the non-indigenous population (National Health and Medical Research Council (NHMRC) 1997).

When Aboriginal mortality for Type 2 diabetes was compared between the Northern Territory, South Australia and Western Australia between 1991-96, the highest mortality rate was among Aboriginal people in Western Australia (Codde, Gattorna & Williams 1999).

Between 1985-1994, there was a noticeable rise in age-adjusted death rates from diabetes among the Australian indigenous population. Age-adjusted death rates from diabetes increased at an estimated 10% per year among indigenous males and over 5% a year among indigenous females (Australian Institute of Health and Welfare 1998).

7.1.2.2 Physical inactivity

Indigenous Australian adults are more likely to report no leisure time physical activity than non-indigenous Australians. In 1995, 40% of indigenous Australians reported no leisure time physical activity, compared with 34% of other Australians (Australian Institute of Health and Welfare & National Heart Foundation of Australia 1999). Indigenous females are more likely to report no physical activity than their non-indigenous counterparts in every age group (Australian Bureau of Statistics 1999b).

7.1.2.3 Overweight/obesity

Data collected in 1994 and 1995 showed little differences in the proportions of indigenous men and Australian men who were overweight (62% and 63% respectively). However, nearly 25% of indigenous men were obese compared with 18% of all Australian men. Almost 60% of indigenous women were overweight, and this rate was much higher than that of all Australian women (49%). Obesity rates among indigenous women (30%) were also much higher than among all Australian women (18%) (Australian Institute of Health and Welfare & National Heart Foundation of Australia 1999).

7.1.2.4 Dietary habits

The modern diet of Aboriginal people typically consists of high energy-dense food, highly refined carbohydrates and saturated fats with dietary staples such as white flour, sugar, bread and rice, powdered milk, cheap fatty meat, carbonated drinks and tinned foods (McGrath et al. 1991 & Australian Bureau of Statistics 1997a). Surveys have also found that Aboriginal people tend to eat take-away foods as a meal more often than their European counterparts, eat more fried food at home and report more frequent use of salt (de Courten et al. 1998).

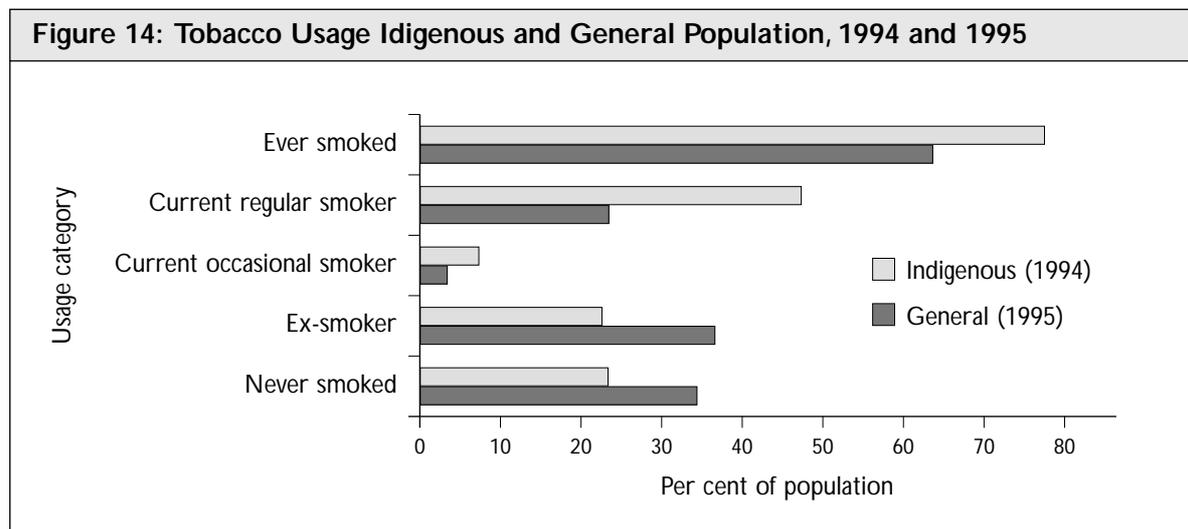
7.1.2.5 Breastfeeding

In 1994, breast-feeding of children in indigenous populations was more commonly reported in rural areas than in urban areas and babies in rural areas were more likely to be breastfed for longer than six months than those in urban areas. Approximately 70% of indigenous children aged 0-12 years had been or were currently being breastfed in 1994 (Australian Bureau of Statistics 1999c & Australian Bureau of Statistics 1999d).

Indigenous children in non-remote areas (75%) were less likely than non-indigenous children to have been breastfed (86%). Among those who had been breastfed and were at least six months old, 60% of indigenous children were reported to have been breastfed for 24 weeks or more compared with 53% of non-indigenous children (Australian Bureau of Statistics 1999c).

7.1.2.6 Smoking

In 1995, indigenous adults were about twice as likely (51%) to smoke as other Australian adults (24%). Smoking was also found to be more common among indigenous males (56%) than indigenous females (46%) (Australian Institute of Health and Welfare & National Heart Foundation of Australia 1999 & Australian Bureau of Statistics 1999c). Tobacco usage among the indigenous and the general population, 1994 and 1995 is depicted in Figure 14.



Source: Australian Institute of Health and Welfare 1998

7.1.2.7 Hypertension

No national data are available on the prevalence of high blood pressure among indigenous Australians, however data from the Kimberley region suggest that high blood pressure is two to three times more common among indigenous Australians than among other Australians (Australian Institute of Health and Welfare & National Heart Foundation of Australia 1999).

7.2 Culturally and Linguistically Diverse Populations (CALD)

People from CALD backgrounds are at a high risk for diabetes, particularly those adopting a western lifestyle (Western Australian Diabetes Services, 1999). This group is disadvantaged in terms of access to diabetes services, mainly due to language and cultural barriers. It is also difficult to reach this group with prevention, awareness and appropriate education messages (Commonwealth Department of Health and Aged Care & Australian Institute of Health and Welfare 1999 & Western Australian Diabetes Services, 1999). Anecdotal evidence suggests that non-English speaking people with diabetes do not receive the same standard of health care and education as their English speaking counterparts and therefore, experience poorer health outcomes (Colagiuri, Colagiuri & Ward 1998).

Culturally and linguistically diverse populations where diabetes has high prevalence, include Micronesians, Polynesians and certain Melanesian Pacific Islanders, migrant Asian Indians and Chinese, some Arab populations and some European communities, especially those from Southern Europe (Commonwealth Department of Health and Aged Care & Australian Institute of Health and Welfare 1999 & Health Department of WA 1999).

Overall, the prevalence of self-reported diabetes (both Type 1 and 2) in populations born overseas is 3% compared with 2.1% in the Australian born population. On arrival migrants have better health than people born in Australia, however, rates of illness and disability increase with duration of residence. Overseas born residents are found to be more susceptible to Type 2 diabetes and gestational diabetes. The two major risk factors for Type 2 diabetes, physical inactivity and obesity, were self-reported by a significantly higher proportion of adults in some of these ethnic groups (Commonwealth Department of Health and Aged Care & Australian Institute of Health and Welfare 1999 & Di Francesco, Gillam & Unsworth 1999).

According to the Commonwealth Department of Health and Aged Care and Australian Institute of Health and Welfare, (1999) page 105-6, 'providing culturally appropriate information on diabetes, its prevention and management is essential to changing behaviours and achieving health gain, and is an area which needs urgent attention. The collaborative planning approaches need to specifically address populations of culturally and linguistically diverse backgrounds and have multicultural policy representatives on advisory committees or taskforces.'

7.3 *Australia's Rural and Remote Population*

Mortality from diabetes is significantly higher in remote areas when compared to other areas. Women living in rural and remote areas have a 46% higher death rate from diabetes than their city counterparts. The death rates for diabetes in remote areas of Australia have been found to be two to three times higher than in metropolitan areas and slightly higher rates have been observed for hospitalisation where diabetes is the principal diagnosis (Commonwealth Department of Health and Aged Care & Australian Institute of Health and Welfare 1999 & Colagiuri, Colagiuri & Ward 1998).

Rural and remote Australians have different patterns of health disadvantage compared with their metropolitan counterparts, such as limited availability and access to adequate and appropriate quality health care. Rural residents may also be disadvantaged by their physical environment and have comparatively restricted access to prevention and treatment services when compared with disadvantaged individuals living within the metropolitan area (Commonwealth Department of Health and Aged Care & Australian Institute of Health and Welfare 1999; Colagiuri, Colagiuri & Ward 1998 & Ridolfo & Codde 1997).

Barriers that may be faced by people living in rural and remote areas include distance and restrictions on travel at certain times of the year. Other problems include a shortage of health

professionals, inadequate training, poor economic infrastructure, ongoing logistic and communication problems and fewer or less comprehensive services and other local health services. Financial pressures and decreasing services leading to unemployment, lifestyle and cultural attitudes regarding personal healthcare, are all barriers that people living in rural and remote areas may face (Colagiuri, Colagiuri & Ward 1998).

7.4 Chapter Seven Summary

This chapter clearly identifies indigenous Australians as the highest-risk population for developing Type 2 diabetes in Australia. They suffer the fourth highest levels of Type 2 diabetes in the world and have extremely high rates of obesity and cardiovascular disease due to the adoption of a westernised lifestyle and diet. Indigenous Australians also reported high levels of physical inactivity and are twice as likely to smoke than other Australian adults.

This review found a dearth of information on the level of Type 2 diabetes and its associated risk factors in the Aboriginal and Torres Strait Islander population. Recent trends of collecting population data through telephone surveys excludes this group more than other minorities, in accessibility, language and cultural sensitivities. In addition, no evidence of other systematic or periodic collection of health-related risk factor information in this population was found. Where information was available it usually resulted from health service records, or data collected in one or two small communities. What is known is that the life expectancy of this population is significantly less than other Australians, and with limited information, it appears related to increased risk through several modifiable behaviours.

Other high-risk groups for developing Type 2 diabetes discussed in this chapter were, Culturally and Linguistically Diverse (CALD) populations and Australia's rural and remote population. People from a CALD background are also at high risk of developing Type 2 diabetes due to their adoption of a westernised diet. Whereas people living in rural or remote Australia tend to have higher rates of Type 2 diabetes both due to a large proportion of the population being indigenous Australian's compared with the metropolitan counterparts and also their disadvantage with respect to availability of fresh food and access to adequate and appropriate quality health care.

8.0 WA REGIONAL TYPE 2 PREVENTION PROGRAMS

8.1 *Major Programs/Activities WA Statewide:*

In July 1998, the Minister for Health (the Hon Kevin Prince) appointed the Western Australian Diabetes Services Taskforce to review diabetes services and recommend strategies for their improvement. One of these strategies is to develop a Statewide diabetes prevention plan. There are some regional programs that address the primary prevention of Type 2 diabetes as their main goal. However, as will be discussed in more detail in section 8.2, these are not linked to a comprehensive plan.

In this report, a major program is classified as one that consists of clearly defined objectives, strategies and evaluation. Currently, three major healthy lifestyle programs related to risk factors for Type 2 diabetes have been reported and used by all regions throughout the State. These programs are entitled “Food Cent\$”, “Supermarket Sleuth” and the “Be Active Program”.

8.1.1 *Food Cent\$ Program*

The “Food Cent\$” program was originally developed with funding from Healthway and the Health Department of Western Australia and supported by the Dietitian’s Association of Australia. The program is used to improve the food choices of people on low incomes by promoting a healthy way of eating to people with a limited food budget. Components of the program include supermarket visits, a 10-Plan (shows how to spend portions of food money so that food choices make a balanced diet) and the use of trained community educators. Low-income families are targeted through the Healthway sponsored Foodbank.

8.1.2 *Supermarket Sleuth*

“Supermarket Sleuth” is an initiative of Diabetes Australia-Western Australia, which involves two-hour conducted tours to the supermarket for eight participants. The aim is to educate people to make lifestyle changes that are beneficial to their health. They are designed to be relevant to the participants and teach them about reading food labels and making wise food choices in a fun, novel and non-threatening way. Once participants gain these skills they are then able to make their own nutrition decisions in-store and cope with the increasing number of food items appearing on supermarket shelves.

8.1.3 *Be Active Program*

The “Be Active” program is a National Heart Foundation (WA Branch) initiative. It encourages the public to be more physically active, by increasing the proportion of people who participate in low-moderate exercise on most days of the week and by assisting those who are inactive to

begin participation in regular physical activity. The program is broken down into different projects in order to address the needs of different target groups within the community. Some of the spin off projects from “Be Active” include “Be Active Everyday” which targets adults aged 35 years and over, and the “Be Active Together” Program in the City of Bayswater and Shire of Swan. This program targets adults from CALD populations, people aged between 17 and 35 years with dependents and adults who are currently inactive or are only achieving low levels of physical activity.

8.2 Major Programs/Activities for each Region in WA

There are seven rural health regions and three metropolitan health regions in Western Australia. At present, there is no Statewide strategic plan addressing the primary prevention of Type 2 diabetes. Each health region has implemented different programs/activities for the primary prevention of Type 2 diabetes, based on the demographics and special needs of their local communities.

To identify these programs, each person interviewed was asked to name the sources of their information for their region regarding health risk factors for Type 2 diabetes, the programs/activities currently being implemented, evaluation measures being used and reports that have been produced on these activities. See Appendix 1: Telephone survey administered to each Regional Public Health Unit and Appendix 2: Telephone survey administered to Aboriginal Medical Services. The regions discussed in this report are the Kimberley, Pilbara, Gascoyne/MidWest, Goldfields, Wheatbelt/Midlands, North Metropolitan, East Metropolitan, South-West and Great Southern.

8.2.1 Kimberley Region

8.2.1.1 Summary of risk factor prevalence

The Kimberley is the most northern region of Western Australia, consisting of major towns such as Broome, Derby and Kununurra. (See Appendix 3: Map of WA Health Regions). The Aboriginal population in the region comprises 45% of the total population (Kimberley Public Health Unit - Derby 1997). Reflecting the high rates of nutrition-related diseases in the Australian Aboriginal population, the Kimberley has observed one of the highest self-reported diabetes prevalence rates in the State (Health Department of WA 1999). In 1995, the Kimberley also had one of the highest percentages (40%) of males doing no physical activity and had a statistically significant lower overall food habits score, as well as being the region with the highest proportion (33%) of current smokers (Milligan 1998).

Healthy lifestyle programs targeting risk factors, including those associated with Type 2 diabetes in the region are run by the Kimberley Public Health Unit and coordinated by the Public Health Nutritionist and Health Promotion Officer. Other programs/activities in the region are coordinated by the Aboriginal Medical/Health Services (AMS) located in Broome, Derby, Kununurra, Wyndham and Halls Creek, Community Health Centres and local clinics or hospitals.

8.2.1.2 Sources of information

Risk factor information for the Kimberley region has been sourced from local nutrition and tobacco smoking information taken from store turn-over in five communities as a percentage of grocery sales and the percentage of money spent on tobacco products and grocery products. Other sources include research at Looma community (Gault et al. 1996 & McDermott et al. 1998) and risk factor screening at community events and local shopping centres.

8.2.1.3 Programs

The Kimberley region has several programs in progress through community stores and supermarkets, as well as several school-based programs and an Aboriginal community program. As evidenced in Table 1, the major programs incorporate a variety of different educational and behavioural strategies aimed at indigenous and non-indigenous community members. In addition, the Community Store Management program aims to improve the quality and supply of healthy foods in remote Aboriginal communities. Evaluation of the Healthy Weight Program, Shelf Talkers and Canning Stock Route were shown to be positive, with the results of other programs unavailable at the time of writing. Program evaluation focused on formative and process outcomes. An Aboriginal Community Program known as the Looma Healthy Lifestyle Program has received recognition for being a successful community project in the Kimberley. Details of the program evaluation measures and results for Western Australia can be found in Appendix 5.

Setting	Name	Brief Description
Community	Healthy Weight Program	Focuses on eating and exercise in the indigenous population. Looks at sustained lifestyle changes and gives priority to loss of 'belly fat'.
	Shelf Talkers	Encourages stores and supermarkets to offer healthy food choices and influence food-purchasing decisions at the point of sale.
	Community Store Management Program	Methods to improve the quality and supply of nutritious foods in remote Aboriginal communities and to raise the community's awareness of the importance of the store on the health of the community.
	Looma Healthy Lifestyle Program	Focuses on sustained methods of weight control by working together to prevent people from developing Type 2 diabetes.
School	Canning Stock Route Challenge – You don't have to get diabetes (Type 2)	Teaches the need for good nutrition and exercise for health. Aims to create awareness among primary school children of the healthy lifestyle behaviours needed to prevent diabetes.
	Feed on Math\$	Teaches high school and adult education students to make healthy food choices on a limited budget. Activities are similar to "Food Cent\$"
	Jabby Don't Smoke	A multi-media primary school-based tobacco education package with pre-exposure television and radio to increase impact and awareness of the package.

Other Type 2 diabetes programs/activities supplement the major programs in the region and are generally conducted by Community Health, AMSs, local clinics or local hospitals at different communities in the Kimberley. Some of the activities are currently being implemented while others are either ongoing or have recently finished. The current activities include risk factor screening at Wyndham, Broome and Derby Aboriginal Regional Medical Services, exercise classes for women in Wyndham, nutrition education for people with diabetes and people at risk through the Derby AMS, classes on cooking bush tucker and health education classes at school on healthy eating, also through the Derby AMS. The “Food Cent\$” Project is ongoing, while five two-day nutrition workshops in Broome and Kununurra for Aboriginal Health Workers and people working in food and nutrition with Aboriginal people called ‘How to conduct nutrition education activities for Aboriginal people’. This was conducted in 1998 and 2000.

8.2.2 Pilbara Region

8.2.2.1 Summary of risk factor prevalence

The Pilbara region is situated south of the Kimberley and contains the main town centres of Port Hedland, Karratha and Newman (see Appendix 3: Map of WA Health Regions). In 1991, the proportion of indigenous people located in the ATSI region of South Hedland was 10.1% and the proportion of indigenous people in the Warburton region, (of which one-quarter of the region is situated in the Pilbara) was 24.2% (Australian Bureau of Statistics 1997a). See Appendix 4: Map of ATSI Regions.

In 1995, the Pilbara had a significantly lower overall healthy food habits score than the entire State. The region also had one of the highest percentages of people who spread their bread thickly with butter or margarine and had the highest percentages of males and females classified as overweight (Milligan, Daly & Codde 1997f; Milligan 1998). The Pilbara was second to the Kimberley as the region with the highest current smoking rate in 1995 (Milligan 1998).

Healthy lifestyle programs targeting primary prevention of Type 2 diabetes in the Pilbara region are based at the Pilbara Public Health Unit in South Hedland and coordinated by the Nutrition Coordinator. Other programs/activities in the region are coordinated by Diabetes Educators at local Community Health Units, the Aboriginal Medical Services in Port Hedland, Roebourne and Jigalong, local clinics and hospitals. At the time of writing this report, there are currently no locally-based healthy lifestyle programs/activities addressing primary prevention of Type 2 diabetes risk factors in the town of Karratha and Roebourne/Wickham, due to lack of staffing and funding. Karratha currently has no dietitian, nutritionist, diabetes educator or Aboriginal Health Workers located in the town. However, Karratha does have access to the Pilbara Public Health Unit dietitian and part-time services of a diabetes educator. According to Cechner (1999), Karratha is said to be ‘lacking services for prevention and management of diabetes.’

8.2.2.2 Sources of information

Some risk factor information for the Pilbara region is available through local general practitioners, who have been asked to enter diabetes cases onto a register. However, this

database is still incomplete and therefore, incidence and prevalence levels of diabetes in the Pilbara are unknown. Most of the data for diabetes is based on hospital admissions or mortality data. Currently, there are no data from the remote communities. Other sources include local risk factor screening at community events and shopping centres.

8.2.2.3 Programs

The Pilbara has several major programs currently being implemented in the community, school, arts and clinical settings. As evidenced in Table 2, there are two community-based programs. One aims to train local Aboriginal women to support mothers and babies in their community, while the other aims to develop culturally appropriate alternatives to dietary habits of the Muslim population. Similar to the Kimberley region, a school-based nutrition and exercise program is being implemented. In addition, a local Aboriginal arts group toured the Pilbara promoting healthy eating and exercise to prevent Type 2 diabetes amongst Aboriginal populations. Finally, the Pilbara has established a clinical renal and diabetes working party to develop a regional plan. At the time of writing, few evaluation results of these programs were available, although the Strong Women, Strong Babies, Strong Culture Program and the Canning Stock Route Challenge – You Don't Have to Get Diabetes (Type 2) has attracted interest in broader implementation. Further details of each program has been provided in Appendix 5: Program evaluation measures and results for WA.

Setting	Name	Brief Description
Community	Strong Women, Strong Babies, Strong Culture Program	Trains local Aboriginal Women to provide support and improve the health of mothers and babies in their local community
	Muslim Diabetes Prevention Program	Developed culturally appropriate alternatives to the Muslim populations' dietary habits and promoted healthy eating habits over a six-week course.
School	Canning Stock Route Challenge – You Don't Have to Get Diabetes (Type 2)	Teaches the need for good nutrition and exercise for health in primary school children by simulating walking the Canning Stock Route.
Arts	Giving It a Go	Video – Theatre production by a local Aboriginal group promoting exercise and healthy eating as ways to prevent Type 2 diabetes. The play toured the Pilbara.
Clinical	Renal and Diabetes Working Party	A working party organised to draw up a program plan for renal and diabetes to cover the spectrum of prevention/promotion, diagnosis/treatment and continuing care.

Other programs/activities in the region that supplement the major programs are usually coordinated by community health staff, Aboriginal Medical Services and local hospital clinics at various communities in the Pilbara. Some of the activities are currently being implemented or have recently finished. Current activities include the FoodCent\$ project with training sessions conducted in May 1999, walking groups in three remote communities, education sessions on hunting, walking and bush foods through Puntukurnu (Jigalong) AMS and risk-factor screening through Puntukurnu AMS with a post-test questionnaire on knowledge about diabetes, smoking and alcohol. Clients are also screened for blood lipids. In the past activities such as risk factor screening for workplaces such as BHP and Cargill Salt have been conducted. Diabetes camps have also been held. A two-day "Eat Healthy Tucker Training Workshop" was held in early 1999 and provided people with knowledge and skills to implement their own nutrition workshop.

8.2.3 Gascoyne Region

8.2.3.1 Summary of risk factor prevalence

The Gascoyne region includes the townships of Carnarvon, Exmouth, Denham and Onslow (See Appendix 3: Map of WA Health Regions). The indigenous population in the Gascoyne region in 1996 comprised 10% of the total population. Lifestyle risk factors for the Gascoyne region alone are difficult to identify as the Health Department of WA includes the Gascoyne region within the larger Mid-West region in many reports. However, a recent report that provides some regional risk factor information was published in December 1999, titled 'Health of the Gascoyne Residents' (Achat & McCaul 1999). This report, showed that in 1995, the Gascoyne and Mid-West regions, had a higher percentage of current smokers (29%) than Western Australia as a whole (23%) and in 1992 the prevalence of vigorous exercise was lower among Gascoyne and Midwest residents compared with other regions in Australia (Achat & McCaul 1999).

8.2.3.2 Programs

Major healthy lifestyle programs targeting the primary prevention of Type 2 diabetes in the Gascoyne region are currently centred at the Gascoyne Public Health Unit in Carnarvon and the Carnarvon Aboriginal Medical Service. Other programs/activities in the region may also be coordinated by the local hospital or community health centres.

In 1999, the main activities currently being implemented in the Gascoyne region consist of the establishment of a collaborative diabetes committee and a community-based program known as the "Healthy Weight Program" which is a workshop-based community nutrition education program. The first year of the "Healthy Weight Program" was completed in November, 1999 and a final report is available from Healthway or the Office of Aboriginal Health. The program restarted in March 2000, however, after discussion with the community, the program will change its focus to issues of supply and access to healthy food and working with the community to address the environmental impacts on their health. Further details of these programs can be located in Appendix 5, along with program evaluation measures and results.

Table 3: Summary of Programs in the Gascoyne Region		
Setting	Name	Brief Description
Community	Collaborative Diabetes Committee	A five-year plan linked to the National Diabetes Strategy. Aims to reduce the prevalence of Type 2 diabetes by reducing the associated risk factors as well as addressing the cultural needs of the local community.
	Healthy Weight Program	Two workshops every month on healthy food choices and the value of regular exercise. Workshops involve the school, store and community as well as individuals.

Other activities/programs that supplement the major programs in the Gascoyne include an over 50s exercise group (in conjunction with the local hospital); a production of a newsletter – Fitness Challenge; a school-based smoking prevention program and fitness activities such as a local triathlon and belly dancing.

The Carnarvon Medical Service Aboriginal Corporation also coordinates healthy lifestyle activities/programs such as community walking groups, work-site risk factor screening, screening at shopping centres and a Diabetes Education Clinic.

8.2.4 Mid-West Region

8.2.4.1 Summary of risk factor prevalence

The Mid-West region includes the major township of Geraldton plus smaller centres such as Greenough and Dongara (See Appendix 3: Map of WA Health Regions). The Health Department of Western Australia classifies the Gascoyne health region as part of the Mid-West, and this region was discussed in the previous section. Therefore this section will discuss the health service regions of Geraldton, the Mid-West and Murchison. The indigenous population in these areas in 1991 was 7.3% (Australian Bureau of Statistics 1999c). The Mid-West Region had one of the State's highest levels of overweight in 1995 (Milligan 1998). It also had high levels of current smoking and hypertension in 1995 (Milligan, Daly & Codde 1997d).

Healthy lifestyle programs targeting the prevention of Type 2 diabetes in the Mid-West region are based at the Mid-West Public Health Unit in Geraldton and coordinated by the Nutrition Coordinator and the Diabetes Coordinator. Other programs/activities in the region are coordinated by the Diabetes Nurse Educator at Silver Chain and the Nutritionist/Health Promotion Officer at the Mid-West Health Service.

8.2.4.2 Sources of information

Risk factor information on the Mid-West region is sourced from two reports titled "Midwest and Gascoyne Health Survey," produced by the Health Department of WA, 1995 and the "Health Risk Factor Profile of Western Australians" (Milligan 1998).

8.2.4.3 Programs

The major programs currently being implemented in the Mid-West region are a community-based weight control program and a healthy food choice award program. Further details of these programs are included in Appendix 5, as well as program evaluation measures and results. The Mid-West region is currently planning a physical activity program for implementation in 2000.

Table 4: Summary of Programs in the Mid-West Region		
Setting	Name	Brief Description
Community	Food for Thought	Weight control program, consisting of six 90 minute sessions, focusing on attitude and behaviour change.
	Healthy Choices Award Program	Rewards and encourages food outlets to provide supportive environment to provide healthy food choices.

Other programs/activities currently being implemented in the Mid-West Region are coordinated either by the Mid-West Public Health Unit, the Mid-West Health Service or Silver Chain Nursing in Geraldton. The Mid-West Public Health Unit coordinates STARCAP which is a school canteen accreditation program, "Food Cent\$" and is currently at the coordination/planning stages of a new regional policy implementation for Type 2 diabetes. The Mid-West Health Service coordinates lifestyle risk factor screening and Diabetes Education groups for newly diagnosed Type 2 diabetes patients. The Diabetes Steering Committee coordinates the annual Diabetes Awareness Week. This committee is part of a three-year integrated service project funded by the Health Department of WA to improve coordination of services for diabetes management. They also have a diabetes register from which they mail a reminder letter to people with diabetes and people at risk inviting them to attend for a status review. The information is passed to their GP (a diabetes register is also currently being set up with local General Practitioners).

8.2.5 Goldfields Region

8.2.5.1 Summary of risk factor prevalence

The Goldfields Region includes the major town centres of Kalgoorlie and Esperance (See Appendix 3: Map of WA Health Regions). The indigenous population in this region in 1993 was estimated to be 7% (Lally 1999). In 1995, the Goldfields region had the highest percentage (14%) of people who used saturated fats (Milligan, Daly & Codde 1997a) and one of highest current population smoking rates (30%) in WA (Milligan 1998).

Healthy lifestyle programs targeting the primary prevention of Type 2 diabetes in the Goldfields region are based at the Goldfields Public Health Unit in Kalgoorlie and are coordinated by the Nutrition Coordinator and the Health Promotion Officer. The Eastern Goldfields Medical Division of General Practice Ltd also plays a major role.

8.2.5.2 Sources of information

Risk factor information for the Goldfields region is derived from the “Health Risk Factor Profile of Western Australians (Milligan 1998), and from the Aboriginal Medical Service medical records, which include a register of people with diabetes.

8.2.5.3 Programs

The major programs currently being implemented in the Goldfields region are school or community-based. As observed in Table 5, the school-based program is the “Kalgoorlie to Perth Pipeline”, which is similar to the Canning Stock Route challenge conducted in the Kimberley and Pilbara regions. The community-based program is part of the “Diabetes in Aboriginal Communities Project” titled the “Community Stores Project”, which are both diet-based programs for Aboriginal communities. A more detailed summary of these programs may be seen in Appendix 5, along with program evaluation measures and results.

Table 5: Summary of Programs in the Goldfields Region		
Setting	Name	Brief Description
Community	Diabetes in Aboriginal Communities Project	Provides dietetic and diabetes education services to Aboriginal people in Kalgoorlie-Boulder and Wiluna.
	Community Stores Project	A shelftalker designed to influence food-purchasing decisions. The project also aims to encourage community store owners to undertake training and to provide community education sessions about the shelf talker.
School	Kalgoorlie to Perth Pipeline	Teaches the need for good nutrition and exercise for health to primary school-aged children. Simulates walking the distance of the Kalgoorlie to Perth Pipeline.

Other activities/programs that supplement the major programs are coordinated either by the Goldfields Public Health Unit, the Eastern Goldfields Medical Division of General Practice or the Aboriginal Medical/Health Services in the region. These activities/programs include: risk factor assessment/screening; education sessions addressing both prevention and management; the “Food Cent\$” program; a first time parents program for non-indigenous parents, involving physical activity and weight control; a diabetes knowledge questionnaire for all Aboriginal Health Workers involved in assessing and educating people with diabetes; walking groups for Aboriginal people in Kalgoorlie; the “Best Start Program” (Healthy eating/cooking program for Aboriginal parents) and a cooking course for low-income earners in the Kalgoorlie region.

A Diabetes Register has been established in Kalgoorlie-Boulder and Wiluna, which will assist in the development of prevention and control strategies for different community groups, as well as showing the change in prevalence and spread of diabetes throughout Australia (Lally 1999).

8.2.5 Coastal and Wheatbelt / Midlands Region

8.2.5.1 Summary of risk factor prevalence

The Coastal and Wheatbelt/Midlands region contains the major townships of Northam, Merredin and Moora (see Appendix 3: Map of WA Health Regions). The indigenous population in the region represented 3.5% of the total population in 1991 (Rainsford 1998). In 1995, the region had one of the highest percentages (46%) of males doing no physical activity. It was also one of the regions with the highest proportion (44%) of overweight residents (Milligan 1998). The Midlands region also had one of the highest percentages (16%) of hypertension in Western Australia in 1995 (Milligan, Daly & Codde 1997c).

Healthy lifestyle programs targeting the primary prevention of Type 2 diabetes in the region are based at the Coastal and Wheatbelt Public Health Unit in Northam and coordinated by the Senior Project Officer – Nutrition. These and other programs/activities in the region are also implemented by Local Community Health Centres, diabetic educators from Silver Chain and the Western Health Service.

8.2.6.2 Sources of information

Risk factor information for the Midlands region is sourced from the “Health Risk Factor Profile of Western Australians” (Milligan 1998) and the “Food Habit Survey of Midlands Health Zone and its Health Service Areas” (Milligan, Daly & Codde 1997c).

8.2.6.3 Programs

As observed in Table 6, the major program currently being implemented in the Midlands region is the “Shape Up” community-based weight management program. A review of diabetes services in the Midlands Health Region has been completed and the plan disseminated to the four General Managers and the CEO of the Division of General Practice. Greater details of these programs can be found in Appendix 5, as well as evaluation measures and results.

Table 6: Summary of Programs in the Coastal and Wheatbelt Region		
Setting	Name	Brief Description
Community	Shape Up	Weight management program, focusing on educational, environmental and long-term strategies. Adapted from the Lighten Up program in QLD.
Review document	A review of diabetes services in the Midlands health region of rural WA.	Outlines the current diabetes services as they exist within the region.

Other activities/programs currently being implemented in the Midlands health region and are coordinated or implemented by Community Health, Coastal and Wheatbelt Public Health Unit, Western Health Service and Silver Chain. These programs include the “Food Cent\$” Project; Canteen Workshops and Accreditation Program; Diabetes education programs for newly diagnosed and at risk people with diabetes; Diabetes Awareness Days; a Meals on Wheels review for a diabetes menu; aged-care nutrition; Well Women’s Clinics (involving risk factor screening) and a Men’s Wellness Clinic; weight reduction programs for residents in a number of Wheatbelt communities; keep fit for the elderly exercise group in a number of towns; risk factor screening at community events; “Supermarket Sleuth” and diabetes education groups.

8.2.7 North Metropolitan Region

8.2.7.1 Summary of risk factor information

The North Metropolitan region covers the northern suburbs of the Perth Metropolitan area (See Appendix 3: Map of WA Health Regions). In 1995, the North Metropolitan region had the highest current smoking rates in the Perth Metropolitan area (Milligan, Daly & Codde 1997e).

Diabetes prevention is one of several priority areas for the North Metropolitan Public Health Unit. However, the single Diabetes Educator in this region is busy working on the management of people with existing Type 2 diabetes and there is little scope to provide programs focusing on the primary prevention of Type 2 diabetes.

8.2.7.2 Programs

The only program identified in this region was an Osborne Division of General Practice Program titled, “Diabetes Detection and Prevention Program” conducted in 1994. This program aimed to identify subjects at increased risk of developing Type 2 diabetes, identify previously undiagnosed people with diabetes, provide education seminars for new diabetics such as lifestyle modification seminars for subjects at increased risk of Type 2 diabetes and raise community awareness of diabetes and risk reduction. The program also aimed to increase General Practitioners’ involvement in the detection and management of Type 2 diabetes. The project formally started in August 1994 and was implemented in response to the National Action Plan – Diabetes – to the year 2000 and beyond report. The program concluded in June 1996. Evaluation results showed that the program was well received by the community and that specific high-risk ethnic groups also responded enthusiastically.

8.2.8 Eastern Perth Region

8.2.8.1 Summary of risk factor prevalence

The Eastern Perth Region covers the eastern suburbs of the Perth Metropolitan area (See Appendix 3: Map of WA Health Regions). In the inner city area of the Eastern Perth Region, Italian and Vietnamese communities constitute approximately 13% of the total population. In

1996, the inner city area of Perth had a considerably higher proportion of people born in non-English speaking countries (28%) and a higher proportion (27%) of people who reported they spoke English poorly or not at all compared with the east metropolitan area of Perth (Di Francesco, Gillam & Unsworth 1999). Language barriers combined with other factors such as cultural barriers and low levels of awareness amongst consumers of services available are thought to limit access to appropriate services other than their general practitioner amongst this group (Di Francesco, Gillam & Unsworth 1999).

8.2.8.2 Sources of information

Risk factor information on people living in the Eastern Perth Health Region was accessed from the 1995 WA Health Survey – “Health Risk Factor Profile of Western Australians” (Milligan 1998). Information was also derived from within the Eastern Perth Public and Community Health Unit, where information is collected on the health status of people living in the region.

Healthy lifestyle programs targeting the primary prevention of Type 2 diabetes in the region are centred at the Eastern Perth Public and Community Health Unit (EPPCHU) located in East Perth and coordinated by the Diabetes Program Officer, the Diabetes Educator, the Nutritionist or the Health Promotion Officers. Other programs/activities are conducted by the Department of Transport, the Aboriginal Medical Service (Derbarl Yerrigan) and the local Community Health Centres.

8.2.8.3 Programs

The East Perth metropolitan region has several major programs currently being implemented that are either business or community-based capacity building strategies. As observed in Table 7, these include the “Walking Promotion Small Grants Scheme” and the “Be Active Together Program” which encourages greater physical activity and contains sub-programs such as the “Muslim Women’s Learn to Swim Program” and the “Riverside Gardens Signage Project”. Much of this activity is funded through the Inner City Integrated Diabetes Care Project, Eastern Perth Public and Community Health Unit budget, Local Government and the Health Department of WA. A more detailed summary of these programs can be located in Appendix 5: Program evaluation measures and results for Western Australia.

Table 7: Summary of Programs in the East Perth Region		
Setting	Name	Brief Description
Community	Inner City Integrated Diabetes Care Project	The development of an integrated service delivery model that ensures equitable access to a full range of diabetes services, eg community group education, podiatry services, eye health and education for CALD groups.
	Be Active Together Program	The program encouraged adults who were currently inactive, or involved at low levels of activity, to increase their rate of participation in regular low to moderate physical activity and recreational pursuits.
	Muslim Women Learning to Swim Program	Promoted participation in physical activity and improvement in knowledge related to physical activity amongst Muslim women.
Community/ Environmental	Riverside Gardens Signage Project	The program intends to develop and install informational and directional signs for walkers in the Riverside Gardens Reserve and upgrade the facilities provided.
Community	Walking Promotion Small Grants Scheme	Seeding grants ranging from \$2000-\$4000 have been awarded to six successful applicants to promote and increase participation in walking and physical activity.

Other activities/programs currently being implemented include: the “Know Your Risks” program; the development of a walking group manual as part of the Ministry of Sport and Recreation’s new interagency ‘Walk Friendly’ initiative; the “Food Cent\$” program developed as a train the trainer package for Vietnamese leaders; the “Food Cent\$” program for Aboriginal people through Derbarl Yerrigan; the recently implemented Afghan Women’s Physical Activity Project; a social capital research project on how to build an enduring community walking group; and the “Healthy Choices Award Scheme” which encourages lunch bars and restaurants to provide healthy food in the Eastern Perth Metropolitan region.

8.2.9 South-West/Bunbury Region

8.2.9.1 Summary of risk factor prevalence

The South-West Health Region is located in the South-West of Western Australia and includes the major centre of Bunbury (see Appendix 3: Map of WA Health Regions). The health service areas within the region are Bunbury, Harvey-Yarloop, Peel, Vasse-Leeuwin, Warren-Blackwood and Wellington. In 1995, the South-West region had one of the highest rates (4%) of self-reported Type 2 diabetes (Milligan 1998). In the same year Bunbury and Wellington areas reported higher percentages (15% and 16% respectively) of residents who used butter or lard compared with the State average (10%) and the Harvey-Yarloop area reported lower (57%) than State averages for trimming all of the fat off their meat (61%) (Milligan, Daly & Codde 1997g).

8.2.9.2 Sources of information

Local risk factor information for the region is sourced from the “Health Risk Factor Profile of Western Australians,” (Milligan 1998) and data from local risk factor screening programs conducted at community events and shopping centres.

Healthy lifestyle programs targeting the primary prevention of Type 2 diabetes in the region are based at the South-West Population Health Unit located in Bunbury and coordinated by the Community Diabetes Nurse and the Community Dietitian. Other programs/activities in the region targeting risk factors for Type 2 diabetes are coordinated by the National Heart Foundation (Western Australia), Community Health Services or the local hospital.

8.2.9.3 Programs

The major programs currently being implemented in the South West Health Region are community-based. As observed in Table 8, these include the “Vasse Leeuwin Diabetes Project”, aimed at developing diabetes management guidelines and an integrated diabetes network with the region, the “Planning for a Comprehensive, Seamless Diabetes Program”, which is associated with Diabetes Week, and raises awareness of weight, nutrition and physical activity. In addition, the worksite-based “Diabetes Know Your Risks Screening Program” and hospital based “Can’t Weight to Get Started Program” lifestyle modification program are offered in this region as part of the prevention of Type 2 diabetes. Further details of these programs can be found in Appendix 5.

Table 8: Summary of Programs in the South West Region		
Setting	Name	Brief Description
Community	Vasse Leeuwin Diabetes Project	The program aims to develop a diabetes plan and a coordinated mechanism for developing diabetes management guidelines and referral networks for the Vasse Leeuwin Health District.
	Planning for a comprehensive, seamless diabetes program for the Bunbury Health Service	Raises awareness about weight, nutrition and physical activity during the annual Diabetes Week.
	Diabetes Know Your Risk Screening Program	Aims to increase the number of people who know of their individual risk factors for developing diabetes and their need to reduce these risk factors.
Community/hospital	Can't weight to get started program	A hospital and community based program for people who are seeking to develop a healthier lifestyle in the Greater Bunbury Area.

Other programs/activities supplementing the major programs in the South-West region are conducted by the National Heart Foundation (Western Australia), Community Health Services and the South-West Aboriginal Medical Service. Some of the activities currently being implemented in the region are supermarket tours using the “Supermarket Sleuth” concept, community walks, use of the media (local paper and ABC Radio) for diabetes awareness raising, exercise activities such as an over 50s exercise group, a fun run/walk, a runners club, Jump Rope for Heart, Walk to the Cape, Heart Movers, Climb to the Top and a walk to school campaign. Nutrition activities such as parenting nutrition talks, nutrition with prisoners and the “Food Cent\$” Program, are also offered. Diabetes awareness information displays at the “Get up and Go Expo for Seniors” and group diabetes education sessions for people with diabetes, those at risk of diabetes and their families have also taken place. Recently the Health Department of WA funded an integrated diabetes service program for the South-West and lower and upper Great Southern regions of Western Australians over three years.

8.2.10 Great Southern Region

8.2.10.1 Summary of risk factor prevalence

The Great Southern region is located in the south of Western Australia comprising the major centres of Albany, Narrogin and Katanning (see Appendix 3: Map of WA Health Regions). This region contains three health service areas, the Central Great Southern, the Lower Great Southern and the Upper Great Southern. In 1995, the Lower Great Southern region had one of the highest rates of self-reported Type 2 diabetes (4.8%) in the State. A high percentage of residents (15%) reported thickly spreading their bread with butter or margarine compared with the State (10%) (Milligan, Daly & Codde 1997b) and the prevalence of hypertension in the region is high (15%) compared with the State (12%) (Milligan 1998).

Healthy lifestyle programs targeting the primary prevention of Type 2 diabetes in the region are based either at the Lower Great Southern Health Service located in Albany or the Upper Great Southern Health Service located in Narrogin and coordinated by the Diabetes Program Coordinator and the Diabetes Coordinator respectively. Other programs/activities in the region are conducted by community health or the Aboriginal Medical Services.

8.2.10.2 Sources of information

Risk factor information on the Great Southern Health region is sourced from the Health Risk Factor Profile of Western Australians (Milligan 1998), the “Food Habits Survey of the Great Southern Health Zone and its Health Service Areas” (Milligan, Daly & Codde 1997b), the Great Southern diabetes register (started in June 1999) and from “An introduction to the health status of residents in the Lower Great Southern of Western Australia 1998” (Maujean 1998).

8.2.10.3 Programs

As observed in Table 9, the major programs currently being implemented in the Lower Great Southern Health region are two community-based programs, the “Healthy Bodies” program and an educational program for people diagnosed with impaired glucose tolerance (IGT). A more detailed summary of these programs can be located in Appendix 5: Program evaluation measures and results for Western Australia.

Table 9: Summary of Programs in the Great Southern Region		
Setting	Name	Brief Description
Community	Healthy Bodies	A five-week program that focuses on behaviour change modification and self-efficacy to reduce lifestyle risk factors for Type 2 diabetes and cardiovascular disease
	Education program for people with impaired glucose tolerance	Aims to delay or prevent the progression from impaired glucose tolerance to confirmed diabetes

Other programs/activities that supplement these major programs are often conducted by community health or the Aboriginal Medical Services. They include the “Get Real” healthy lifestyle program in the Upper Great Southern Health Service area; an over 55s exercise group; a boot scooting group for the Aboriginal population; cooking activities for the Aboriginal population; and a lifestyle exercise group for Aboriginal people with diabetes or who are at risk of developing Type 2 diabetes in the Central Great Southern area. An Action Plan for Diabetes is currently being developed for Aboriginal people under 25 years and for Aboriginal people with diabetes in Narrogin. In addition, risk factor screening at community events in the Central Great Southern area was conducted, as was a women’s weight control program “When Weight Weighs You Down”. A men’s performance management group and a senior’s exercise group as part of a falls prevention program called “Stay on Your Feet” in the Upper Great Southern area, have also taken place.

8.3 Chapter Eight Summary

At present three programs operate Statewide, the “Supermarket Sleuth”, “Food Cent\$” and “Be Active.” These programs do not directly target all of the risk factors associated with the primary prevention of Type 2 diabetes. In addition, they are independently coordinated by each WA health region, resulting in differences between regions in the number and intensity of programs delivered.

In Western Australia, each health region develops or modifies their own Type 2 diabetes program in accordance with the perceived needs of their community. Information on community needs and risk factor information relating to Type 2 diabetes is most commonly sourced from State health survey information, or anecdotal evidence. Type 2 diabetes programs that have been developed within each region are more likely to be a combination of primary, secondary and tertiary prevention, rather than just primary prevention. The reason for this in part, is that attempts to modify the risk factors of obesity, diet and physical activity relate to diagnosed and undiagnosed Type 2 community members because those associated with the disease will benefit from the intervention irrespective of their current Type 2 diabetes status. Therefore, programs considered primary prevention are probably inclusive of diagnosed members, particularly in health regions outside of Perth.

In regions such as the Kimberley, Pilbara, Gascoyne and Goldfields, the majority of programs are targeted towards the Aboriginal population due to the higher proportion of Aboriginal people living in these regions, and the high rates of diabetes and associated risk factors. Other regions within the State tend to have community-based projects targeting either the CALD population groups in their region or the general community. However, most of these programs tend to be one-off programs tied to the funding process, rely on unskilled staff and are limited by a high turnover of staff working on these projects. As a result, most are limited in their comprehensiveness, as few provide participants with a combination of knowledge, skills development and environmental opportunities, recognised as the most likely components to bring about behaviour change. Furthermore, a limited number of evaluation processes are used, and of those conducted, effectiveness of the program is unlikely to be determined.

9.0 PRIMARY PREVENTION PROGRAMS IN OTHER AUSTRALIAN STATES AND TERRITORIES

Programs addressing the primary prevention of Type 2 diabetes in Australia are either national programs funded or implemented by the Commonwealth Government and national health organisations such as National Health and Medical Research Council or are State/territory-wide programs funded or implemented by State and territory health organisations.

9.1 *Nationally*

In early 1996, the Australian Government made a strong commitment to address diabetes and acknowledged that Type 2 diabetes is reaching epidemic proportions. In that year, State and territory health ministers made diabetes mellitus the fifth National Health Priority Area and a Ministerial Advisory Committee on Diabetes was established. From this the National Diabetes Strategy and Implementation Plan (Colagiuri, Colagiuri & Ward 1998) was initiated. A significant recommendation from this strategy in addressing the primary prevention of Type 2 diabetes was to implement a national early detection of Type 2 diabetes program. Since then the “Community Awareness Diabetes Strategy” (CADS) was launched. In addition, the “Active Australia: Framework for Action for Physical Activity and Health” was developed, the “National Divisions Diabetes Program” from the Divisions of General Practice was implemented. “Acting on Australia’s Weight: A strategic Plan for Prevention of Overweight and Obesity” has

Setting	Name	Brief Description
Community	Community Awareness Diabetes Strategy	A nationally funded strategy by the Commonwealth Department of Health and Aged Care and coordinated by Diabetes Australia with one project coordinator in each State and territory.
	Active Australia Framework for Action for Physical Activity and Health	The strategies outlined in the document aim to improve the health and wellbeing of all Australians by promoting increased levels of moderate-intensity physical activity.
	Acting on Australia’s Weight	Aims to prevent further weight gain in adults and eventually reduce the proportion of the adult population who are overweight or obese; and to ensure children maintain a healthy body weight.
	National Diabetes Strategy 2000-2004	The aims of the strategy are to ensure appropriate attention is given to primary prevention, including risk reduction and effective high quality management of diabetes and research.
General Practice	The National Divisions Diabetes Project	A coordinated approach to diabetes care in Australian general practice, facilitating the links between division activities with those of the National Diabetes Strategy.

commenced and the “National Diabetes Strategy 2000-2004” has been developed to address primary prevention of Type 2 diabetes and risk factors associated with Type 2 diabetes. Table 10 summarises these national Type 2 diabetes primary prevention programs.

9.1.1 Community Awareness Diabetes Strategy

The “Community Awareness Diabetes Strategy” (CADS) is a national strategy funded by the Commonwealth Department of Health and Aged Care and coordinated by Diabetes Australia with one project coordinator in each state and territory. As part of the strategy, a campaign known as ‘Defuse Diabetes’ was launched on World Diabetes Day, 14 November 1999. The aim of the strategy is to raise awareness of diabetes and help to diagnose some of the 400,000 Australians who have Type 2 (adult onset) diabetes and are not aware they have it. National evaluation of the campaign is currently being conducted by a market research company in Sydney, with State evaluation being conducted by the project officer at Diabetes Australia in each State and territory.

9.1.2 Active Australia: Framework for Action for Physical Activity and Health

“Developing an Active Australia: A framework for Action for Physical Activity and Health” is a Commonwealth Department of Health and Family Services initiative. The strategies outlined in the document aim to improve the health and wellbeing of all Australians by promoting increased levels of moderate-intensity physical activity. Planning stages of the document occurred during 1996 and 1997, with the document being published in 1998. An interim evaluation of Active Australia health-related initiatives is planned for the year 2000. Baseline measures for levels of physical activity in the population are in place, so that national levels of activity can be assessed (Commonwealth Department of Health and Family Services 1998).

9.1.3 National Divisions Diabetes Program

The “National Divisions Diabetes Program” (NDDP) developed in 1997, is an initiative of the Integration Support and Evaluation Resource Unit (SERU) funded by the Divisions of General Practice Program, General Practice Branch, Commonwealth Department of Health and Family Services. (Integration Support and Evaluation Resource Unit (SERU) 1998) The “National Divisions Diabetes Program” is a coordinated approach to diabetes care in Australian general practice. Development of the program is in line with the inclusion of diabetes as a National Health Priority and facilitates linking of division activities with those of the National Diabetes Strategy. The aims are to improve the quality of diabetes care in general practice; to improve the health outcomes of people with diabetes; to identify Type 1 and Type 2 diabetes early; and to prevent Type 2 diabetes. The primary prevention aspect of the program aims to facilitate GPs working in partnership with other services in the promotion of physical activity and improved nutrition in local communities. It will also address the needs of disadvantaged or target groups in relation to diabetes, in particular Aboriginal and Torres Strait Islander communities and recognised high-risk ethnic groups. The evaluation design is a pre and post-test design

comparing outcomes for individual participants. Evaluation results from 1997-2000 regarding the effectiveness of GP management in achieving better health and health service outcomes have recently been released.

9.1.4 Acting on Australia's Weight

“Acting on Australia's Weight: A strategic Plan for Prevention of Overweight and Obesity” is a National Health and Medical Research Council initiative (National Health and Medical Research Council (NHMRC) 1996). The timeframe for the implementation of the strategy is 10 years from January 1997, with an interim evaluation to take place after five years. The goal of the strategy is to prevent further weight gain in adults and to eventually reduce the proportion of the adult population that is overweight or obese; and to ensure the healthy growth of children. The target groups for the strategy are Aboriginal and Torres Strait Islander peoples, men aged 25-40 years, women of menopausal age and children and adolescents. The model adopted for the strategy proposes that the macro-environment of food supply and opportunities for physical activity determine the prevalence of overweight and obesity in a population, while the micro-environment of knowledge, beliefs and social attitudes and behaviour determine the presence of overweight and obesity in an individual. Therefore the strategic plan focuses on changes to the macro-environment to make it easier for people to undertake physical activity and make healthier food choices. Evaluation measures will include monitoring changes in weight and waist measurements of the Australian population using standardised methods, monitoring physical activity patterns by using ongoing surveys and using standardised methods of measuring activity and monitoring dietary intake, with a particular focus on fat – energy intake and diet-related community weight control practices.

9.1.5 National Diabetes Strategy 2000-2004

The “National Diabetes Strategy 2000-2004” is a Commonwealth Government initiative based on the results of consultations undertaken in the development of two reports. (Commonwealth Department of Health and Aged Care 1999) The two reports are the National Diabetes Strategy and Implementation Plan 1998 (Colagiuri, Colagiuri & Ward 1998) and the 1998 Report to Health Ministers on Diabetes Mellitus (Commonwealth Department of Health and Aged Care & Australian Institute of Health and Welfare 1999). These two reports are used as a platform for the National Diabetes Strategy. The aims of the strategy are to ensure appropriate attention is given to primary prevention, including risk reduction, effective high quality management of diabetes and research. The strategy aims to establish an effective partnership between Governments, health care professionals, non-Government organisations, consumers and carers and to build on experience and successes to date. The evaluation will include process, output and outcome, and the use of qualitative and quantitative measures. It is noted that evaluation will only reach its full potential if it is based on measures put in place before or soon after the commencement of initiatives outlined under the strategy.

9.2 Northern Territory

Major primary prevention programs for Type 2 diabetes in the Northern Territory are controlled by the Territory Health Services–Northern Territory Government. Diabetes programs are often coordinated by nutritionists, Aboriginal nutrition officers and health promotion officers. The Northern Territory has been classified as the Australian State or territory to have the highest proportion of indigenous people, representing 22.7% of the population (Australian Bureau of Statistics 1999c). Current Type 2 diabetes primary prevention activities being implemented in the Northern Territory are targeted at the indigenous population.

As observed in Table 11, the major programs for the Northern Territory are “Northern Territory Stores Project,” “Central Australian Remote Community Diabetes Project” and the “Strong Women, Strong Babies, Strong Culture” program. Territory Health Services has also recently released a document titled “Preventable Chronic Diseases Strategy-the Evidence Base” in August 1999 (Territory Health Services 1999). A more detailed summary of these programs can be located in Appendix 6: Program evaluation measures and results for Australia.

Setting	Name	Brief Description
Community	Northern Territory Stores Project	Involves food and nutrition training for people working in community stores. Resources have been developed and are used to encourage Aboriginal people to become more involved in their community store and to develop and put in place healthy food and nutrition policies for their local store.
	Central Australian Remote Community Diabetes Project	A pilot project that aims to provide a remote community with access to equivalent diabetes services as urban centres and ensure staff have knowledge and skills regarding diabetes.
	Strong Women, Strong Babies, Strong Culture	Trains local Aboriginal women to provide support and improve the health of mothers and babies in their local community.
	Preventable Chronic Disease Strategy	A 10-year strategic plan that outlines 5 common chronic diseases including diabetes and a number of key result areas and discrete programs or interventions to address these diseases.

9.3 Queensland

Major primary prevention programs for Type 2 diabetes in Queensland are controlled by Queensland Health, with some programs based either at the Queensland Health Tropical Public Health Unit in Cairns or the Southern Public Health Unit. In 1991, the indigenous population in Queensland represented 2.4% of the total population. However, in Northern Queensland such as the ATSIC regions of Mount Isa, Cooktown and Torres Strait Area, indigenous population rates were as high as 17.1%, 42.4% and 77.4% respectively (Australian Bureau of Statistics 1999c). Many healthy lifestyle programs address both indigenous health and non-indigenous health issues. In 1996, the 'Meriba Zageh for Diabetes' blueprint for diabetes prevention and management in the Torres Strait was developed. Based upon health promotion principles, Meriba Zageh focuses on community action, healthy public policy and case identification and quality care of Type 2 diabetes. Within this framework an action plan was developed to address the food supply, eating and exercise, diabetes and women, smoking prevention and clinical issues. Meriba Zageh for Diabetes provides a model for the development of community based Type 2 diabetes prevention programs.

Table 12 summarises current programs addressing primary prevention of risk factors for Type 2 diabetes. These include, the "Lighten Up Program," the "Healthy Weight Program," and the "Lunch Box" project. A more detailed summary of these programs can be located in Appendix 6: Program evaluation measures and results for Australia.

Table 12: Summary of Programs in Queensland		
Setting	Name	Brief Description
Community	Lighten Up Program	Weight management program, focusing on educational, environmental and long-term strategies.
	Healthy Weight Program	Focuses on eating and exercise in the indigenous population and gives priority to loss of 'belly fat'.
School	Lunch Box Program	Focuses on knowledge and behaviours related to healthy food choices for school lunches for year one children.

9.4 South Australia

Major programs addressing primary prevention of Type 2 diabetes in South Australia are generally controlled by Health Promotion SA, Department of Human Services or Diabetes Australia, South Australia. The indigenous population in South Australia in 1991 was one of the lowest in Australia, representing 1.2% of the total population, with the highest percentage in the ATSI region of Port Augusta with 6.1% (Australian Bureau of Statistics 1999c). Healthy lifestyle programs in South Australia are generally targeted at the non-indigenous population.

As shown in Table 13, the major programs currently being implemented in South Australia that address the primary prevention of Type 2 diabetes are the “Maybe It’s Diabetes” campaign and “A Celebration in Diabetes Prevention” program. A more detailed summary of these programs can be located in Appendix 6: Program evaluation measures and results for Australia.

Table 13: Summary of Programs in South Australia		
Setting	Name	Brief Description
Community	Maybe it's Diabetes Campaign	An awareness campaign that encourages lifestyle behaviours that minimise the risk of developing diabetes. Used as a message in sporting and arts venues.
	A Celebration in Diabetes Prevention	Focuses on primary health care strategies with an aim to reduce the long term incidence and prevalence of Type 2 diabetes in the region.

9.5 Victoria

Major programs addressing primary prevention of Type 2 diabetes in Victoria are generally controlled by the Victorian Government through the Department of Human Services and VicHealth. The proportion of indigenous people in Victoria in 1991 was the lowest in the country representing 0.4% of the total population (Australian Bureau of Statistics 1999c). Therefore, healthy lifestyle programs aimed at reducing risk factors for Type 2 diabetes are mainly targeted to the health needs of non-indigenous Australians.

As observed in Table 14, programs currently being implemented in Victoria that address primary prevention of Type 2 diabetes are the “Active for Life” program, the “Physical Activity Strategy” and Primary Prevention Using Arts and Sports Sponsorship. A more detailed summary of the Active for Life program can be located in Appendix 6: Program evaluation measures and results for Australia.

Table 14: Summary of Programs in Victoria		
Setting	Name	Brief Description
Community	Active for Life Campaign	Aims to encourage older adults (50+ years) to participate in regular moderate physical activity.
	Active for Life – Physical Activity Strategy	Encourages organisations and sectors that contribute to physical activity promotion, services and facilities, to work in partnership to enhance lifelong participation in physical activity.
	Primary Prevention Using Arts and Sports Sponsorship	Aims to market specific health messages and promote healthy environments through policy and program development.

9.6 New South Wales

Major programs addressing Type 2 diabetes primary prevention in New South Wales are generally controlled by the New South Wales Health Department's Centre for Research and Clinical Policy. In 1991, the indigenous population in New South Wales represented 1.2% of the total population. However, New South Wales has the highest number of indigenous people in their State when compared with other Australian States and territories. In 1991, 26.5% of the total Australian indigenous population were resident in New South Wales (Australian Bureau of Statistics 1999c).

As observed in Table 15, programs addressing primary prevention of Type 2 diabetes currently being implemented in New South Wales include School Canteen Improvement, smoking cessation programs and Active Australia's "Simply Active Everyday" program. A more detailed summary of these programs can be located in Appendix 6: Program evaluation measures and results for Australia.

Table 15: Summary of Programs in New South Wales		
Setting	Name	Brief Description
School	School Canteen Improvement	Aims to improve food supply in the school environment and to increase effective nutrition education in schools.
Community	Smoking Cessation Programs	Aims to reduce the exposure of the community to tobacco products and incentives to buy tobacco. Consists of many components such as tobacco advertising legislation, tobacco sales to minors program and the NSW smoke-free workplace policy.
	Active Australia's Simply Active Everyday Program	Provides a strategy vision and framework for the promotion of physical activity. People aged 55 years and over are the target population for 1999/2000.

Active Australia's, Simply Active Everyday program is an initiative of the New South Wales Health Department (NSW Physical Activity Taskforce 1998). The program provides a strategy vision and framework for the promotion of physical activity in NSW 1998-2002. Three strategic goals are proposed and accompanied by 10 strategic objectives, subdivided into 64 strategies. The three main strategic goals are to increase safe and ongoing participation in physical activity, particularly among less active people, to develop quality infrastructure, opportunities, programs and services to support participation and to realise the social, health, environmental and the economic benefits of participation. Evaluation of this planning framework involves establishing an intersectoral technical working group to ensure comprehensive measuring and monitoring of participation in sport, recreation and other physical activities in NSW, to establish a system for regular monitoring of the physical activity and fitness levels of school students and to develop performance monitoring systems that ensure quality sport and recreation services are delivered to the community. The target population for 1999/2000 is people aged 55 years and older.

9.7 Tasmania

Primary prevention programs addressing Type 2 diabetes are mainly controlled by the Tasmania Department of Health and Human Services and the Tasmanian Health Promotion Council. In 1991, the indigenous population in Tasmania represented 2% of the total population (Australian Bureau of Statistics 1999c).

As observed in Table 16, programs addressing the primary prevention of Type 2 diabetes currently being implemented in Tasmania are “Eat Well Tasmania,” the “Healthy Options Tasmania (HOT) Award,” the “Cool Canteens Accreditation Project,” and the “Peer-to-Peer Diabetes Education Project.” A more detailed summary of these programs can be located in Appendix 6: Program evaluation measures and results for Australia.

Table 16: Summary of Programs in Tasmania		
Setting	Name	Brief Description
Community	Eat Well Tasmania	Identifies, supports and promotes opportunities for local businesses, Government agencies and community groups to form partnerships to promote healthy enjoyable eating
	Healthy Options Tasmania (HOT)	Awards An accreditation program for food retail outlets that meet specific criteria regarding healthy foods, food safety and hygiene and provision of a smoke-free environment.
School	Cool Canteens Accreditation Project	Aims to increase the availability and demand for healthy and safe food choices in school canteens.
Community	Peer-to-Peer Diabetes Education Project.	Involves information, skills and general awareness of Type 2 diabetes prevention and management to Greek communities.

9.8 Australian Capital Territory

Primary prevention of Type 2 diabetes programs in the Australian Capital Territory, are generally conducted by Diabetes Australia, ACT. In 1991, the indigenous population in the ACT represented 1.1% of the total population (Australian Bureau of Statistics 1999c). Therefore many healthy lifestyle programs are targeted at the non-indigenous population.

As observed in Table 17, current programs being implemented in the Australian Capital Territory are the “Diabetes-Know the Risks” campaign and the “Goals and Targets for Diabetes Mellitus-ACT” document. A more detailed summary of these projects can be located in Appendix 6: Program evaluation measures and results for Australia.

Setting	Name	Brief Description
Community	Diabetes – Know the Risks Campaign	Campaign message promoted during health promotion activities and as sponsorship of sports, arts and other cultural events.
	Goals and Targets for Diabetes Mellitus – ACT	Focuses on increasing coordination between ACT diabetes services and programs.

9.9 Chapter Nine Summary

Diabetes mellitus is currently the fifth National Health Priority Area. Currently no comprehensive nation-wide coordinated Type 2 diabetes primary prevention program exists. Therefore, similar to Western Australia, all States and territories in Australia are responsible for developing and implementing their own programs according to the demographics and special needs of their State or territory. The only program that is directly associated with Type 2 diabetes and is implemented nation-wide is the “Community Awareness Diabetes Strategy” (CADS) program. However, this program only addresses increasing awareness of Type 2 diabetes and encouraging undiagnosed high-risk people to be tested for the disease. It does not provide people with a combination of knowledge, skills development and environmental opportunities for change. Other nation-wide programs only address risk factors for Type 2 diabetes, not Type 2 diabetes primary prevention strategies as a whole.

10.0 SUMMARY AND CONCLUSIONS

10.1 Risk factors

The main modifiable risk factors associated with the development of Type 2 diabetes are obesity, poor dietary habits and physical inactivity (Colagiuri, Colagiuri & Ward 1998). The trends for these modifiable risk factors in Australia have either increased or remained relatively stable. However, it should be noted that the most recent data available on the prevalence of the risk factors in Western Australia was collected in 1995.

In 1995, over one-third of the adult population of Australia did not participate in any physical activity (Commonwealth Department of Health and Aged Care & Australian Institute of Health and Welfare 1999 & Australian Institute of Health and Welfare & National Heart Foundation of Australia 1999). Trend data also shows that the proportion of people undertaking physical activity either at low, moderate or high levels has remained fairly stable between 1989-90 and 1995 (Commonwealth Department of Health and Aged Care & Australian Institute of Health and Welfare 1999). Whereas between 1980 and 1995 trend data have shown that there were significant increases in the proportion of overweight and obese Australians (Australian Institute of Health and Welfare & National Heart Foundation of Australia 1999). With regards to diet, the main dietary risk factor for the development of Type 2 diabetes is the proportion of fats, particularly saturated fats in the diet (Commonwealth Department of Health and Aged Care & Australian Institute of Health and Welfare 1999). In Australia in 1995, total fats consumed as a proportion of total energy intake and the contribution of saturated fats as a proportion of total energy intake were both above the National Health and Medical Research Council's recommended levels of 30% and 10% respectively (Australian Institute of Health and Welfare & National Heart Foundation of Australia 1999).

These trends in health risk factors are similar across Australia. However, when compared with sub-populations such as indigenous, CALD and rural populations, the prevalence of health risk factors is consistently higher. In part, the reason indigenous and CALD populations are found to have higher rates of health risk factors relates to their adoption of a western lifestyle characterised by a high fat diet, with little or no physical activity (de Courten et al. 1998). Rural Australia's relative disadvantage with respect to availability and access to adequate and appropriate quality health care and services (Colagiuri, Colagiuri & Ward 1998) is considered to contribute towards observed higher prevalence of health risk factors compared with their metropolitan counterparts. In addition, this disadvantage is believed to be due to availability, cost, quality and seasonality of activities available, as well as a lack of reasonably priced and available nutritious food (Milligan 1998).

The prevalence of modifiable risk factors for Type 2 diabetes is pronounced amongst the Aboriginal population. Indigenous Australian adults are more likely to report no leisure time physical activity than non-indigenous Australians (Australian Institute of Health and Welfare & National Heart Foundation of Australia 1999), with rural areas of Western Australia reporting

substantially higher inactivity levels than in the metropolitan area (Milligan 1998). Overweight and obesity affects 60% of the Aboriginal and Torres Strait Islander men and 58% of women (National Health and Medical Research Council (NHMRC) 1996). The prevalence of obesity and overweight is exacerbated by the diet of Australia's indigenous population, which tends to be high energy-dense foods, highly refined carbohydrates and saturated fats with dietary staples such as white flour, sugar, bread and rice, powdered milk, cheap fatty meat, carbonated drinks and tinned foods (McGrath et al. 1991 & Australian Bureau of Statistics 1997a). In addition, Aboriginals tend to eat take-away foods as a meal more frequently than their European counterparts, as well as eating fried food at home more often (de Courten et al. 1998). Within Western Australia, rural regions, in particular the Kimberley and the Pilbara were found to have the worst food habits in the State (Milligan 1998).

10.2 Primary Prevention Research Findings

A limited number of well conducted and evaluated Type 2 primary prevention intervention trials have been published. Amongst those that have been published, the successful preventive programs for Type 2 diabetes have been found to promote a proper diet, weight reduction and regular physical activity (Helmrich et al. 1991; Eriksson & Lindgarde 1991). As improved diet and exercise behaviours are also associated with reducing other chronic diseases such as cardiovascular disease and cancer, preventive programs that have placed an emphasis on lifestyle changes (diet and exercise) have had the greatest longer-term impact on the community (Eriksson & Lindgarde 1991; King & Dowd 1990). Several limited short-term studies addressing one or more of the risk factors associated with Type 2 diabetes have shown that it is possible to prevent the disease at the individual level (Bjaras et al. 1997). However, there is limited data demonstrating the effectiveness of population-based interventions in the prevention of Type 2 diabetes. While these programs have had limited success at the community level, the framework and approach used is likely to form the basis for any Type 2 diabetes intervention.

Despite cardiovascular disease prevention programs having had a small positive influence on addressing lifestyle risk factors over a 20-year period, in general the population is still gaining weight and exercising less, this in turn has seen Type 2 diabetes cases increasing at an alarming rate, especially in certain cultural sub-groups (Colagiuri, Colagiuri & Ward 1998). These rates will continue to increase in Australia unless there is more emphasis on reducing the current rates of the health risk factors: overweight/obesity, physical inactivity, tobacco smoking and poor diet in Australia.

In reducing the current rates of overweight/obesity and physical activity, the literature suggests that programs including both a diet and exercise component hold the greatest potential for success, irrespective of the setting and population. However, while most diet and exercise intervention programs show gains in the short term, few have succeeded in reducing obesity or inactivity levels beyond two years. Furthermore, amongst the more successful weight loss programs, a common component is an overall lifestyle or long-term behaviour change that incorporates a physical activity component.

When developing programs aimed at reducing obesity and inactivity, it is worth noting that successful programs were associated with behaviour change theories, promoting physical activity as part of people's daily lifestyle, empowering communities to improve their environment, the provision of relevant information in an educational context, as well as providing social support to participants, and targeting different segments of the community. Furthermore, programs such as the larger and more comprehensive cardiovascular community intervention trials used a combination of these factors as part of their strategies. On the other hand, intervention programs that had little impact on weight and exercise have been associated with interventions of insufficient length for participants to achieve goals, incorporated high levels of program dependency, did not involve the target group in the program development and failed to provide follow-up support or guidance beyond the length of the program.

Finally, the literature suggests that evaluation and monitoring of Type 2 diabetes prevention programs and its associated risk factors should form an important element in directed future resources. The limited information on the long-term benefits of primary prevention intervention should be addressed through more rigorous evaluations.

10.3 Western Australian Statewide Type 2 diabetes prevention programs

Currently in Western Australia, there is no structured or coordinated Statewide strategic plan addressing the primary prevention of Type 2 diabetes. However, in July 1998, the Western Australian Government appointed the Western Australian Diabetes Services Taskforce to review diabetes services and recommend strategies for their improvement. One of the strategies recommended was a Statewide diabetes prevention plan. A limited number of regionally-based primary prevention of Type 2 diabetes programs exist, although they are disjointed, dependant on funding and are unlikely to form part of a broader Statewide Type 2 diabetes prevention strategy. The main programs for the state are "Food Cent\$", "Supermarket Sleuth" and the "Be Active Program". The "Food Cent\$" project and the "Supermarket Sleuth" are designed to promote a healthy way of eating to people with a limited food budget, as well as teach them about reading food labels and making wise food choices in a fun, novel and non-threatening way. Whereas the "Be Active Program" encourages people to commence and sustain regular physical activity.

10.4 Overview of Regional-Based Type 2 Diabetes Primary Prevention Programs in Western Australia

The number of current or recently completed projects implemented by each health region in WA was divided into two groups. Any program addressing the risk factors for Type 2 diabetes was included. For example, the Kimberley program – "Jabby Don't Smoke" with the aim was to reduce smoking in the community, was included as smoking is considered a risk factor for Type 2 diabetes. One group was labelled 'major programs' and the other 'activities'. A major program was identified as one that consisted of clearly defined objectives, strategies and was

evaluated. If a program lacked these components it was considered to be an activity. Programs likely to be considered activities were shopping centre displays or one-off events.

Throughout WA, 33 major programs were identified as currently implemented or recently completed. The Kimberley region reported the most number of programs, with the Great Southern region reporting the least. However, the number of programs does not necessarily relate to the comprehensive nature of the programs offered. In addition, differences between program reach was difficult to determine and were not considered in the count of programs.

It was found that the larger the region geographically, the less reach programs had. For example, in the Kimberley and Pilbara, most programs were implemented in one or two of their major towns or communities, thus limiting their reach. In part, this was believed to be due to funding issues and the cost of travel to remote communities in these large regions to implement and evaluate programs. The only program implemented in all towns and communities was the “Canning Stock Route Challenge – You Don’t Have to Get Diabetes (Type 2)” in the Pilbara.

When investigating how many of these programs were directly addressing the needs of Aboriginal people in regards to preventing Type 2 diabetes, it was found that regions with the highest proportion of Aboriginal people had the highest number of programs targeting this population. Most of these programs have been adapted from community-based non-Aboriginal programs and made more specific to Aboriginal people, or have been developed and previously implemented elsewhere in Australia with differing levels of success.

11.0 RECOMMENDATIONS

- It is recommended that the prevalence and incidence of Type 2 diabetes and associated risk factors be systematically and periodically collected at a Statewide level, with special consideration for rural and remote communities and the indigenous population.

Current data on the incidence and prevalence of Type 2 diabetes in Australia is limited and risk factor prevalence data is outdated. It is recommended that a coordinated database regarding the prevalence and incidence of Type 2 diabetes at the national and Statewide level, including sub-populations (ie indigenous people, CALD populations, rural population and the ageing population) be established. Collection of this information is a priority for primary prevention programs to be planned, developed, and implemented effectively. The establishment of a systematic data collection process, as well as periodic data collection would provide pertinent information at the State, regional and local level to identify appropriate strategies for addressing Type 2 diabetes prevention. In addition, the information could provide a guide to the relative resource requirements of different regions, and subgroups in the short, medium and long-term. The recommendation for the establishment of a Type 2 diabetes database was also made by McCarty, (1996) who stated that 'the lack of Australian data for diabetes is a major concern and it hinders public health planning for what is one of our most common disorders. Australia is many years behind countries such as New Zealand, Singapore, Taiwan and a number of Pacific island nations in having baseline data on diabetes, its complications and its associated disorders such as obesity, heart disease and strokes and blood lipid disorders'.

- It is recommended that a coordinated Statewide primary prevention strategic plan addressing Type 2 diabetes risk factors be established within the Health Department of Western Australia.

This formative review found that no coordinated Statewide or national program for Type 2 diabetes prevention, activities and programs that address primary prevention exists. It is therefore recommended that a collaborative, organisational and structural approach be adopted to incorporate existing Type 2 diabetes prevention initiatives. To date, most Statewide and regional programs and activities have been developed as 'one-offs' for specific communities. These programs and strategies, although unlikely to have been evaluated, still make a significant contribution to each region as they are based on local need. It is, therefore, recommended that the integration of existing programs and activities into any new coordinated strategy would be of value, provided greater attention is given to evaluation and outcome measures. Furthermore, the proposed primary prevention strategy should consider Type 2 diabetes risk factors, especially increasing physical activity, reducing obesity and improving diet, and link closely with respective diet and physical exercise programs.

It is also recommended that the proposed coordinated approach for the plan should be centrally located with a dedicated project officer. This person would be available to assist each health region service to adapt, develop, implement and evaluate their programs and strategies. The Statewide plan should be grounded in behavioural, environmental and social change theories,

incorporating different components to address the needs of the Western Australian population. In particular, the plan should have a school-based, community-based (ie involving community stores and shopping centres), and sub-populations components. The plan should also be flexible allowing for the adaption and development of different components of the program to suit the needs of different regions. For example, the Kimberley would also need the plan to address the needs of indigenous people and contain components that will suit the cultural needs of this population. Colagiuri, (1998) has recommended that 'both the high-risk and population approaches can be used for risk reduction programs. Prevention strategies should include action to address environmental issues such as the food supply and opportunities for physical activity'. In addition, 'accurate prevalence baseline data and a well designed evaluation strategy should be key components of any Type 2 diabetes prevention program' (Colagiuri, Colagiuri & Ward 1998, pg 162-163).

- It is recommended that a well structured Statewide evaluation strategy to measure the process, impact and outcome of primary prevention programs be implemented.

With only a small number of population-based Type 2 primary prevention intervention trials conducted to date, the establishment of a structured and coordinated evaluation approach is required. It is recommended that this could be achieved through the development of an evaluation guideline to monitor the effect of programs and strategies at the local, regional and State level. This approach has been used successfully in the field of health sponsorship, and more recently amongst the Divisions of General Practice, where evaluation, indicators, instruments and evaluation support have been developed. For the evaluation of primary prevention of Type 2 diabetes, it is recommended that a centrally coordinated evaluation and reporting system be implemented, and linked to funding of Type 2 diabetes prevention programs. It is also recommended that the evaluation results be incorporated into the planning of future primary intervention programs.

- It is recommended that increased collaboration amongst health organisations working in the primary prevention of health risks such as diet and physical activity (ie NHF, Cancer Foundation, Sport and Recreation, Department of Transport) be actively encouraged.

In developing a Statewide program it is recommended that the development, implementation and evaluation components of the program involve collaboration with other health organisations, in particular the National Heart Foundation, Cancer Foundation, Department of Sport and Recreation and Department of Transport. This collaboration should ensure consistency in campaign slogans and messages regarding healthy lifestyle as well as being aware that a healthy lifestyle reduces the risks of developing not only Type 2 diabetes but also cardiovascular disease. McCarty, (1996) reported a similar recommendation stating, 'it is both cost and health-effective to use an integrated approach for prevention activities to reduce the common risk factor levels for these non-communicable diseases in the community, particularly in developing nations. Correction and prevention of obesity, exercise, avoidance of a high-fat diet and encouraging a high-fibre diet all reduce insulin resistance and reduce the levels of some of the other risk factors for CVD' (McCarty et al. 1996, pg50).

- It is recommended that research funding for longitudinal research trials on the primary prevention of Type 2 diabetes be made available.

The limited published evidence on the effectiveness of primary prevention of Type 2 diabetes studies has been identified in several reports. Of the few studies that have been conducted for Type 2 diabetes, results have been difficult to both interpret and implement. It is recommended that opportunities for conducting Type 2 primary prevention research trials be made available for suitable researchers in an ongoing manner. It is further recommended that the process of awarding research funding should follow established guidelines for receiving competitive research funding. This recommendation is supported by McCarty, (1996) who stated that 'for Australia, a commitment to funding of interventions for the prevention of diabetes and its complications is required from State and Commonwealth health authorities from both economic and equity perspectives'.

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13.0 APPENDICES

- Telephone interview survey for non-Aboriginal organisations in WA
- Telephone interview survey for Aboriginal medical/health organisations in WA
- Map of WA health regions
- Map of ATSI regions
- Program evaluation measures and results for WA
- Program evaluation measures and results for Australia
- International programs listed on the web
- Useful diabetes web-sites
- Annotated bibliography of Type 2 diabetes primary prevention literature

13.1 Appendix 1 – Telephone interview survey for non-Aboriginal organisations in WA

1. Name of Health Service:
2. Name of person being interviewed:
3. Current Position:
4. What geographical area do you cover in your work position?
5. What are the current population rates for Aboriginal people living in your region?
6. Do you know the current levels for either Aboriginal, non-Aboriginal and/or the total population/community in your region for the following health risk factors?
(write the correct level in the appropriate grid on the table as a %)

Risk factor	Aboriginal levels	Non-Aboriginal levels	Population/Community levels	Reference/Source for each
Physical activity participation				
Obesity and/or overweight levels				
Smoking rates				
Dietary intake				
Diabetes Type 2				

7. Do you have any trend data for these risk factors? (circle the appropriate number)

Yes **1** go to Q7a
 No **2**

Q7a. IF YES,

What trend data?

How can we access this?

Can you provide this to us?

I AM NOW GOING TO ASK YOU ABOUT DIABETES PREVENTION PROGRAMS THAT YOUR UNIT MAY BE RUNNING

8. Are you, or your health unit, currently running any programs aimed at preventing diabetes Type 2 in your region? (circle the appropriate number)

Yes ① go to Q9

No ② go to Q8a

8a. If NO, are there any diabetes prevention programs planned to be implemented in the near future? (circle the appropriate number)

Yes ① go to Q9

No ② go to Q18

9. Can we have a copy of the program/s including the materials produced, evaluation methods and any reports that have been produced?

Yes

No

10. Please list the name of each diabetes Type 2 prevention program/s, that your health unit is or will be running?

- a. _____
- b. _____
- c. _____
- d. _____
- e. _____

11. What is the target group for each of these program/s?

- a. _____
- b. _____
- c. _____
- d. _____
- e. _____

12. What are the objectives for each of these program/s?
(please list up to 5 objectives for each program in the table below)

Objectives	Program a	Program b	Program c	Program d	Program e
Objective 1					
Objective 2					
Objective 3					
Objective 4					
Objective 5					

13. What are the methods/implementation strategies for each program?
(please list up to 5 method/implementation strategies for each program in the table below)

Method / Implementation	Program a	Program b	Program c	Program d	Program e
Strategy 1					
Strategy 2					
Strategy 3					
Strategy 4					
Strategy 5					

14. What are the evaluation measures for each of these program/s?
(please list the evaluation measures for each program in the table below)

Program	Evaluation Measures
e.g School-based diabetes Type 2 prevention program	Teacher survey, student survey, parent survey
a.	
b.	
c.	
d.	
e.	

15. Have materials been produced to compliment these program/s?
(circle the appropriate number)

- Yes ①
No ②

15a. If YES, what type of materials ie water bottles, hats etc and can we get a copy of them?

16. Has the budget for the program/s been sourced internally or externally?

- Internally ①
Externally ② go to Q16a

16a. If EXTERNALLY, please list the agencies/funding bodies that provided this external funding.

What is the time frame for each of these program/s?

Program	Time frame:
a.	
b.	
c.	
d.	
e.	

18. Have any reports been produced on these program/s, either published or unpublished?

- Yes ① go to Q18a
No ②

18a. If YES, is it possible for us to receive a copy of each of these reports?

- Yes ①
No ②

19. Does your unit run other healthy lifestyle programs such as physical activity or weight control programs that aren't directly aimed at preventing diabetes?

Yes ① go to Q19a

No ②

Q19a Please tell us what these programs are and the target group for each.

Title of program	Type of program	Target group
e.g Healthy weight program	Weight control program	Aboriginal women in both towns and communities
1.		
2.		
3.		
4.		
5.		

20. Please provide us with any other contacts in your region that may be able to assist with these figures.

Name: Name:

Workplace: Workplace:

Position: Position:

Contact Number: Contact Number:

Name: Name:

Workplace: Workplace:

Position: Position:

Contact Number: Contact Number:

The End

Thank you for your assistance with this project.

13.2 Appendix 2 – Telephone interview survey for Aboriginal medical/health organisations

1. Name of Health Service/Organisation:

2. Name of person being interviewed:

3. Current Position:

4. What geographical area do you cover in your work position?

5. What are the current population rates for Aboriginal and/or Torres Strait Islander people living in your region?

6. Do you know the current levels (rates) for either Aboriginal/Torres Strait Islander people in your region for the following health risk factors?

Risk factor	Aboriginal / Torres Strait Islander	Reference/Source for each
Physical activity participation		
Obesity and/or overweight levels		
Smoking rates		
Dietary intake (ie fats, fruit and veg, cereals etc)		
Diabetes Type 2		

7a. Do you have any trend data for these risk factors?

- Yes ①
- No ②

7b. If YES,

What trend data?

How can we access this?

Can you provide this to us?

I AM NOW GOING TO ASK YOU ABOUT DIABETES PREVENTION PROGRAMS THAT YOUR HEALTH ORGANISATION MAY BE RUNNING

8. Are you, or your health organisation, currently running or planning on running any programs / health activities aimed at preventing Type 2 diabetes in your region?
9. Please list the name of each diabetes Type 2 prevention programs / health activities, that your health organisation is or will be running and the target group for each of these programs?

Title of program	Target group
e.g. Canning Stock Route Challenge	Primary school aged children
1.	
2.	
3.	
4.	
5.	

10. What are the evaluation measures for each of these programs / health activities?

Program	Evaluation Measures
e.g. School-based diabetes Type 2 prevention program	Teacher survey, student survey, parent survey
a.	
b.	
c.	
d.	
e.	

- 11a. Have materials been produced to compliment these programs / health activities?

- 11b. If YES, what type of materials ie water bottles, hats etc?

- 12a. Has the budget for the programs / health activities been sourced internally or externally?

- 12b. If EXTERNALLY, please list the agencies/funding bodies that provided this external funding.

13. What is the time frame for each of these program/s?

Program	Time frame:
a.	
b.	
c.	
d.	
e.	

14a. Does your unit run other healthy lifestyle programs / activities such as physical activity or weight control programs that aren't directly aimed at preventing diabetes?

14b. If YES, please tell us what these programs are and the target group for each.

Title of program	Type of program	Target group
e.g Best Start Program	Nutrition	New Aboriginal parents in both towns and communities
1.		
2.		
3.		
4.		
5.		

15. Can we possibly get a copy of each of the program outlines (packages), reports and evaluation measures? Can these be faxed, e-mailed or mailed to me?

16. Please provide us with any other contacts in your region that may be able to assist with these figures.

Name:	<input type="text"/>	Name:	<input type="text"/>
Workplace:	<input type="text"/>	Workplace:	<input type="text"/>
Position:	<input type="text"/>	Position:	<input type="text"/>
Contact Number:	<input type="text"/>	Contact Number:	<input type="text"/>
Name:	<input type="text"/>	Name:	<input type="text"/>
Workplace:	<input type="text"/>	Workplace:	<input type="text"/>
Position:	<input type="text"/>	Position:	<input type="text"/>
Contact Number:	<input type="text"/>	Contact Number:	<input type="text"/>

The End

Thank you for your assistance with this project.

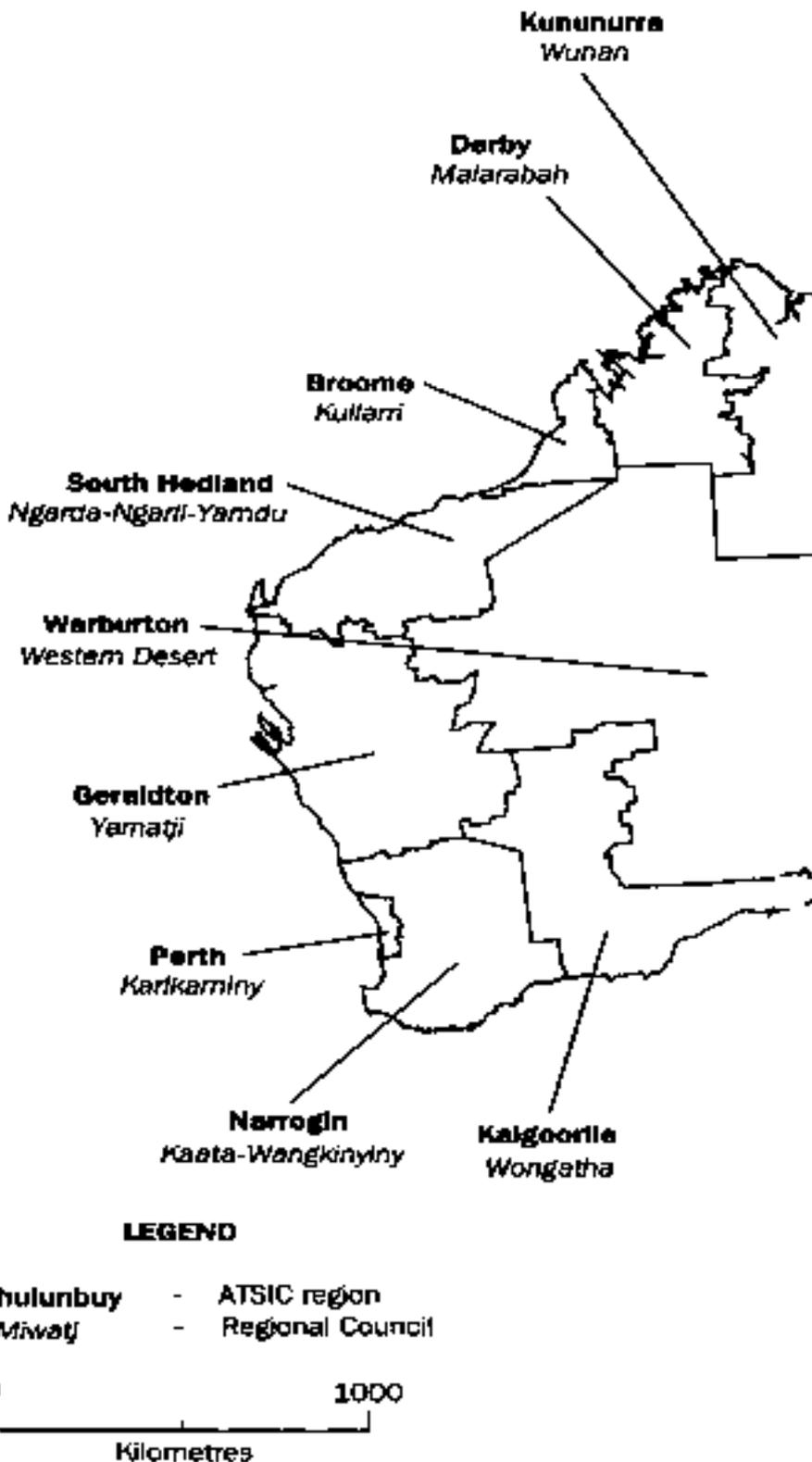
13.3 Appendix 3 – Map of WA health regions



Health Zone	Health Service	Health Zone	Health Service
Kimberley	East Kimberley West Kimberley	North Metro	Lower North Metro Wanneroo
Pilbara	East Pilbara West Pilbara	East Metro	Bentley Inner City Health Service & RPH Kalamunda Hospital & Health Service Swan
Midwest	Gascoyne Geraldton Midwest Murchison	South Metro	Armadale/Kelmscott Fremantle Hospital & Health Service Rockingham/Kwinana
Goldfields	Northern Goldfields	South West	Bunbury Harvey/Yarloop Peel Vasse/Leeuwin Warren/Blackwood Wellington
Midlands	South East Coastal Avon Central Wheatbelt Eastern Wheatbelt Western		
Great Southern	Central Great Southern Lower Great Southern Upper Great Southern		

Source: Milligan, Daly & Codde 1997a

13.4 Appendix 4 – Map of ATASIC regions



Source: Australian Bureau of Statistics 1999c & Australian Bureau of Statistics 1999d

13.5 Appendix 5 – Program Evaluation Measures and Results for WA

WA Region	Program/Activity	Aims/Objectives	Evaluation Method	Results
Kimberley	Healthy Weight Program - adapted from "Lighten Up Program" in Queensland. (Harvey & Kirkwood 1996)	Addresses healthy eating and exercise focussing on the indigenous community. Looks at sustained lifestyle changes and gives priority to the loss of "belly fat".	Process of the dissemination and participant outcomes. An outcome evaluation form for all training programs, a form for facilitators' assessment of training and recording of weight, waist and BP measurements.	Long-term evaluation data from the "Lighten Up Program" indicates that the program was effective in both preventing weight gain and also in maintaining behavioural changes that had been reported during the initial phase.
Kimberley	Shelf Talkers (Bowcock, Doyle & Hogan 1999)	To influence food-purchasing decisions at the point of sale so consumers will choose foods low in fat and sugar over their higher sugar and fat alternatives. Objectives are to increase recognition of the "Good Tucker" shelf talkers program, to demonstrate understanding that choosing "Good Tucker" foods would be a healthier food choice and for store workers to be able to identify labels indicating foods low in sugar and fat.	Objective and Subjective	Evaluation found that the project was well recognised by its target group and up to one-third of supermarket customers surveyed said they made healthier purchasing decisions because of the "shelf Talkers". The evaluation recommended monitoring the correct placement of "Shelf Talkers" on a weekly basis and allowing time to train new supermarket staff in the use of and importance of the "Shelf Talkers" to their customers.
Kimberley	Community Stores Project	To raise the community's awareness of the importance of the store on the health of the community and document examples of best practice marketing strategies to promote nutritious foods. It also aims to increase the proportion of nutritious foods sold in community food stores and to develop a computerised monitoring system to assess the effectiveness of nutrition interventions.	Planned evaluation involves using the computerised ordering and stock control system to monitor changes of food sales during the project.	Results are expected in the year 2000.
Kimberley	Looma Healthy Lifestyle Program (Rowley et al. 2000)	To increase the knowledge of community members about Type 2 diabetes, its risk factors and complications; To prevent and reduce the severity of the long-term complications of Type 2 diabetes; and prevent the occurrence of new cases of Type 2 diabetes among population at risk.	Follow-up screening assessments performed at 6, 12, 18 and 24 months. A cross-sectional community risk factor survey to measure outcome evaluation at base-line, two-year and four-year. Store turnover to analyse food sales and case studies to determine what has influenced people to make the necessary lifestyle changes.	Results show that this program was associated with sustained, if modest, improvements in several important biochemical and behavioural risk factors for diabetes and CVD. The most notable feature of the program is its sustainability and the degree to which it is embedded in and directed by the community.

WA Region	Program/Activity	Aims/Objectives	Evaluation Method	Results
Kimberley	Canning Stock Route Challenge – You Don't Have to Get Diabetes (Type 2) (Radich 1999)	School-based diabetes prevention program for pre-primary and primary school aged children. Focus is to impart knowledge on nutrition and physical activity and its relationship to diabetes. The aim is to create awareness among school children of the healthy lifestyle behaviours needed to prevent diabetes. Objectives seek for students to recognise healthy behaviours and to understand the actions needed to be and stay at a healthy weight.	Teacher questionnaire to assess the appropriateness of the program content and suggested improvements, as well as measuring participation rates.	Results for the Kimberley are due out soon. However, results from the evaluation in the Pilbara are available in the Pilbara section of this table.
Kimberley	Feed on Math\$	School-based "FoodCent\$" project for high school and adult education students in the West Kimberley. Promotes a healthy way of eating for people with a limited food budget. Activities in the program are similar to "Food Cent\$".	Evaluation results have not been made available to date.	Other high school teachers and adult literacy providers in the Kimberley have showed subsequent interest. Adult educators have picked up the program as it meets their criteria and is a practical numeracy teaching tool.
Kimberley	Jabby Don't Smoke (Kimberley Health Service 2000)	A smoking prevention education resource for remote Aboriginal community schools. Aims to address smoking and chewing tobacco in a manner that is appropriate for children living in remote Aboriginal communities.	Formative evaluation with local community people and evaluation of media coverage and live tours by Jabby and other puppet characters through remote Kimberley schools. Process and Impact.	The impact of the project exceeded the producer's expectations. The Jabby character is widely recognised by the target population and beyond. Statistical analysis of student questionnaires is flawed due to lack of numbers and selection bias. It is envisaged that the program will continue in the year 2000.
Pilbara	Strong Women, Strong Babies, Strong Culture Program	Initiated in the Northern Territory. Involves training local Aboriginal women to provide support and improve the health of mothers and babies in their local community.	Evaluation measures for the Pilbara were not provided.	Other communities in the Pilbara have been keen to implement the program. One community with the program has successfully piloted a lunch program for local school children and consulted with the local store manager.
Pilbara	Muslim Diabetes Prevention Project – Healthy Eating the Muslim Way	To investigate dietary habits of the Muslim population in Port Hedland, to develop culturally appropriate alternatives to their dietary habits, promote healthy eating habits by demonstrating healthy and appetising menus and produce a simple recipe book with translation into Malay/Indonesian.	Questionnaires to participants at the completion of each session, to measure satisfaction, awareness of concurrent issues surrounding diabetes and services providers. Focus groups scheduled for one month after final session to identify dietary changes as a result of the project.	Results of the program should be available by early 2000.

WA Region	Program/Activity	Aims/Objectives	Evaluation Method	Results
Pilbara	Canning Stock Route Challenge – You Don't Have to Get Diabetes (Type 2) (Radich 1999)	School-based diabetes prevention program for pre-primary and primary school aged children. Focus is to impart knowledge on nutrition and physical activity and its relationship to diabetes. The aim is to create awareness among school children of the healthy lifestyle behaviours needed to prevent diabetes. Objectives seek for students to recognise healthy behaviours and to understand the actions needed to be and stay at a healthy weight.	Teacher questionnaire to assess the appropriateness of the program content and suggested improvements, as well as measuring participation rates.	Response rate for teacher questionnaire was 64.6%. Feedback was positive and program easy to implement. Children were reported as being very enthusiastic and motivated. In some classes parents were involved in the program and positive changes had occurred at the school canteen as a result from the program. Other Public Health Units have decided to implement the Canning Stock Route Challenge in 1999, such as the Kimberley and Goldfields Public Health Units.
Pilbara	Renal and Diabetes Working Party	To draw up a program plan for renal and diabetes to cover the spectrum of prevention/promotion, diagnosis/treatment and continuing care.	Evaluation measures have not been finalised as yet.	Party was established in late 1999. No results have been provided as yet.
Pilbara	"Giving it a Go" – Diabetes Theatre Production and Video	To increase awareness of Type 2 diabetes in the Pilbara Aboriginal communities and promote exercise and healthy eating as ways to prevent the disease.	Pre and post-test of diabetes knowledge administered to attendees at the theatre productions and focus testing of the video with local Aboriginal and health organisations.	Evaluation report with results is currently being compiled. Due early 2000.
Gascoyne	Diabetes Collaborative Committee	To reduce the prevalence of Type 2 diabetes by reducing the associated risk factors as well as addressing the cultural needs of the local community. Aims for the primary prevention component of the framework are to reduce the prevalence of obesity in the region; to increase the awareness of the role of lifestyle in disease development and progression; and to provide educational and culturally appropriate training and support to both health providers and community representatives involved in this issue.	No evaluation measures were stated in the framework outline.	Due to staff instability this committee disbanded in late 1999 but is now being reformed.
Gascoyne	Healthy Weight Program	Workshops instructing individuals and members of the community on healthy choices, exercise and diet.	No evaluation measures were given.	First year finished in November 1999. Finalist in the Healthway Awards in May 2000. Report available from Healthway. Program continuing in 2000.

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WA Region	Program/Activity	Aims/Objectives	Evaluation Method	Results
Mid-West	Food for Thought	Focus is on attitude and behaviour change. Aims to de-emphasise weight as a measure of success and instead looks at changing eating behaviours and increasing physical activity levels. Incorporates stress and self-esteem issues associated with food and eating and tries to dispel the dieting Myth.	A checklist of skills competency to be assessed prior to and following education sessions, with continual evaluation throughout the sessions. Hospitalisation rates due to diabetes in the community will be monitored as well as the number of referrals to allied health practitioners.	Program due to commence in September 1999 with final evaluation report to follow.
Mid-West	Healthy Choices Award (Mid-West Public Health Unit et al. 1998)	To increase the number of non-franchised food outlets providing meals and snacks low in fat and sugar and high in fibre; to encourage licensed food outlets to provide low alcohol and non-alcoholic drinks; and to ensure outlets comply with food hygiene regulations and staff have a minimum level of training in food safety practices.	Process: Pre-program surveys of food outlets and telephone surveys with residents within the town. Impact: Self-administered surveys of food outlets and randomly selected residents. The training session was evaluated by giving all participants an evaluation form.	The program was reported to have been successful in recruiting outlets that went on to receive the reward and had achieved its objectives.
Goldfields	Kalgoorlie to Perth Pipeline	School-based program adapted from Canning Stock Route Challenge. See Canning Stock Route Challenge previously in this table for details.		
Goldfields	Diabetes in Aboriginal Communities Project	To provide dietetic and diabetes education services to Aboriginal people in Kalgoorlie/Boulder and Wiluna.	Evaluation measure have not been reported.	Results of the project have not been reported.
Goldfields	Community Stores Project Adapted from the shelftalker project in the Kimberley.	Aims to involve children in developing the shelftalker design; to encourage community store owners to undertake accredited "Store Wise" training; and to provide community education sessions about the shelftalker.	Evaluation on store turnover of all products prior to the introduction of the shelftalker, then again at three months, six months and 12 months. Community members attitudes will be measured after one month and three months.	Program evaluation is ongoing and results will follow in the near future.
Coastal and Wheatbelt/ Midlands	Shape-Up, adapted from the "Lighten Up Program" in QLD (Harvey & Kirkwood 1996)	Focuses on healthy lifestyle, flexible attitude to eating, self responsibility, maintenance of healthy lifestyle habits, environmental supports and involvement of a broader health network.	Process evaluation: Recording the number of facilitators trained; training satisfaction survey; number of shape-up groups conducted; number of participants and other demographic information; and participant satisfaction survey at the end of the program. Impact evaluation; BMI, waist-hip ratio and BP measures at sessions one and seven and at three and six month follow-up; participant survey following program and at 6 months and the establishment of environmental support and self-help strategies to support the program evaluated through surveys of facilitators and participants.	Shape-Up is an ongoing program till October 2000. Results are unavailable at present. Results reported from dissemination of Lighten Up Program in QLD are that women lost on average 2.6 kg and men lost on average 3.6 kg during the initial phase of the workshops. Data available from a three-year follow-up of participants found that 79% of respondents to the follow-up survey had prevented weight gain (self-reported) over the three-year period and over 80% self-reported maintaining some positive behavioural change over this time.

WA Region	Program/Activity	Aims/Objectives	Evaluation Method	Results
Eastern Perth	Inner City Integrated Diabetes Care Project – Business Case (Eastern Perth Public and Community Health Unit 1998) & (Di Francesco, Gillam & Unsworth 1999)	To develop and support an integrated service delivery model that ensures equitable access to a full range of diabetes services; health professionals access to training and support; systems of coordinated care; systems for ensuring standards and monitoring outcomes; and a commitment to the development of a locally appropriate service delivery model.	Evaluation will look at determining the proportion of the target group that has increased physical activity, attended diabetes prevention programs and increased knowledge, self-efficacy and skills to prevent diabetes.	Final evaluation report with results is due in late 2001 or early 2002.
Eastern Perth	Be Active Together Program	Aims to increase the number of adults who participate in 30 minutes of moderate intensity physical activity (PA); on most days of the week. Objectives are for the target group to develop personal skills to empower them to be more readily able to participate in regular, moderate PA, to create supportive environments conducive to the participation in regular moderate PA; to strengthen and expand the role of the wider community in planning, implementation and evaluation of PA services; to increase investments for health development in PA for special needs populations and to consolidate and expand partnerships within various departments, across health services and other Government and non-Government agencies.	Formative evaluation - intercept interviews/surveys/focus groups implemented in consultation with relevant departments/agencies and the community. Process evaluation - using a tracking sheet to record publicity/media coverage. Workshops/educational sessions have an evaluation form for participants to complete at the end of the workshops. Program activities/events are evaluated by participants at the end of each activity on the evaluation form. Impact evaluation - key intermediaries/professionals survey to be undertaken and results from the impact evaluation reported in a variety of publications and reports.	The program is supplemented by specific sub-programs aimed at specific target groups. These sub-programs are Muslim Women's Learn to Swim Program and the Riverside Gardens Signage Project. These are discussed in more detail further in this table. Results from the evaluation of the Swan and Bayswater newsletters found that they reached the appropriate target group and were effective in promoting physical activity among that target group. The newsletter helped readers move through the stages of change.
Eastern Perth	Muslim Women's Learn to Swim Program (Eastern Perth Public and Community Health Unit 1999)	To promote participation in physical activity and to improve knowledge relating to physical activity.	Quantitative data described the Muslim women participants and their participation and the qualitative data was obtained through focus groups with the Muslim women who had attended the program and from the program enablers ie swimming instructor, pool manager etc. The pilot program in 1998 was extended and ran from February-December 1999. Quantitative and qualitative data was collected at the conclusion of the program and is currently being analysed for reporting.	Eleven swimming lessons were held with 92 attendances during the 11-week period. The women stated that they would like to continue participating in the program and some wanted to participate in other physical activity programs. Self-esteem and self-efficacy seemed to have increased as a result of learning water skills. Some identified specific benefits they had derived from the program, such as exercise, relaxation, improvement of asthmatic conditions etc. This program had experienced some negative effect of mainstream attitudes.

WA Region	Program/Activity	Aims/Objectives	Evaluation Method	Results
Eastern Perth	Riverside Gardens Signage Project	Aims to increase the attractiveness of, and encourage greater use of, the Riverside Gardens area, predominantly for people undertaking physical activity, in particular walking. The main objective is to increase the number of adults aged 20+ years who use the Riverside Gardens Reserve for walking.	Individual interviews regarding awareness and comprehension of the physical activity health message, self-reported increase in walking and in walking in Riverside Gardens. A formative evaluation was conducted in 1998 and 1999/2000 involving an environmental audit, intercept interviews and observational methods.	The project is ongoing until April 2000. A final evaluation report discussing the results will be available late 2000. A subsequent 12-month intervention promoting walking at Riverside Gardens was implemented in February 2000. Post evaluation using observational methods and intercept interviews will be conducted in February 2001.
Eastern Perth	Walking Promotion Small Grants Scheme	Aims to increase the capacity of targeted organisations to promote and increase participation in walking and physical activity through the provision of small grants.	Evaluation measures are different for each individual grant. The organisations that have been offered the grant submit their evaluation outline with the grant submission.	Evaluation results and recommendations regarding the value of these small grants schemes will be presented in a report in 2000.
South-West	Vasse Leeuwin Diabetes Project	Aims to develop a diabetes plan and a coordinated mechanism for developing diabetes management guidelines and referral networks for the Vasse Leeuwin Health District; to provide opportunities for increased collaboration between diabetes service providers including hospital personnel, community health, Silver Chain, GPs and pharmacists; and to decrease the incidence of the risk factors for Type 2 diabetes in the district.	Process and impact evaluation focuses on the satisfaction of providers with the diabetes plan for the health workers' satisfaction with training provided by diabetes educators; the number attending health checks and satisfaction with the check; a six-week follow up with participants to determine progress towards health goals; media interest generated; and measurement of follow-up sessions by numbers attending, participant observation, satisfaction and feedback at session.	Results reported that diabetes health professionals found each section of the forum useful, especially information on exercise, diet, complications and podiatry. The majority of participants who attended the community diabetes seminar found the sessions very useful, with foot care and diet being rated as most suitable.
South-West	Planning for a Comprehensive, Seamless Diabetes Program for the Bunbury Health Service. (Mason & Turner 1997)	Raising awareness about weight, nutrition and physical activity during the Annual Diabetes Week, conducting supermarket tours and cooking classes for people diagnosed with diabetes or at risk of developing Type 2 diabetes.		Projects are currently ongoing. Evaluation results have not been published.

WA Region	Program/Activity	Aims/Objectives	Evaluation Method	Results
South-West	Diabetes Know Your Risks Screening Program (McDonnell 1999)	Aims to reduce lifestyle-related risk factors for developing Type 2 diabetes. Objectives are to increase the number of people who know their individual risk factors for developing diabetes and their need to reduce these risk factors as well as to increase the number of individuals with high risk factors for developing Type 2 diabetes who present to their medical practitioner for further investigations.	Process involved measuring publicity and number of people who are assessed. Impact involves measuring percentage who are given letters of referral to their GP; proportion with high BP, BMI and waist circumference; percentage intending to make changes to reduce their diabetes risk; and percentage prior to screening able to identify personal risk. Outcome involved random selection of participants measured/monitored three months following the screening as well as number who attend their GP for further investigation assessed by phone contact at three months.	104 people were screened for diabetes risk factors during the National Diabetes Week 1999 at two different locations. Over 50% of both target groups were considered to be at high risk and given letters of referral to their GP. In one location over 40% were overweight, with this extra weight carried mainly around the waist area. Following the screening, 70-80% indicated they wanted to make changes to reduce diabetes risks. In both groups approximately 40% could indicate prior to the screening their personal risk. Another industry has requested a similar program for their workers next year. Outcome evaluation results are yet to be published. Recommendations were that smoking should be included as a risk factor and alcohol to be included in the food and alcohol questionnaire.
South-West	Can't Weight to Get Started	To provide participants with skills, increased knowledge and motivation to adopt healthy lifestyle habits.	Pre, post and three-month questionnaire.	Program is currently ongoing. Results are unavailable at present.
Great Southern	Healthy Bodies Program	Aims to reduce the lifestyle risk factors for Type 2 diabetes and cardiovascular disease. Objectives are to reduce dietary fat intake; increase physical activity; increase readiness for smoking cessation; promote the practice of personal stress management techniques; and increase self-efficacy with respect to determining personal health status and outcomes.	Process conducted through a questionnaire at the completion of the program regarding client satisfaction and number of referrals. Impact involves a pre and post-test questionnaire on self-reported behaviour and attitude change at completion, six months and 12 months. Outcome evaluation involves change in risk factor status and fitness testing.	Implemented in 1999 and is currently ongoing. Results are unavailable at present.
Great Southern	Educational Program for People Diagnosed with IGT	To delay or prevent the progression for impaired glucose tolerance to frank diabetes.	Questionnaire on client satisfaction, reported behaviours change, progression to the diabetes register and a three-month review of clients.	Program is ongoing in the primary health service. Results are unavailable at present.

13.6 Appendix 6 – Program Evaluation Measures and Results for Australia

State/ Territory	Program/Activity	Aims/Objectives	Evaluation Method	Results
Northern Territory	Central Australian Remote Community Diabetes Project	To work with a steering committee to develop a collaborative inter and intra-sectorial action plan for ongoing development; implementation and monitoring of nutrition/diabetes education camps; ensure access for remote communities to resource services; enable community-based staff to provide optimal care for people with diabetes; and raise awareness of local families and the community about risk factors.	An action research/participatory evaluation approach will be used. Initial activities and objectives will be reviewed and modified as necessary, with the full involvement of staff and consumers in the evaluation. Standard biomedical indicators and clinical data relevant to the participants will be reviewed. A literature review of current research, particularly remote area Aboriginal communities, diabetes and nutrition will be carried out.	The program is funded from February 1999 to December 2000. Results will be available in 2001.
Northern Territory	Strong Women, Strong Babies, Strong Culture	To promote good health for pregnant Aboriginal women and their babies; to improve the health of all Aboriginal people; to support and educate community based Strong Women Workers; and to support the identified health needs of the community and work with them to improve their health.	No evaluation measure have been reported. However, results from and 18-month trial period have been reported.	Piloted in three communities and achieved an improvement in the health status of pregnant women and a positive impact on the health of their infants at birth in those communities. There was a 43% reduction in the number of low birth weight infants and a 140gram increase in the birth mean weight. Currently 11 communities in the Northern Territory are involved in the program. It is also being implemented in the Kimberley and Pilbara regions of WA.
Northern Territory	Preventable Chronic Diseases Strategy for the Northern Territory (Territory Health Services 1999)	A 10-year goal to reduce projected incidence and prevalence of the five common chronic diseases in the Northern Territory (Type 2 diabetes is one of these diseases) and their immediate underlying causes.		
Queensland	Lighten Up (Harvey & Kirkwood 1996)	Focuses on healthy lifestyle, flexible attitude to eating, self responsibility, maintenance of healthy lifestyle habits, environmental supports and involvement of a broader health network.	Process: number of facilitators trained; training satisfaction survey; number of shape-up groups conducted; number of participants and other demographic information; and participant satisfaction survey at the end of the program. Impact evaluation: BMI, waist hip ratio and BP measures at sessions one and seven and at three and six month follow up; a participant survey following program and at six months. Surveys of facilitators and participants.	Results reported from dissemination of Lighten Up Program in QLD (Harvey and Kirkwood, 1996) are that women lost on average 2.6 kg and men lost on average 3.6 kg during the initial phase of the workshops. Data available from a three-year follow-up of participants found that 79% of respondents to the follow-up survey had prevented weight gain (self-reported) over the three-year period and over 80% self-reported maintaining some positive behavioural change over this time.

State/ Territory	Program/Activity	Aims/Objectives	Evaluation Method	Results
Queensland	Healthy Weight Program (adapted from "Lighten Up") – for Aboriginal and Torres Strait Islander People	Focuses on sustained lifestyle changes and gives priority to loss of 'belly fat'. Addresses healthy eating and exercise and focuses on the indigenous community.	Evaluation measures have not been reported.	The Tropical Public Health Unit Network are currently completing the evaluation of the program, results will be disseminated in the near future.
Queensland	Lunch Box (QLD Health - Public Health Services 1999)	Objectives are to integrate lunchbox activities into the health and physical education curriculum, to increase the point of sale and broader school environment marketing of healthy food choices; and to develop nutrition policies endorsed by school management.	Evaluation measures have not been reported.	Pilot project was implemented in 1999. Results will follow in the near future.
South Australia	Maybe it's Diabetes Campaign	Used as a message in sporting and arts venues on signage and in programs. Encourages lifestyle behaviours that minimise the risk of developing diabetes or delay onset of diabetes.	Evaluation measures have not been reported.	Evaluation is currently being conducted.
South Australia	A Celebration in Diabetes Prevention (Temple-Smith 1998) (Stringfellow & Heward 1999)	To establish health promotion activities aimed at reducing the risk of developing Type 2 diabetes amongst the Mid North Region's general community; to improve the diabetes prevention/promotion strategies of health care providers; and to establish an appropriate model for obtaining accurate information on the prevalence and incidence of Type 2 diabetes across the region.	Pre and post-test questionnaires for primary and secondary target groups; attendance to activities/media coverage; diabetes nurse educators' clinic data collection of referrals; observation and informal interviews; monitoring of food purchases menu changes; and random community surveys.	Final report produced December 1999 reported that it was not possible to measure changes in prevalence/incidence of Type 2 diabetes, due to the strategies implemented in this project. However, the project enabled health workers to work through the process of planning, implementation and evaluation of a region-wide health promotion program. This model provides significant support for future health promoting programs.
Victoria	Active for Life (Active Australia 1999)	Aims to encourage Victorians, especially older adults to participate in regular moderate physical activity and to ensure Victorians are physically active throughout their lives in ways that enhance their health and quality of life.	Pre and post-test Newspoll Omnibus survey; Pre-campaign focus testing; Post-campaign intercept interviews (N=300) and a free-call infoline.	Results of survey: 57% recalled the campaign from phase one; 53% aware of campaign at phase two; understanding of campaign message had improved; print advertisements were clear with their message; post-campaign evaluation phase three; 31% recalled newspaper advertisements when prompted; 11% heard radio advertisements; 36% who had seen or heard advertising were prompted to consider more physical activity; and 6% increased their level of moderate activity.

State/ Territory	Program/Activity	Aims/Objectives	Evaluation Method	Results
New South Wales	School Canteen Improvement Program	Aims to improve food supply in the school environment and to increase effective nutrition education in schools.	Process: number of school canteens that apply for accreditation. Impact: number of school canteens that have developed a policy. Outcome: number of healthy food products available or food habit changes.	Currently ongoing, results to follow in the near future.
New South Wales	Smoking Cessation Program	Aims to reduce the exposure of the community to tobacco products and incentives to buy tobacco.	Public Health Units monitoring compliance with the legislation and prosecutions and ensuring new signage under the legislation, features the QUIT line phone number, monitoring QUIT line.	Program is ongoing. Results have not be published at present.
New South Wales	Active Australia – Simply Active Everyday (NSW Physical Activity Taskforce 1998)	Provides a strategy vision and framework for the promotion of physical activity in NSW 1998-2002.	Establishing an intersectoral technical working group to ensure comprehensive measuring and monitoring of participation in sport, recreation and other physical activities; regular monitoring of physical activity and fitness levels of school students; and monitoring quality of sport and recreation services delivered to the community.	The strategy vision and framework is from 1998-2002, currently results have not been reported. Final evaluation will take place after 2002.
Tasmania	Eat Well Tasmania (van Velzen & Kelly 1998)	The mission is to contribute to the reduction of diet-related health problems and improve the nutritional well-being of all Tasmanians by maximising the impact of food and nutrition promotion in Tasmania.	Attendance records; media/publicity log; and surveys at end of year one and end of year two (1996 and 1997 respectively)	In 1997, 50 people and in 1998, 150 people attended Eat Well Tasmania Forums. A database of members, partnerships, activities and events promoting healthy eating has been developed with 1,150 entries and 29 financial members between 1996-98. There were 189 media articles, interviews, community service announcements, papers or speeches promoting the campaign. Results on the surveys have not been reported.
Tasmania	Healthy Options Tasmania (HOT) Award	An accreditation program for food retail outlets such as take-aways, cafes and restaurants to provide healthy food choices, non-smoking areas and food safety and hygiene.	Evaluation measures have not been reported.	The program is currently being evaluated. Results to follow shortly. State/Territory Program/Activity Aims/Objectives Evaluation Method Results

State/ Territory	Program/Activity	Aims/Objectives	Evaluation Method	Results
Tasmania	Cool Canteens Accreditation Project	To increase the availability and demand for healthy and safe food choices, marketing and promotions, food safety and hygiene and school community environment.	Evaluation measures have not been reported.	Evaluation is currently being conducted.
Tasmania	Peer-to-Peer Diabetes Education Project	Greek-English speaking volunteers to attend a course on information, skills and general awareness of Type 2 diabetes prevention and management. The volunteers encourage and support Greek people with or at risk of developing diabetes.	Involves testing diabetes knowledge and knowledge of mainstream diabetes services administered to volunteers before and after the instruction course. Number of people who receive assistance are monitored.	Evaluation report has yet to be published.
Australian Capital Territory	Diabetes – Know the Risks	To reduce Type 2 incidence in the community and to focus on prevention and enable people to have greater control over their health as well as improving it.	Evaluation measures were not provided.	Evaluation of the campaign is currently being completed.
Australian Capital Territory	Goals and Targets for Diabetes Mellitus, ACT	Primary prevention focus is increasing coordination between ACT diabetes services and programs in order to reduce the prevalence of Type 2 diabetes.	Evaluation measures have not been reported.	Evaluation results have yet to be published.

13.7 Appendix 7 – International Programs Listed on the Web

The following information was identified on the world wide web and provides useful links to relevant Type 2 diabetes programs and organisations involved in its prevention.

- Country:** America
Title: 'Diabetes Prevention Program'
Website: www.preventdiabetes.com
Summary: The 'Diabetes Prevention Program' is a nationwide research study designed to find out whether Type 2 diabetes can be prevented through diet and exercise, or medication. The study is sponsored by the National Institute of Diabetes and Digestive and Kidney Diseases. The study's goal is to evaluate 3,000 men and women age 25 or older who have impaired glucose tolerance. Volunteers have been randomly assigned to one of three groups:
1. Intensive lifestyle changes (diet and exercise) to reduce weight by 7%;
 2. Intervention with the drug metformin, approved in 1995 to treat Type 2 diabetes; and
 3. A standard group is taking placebo pills in place of metformin and is receiving information on diet and exercise.
- Volunteers are expected to stay in the study for three to six years, depending on when they join.
- Country:** America
Title: 'Shape Up and Drop 10'
Website: www.shapeup.org
Summary: The program is an individualised weight-loss and weight management program for men and women. The goal is to help participants lose weight and maintain that weight loss by improving body composition with better eating and physical activity habits. The aim is to decrease their risk of developing certain diseases associated with being overweight or obese, such as Type 2 diabetes. The program consists of the following components, a food plan, a physical activity plan, challenges/solutions, feeding my soul, support, tutorials, maintenance and an online customer service.
- Country:** America
Title: 'Type 2 Diabetes Clinical Trials'
Website: www.niddk.nih.gov/fund/fund.html
Summary: The 'Type 2 Diabetes Clinical Trials' program supports large, multi-centre clinical trials conducted under cooperative agreements or contracts. One primary prevention trial is underway. The 'Diabetes Prevention Program' (as discussed previously) is focused on testing lifestyle and pharmacological intervention strategies in individuals at genetic and metabolic risk for developing Type 2 diabetes to prevent or delay onset of this disease.

Country	America
Title	'Epidemiology, Type 2 Diabetes' research program
Website	www.niddk.nih.gov/fund/fund.html
Summary	The program focuses on study of the distribution and determinants of Type 2 diabetes, gestational diabetes and complications of diabetes in populations including, community-based groups and large patient populations. Specific areas of research include, epidemiological studies on the genetic and environmental factors that determine Type 2 diabetes. Geographic and temporal variations in the disease, variations in disease frequency by race, socioeconomic status, metabolic factors and other determinants and studies on the aetiology of diabetes, including identification of risk factors determining susceptibility to diabetes and variations in the distribution of risk factors within populations and within individuals.

13.8 Appendix 8 – Useful Diabetes Web-sites

The following are a list of web-sites that may be useful when researching the area of Type 2 diabetes.

13.8.1 International Sites

American Diabetes Association	www.diabetes.org
Joslin Diabetes Centre – America	www.joslin.org
The Diabetes Monitor	www.diabetesmonitor.com
U.S. National Library of Medicine, Medline Plus	www.nlm.nih.gov/medlineplus/diabetes
Diabetic-Lifestyle Online Magazine	www.diabetic-lifestyle.com
Online Diabetes Resources by Rick Mendosa – Tracking diabetes on the Web	www.mendosa.com
Nethealth's diabetes	www.diabetes.com
National Institute of Diabetes and Digestive and Kidney Diseases	www.niddk.nih.gov
Centres for Disease Control and Prevention	www.cdc.gov/diabetes
American Association of Diabetes Educators	www.aadenet.org
International Diabetes Federation	www.idf.org
Diabetes Mall	www.diabetesnet.com
Diabetes Well	www.diabeteswell.com

13.8.2 Australian Sites:

International Diabetes Institute, Australia	www.diabetes.com.au
Diabetes Australia Victoria	www.dav.org.au

13.9 Annotated bibliography of Type 2 diabetes Primary Prevention Literature

13.9.1 Western Australia

- “Risk factors for ill-health in a remote desert-dwelling Aboriginal community in Western Australia” – Gracey, Spargo, Smith, Smith, Burke, Beilin, Beilby and Chin. 1996 (Gracey et al. 1996).

In November 1994 all available residents of a small community in the Great Sandy Desert underwent medical examinations, anthropometry and measurement of blood pressure. A total of 77 subjects (26 children and 51 adults, of which 44 were male and 33 female) took part in the survey. Results for Type 2 diabetes risk factors showed that, 22% were overweight and 40% of women and 13% of men were obese, with central obesity in 90% of women and 48% of men. Fifteen per cent were classified as hypertensive and 55% of subjects had increased insulin levels.

- “Influence of gender and socio-economic status on dietary patterns and nutrient intakes in 18-year-old Australians” – Milligan, Burke, Beilin, Dunbar, Spencer, Balde and Gracey, 1998, (Milligan et al. 1998).

Between July and September 1994, a cohort of 504 (247 men, 261 women) 18-year-olds who had been participating for nine years in a longitudinal study of cardiovascular risk factors were re-surveyed using two-day dietary records to examine their dietary behaviour. Generalisation is limited by the restriction of two-day diet records to weekdays, due to higher intakes of salt, fat and alcohol having been reported at weekends by other populations. Fat intake exceeded 30% of energy in about 80% of subjects and was greater than 40% in about one-quarter. The major food groups contributing to fat intake were convenience foods and meat. Fibre intake was less than 30g/day in 93% of women and 77% of men.

- “Risk factors for diabetes and cardiovascular disease in young Australian Aboriginals – A five-year follow-up study” – Braun, Zimmerman, Kretchmer, Spargo, Smith, Gracey, 1996, (Braun et al. 1996)

In 1989, baseline anthropometric, pubertal stage, and blood pressure data were collected for 100 Aboriginal children and adolescents. All measurements were repeated in 74 individuals from the original study population in 1994. The percentage of subjects who were overweight increased from 2.7% at baseline to 17.6% five years later. At a mean age of 18.5 years, 8.1% of the population had impaired glucose tolerance and 2.7% had diabetes. Dyslipidaemia was particularly prevalent among male subjects in the population, with 34.4% having elevated plasma cholesterol and 21.9% having elevated LDL cholesterol values.

13.9.2 *Nationally*

- “Exercise profile and subsequent mortality in an elderly Australian population” – Finucane, Giles, Withers, Silay, Sedgwick, Hamdorf, Halbert, Cobiac, Clark and Andrews, 1997, (Finucane et al. 1997).

In 1992/93, 1788 subjects aged 70 years and over who were participating in the Australian Longitudinal Study of Aging in South Australia, were interviewed about their exercise patterns in a cross-sectional study. The results reported found that in the two weeks prior to the interview, 39% of subjects had reported taking no exercise. At two years follow up, 10.6% of the study group had died. These comprised 2.8% of the vigorous exercisers, 7.6% of the less vigorous exercisers and 15.7% of the non-exercisers. The difference in mortality rates between non-exercisers and others was highly significant.

- “Stage distributions for five health behaviours in the United States and Australia” – Laforge, Velicer, Richmond and Owen, 1999, (Laforge et al. 1999).

Five independent surveys, two conducted in the United States and three in Australia assessed stage of change using identical single item survey measures for the common problem behaviours. The stage information was collected for five different risk factors. The three goals of the study were, to collect stage distribution information for planning interventions and as a basis for future comparisons. To extend stage distribution information to four additional risk factors and to compare stage distributions in two countries which share a common language but have important cultural differences. Results reported that, the stage distributions for the five risk factors (smoking, low-fat diet, regular exercise, reducing stress and losing weight) were similar across the five independent samples. The pattern of stage distributions was also found to be stable across health risk factors, gender, country and sample. The authors concluded by stating that ‘single-item survey measures of stage of change that are readily applicable to population studies appear to provide important information about the population characteristics of readiness to change behavioural risk factors. The stability of these distributions suggests that interventions matched by stage may have broad applicability’ (Laforge et al. 1999).

- “Beneficial impact of the homelands movement on health outcomes in central Australian Aboriginals” – McDermott, O’Dea, Rowley, Knight and Burgess, 1998, (McDermott et al. 1998).

The study compares prevalence of obesity, hypertension, weight gain, diabetes, incidence of diabetes, mortality and hospitalisation rates in two groups of Aboriginal adults over a seven-year period – those living in homelands versus centralised communities in central Australia. Baseline survey consisted of 826 Aboriginal adults in rural central Australian communities in 1987-88 with a follow-up survey of 416 in 1995. Results found that homelands residents had a lower baseline prevalence of diabetes, hypertension, overweight/obesity and a lower incidence of diabetes. They were also less likely to die than those living in centralised communities and were less likely to be hospitalised for any cause.

- “Correspondence of self-reported fruit and vegetable intake with dietary intake data” – Radimer, Harvey and Lytle, 1997, (Radimer, Harvey & Lytle 1997).

In 1989, the Queensland State health department began a three-year community-based health intervention. An invitation to attend a cardiovascular risk screening was sent to residents and 860 people satisfactorily completed a dietary questionnaire at the screening. In 1992, a follow-up questionnaire was mailed to those who had completed the initial diet survey, where 453 satisfactorily completed the second survey. The sub-sample group that responded in 1992 was similar to the 1989 sample in demographic measures and nutrient intake, except that it included slightly more women. The survey found that about 40% of men and 50% of women reported having increased their intake of fruit and vegetables over the three-year surveyed period. However, self-report of changed intake of fruit was not associated with change from dietary intake data in men, with less than half of these men who reported an increase having achieved this. Mean change in fruit intake was more accurately reported by women, however, many women still incorrectly classified their status with 43% of women who reported an increase not actually increasing their intake.

- “Abnormal glucose tolerance and other coronary heart disease risk factors in an isolated Aboriginal community in central Australia” – Gault, O’Dea, Rowley, McLeay, Traianedes, 1996, (Gault et al. 1996).

In 1988, a cross sectional survey of 437 subjects 15 years and over (189 men, 248 women) representing 80% of the adult population in an Aboriginal community in central Australia was conducted. The survey measured BMI, glucose tolerance, circulating insulin and lipids and blood pressure. Results from the survey showed that the prevalence of diabetes in the age group 15-34 years was 2% for men and 6% for women. In the 35 years and over age group, diabetes prevalence was 19% for men and 13% for women. IGT (Impaired Glucose Tolerance) occurred in 8% of younger men and 15% of younger women. In older men and women IGT occurred in 17% and 32% respectively. The prevalence of hypercholesterolemia, hypertriglyceridemia, hypertension and overweight rose with increasing degrees of glucose tolerance. The two communities near the only store in the area had a higher prevalence of abnormal glucose tolerance than the more remote homeland communities.

- “Onset of NIDDM occurs at least 4-7 yr before diagnosis” – Harris, Klein, Welborn, Knudman, 1992. (Harris et al. 1992)

The study aimed to investigate duration of the period between diabetes onset and its clinical diagnosis. Two population-based groups of white patients with Type 2 diabetes in the United States and Australia were studied. Retinopathy is a common complication of diabetes and is usually the first observable vascular condition specific to diabetes to develop in people with diabetes. Therefore, the prevalence of retinopathy and duration of diabetes subsequent to clinical diagnosis were determined for all subjects. Weighted linear regression was used to examine the relationship between diabetes duration and prevalence

of retinopathy. Results found that retinopathy may appear 4-7 years before clinical diagnosis of Type 2 diabetes in this study group. It was also suggested that 'significant pathological changes by hyperglycaemia precede the development of detectable retinopathy. The findings suggest that undiagnosed Type 2 diabetes is not a benign condition. Clinically significant morbidity is present at diagnosis and for years before diagnosis. During this preclinical period, treatment is not being offered for diabetes or its specific complications, despite the fact that reduction in hyperglycaemia, hypertension and cardiovascular risk factors is believed to benefit patients. Imprecise dating of diabetes onset also obscures investigations of the aetiology of NIDDM and studies of the nature and importance of risk factors for diabetes complications' (Harris et al. 1992).

13.9.3 *Internationally*

- "Effects of smoking on the incidence of non-insulin-dependent diabetes mellitus" – Kawakami, Takatsuka, Shimizu and Ishibashi, 1997, (Kawakami et al. 1997).

The effects of smoking on the incidence of Type 2 diabetes over an eight-year period (1984 baseline – 1992 follow-up) were investigated in a cohort of 2312 male employees of an electrical company in Japan. After controlling for other known risk factors for Type 2 diabetes, a proportional hazards regression analysis indicated that those who were currently smoking 16-25 cigarettes per day had a 3.27 times higher risk of developing Type 2 diabetes during the follow-up period than never smokers. The hazard ratio was similar at 3.21 for those who were currently smoking greater than 26 cigarettes per day. It was also indicated by the proportional hazards regression analysis that younger age at starting smoking was associated with an increased risk in Type 2 diabetes. The study reported that, 'the population attributable risk percentage for current smoking was greater than the percentages for obesity, leisure-time physical activity, alcohol drinking and family history of diabetes, suggesting that smoking is a major risk factor for Type 2 diabetes' (Kawakami et al. 1997).

- "Physical activity and reduced occurrence of non-insulin-dependent diabetes mellitus" – Helmrich, Ragland, Leung, Paffenbarger, 1991, (Helmrich et al. 1991).

Questionnaires to examine patterns of physical activity and other personal characteristics in relation to the subsequent development of Type 2 diabetes in 5990 male alumni of the University of Pennsylvania between 1962 and 1976. It was reported that total expenditure of energy during leisure time had a protective effect against the development of Type 2 diabetes in middle-aged men. This effect was independent of obesity, age, history of hypertension and parental history of diabetes. Vigorous sporting activity was most effective in decreasing the risk of Type 2 diabetes but moderate sporting activity was also effective. The protective effect of physical activity was particularly apparent in the subjects at high risk for Type 2 diabetes. Thus, activity would seem to provide protection from Type 2 diabetes independently of the subject's general health status.

- “Diabetes, other risk factors and 12 yr cardiovascular mortality for men screened in the multiple risk factor intervention trial” – Stamler, Vaccaro, Neaton, Wentworth, 1993, (Stamler et al. 1993).

The Multiple Risk Factor Intervention Trial (MRFIT) aimed to assess predictors of CVD mortality among men with and without diabetes and to assess the independent effect of diabetes on the risk of CVD death. From 1973 to 1975, 347 978 men aged 35-57 years participated in the cohort study, where they were screened by 20 MRFIT centres in 18 cities across the United States. The study compared the relationships of systolic blood pressure, serum total cholesterol and cigarette smoking to CVD mortality in men with and without diabetes. The results from MRFIT clearly indicate that serum cholesterol, systolic blood pressure and cigarette smoking are significant, strong, independent predictors of mortality in men with and without diabetes, whereas previous studies on this have yielded inconsistent results for people with diabetes. The findings emphasise the importance of rigorous sustained intervention in people with diabetes to control blood pressure, lower serum cholesterol and quit smoking and the importance of considering nutritional-hygienic approaches on a mass scale to prevent diabetes.

- “Obesity and body fat distribution in relation to the incidence of non-insulin-dependent diabetes mellitus” – Cassano, Rosner, Vokonas, Weiss, 1992, (Cassano et al. 1992).

From 1963-1987, the relationship between the abdominal accumulation of body fat, total-body adiposity and blood glucose level and the risk of Type 2 diabetes was evaluated among 1,972 male participants in the Department of Veterans Affairs Normative Aging Study cohort in the United States. Participants were aged between 22 and 80 years, with a mean age at entry of 41.9 years. Results reported from the study found that 226 cases of diabetes occurred among the 1,972 men. The relation between body mass index to diabetes risk was partly explained by body fat distribution, after adjusting for age, the ratio of abdominal circumference to hip breadth and cigarette smoking, men in the top tertile for body mass index had a 1.3-fold greater risk of diabetes than men in the lowest tertile. However after adjusting for age, body mass index and cigarette smoking, the study found that men in the top tertile for the ratio of abdominal circumference to hip breadth had a 2.4-fold greater risk of diabetes than did men in the lowest tertile.

- “Obesity, fat distribution and weight gain as risk factors for clinical diabetes in men” – Chan, Rimm, Colditz, Stampfer and Willett, 1994, (Chan et al. 1994).

Data from a cohort of 51, 529 U.S. male health professionals, 40-75 years of age in 1986, who completed bi-ennial questionnaires sent out in 1986, 1988, 1990 and 1992 were analysed. Results reported found that there was a strong positive association between overall obesity (measured by BMI) and risk of diabetes. BMI at age 21 and absolute weight gain throughout adulthood were also significant independent risk factors for diabetes. Fat distribution, measured by waist-to-hip ratio was reported as a good predictor of diabetes only among the top 5%, while waist circumference was positively associated with the risk of diabetes among the top 20% of the cohort.

- “Association of waist-hip ratio with diabetes mellitus” – Schmidt, Duncan, Canani, Karohl, Chambless, 1992, (Schmidt et al. 1992).

Between August 1987 and April 1988, a case-control study nested within a community-based household survey consisting of a probability sample of 2937 adults between 30 and 69 years was conducted in Porto Alegre, Brazil. The cases were individuals with probable Type 2 diabetes (n=155) and a group of 313 non-diabetic control subjects. The study's results strongly suggest that the waist-hip ratio (WHR) to diabetes association is real, independent of age, sex, family history of diabetes and overall obesity and is quite complex. In women the WHR-diabetes association was greater than in men and also greater than that of the other risk factors. In men, the study found that WHR and BMI each importantly confounded the other's association with diabetes. Once control for the effect of the WHR was undertaken, the BMI-diabetes association was no longer statistically significant.

- “Relationship of obesity to diabetes: Influence of obesity level and body fat distribution” – Hartz, Rupley, Kalkhoff and Rimm, 1983, (Hartz et al. 1983).

In 1969 and 1970, questionnaires were distributed throughout the United States and Canada to members of the TOPS Club (Take Off Pounds Sensibly) – a weight reduction organisation. The relationship of clinical diabetes to body fat distribution and obesity level was examined in 15,532 women. It was reported that after adjusting relative weight, all upper body segment girth measurements (waist, bust and neck) had strong positive associations with diabetes. Results from the study suggest that upper body fat predominance and obesity are distinct and additive risk factors for clinical apparent diabetes and the prevalence of diabetes continued to increase with increasing values of the ratio of waist to hip.

- “Weight loss in severely obese subjects prevents the progression of impaired glucose tolerance to Type 2 diabetes” – Long, O'Brien, MacDonald, Leggett-Frazier, Swanson, Pories and Caro, 1994, (Long et al. 1994).

From 1980-1991, a cohort of 136 individuals with IGT (Impaired Glucose Tolerance) and clinically severe obesity (> 45 Kg excess body weight) were followed. The results reported from the study found that weight loss prevents the development of Type 2 diabetes in an extremely high-risk population for the disease. Individuals with IGT who did not lose weight developed Type 2 diabetes at a rate of 4.72 cases per 100 person-years. However, loss of approximately 50% of excess body weight resulted in a significant reduction in the conversion rate of Type 2 diabetes to a low of 0.15 cases per 100 person years. In conclusion, the article reported that weight loss in patients with clinically severe obesity prevents the progression of IGT to diabetes by >30-fold.

- “The influence of body fat distribution on the incidence of diabetes mellitus – 13.5 years of follow-up of the participants in the study of men born in 1913” – Ohlson, Larsson, Svardsudd, Eriksson, Wilhelmsen, Bjorntorp and Tibblin, 1985, (Ohlson et al. 1985).

In 1967, 792 54-year-old men selected by year of birth (1913) and residence in Goteborg, Sweden for a cross-sectional study focussing on the importance of abdominal adipose tissue distribution (measured as waist-hip ratio), as a predictor for development of Type 2 diabetes. The men were followed-up by re-examinations of anthropometric measures in 1973-74 and 1980-81 (13.5 years later). Results from this prospective study were said to strongly support the hypothesis that not only the degree of obesity but also a certain localisation of the adipose tissue is a risk factor for diabetes mellitus.

- “Prevention of Type 2 (non-insulin dependent) diabetes mellitus by diet and physical exercise – A six year Malmo feasibility study” – Eriksson and Lindgarde, 1991, (Eriksson & Lindgarde 1991).

The study has its origins in two age cohort screening programs carried out in the period 1974-1985 in the city of Malmo in Sweden. From a previously reported five-year screening program of 6,956 47-49 year old Malmo males, a series of 41 subjects with early stage Type 2 diabetes and 181 subjects with impaired glucose tolerance were selected for a prospective study. The focus of the study is to test the feasibility aspect of long-term intervention with an emphasis on life-style changes. A five-year protocol, including an initial six months (randomised) pilot study, consisting of dietary treatment and/or increase of physical activity or training with annual check-ups, was completed by 90% of subjects. Results reported found that body weight was reduced by 2.3-3.7% among participants, whereas values increased by 0.5-1.7% in non-intervened subjects with IGT and in normal control subjects. The maximal oxygen uptake was increased by 10-14% among participants, compared with a decrease by 5-9% among non-intervened subjects. Glucose tolerance was normalised in >50% of subjects with IGT and more than 50% of the people with diabetes were in remission after a mean follow-up of six years. Blood pressure, lipids, and hyperinsulinaemia were reduced. Improvement in glucose tolerance was correlated to weight reduction and increased fitness. In conclusion, it is reported that long-term intervention through diet and physical activity is feasible on a large scale and that substantial metabolic improvement can be achieved, which may contribute to prevent or delay manifest diabetes.

- “Diabetes and Cardiovascular Disease – The Framingham Study” – Kannel and McGee, 1979, (Kannel & McGee 1979).

The Framingham study is a cohort study that began in 1948 in the U.S. This article discusses additional data provided by 20 years follow-up. A cohort of 5,209 men and women aged 30-62 years at the time of initial examination were followed up biennially to determine the particulars by which those who go on to have CVD differ from those who remain free from the disease. Results found that from the age-adjusted relative risks, it appears that diabetes doubles the risk of total CVD in men and almost triples it in women. Age-adjusted relative risks were higher for women than for men for every CVD end point. ‘Conventional therapy for people with diabetes has not been demonstrated to prolong life. The only definite beneficial effect that has been demonstrated is the relief of symptoms

derived from a decrease in the level of blood glucose' (Kannel and McGee, 1979).

- “Sex differential in ischemic heart disease mortality in people with diabetes: A prospective population-based study” – Barrett-Connor and Wingard, 1983, (Barrott-Connor & Wingard 1983).

As discussed above in the Framingham study, it was suggested that diabetes predicted heart disease only in women after adjustments for covariates. However, the authors of this article believed it seemed intuitively unlikely that diabetes should be an independent heart disease risk factor in women only and decided to re-examine the association in a geographically defined community in the U.S. Between 1972 and 1974, a total of 212 diabetic and 877 non-diabetic men and 131 diabetic and 1227 non-diabetic women were in the study population. In a seven-year prospective study of this population, the authors were ‘able to show for the first time that diabetes, independent of other cardiovascular disease risk factors, is a significant predictor of ischemic heart disease death in both men and women’ (Barrott-Connor & Wingard 1983).

- “Clustering of heart disease risk factors in diabetic compared with nondiabetic adults” – Wingard, Barrett-Connor, Criqui and Suarez, 1983, (Wingard et al. 1982).

In 1972-1974, a population-based study investigated the frequency and clustering of five heart disease risk factors – cholesterol, triglycerides, systolic blood pressure, obesity and cigarette smoking in 347 diabetic and 2285 euglycemic non-diabetic adults aged 35-79 years. Results reported found that people with diabetes were more likely than non-diabetics to have high risk factor levels. Subjects at or above the 70th or 90th percentiles for one risk factor were more likely to be at or above these percentiles for other risk factors. Excess clustering in people with diabetes persisted after controlling for obesity and when only cholesterol, blood pressure or cigarette smoking was analysed. Therefore, the study found that heart disease risk factors are more common among people with diabetes and that if one risk factor is found, it is likely others will be present.

- “Effects of the Stanford Five-City Project Media Advocacy Program” – Schooler, Sundar and Flora, 1996, (Schooler, Sundar & Flora 1996).

The study investigated the effects of media advocacy efforts conducted as part of the Stanford Five-City Multifactor Risk Reduction Project (FCP), a long-term trial of community-wide cardiovascular disease (CVD) risk reduction achieved through a comprehensive, integrated program of community organisation and health education in the U.S. The objectives for the media advocacy were to include both building support for CVD-related policy change and encouraging people to develop more healthful lifestyles. The primary research questionnaire was to determine whether the FCP media advocacy program affected media content. Because the FCP used a quasi-experimental design carried out in five communities, they were able to compare stories about CVD in treatment city newspapers and reference city newspapers before, during and after the campaign. The methods involved conducting a content analysis of newspapers in treatment cities and

reference cities of the FCP for three time periods being, four years before the media advocacy program started, for five years during the program and for five years after the program. A total of 4,824 health articles in the two treatment city newspapers and two reference city newspapers between 1977-1990 were analysed. Results found that of the two treatment city newspapers that were targeted by the program, one demonstrated most of the hypothesised effects and the other did not. The one that demonstrated most of the hypothesised effects responded favourably to the FCP media advocacy program. The number of CVD-related articles increased during the campaign and coverage of general health-related topics increased after the campaign. The CVD-related articles were more prominent in this newspaper (ie. accompanying photographs and placement of the article) and the number of articles with a focus on prevention increased in this newspaper during the media advocacy program. The other treatment city newspaper did not show the same effects and in fact the newspaper diluted many of the treatment effects with their performance, therefore, not always being well presented by the statistical tests. A reason for this may be that a good relationship with the other newspaper was established early in the media advocacy program and from the outset of the program and therefore, the editorial staff at that newspaper were interested in participating in the FCP. 'Results suggest that frequent, regular, systematic contact with media professionals and provision of materials influence newspaper coverage of health-related topics, which has important implications for shaping public opinion and policy change' (Schooler, Sundar & Flora 1996).

- 'Population strategies to enhance physical activity: The Minnesota Heart Health Program.' – Crow, Blackburn, Jacobs, Hannan, Pirie, Mittelmark, Murray and Luepker, 1986, (Crow et al. 1986)

The Minnesota Heart Health Program (MHHP) is a community-based research strategy designed to favourably increase population shifts in coronary risk factors and their associated behaviours. Systematic, multiple, educational and motivational strategies are being used and are hypothesised to result in widespread and maintained behaviour changes likely to reduce CVD risk. The goal of the physical activity component of the MHHP is to enhance motivation and skills in exercise and reduce barriers to regular physical activity. The program seeks a basic change in community values, such that, an active life is valued by individuals and their employers, friends and family, as the behavioural norm. The MHHP physical activity program is implemented through three major education strategies, including direct education, community organisation and mass communications. The results so far (as at three years) from the 10-year project indicate that it is feasible to enter and involve communities actively in a health education program, which includes enhancement of physical activity. Total awareness in the community about the physical activity program and heart health is achieved in one to two years, with significantly greater exposure achieved in education communities than in comparison communities and exposure to heart health messages is increasing faster in educational communities. Moreover, attitudes, knowledge, awareness, participation and behaviours related to exercise and eating patterns appear to be changed by the program.

- 'Obstacles to the future goals of ten comprehensive community health promotion projects.' – Altman, Endres, Linzer, Lorig, Howard-Piney and Rogers, 1991, (Altman et al. 1991).

The focus of the study was to assess planning and implementation activities across diverse community health programs so as to identify and understand the common and unique issues facing community coalitions involved in health promotion in the U.S. The project had two primary goals. The first goal was to engage project staff, coalition/board members, staff and community representatives in an organisational and community analysis. A nominal group process was designed by which people involved in all projects communicated with each other about the issues they faced. Over 100 project staff, community coalition members and other representatives from 10 comprehensive community health promotion projects were surveyed two years into the three-year project. The main issues confronting respondents were diverse, however, issues around the process of implementing community health promotion programs were cited more frequently than issues related to the content of health promotion. When they were asked to prioritise future goals, a consensus emerged around the importance of community support and involvement, community awareness and funding. Results from the project found that firstly, 'community health programs should engage regularly in organisational analysis, even though it can be time consuming. Secondly, organisational analysis is a means for achieving desired outcomes, rather than an outcome itself and implementation of organisational analysis decisions require extensive follow-up and long-term commitment by the organisation. Thirdly, since insulated analysis leads to misdirected planning, broad community involvement in an organisation's self analysis is critically important' (Altman et al. 1991).

- 'Effect of the Heartbeat Wales programme over five years on behavioural risks for cardiovascular disease: Quasi-experimental comparison results from Wales and a matched reference area.' – Tudor-Smith, Nutbeam, Moore and Catford, 1998, (Tudor-Smith et al. 1998).

The Heartbeat Wales program is a community-based demonstration program in Wales directed towards reducing modifiable behavioural risks for cardiovascular disease. The program was launched in 1985 with its three strategic aims being leadership, demonstration and experimentation. The Heartbeat Wales program drew on experiences of other community-based risk reduction programs for cardiovascular disease. The program used a range of established health promotion methods directed towards both changing health behaviours in individuals and achieving environmental, organisational and policy changes that support healthy choices. A quasi-experimental design was used to compare results from two independent cross-sectional population surveys conducted in 1985 and 1990 in Wales and a matched reference area in North East England. The results found that positive changes in behavioural outcomes were observed among the population in Wales, including a reduction in reported smoking and improvements in dietary choice. However, it was reported that 'no conclusions can be drawn concerning the efficacy of the program in terms of behavioural outcomes. With hindsight, the difficulties of evaluating such a complex multifaceted intervention were underestimated.' The authors called for 'further debate on the most appropriate methods for assessing the effectiveness of community based health promotion programs' (Tudor-Smith et al. 1998).

14.0 GLOSSARY OF TERMS

Body Mass Index (BMI)	A measurement used to classify overweight and obesity. Calculated by dividing height in meters squared by weight in Kilograms. $BMI = \text{weight (kg)} / \text{height (m)}^2$.
Centralised body fat	Body fat centrally located. Also known as truncal and 'belly' fat.
Counter-regulatory hormones	Glucagon, Epinephrine, Growth Hormone and Cortisol responsible for carbohydrate and fat metabolism
Disability Adjusted Life Year (DALY)	The equivalent years of 'healthy' life lost by virtue of being in states of poor health or disability. $DALY = YLL + YLD$.
Dyslipidaemia	Abnormal blood lipid levels.
Glycaemic load	High sugar/glucose in the blood.
Hyperlipidaemia	High lipid levels.
Hypertension	High blood pressure.
Impaired glucose tolerance (IGT)	An abnormality where fasting blood glucose levels and results of oral glucose tolerance tests fall between normal values and those that meet criteria for diabetes.
Incidence	Number of new cases (of an illness or event etc) occurring during a given period.
Insulin	Hormone produced by β -cells and secreted in the pancreas that controls the amount of sugar in the blood.
Major program	One that consists of clearly defined objectives, strategies and evaluation.
Obesity	BMI measure > 30 .
Overweight	BMI measure $> 25; < 30$.
Pancreatic β-cell	Insulin producing cells in the pancreas.
Prevalence	The number or proportion (of cases, instances etc) present in a population at a given time.
Primary prevention	Attempts to prevent a disorder from occurring.
Recidivism	Relapse of a disease or reoccurrence of a symptom.
Secondary prevention	Attempts to identify and treat at the earliest possible moment so as to reduce the length and severity of a disorder.

Tertiary prevention	Attempts to reduce to a minimum the degree of handicap or impairment that results from a disorder that has already occurred.
Triglycerides	Combination of glycerol with three of five different fatty acids. A large proportion of lipids in the blood are triglycerides.
Type 1 diabetes	Insulin dependent diabetes mellitus usually developed in childhood.
Type 2 diabetes	Non-Insulin dependent diabetes mellitus usually developed in adulthood and is generally controlled by diet and exercise.
Years Lost due to Disability (YLD)	Years lost due to disability for incident cases of a health condition.
Years of Life Lost (YLL)	Years of life lost due to premature mortality.