Development and pilot test of a culturally tailored menu plan for Chinese immigrants with type 2 diabetes

by

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Abstract

Chinese Canadians are at higher risk for developing diabetes than the general Canadian population. Although culturally tailored diabetes treatment is recommended, there is a lack of relevant dietary resources for Chinese in Canada. The objectives of this thesis were to identify components in Chinese immigrants' diet that need improvement and the barriers to dietary adherence, to develop a culturally tailored menu plan based on the 4-A Framework, and to pilot test the feasibility and efficacy of the menu plan.

The first phase, i.e., the dietary needs assessment study, was conducted among 14 Chinese immigrants with type 2 diabetes (T2D) living in Edmonton using a convergent mixed methods design. Three-day food record was used to assess diet quality and questionnaires were used to collect other diet- and diabetes-related information. One-on-one semi-structured interviews were conducted to assess the barriers to dietary adherence. The second phase, i.e., menu plan development, followed the 4-A Framework to ensure that foods in the nutrition program were Adequate, Accessible, Available, and Acceptable. Findings from the needs assessment and current nutritional guidelines were taken into account when developing the menu plan. Some participants from the needs assessment study were invited to review the menu plan outline and their feedback was used to modify the menu plan. The third phase, i.e., pilot test of the menu plan, was conducted among 17 Chinese immigrants living in Edmonton using an intervention mixed methods design. The intervention lasted for 12 weeks. Weekly nutritional counselling was provided to participants during the first 4 weeks, and participants were contacted monthly in the last 8 weeks. Diet quality, biological outcomes and diabetes knowledge were assessed pre- and post-intervention. One-on-one interviews were conducted post-intervention to learn about how

the menu plan benefited participants and obstacles to adherence. Email or telephone follow-ups were conducted 2 months after study completion to obtain information regarding continued use of the menu plan and to address any further questions or suggestions.

Results from the dietary needs assessment showed that the mean Healthy Eating Index (HEI) score among Chinese immigrants with T2D was 67.7±10.9. The specific dietary components that needed improvement were grains and whole grains, milk and alternatives, saturated fats and sodium. Chinese immigrants were facing personal, societal and cultural barriers to dietary adherence, including time constraints, cravings, lack of diabetes knowledge, language, lack of culturally relevant resources, lack of healthy options in restaurants, and food prices. A pilot test of the culturally tailored menu plan showed that the mean HEI increased from 72.7±8.3 to 78.0±5.4 post-intervention ($p=0.010$), total vegetables and fruit score increased from 7.8±2.6 to 9.1±1.6 ($p=0.027$), dark green and orange vegetables score increased from 3.9±1.6 to 5.0±0.1 ($p=0.008$), servings of milk and alternatives increased from 0.9±0.9 to 1.3±0.8 ($p=0.083$), servings of total grains decreased from 6.5±2.8 to 5.4±2.7 ($p=0.024$), food acceptability increased from 19±3 to 21±3 ($p=0.039$), waist circumference decreased from 90.9±8.5 to 88.8±7.6 ($p=0.004$), total cholesterol decreased from 216.6±51.7 mg/dl to 195.2±52.6 mg/dl ($p=0.007$), low-density lipoprotein cholesterol decreased from 106.9±50.8 to 88.6±54.0 ($p=0.007$), diabetes knowledge score increased from 4.9±1.6 to 5.8±1.2 ($p=0.009$). No significant changes were observed in saturated fats and sodium intake and A1C.

In conclusion, a flexible, culturally tailored menu plan could be a feasible and effective tool for improving diabetes knowledge, diet quality and biological outcomes among Chinese immigrants. The research helped narrow the gap in the literature about culturally tailored dietary

interventions for Chinese immigrants and provided important information about menu planning for Asian immigrants. The 4-A Framework has the potential to be generalized across cultures to guide development of culturally tailored resources for diabetes management.

Preface

All the research presented in this thesis was conducted at the University of Alberta. All studies received ethics approval from the University of Alberta Research Ethics Board. The first study, "Dietary Needs Assessment of Chinese People with Type 2 Diabetes", ID: Pro00023449, was approved Oct 26, 2011, and closed Oct 1, 2014. The second study, "Participants' feedback on a Chinese menu plan for type 2 diabetes", ID: Pro00050028, was approved Aug 22, 2014, and closed Aug 3, 2015. The third study, "Pilot test of a Chinese menu plan for type 2 diabetes", ID: Pro00053775, was approved on Feb 28, 2015.

A version of Section 1.1.6 in Chapter 1 was published in Frontiers in Endocrinology 4:108, 2013. DOI:10.3389/fendo.2013.00108. The title of the publication is "Acculturation, dietary acceptability, and diabetes management among Chinese in North America". The authors are Feiyue Deng, Anran Zhang and Catherine B. Chan. Three authors contributed equally to the publication. Permission has been obtained from the other two authors to include the publication in the thesis.

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List of abbreviations

2hPG	2-hour plasma glucose
A1C	glycated hemoglobin
ADA	American Diabetes Association
BMI	body mass index
BP	blood pressure
CBPR	community-based participatory research
CDA	Canadian Diabetes Association
CPG	clinical practice guidelines
CVD	cardiovascular disease
DPP	Diabetes Prevention Program
DPPOS	Diabetes Prevention Program Outcomes Study
DQOL	diabetes quality of life
EER	estimated energy requirement
EWCFG	Eating Well with Canada's Food Guide
FDPS	Finnish Diabetes Prevention Program
FPG	fasting plasma glucose
GDM	gestational diabetes mellitus
GI	glycemic index
HDLC	high-density lipoprotein cholesterol
HEI	healthy eating index
IDF	International Diabetes Federation
IFG	impaired fasting glucose

IGT	impaired glucose tolerance
IGR	impaired glucose regulation
LDLC	low-density lipoprotein cholesterol
NNT	number needed to treat
OGTT	oral glucose tolerance test
PANDA	Physical Activity and Nutrition for Diabetes in Alberta
PIH	pregnancy-induced hypertension
PODOSA	Prevention of Diabetes and Obesity in South Asians
PPEP	Pure Prairie Eating Plan
RCT	randomized controlled trial
SES	socioeconomic status
SL-ASIA	Suinn-Lew Asian Self Identity Acculturation Scale
SMS	short message services
T1D	type 1 diabetes
T2D	type 2 diabetes
TC	total cholesterol
TG	triglycerides
UL	Tolerable Upper Intake Level

1 Introduction

1.1 Literature review

1.1.1 Definition, pathophysiology and diagnosis of type 2 diabetes and prediabetes

Diabetes is a metabolic disorder with the presence of hyperglycemia. Over the long term, high blood glucose levels are associated with not only microvascular complications including eye-, kidney- and nerve-related diseases, but also an increased risk for cardiovascular disease (CVD).[1]

The majority of diabetes belongs to one of these three types, that is, type 1 diabetes (T1D), type 2 diabetes (T2D), and gestational diabetes (GDM).[1] The categorization is based on the pathophysiology. T2D may "range from predominant insulin resistance with relative insulin deficiency to a predominant secretory defect with insulin resistance."[1] The diagnostic criteria for diabetes are determined based on thresholds of blood glucose levels associated with microvascular disease. The diagnostic criteria for diabetes are shown in Table 1-1.

Prediabetes refers to the condition in which blood glucose levels are higher than normal but not as high as the criteria for diabetes diagnosis.[2] The diagnostic criteria for prediabetes are shown in Table 1-2. Prediabetes can refer to impaired fasting glucose (IFG), impaired glucose tolerance (IGT)[3] or a glycated hemoglobin (A1C) of 6.0% to 6.4%. Individuals with prediabetes have an elevated risk of developing T2D and its complications.[1]

Table 1-1 Diagnosis of Diabetes

FPG ≥7.0 mmol/L Fasting = no caloric intake for at least 8 hours or A1C ≥6.5% (in adults) Using a standardized, validated assay in the absence of factors that affect the accuracy of the A1C and not for suspected type 1 diabetes or 2hPG in a 75 g OGTT ≥11.1 mmol/L or Random PG ≥11.1 mmol/L Random = any time of the day, without regard to the interval since the last meal
2hPG, 2-hour plasma glucose; A1C, glycated hemoglobin; FPG, fasting plasma glucose; OGTT, oral glucose tolerance test; PG, plasma glucose. Reference: Canadian Diabetes Association Clinical Practice Guidelines 2013

Table 1-2 Diagnosis of prediabetes

Test	**Result**	**Prediabetes category**
FPG (mmol/L)	6.1-6.9	IFG
2hPG in a 75 g OGTT (mmol/L)	7.8-11.0	IGT
A1C (%)	6.0-6.4	Prediabetes
Reference: Canadian Diabetes Association Clinical Practice Guidelines 2013		

1.1.2 Epidemiology

According to the International Diabetes Federation (IDF) [4], 387 million people had diabetes in 2014, and this will rise to 592 million by 2035. Diabetes caused 4.9 million deaths in 2014. The number of people with T2D is increasing in every country. T2D accounts for 85% to 95% of all diabetes in high-income countries and may account for an even larger proportion in middle- and low-income countries.[5] In Canada, the estimated prevalence of diabetes was 6.8% in 2009, which represented 2.4 million Canadians. That number is projected to grow to 3.7 million by 2019.[1] Besides, it is estimated that more than 5.7 million Canadians have prediabetes,[2] who have a high risk for progressing to T2D later on, if timely intervention is not initiated.[6]

1.1.3 Complications of diabetes

In Canada, diabetes is the leading cause of blindness, end stage renal disease and nontraumatic amputation among adults.[1] Compared to people without diabetes, diabetic patients have much higher risk for developing atherosclerotic CVD including coronary heart disease, stroke and peripheral vascular disease.[7–9] About 65% to 80% of diabetic patients will die from CVD.[8,10] Likewise, the combination of diabetes and stroke is a major contributor to morbidity and mortality around the world. One of the important modifiable risk factors for stroke is diabetes.[11] The increased incidence of CVD is directly dependant on plasma glucose levels[11] and may begin even at the prediabetes stage.[2] Diabetic nephropathy is another common complication of diabetes,[12,13] associated with significantly reduced life expectancy and impaired quality of life.[14] Furthermore, individuals with diabetes, especially T2D, often develop kidney diseases other than diabetic nephropathy, such as nondiabetic glomerular disease, which shows similar prevalence to diabetic nephropathy in diabetic patients.[15] Another complication of diabetes is diabetic retinopathy, which affects 40% of the adults with diabetes in the United States, with the rate for

more severe sight-threatening retinopathy estimated at 8%.[16] Visual loss has significant negative impact on safety issues, independent living, and emotional wellbeing.[17] Diabetic retinopathy can be delayed or prevented through tight glycemic control.[1] Other common complications of diabetes include neuropathy and foot ulcers, which affect quality of life and work productivity and increase hospitalization and healthcare costs.[18,19]

1.1.4 Clinical practice guidelines for nutrition therapy in Canada

Every five years, the Canadian Diabetes Association (CDA) publishes clinical practice guidelines (CPG) that contain comprehensive and evidence-based recommendations for healthcare professionals to consider in their clinical practice for diabetes prevention and treatment,[1] among which nutrition therapy is an important segment. Nutrition therapy is intended to improve quality of life and nutritional and physiological health, and to prevent and treat complications of diabetes.[1] Clinical studies have shown the effectiveness of nutrition therapy in weight loss and glycemic control.[20,21] Generally speaking, individuals with diabetes should follow the healthy diet recommended in Eating Well with Canada's Food Guide (EWCFG) that is designed for the general Canadian population.[22] EWCFG recommends the consumption of various foods from four food groups, i.e., vegetables and fruits; grain products; milk and alternatives; meat and alternatives.[22]

The CPG for nutrition therapy recommend energy restriction to achieve a healthy body weight because the majority of people with T2D are overweight or obese and a modest weight loss can significantly improve insulin sensitivity and glycemic control.[23] Total calories should reflect the weight management goals of patients themselves. The macronutrient distribution can be flexible

within recommended ranges, depending on patients' preferences and the quality of different macronutrients.[24]

The percentage of total daily energy from carbohydrate should be between 45% and 60%. A minimum of 45% helps to prevent high intake of fat and a maximum of up to 60% is allowed when carbohydrate is derived from low glycemic index (GI) and high-fibre foods. The GI measures the quality of carbohydrate-containing foods based on their ability to raise blood sugar. A food with a low GI raises blood sugar less than a food with a high GI.[25] One of the key messages of the CPG for nutrition therapy is, "Replacing high glycemic index carbohydrates with low glycemic index carbohydrates in mixed meals has a clinically significant benefit for glycemic control in people with type 1 and type 2 diabetes."[1] Studies have shown that dietary fibre is associated with improved postprandial blood glucose control and reduced risk of CVD. The CPG for nutrition therapy recommend higher intakes of dietary fibre than the recommendations to the general population. The general recommendation is 25g and 38g for women and men under 51 years old, and 21g and 30g for women and men over 51 years old, respectively. The recommendation of dietary fibre for diabetic patients is 25-50g/day or 15g to 25g per 1000 kcal.[26] Added sucrose intake of up to 10% of total energy intake is acceptable. Substituting fructose for other carbohydrates of equal calories hardly has any harmful effects on body weight[27,28] and blood pressure[29], and may even improve glycemic control.[30,31] However, if consumed more than 10% of total daily energy, fructose can lead to slightly elevated TG in type 2 diabetic patients.[32]

The CPG for nutrition therapy recommend the same range of fat intake as that recommended for the general population, which is 20%-35% of total daily energy intake.[33] However, saturated fats

should be limited to less than 7% of total daily energy in order to reduce the risk for coronary artery disease.[34] Another component that should be restricted is trans fatty acids derived from industrial hydrogenation.[1]

The CPG for nutrition therapy recommend the same protein range as the usual protein intake in the general population, that is, 15%-20% of total energy intake, or 1 to 1.5 g per kg body weight per day.[35] Meanwhile, protein quality should be considered. Replacing animal protein with plant protein, especially soy, is beneficial to renal function and lipid profile in people with T2D.[36–38]

Intensive lifestyle interventions have demonstrated positive effects on various aspects of health in diabetic patients, such as body weight control, glycemic control and diabetic complications.[1] The CPG for nutrition therapy have summarized a variety of dietary patterns that have beneficial effects in individuals with diabetes, including vegetarian diets, Mediterranean diets, Dietary Approaches to Stop Hypertension (DASH) dietary pattern and diets emphasizing specific foods such as dietary pulses. Whether to follow one of these dietary patterns or not or what dietary pattern to follow depends largely on an individual's preferences and abilities.[1]

Finally, the method by which nutrition education is delivered also matters. Nutrition education is effective for individuals with, or at risk for, diabetes, when delivered in small groups or by individual counselling.[39–41] For people with lower socioeconomic status (SES), individual counselling may achieve better results.[42] Cultural sensitivity is an important facilitator in the successfulness of nutrition education in diabetic patients.[43] In vulnerable populations such as those with low income or ethnic minorities, barriers to healthy eating should be evaluated and education programs should be focused on solutions to overcoming these barriers so as to attain positive behavioural changes.[44]

1.1.5 The 4-A Framework and PANDA project

The 4-A Framework derived from food security literature[45] stipulates that foods included in nutrition programs should be Adequate, Accessible, Acceptable and Available. Adequacy means the diet meets guidelines for health and promotes dietary improvements that lead to better primary (blood glucose control) and secondary outcomes (complications, e.g. cardiovascular diseases). Accessible refers to the factors associated with financial and physical accessibility of foods. Foods must be Acceptable from multiple perspectives: hedonic qualities, culture, traditions and consumption habits. Foods must also be generally Available to the consumer population of interest, which can be locally grown or regularly imported. The 4-A Framework can serve as a rationale for dietary intervention development and evaluation among type 2 diabetics, and has been applied in the PANDA project: Physical Activity and Nutrition for Diabetes in Alberta.[46]

A four-week menu plan was developed by the PANDA research group to facilitate healthy eating behaviours and improve adherence to dietary recommendations through reducing barriers such as lack of knowledge and flexibility of recommended diets in Albertans with T2D.[47] The menu plan features four weeks of menus, weekly grocery shopping lists, recipes and healthy eating tips. How to substitute ingredients to improve flexibility was also explained. This strategy could improve Acceptability. In order to ensure Adequacy, the menu plan translated recommendations from the CDA-CPG for nutrition therapy[1] into practical recipes and menus. The menus met the food guide servings recommended by EWCFG.[22] The average total daily energy of the menus was 2055 kcal. Three meals and two to three snacks were included in each day's menu. Meals contained foods from three to four food groups and snacks consisted of foods from at least two food groups to ensure a balanced diet. A variety of low-GI foods were used in

the recipes, such as legumes, whole grains and pasta. Carbohydrates were spaced throughout the day as recommended for improved blood sugar control. Incorporating local foods was also emphasized, which improved Availability and Accessibility. Additionally, "specialty" foods for diabetic patients, such as artificial sweeteners, were not included in the menu plan thus making it appropriate for people without diabetes as well.[47]

The menu plan was initially named "Eating Healthy with Type 2 Diabetes – a Smart Menu Plan for Albertans", and tested for feasibility and efficacy in a phase 1 pilot study[21] followed by a larger phase 2, single-arm study[20]. The pilot study was a 12-week trial in 15 T2D participants with a pre-test and post-test design. Individual nutrition counselling was provided to participants weekly in the first 4 weeks and monthly in the last 8 weeks. Mean (±SD) age of the participants was 59±10 years. The pre- and post-test comparison showed significant reductions in body weight, body mass index (BMI, body weight divided by the square of body height), waist circumference, fat mass and A1C (decreased by 1.0%±0.9%) and increased high-density lipoprotein cholesterol (HDLC). In terms of dietary measures, improvement in perceived dietary adherence score was the only significant change. The adherence to the menu plan was assessed based on self-report via a diary as well as the participation rate in the counselling sessions. Participants reported using the menu plan an average of 5.0±1.9 days a week and attended 4 of 6 counselling sessions on average.[21]

Based on the positive results and feedback from the pilot study, a larger study[20] was conducted. Seventy-three participants (age 59±10 years) with T2D living in Alberta, Canada enrolled in the 12-week intervention, which combined menu planning with 5 weekly interactive small group sessions and a grocery store tour. Post-intervention follow-up was conducted at 3 months, when

the intervention was completed. Results showed statistically significant reductions in A1C, BMI, diastolic blood pressure (BP), TC (total cholesterol) and low-density lipoprotein cholesterol (LDLC) after the 12-week intervention. The improvements in A1C, BMI and lipid profile were sustained at 3 months after intervention. Significant improvements were observed in the overall diet quality as well as specific components including reductions in the intake of saturated fat, sodium and total energy. Significant correlation was found between dietary improvement and A1C reduction. This study further confirmed and expanded the positive changes observed in the pilot test. Therefore, our research group concluded that the combination of menu planning and nutrition education sessions in a one-on-one or group setting was feasible and effective for diabetes management, and could serve as a practical approach to implementing nutritional guidelines for diabetes in Canada. Renamed as "Pure Prairie Eating Plan" (PPEP)[48], the menu plan has been published and is available to the public. A website[49] is available to complement the PPEP and provide updates on new recipes and useful information about healthy eating and to promote continuous interaction and communication between researchers and patients as well as the general population who want to eat healthy.

1.1.6 Acculturation, dietary adherence and acceptability, and diabetes management among Chinese in North America

Changes in health status following immigration have been noted, with health advantages disappearing over time[50] and increasing prevalence of obesity and associated metabolic diseases such as T2D;[51,52] this change over time is known as the "healthy immigrant effect." This suggests that adaptation to the new environment and culture is a risk factor for diabetes. Immigrants may also face obstacles to optimized treatment of complex chronic diseases due to many factors; lack of optimization of interventions based on culture may be a major barrier. As will be described

further, the adaptation occurring following immigration is termed *acculturation*, which has been defined as "the process by which an ethnic group, usually a minority, adopts the cultural patterns including beliefs, religion, and language of a dominant group".[53] At the group level, the acculturating group (or society as a whole) adopts physical, economic, cultural, and political changes while at the individual level, change is manifested in attitudes, beliefs, values, and behaviors (for example dietary behaviours and eating patterns).[53] It is proposed that acculturation is affected by personal factors such as age, gender, and socio-economic status, the duration of stay in the host country and the traditions of the original culture.[53] As reviewed by Sanou et al.,[50] significant knowledge gaps exist regarding the interrelationship between immigration, acculturation, and health status in Canada and acculturation may affect an individual's ability to fully embrace treatment,[50] which for T2D includes a complex regimen of self-care activities such as managing diet, increasing physical activity, monitoring blood glucose, taking medications, and being vigilant for comorbidities.[1] Because diet is closely tied to culture, adhering to a prescribed nutrition regimen may be even more difficult for immigrants than for the dominant culture.

A major immigrant group in Canada is ethnic Chinese. According to the 2011 census, first generation immigrants make up about 20% of Canada's population. Ethnic Chinese are the second largest population of first generation Canadians and are also the second largest visible minority in Canada overall, comprising 4.0% of the total population.[54] Only five published papers regarding health of Chinese immigrants to Canada were found in the literature.[50] However, several studies have examined the association between the prevalence of chronic diseases and acculturation among Asian immigrants to the United States. Chinese Americans have a higher prevalence of diabetes compared with both native Americans and their peers in

China.[55] The purpose of this review is first to describe general barriers to dietary adherence in people with T2D.We will then summarize what is known about the influence of several acculturation indicators (diet, language, length of stay in North America) on T2D management behaviours in Chinese immigrants to North America and the effects of acculturation on diabetic management in different genders and family context. Avenues for improving diabetes nutrition therapy for ethnic Chinese, as a model for immigrant populations to Canada, will be suggested.

1.1.6.1 Adherence to nutrition interventions in type 2 diabetes

Nutrition therapy is a critical component of care for people with T2D and has the potential to lower A1C by 1–2%.[1] However, dietary management is perceived to be the most difficult to achieve of all the aspects of self-care.[56,57] Studies conducted in various countries around the world show that adherence to dietary recommendations is poor among diabetes patients.[58–60] Data from the US-based National Health and Examination survey (NHANES) indicate that protein, saturated fat, and fiber recommendations were met by 65, 28, and 18% of those with diabetes, respectively.[61] Thus, the accumulated evidence suggests that diabetes patients have difficulty implementing recommended dietary changes into their daily routines and lifestyle. Family physicians and other health care providers may be enthusiastic supporters of lifestyle modifications but are lacking practical resources to help their patients with T2D achieve these recommendations.[62] Clinical Practice Guidelines produced by national and international organizations[1,63,64] provide specific recommendations but do not address how guidelines can be met except in a general way.

A major part of the uncertainty regarding adherence to dietary treatment and its "success" or "failure" is related to our lack of understanding of the extent to which patients adopt and are able

to maintain changes that they make in their dietary intake. For example, a systematic review[65] of dietary advice for the treatment of T2D found only 36 papers reporting on 18 studies that met the inclusion criteria for this review. The authors noted that many studies failed to measure and report adherence to the intervention, limiting their ability to make conclusions as to the relative efficacy of interventions. Failure to adhere to nutrition advice may actually reflect a range of factors ranging from social and ecological to personal and familial factors that limit patients' ability to implement changes in diet.

Even less is known about how minority or immigrant populations respond to interventions for chronic diseases compared with the general population. Osei-Assibey et al.[66] conducted a systematic review and found only 19 publications comparing minority populations within randomized control trials aimed at weight loss in the obese. All of the studies were conducted in the United States and focused mainly on African-Americans. In the Diabetes Prevention Program, an ethnically representative sample was studied and ethnic x gender differences in response to the intervention were noted, with female African-Americans losing less weight than their white counterparts.[67] However, the authors of that study noted that weight loss was still greater than in most other published reports and attributed the effect to the intervention design, which included tailoring foods and cooking methods to ethnic groups, among other strategies.[67]

1.1.6.2 Focus on cultural and social acceptability of prescribed diets

The need to recognize cultural diversity in diabetes treatment is emphasized by the IDF[63] and countries with large immigrant populations and multi-cultural societies.[1] When optimizing dietary patterns in order to treat disease, the food culture of the society and the individual should be considered in order to maximize the acceptability of the treatment. Choosing unfamiliar foods

from a different ethnic heritage might make dietary adherence to diabetes guidelines more complicated and could contribute to low adherence rates, while acceptability of a recommended diet could increase adherence. Therefore, understanding the personal and cultural barriers that are associated with dietary adherence faced by people with diabetes could contribute to a future intervention program.

Food acceptability is widely referred to terms such as palatability, liking/disliking, food preferences, and pleasantness/unpleasantness.[68] For example, the DASH diet has been evaluated for the acceptability of reduced salt in foods.[69] Besides the sensory aspect, food acceptability also has social and cultural connotations. Holm's group[70] divides social and cultural acceptability into four dimensions including liking of the diet, social eating events, practical matters of implementation (shopping, cooking, eating), and relationship of the diet to the desired outcome (e.g., weight loss). In diabetes populations, it is predicted that a person will be better able to follow the prescribed diet when the foods specific for diabetes are available at an affordable price with easy access and are acceptable culturally, socially, and personally. The association between these factors and dietary adherence is not widely studied in diabetes. Understanding these factors would help to plan intervention programs that would be more effective and convenient for diabetes patients. The CDA-CPG[1] do advise that the health care team consider cultural and personal preference when formulating diet plans for clients but how well these preferences are incorporated is not widely studied.

Few studies assess the effect of cultural acceptability on dietary adherence. Interestingly, prescribing a diet outside of the cultural norm was persistently associated with participants' feeling that the diet was difficult to incorporate into the family's eating patterns or with social

interactions. There were also perceptions of increased investment of time and money for food preparation and difficulty in incorporating into traditional dishes.[71] Some studies suggest that diabetic individuals have difficulty altering their foods habits and often tend to consume traditional foods that are high in fat and sugar.[72,73] Data from our group suggest that higher cultural and social acceptability of an individual's prescribed diabetes diet correlates with improved blood glucose control;[74] however, these results were obtained from a cross-sectional study of predominantly white participants. A study of ethnic minority or immigrant participants would help to clarify the relative acceptability of diabetes diets and the relationship to health outcomes. Another study examining diabetes dietary satisfaction also found improved A1C when participants expressed better ability to implement a diabetes diet, including with regard to social situations,[75] but cultural considerations were not addressed. Diabetes educators[76] and people with diabetes[72,77] report that not wanting to give up ethnic foods is a barrier to adherence whereas when dietary recommendations are flexible and adapted to a specific culture, better control of blood glucose may be achieved.[78] Modifying traditional foods to make them healthier may also be of benefit.[79]

It has been suggested that new immigrants should retain their traditional healthy eating patterns while adopting the healthy components of the dietary practices of their host country.[80] Health professionals could decide whether to focus more on the former or the latter, based on specific dietary acculturation of an individual or community. For example, if an immigrant has a very low acculturation level, and his diet remains traditional, more attention should be paid to retaining his traditional healthy dietary practices instead of letting him incorporate the healthy eating patterns of the host country, which may result in low acceptability and low adherence.

1.1.6.3 Acculturation, dietary acculturation, and diabetes management

For an immigrant in North America, the degree of acculturation influences many aspects of life, such as access to health services organizations and physical activity facilities as well as healthy eating behaviours. Therefore, the degree to which individuals are acculturated into the host culture is predicted to influence their ability to adapt to the requirements of a therapeutic nutritional pattern upon diagnosis of a chronic disease like T2D. Acculturation can be quantified using instruments such as the Suinn-Lew Asian Self-Identity Acculturation (SL-ASIA) scale, which examines responses to statements in several dimensions including ethnic identity, social interactions, language and cultural preference, country of birth and pride for one's culture.[55] The term "dietary acculturation" specifically refers to the process of adopting the eating patterns and food choices of their new environment.[81] Dietary acculturation is multidimensional. Instead of moving predictably from traditional to acculturated, immigrants may "retain and find new ways to use traditional foods, exclude others, and/or consume new foods".[80]

When Chinese people immigrate to North America, dietary patterns change as a result of acculturation and availability of specific foods. More than half of respondents changed their diet after immigration from China to the USA, with increased consumption of western and reduced consumption of traditional Chinese foods from all food groups, as well as increased consumption of sweets and soft drinks.[82] Lack of availability of traditional Chinese food at competitive prices with western foods is an important factor.[83] Of the three daily meals, breakfast is usually the first to be acculturated, with inclusion of foods such as oatmeal, milk, bagels, and cream cheese whereas noodles or rice remain staples of the lunch and supper meals.[84] This dietary acculturation pattern is likely a risk factor for obesity and T2D. As acculturation progresses,

intake of processed, ready-to-eat western foods increases because of lack of familiarity with western cooking methods.[84]

In general, dietary acculturation has a negative influence on the health status of immigrants, placing them at elevated risk for chronic diseases related to diet.[80] Using Canadian data from several nationally representative surveys, there was a similar[85] diabetes prevalence between the Chinese-Canadian population and the general Canadian population. However, a prospective study with median 6 years of follow-up of diabetes incidence in Ontario, Canada showed that Chinese had 87% greater risk than white subjects.[86] The ethnic Chinese were also younger at diagnosis and developed diabetes at a lower BMI than Caucasian Canadians.[86] Asian Americans have also been reported to have increased risk of diabetes[87] although a recent US study indicated similar risk to whites for incident diabetes over 1 year of follow-up.[88] Thus, ethnic Chinese in North America are a sizable population with diabetes prevalence equal to or greater than the general population. From both economic and personal perspectives, there is a strong rationale for optimizing diabetes treatment, particularly related to nutrition, in this group.

Nutrition therapy is an important part of diabetes treatment[1] but it is a challenging task to change and maintain one's diet. Immigrant groups usually have different dietary patterns than native Canadians, so it is likely to be even harder for them to adhere to a typical Canadian food guide or menu plan. Application of dietary acculturation to specific immigrant groups holds special challenges and self-care during chronic disease is better facilitated when cultural competence and congruency is incorporated in the management approach.[89] In Canada, the importance of providing individualized behavioural treatment taking cultural factors into account has been noted by researchers[90] as well as in the CDA-CPG.[1] Dietary acculturation occurs to varying

extents in people, with different combinations of traditional and western foods included in the diet, and appears to occur more in younger immigrants;[82,91] therefore, for older adults with T2D, acculturation is likely to be lower. Furthermore, compared with many other immigrant groups, Chinese retain their diet longer and more faithfully after immigration,[92] with rice, noodles, ethnic breads, and starchy vegetables remaining staple foods in immigrant Chinese diets.[93] One reason for this is that diet is at the center of life and tradition, with influences on emotions and interpersonal relations as well as health.[94] At the nutrient level, compared with a western diet, a traditional Chinese diet contains large amounts of fibre and less saturated fats, being largely composed of vegetables, fruits, and meats[95] whereas a western diet contains more cholesterol and calcium.[84]

Some of the cultural factors influencing nutritional treatment of T2D in Chinese immigrants to North America have been studied, mainly in the United States. In Chinese Americans with diabetes, family harmony and buy-in to the treatment regimen are critical to diabetes outcomes.[96,97] In the Chinese dietary tradition, the Yin-Yang (hot-cold) principles of food are deeply rooted, especially for older Chinese.[82] A dependence on Chinese staple foods could be challenging to Chinese immigrants with T2D in western countries because these foods are not appreciated by western health service providers and educators.[97] For example, a doctor's recommendation to restrict rice consumption can lead to family conflict because rice brings a sense of well-being to Chinese people.[97] Some Chinese Americans perceive that restriction of rice weakens their physical strength and keeps them from fulfilling their roles as a financial provider for the family.[98] These findings suggest that recommended dietary changes for T2D have a huge influence on the emotional and physical health of Chinese Americans.

Lack of nutritional knowledge is also an issue for less-acculturated Chinese with T2D. Although most are aware of the importance of diet in managing their disease, they lack knowledge of portion sizes and food groups and continue to eat staple food such as rice or wheat products daily.[99] This leads to the consideration of health literacy of immigrant groups. Health literacy refers to "the wide range of skills and competencies that people develop over their lifetimes to seek out, comprehend, evaluate, and use health information and concepts to make informed choices, reduce health risks, and increase quality of life".[100] Among different aspects of health literacy, fundamental literacy and cultural literacy are of major concern in minority groups due to their language and cultural differences with the mainstream society.

English proficiency among immigrants highly influences their fundamental literacy, which includes speaking, reading, writing, and numeracy.[100] Fundamental literacy is very important for diabetes management because there is a need to communicate with health professionals, read medication instructions, food labels, and other information about disease management. English proficiency is one of the most commonly cited indicators of acculturation. When immigrants come to North America, language is the first barrier to overcome.[101] For those with a disease such as T2D, accessibility to medical services and disease management advice is limited by language capabilities, miscommunication, frustration, and distrust.[98] It has been estimated that only half of Chinese Americans with T2D obtain advice on diabetes management,[102] and those who speak little English are less likely to effectively monitor blood glucose.[103] Lack of language capacity affects adherence to drug regimens and decreases knowledge of side-effects.[99] Even when translation is provided, these services may not meet client needs[98,104] and when family members serve as translators important medical or pharmaceutical information may not be fully understood because literal translation is not always appropriate in the delivery of medical

information and health education.[104] In order for effective health education and promotion, cultural competence is needed among health professionals and organizations. Culturally appropriate needs assessment is necessary before planning and implementing health education programs.[105]

1.1.6.4 General acculturation trends in Chinese populations in North America

Most Chinese immigrants in Canada reside in the largest metropolitan areas[106] and many reside in their own ethnic enclaves.[107] For example, nearly half of the population of the Vancouver suburb of Richmond is ethnic Chinese.[108] Studies of American Chinese indicate lower acculturation than for other immigrant groups[52] and less likelihood of speaking English.[52] Approximately 15% of Chinese immigrants to Canada cannot speak either official language (English or French), although this is dependent upon age and education.[106] Although the low acculturation is partially because of the collective orientation, individual differences among Chinese immigrants are significant in acculturation experience. Berry has suggested that individual socio-economic status and psychological factors affected acculturation experiences.[109]

Variation in age, gender, and socio-economic status can make a difference in both acculturation experiences and outcomes. Korean immigrants who were younger and living in the US for 8 or more years were more acculturated than older people.[110] Women were less-acculturated than men, which suggested a gender difference in acculturation levels.[110,111] Gender differences were attributed to men being more likely to work long hours and therefore more exposed to the American culture.[110] Since the gender roles in family are similar between East Asian countries, this finding might be also valid in the Chinese American population and it was found that female Chinese Americans are less-acculturated than males.[55] This gender-related difference in

acculturation is reflected in health-related behaviours relevant to T2D, such as physical activity.[112] Higher acculturation has been associated with higher physical activity.[55] Women within households frequently place husbands' and children's preferences in front of their own when designing a meal; in contrast, men tend to emphasize their own creativity more than the taste preferences of those they serve.[113] These gender differences may influence diabetes management because diet is an important aspect of it. A female diabetes patient in a family might sacrifice meeting her own dietary requirements in order to satisfy the preferences of the husband and children. Thus, education or intervention programs may need to be targeted at the whole family or even larger environment to develop social support for individuals with diabetes.

With respect to education, Kandula and Lauderdale showed that Chinese Americans with education higher than high school were more likely to be acculturated and only 5.4% of Chinese having a high school education or less obtained acculturation score 3–5 (out of 5) using the SL-ASIA scale. They found a similar pattern of association between income and acculturation. People with a higher income were more likely to be highly acculturated than their counterparts with low income.[112] These findings suggest that individual and socio-economic characteristics affected acculturation of Chinese immigrants in the United States, which may impact an individual's ability to adopt a nutrition prescription for diabetes. The tendency for Chinese immigrants to live in segregated enclaves within the large metropolitan areas presents an opportunity to introduce culture-specific interventions within distinct geographical areas of a city to maximize reach and uptake of a program.

Although there is increasing research on the health practices of Chinese immigrants to North America, most focuses on traditional aspects of medical care of disease management. However,

in Chinese culture, social and family influences are emphasized in disease management; an aspect little studied with regard to acculturation effects. Being influenced by the traditional collectivistic social orientation and the philosophy of harmony, Chinese Americans tend to value the well-being of the whole community and family more than individuals' physiological and emotional health.[96] In addition, changes in socio-economic status imposed by immigration may influence the community and family status of Chinese Americans. Therefore, these factors need to be considered in order to achieve optimal health care. For example, in traditional Chinese families, filial piety and respect for elders is highly appreciated but are not valued in American culture; therefore, Chinese elders perceive less family support especially for diabetes management practices.[98] Lower SES may lead to loss of face, depression, and changes in behaviour such as reduced physical activity.[98] Within the family, interpersonal harmony is an important value such that Chinese Americans may not express their negative emotions related to their disease in front of family members, who may in turn remain silent in order to avoid conflicts arising from altered family roles and responsibilities.[97] Families or couples with higher interpersonal respect or conflict resolution skills have better disease management.[114]

1.1.6.5 Summary

There is an appreciation for the need to address cultural considerations when prescribing diets for the treatment of T2D to patients from ethnic minorities in North America in order to increase diet acceptability and adherence. Ethnic Chinese are a large minority population in North America. The degree of acculturation may impact dietary choices by ethnic Chinese but few studies have addressed this possibility directly, particularly in the segment of this population with T2D. Immigrants were less likely to access dietitians or other specialists.[115] This may be due to overall low health literacy,[100] which clearly must be addressed in order for optimal medical and

behavioural treatment to occur. Optimization of care may be facilitated by increasing the cultural competency of healthcare providers. For the population of immigrants not living in large metropolitan centers with readily available, multilingual healthcare services, increased availability of translated health education materials may be of benefit. However, one weakness of this approach is that texts are often translated literally. It is important to ensure that any adaptations of materials including both text and graphics have considered cultural differences and language nuances.[100] Furthermore, it is necessary to go beyond simple translation of materials when considering nutrition programing.

In order to increase diet acceptability, materials and program delivery should incorporate familiar foods that are available to participants, as well as appropriate cooking methods. The desirability of removing refined carbohydrates such as white rice from the diet of an ethnic Chinese patient with T2D may need to be tempered with the practicality of such a recommendation given the cultural connotations of such advice.

Finally, additional research is required in a number of focus areas. These include understanding the factors influencing food choice; how traditional foods can be included in nutrition therapy to maximize acceptability and adherence; and development, implementation, and evaluation of programs targeted at immigrant populations.

1.1.7 Effects of lifestyle interventions in Chinese with diabetes or prediabetes

In order to learn about the effects of different lifestyle intervention programs for Chinese populations to prevent or manage diabetes, a literature review was conducted. Using “diabetes”, “intervention”, “lifestyle” in the Keywords or Subject terms and “Chinese” in the Title, 13 and 16 articles were found in the Medline via OVID and EBSCOhost databases, respectively. After

removing duplicates and articles about studies lacking interventions in diabetes or prediabetes subjects, 10 articles (9 studies) were included in this review and their characteristics were described in Table 1-3.

Table 1-3 Effects of lifestyle interventions for Chinese with diabetes or prediabetes

Authors and year of publication	Study design	Control and intervention groups	Study location and participants	Length of intervention and follow-up	Outcomes
#1 Cao et al. 2012	● RCT[1]	● Control group received standard treatment ● Intensive treatment group received individualized diabetes education, dietary and exercise advice, and instructions on how to self-monitor glucose levels	● Guangzhou, China ● 275 pregnant women with GDM ● n=127 in the intervention group	● From diagnosis of GDM (around 30 weeks) to delivery ● Follow-up at 1-3 years after delivery (n=41 in the control, n=40 in the intervention group)	● Neonatal outcomes such as birth weight, macrosomia, and stillbirth ● Pregnancy outcomes such as gestational age at birth and postpartum complications ● Metabolic parameters of mothers after delivery such as BMI, BP[2], blood glucose and lipid profile
#2 Fu et al. 2015	● Quasi-experimental design	● A single group received six weekly education sessions about diabetes knowledge, diet, exercise, blood glucose monitoring, foot care	● Wuhan, China ● 39 Chinese adults with T2D ● 29 completed follow-up	● 6 weeks ● Follow-up at 1 month post-intervention	● Diabetes knowledge ● Diabetes self-care activities ● Fasting blood glucose ● BP ● BMI ● Waist circumference
#3 Gong et al. 2011	● Cluster randomized trial	● Control ● Diet ● Exercise ● Diet plus exercise	● Da Qing, China ● 577 Chinese adults with IGT ● Participants 1:1:1:1 in four groups	● 6 years ● Follow-up at 20 years	● Incidence of retinopathy, nephropathy and neuropathy
#4 Li et al. 2014	● Cluster randomized trial	● Control ● Diet ● Exercise ● Diet plus exercise	● Da Qing, China ● 577 Chinese adults with IGT ● Participants 1:1:1:1 in four groups	● 6 years ● Follow-up at 23 years	● Cardiovascular mortality ● All-cause mortality ● Incidence of diabetes
#5 Shek et al. 2014	● RCT	● Control group without treatment ● Intervention group received advice on diet and exercise	● Hong Kong ● 450 women who had GDM and IGT postpartum ● n=225 in the intervention group	● 36 months ● Visits at 0, 3, 6, 12, 18, 24, 30, 36 months	● BP ● Anthropometric measures ● Incidence of diabetes ● Lipid profile

#6 Wang and Chan 2005	● Single group pre- and post-test quasi-experimental design	● A single group received culturally adapted diabetes education	● Hawaii, the US ● 40 Chinese Americans with T2D ● 33 participants completed all sessions and assessment	● 10 weeks ● Follow-up at 3 months post-intervention	● DQOL[3] ● Body weight ● BP ● A1C
#7 Wong et al. 2013	● Pilot single-blinded RCT	● Control group received usual care ● Intervention group received knowledge on diabetes and lifestyle modification through SMS[4]	● Hong Kong ● 104 Chinese professional drivers with IGT ● n=54 in intervention, n=50 in control	● 24 months ● Follow-up at 6, 12, 24 months	● Incidence of diabetes ● Anthropometric measures ● BP ● Glycemic control ● Lipid profile
#8 Xu et al. 2013	● RCT	● Control group only received health counselling at baseline ●Intervention group also received meal replacement and intensive lifestyle intervention	● Shanghai, China ● 88 Chinese adults with IGR[5]● n=46 in the intervention group	● 3 months ● Monthly follow-up post-intervention until 1 year	● Plasma glucose ● A1C ● Lipid profile ● Body weight ● BP ● Body composition
#9 Yang et al. 2014	● RCT	● Control group received usual care (UC) ● Culturally relevant lifestyle intervention using shared care (SC)	● Tianjin, China ● 700 pregnant women with GDM at 26.3 gestational weeks ● 339 in SC, 361 in UC	● From 26 weeks pregnancy to delivery ● Follow-up until delivery	● Macrosomia defined as birth weight ≥ 4.0 kg ● Pregnancy-induced hypertension (PIH)
#10 Sun et al. 2014	● Single-group, pre- and post-test design	● A single group received culturally adapted diabetes education	● San Francisco, the US ● 23 Chinese Americans with type 1 or type 2 diabetes	● 6 months ● No follow-up	● Glycemic control ● Diabetes knowledge ● Perceived diabetes management and emotional and social support
[1]Randomized controlled trial, [2]Blood pressure, [3]Diabetes Quality of Life, [4]Short Message Service, [5]Impaired glucose regulation					

Six of the studies were RCTs, and the other 3 studies used single group pre- and post-test design. Intervention duration ranged from 6 weeks to 6 years. All studies had at least one group that received lifestyle intervention including diet- and exercise-related education or meal replacement. Two studies were conducted among type 2 diabetics, three studies among women with gestational diabetes mellitus (GDM), three studies among subjects with impaired glucose tolerance or regulation, and one study among mixed type 1 and type 2 diabetics. Two studies were conducted in Chinese immigrants in the US; the other 7 studies were conducted among Chinese in China.

In the seven studies conducted in China, only one was in T2D patients, and the others were in people with GDM or IGT. In the one study (shown as #2 in Table 1-3) in T2D,[116] 39 patients participated and 29 completed the intervention and outcome measurements. The intervention program was developed based on the China Guideline for Diabetes Care and Education,[117] and consisted of six weekly sessions. Because most participants were over 70 years old with low literacy levels and impaired vision, education materials were simplified using simple words and pictures. Group education was used because previous research showed more cost-effectiveness in group than in individual education, with the additional benefit that participants could learn from each other.[118] Each session lasted 1 hour and was led by the investigator. The sessions covered knowledge about diabetes, diet, exercise, self-monitoring of blood glucose, foot care and medication adherence. Following each educational session, participants were divided into small groups to have discussions and share opinions. Reinforcement strategies were used to help overcome barriers participant had, although the authors did not elaborate on the specific strategies. Reflections on necessary behavioural changes for daily life were encouraged at the end of each session. After completing the intervention, participants had significantly improved

diet, diabetes knowledge and glycemic control, which was reflected in a significant decrease in FBG at 1-month follow-up. There were no significant differences in BP, waist circumference, or BMI. This study provided evidence that an intervention tailored to the target population, delivered in group-based sessions, could improve diabetes knowledge, self-care activities and clinical outcomes. However, there were a few limitations. First, the follow-up was short so the long-term effects were not clear. Second, according to the authors of this article, the diet subscale of the Chinese version of the Summary of Diabetes Self-Care Activities Measure (SDSCA)[119] had low reliability, which made the findings about improved diet less convincing.

Four of the studies (shown as #3, 4, 5, 7, 8 in Table 1-3; #3 and #4 are from the same trial) conducted in China were among individuals with IGT or impaired glucose regulation. One of them (#5) was in women who had GDM during pregnancy and IGT postpartum.[120] A total of 450 women participated in this RCT. The intervention group received advice on diet and exercise from a dietitian, while the control received no treatment. There were 7 follow-ups during the 36 months of study. Participants in the intervention group were asked to record food intake and physical activity for the past 5 days before returning for each follow-up. The records were checked by a nurse, and counselling were repeated at each follow-up. BP, anthropometry, urine glucose, blood glucose and lipid profile were measured at each follow-up visit. At 36-month follow-up, there was a lower incidence of diabetes among women over 40 years old. No difference was found in fasting glucose, insulin and homeostasis model assessment (HOMA) index. BP and TG were lower but the significance was inconsistent among visits. BMI and percentage of body fat were significantly lower in the later visits. One strength of this study was that it was the first RCT in China to assess the conversion to diabetes in women who had GDM and IGT postpartum, thus providing important information for future studies in similar

populations. The frequent follow-ups might have improved compliance and enriched the data obtained throughout the study. However, a limitation of this study was that no behavioural changes were analyzed or reported although diet and physical activity were recorded at each follow-up. Another study was the well-known China Da Qing Diabetes Prevention Study (CDQDPS) for people with IGT. After the 6-year lifestyle intervention, participants were followed up at 20 years to determine the incidence of microvascular complications[121] and followed up at 23 years to determine diabetes incidence and mortality[122] in different groups. Originally there were 577 individuals who participated in this study, and they were randomised into four groups: the control, diet, exercise, and diet plus exercise group. The goal of the diet intervention was "to increase vegetable intake and reduce alcohol and sugar intake, and in overweight or obese participants, to lose weight by reducing total calorie intake". The goal of the exercise intervention was "to increase leisure-time physical activity". When the 6-year intervention was completed, all participants were asked to continue with usual medical care. Over 20 years follow-up, it was found that statistically combining three intervention groups (diet, exercise and both) was associated with a 47% reduction in the incidence of severe retinopathy, although no significant differences were observed for nephropathy or neuropathy.[121] The follow-up over 23 years demonstrated reduced incidence of diabetes, cardiovascular mortality and all-cause mortality in the lifestyle intervention groups.[122] However, because the Da Qing study was originally designed for a 6-year period, systematic information about behavioural changes was missing for the later years of follow-up. Nevertheless, the findings from the Da Qing study proved long-term benefits of lifestyle intervention for Chinese with IGT. Similar results were also found in other populations. The American Diabetes Prevention Program (DPP)[123] and the Finnish Diabetes Prevention Study (FDPS)[124] started in 1996 and 1993 respectively were also

among the earliest RCT to demonstrate the efficacy of lifestyle intervention in preventing diabetes. The participants in the American DPP study included 45% racial and ethnic minorities and the materials and strategies were tailored to address ethnic diversity.[123] Both of these studies adopted intensive lifestyle interventions and had the goal of reducing calories or fat intake, losing weight and increasing physical activity. They both showed relatively long-term benefits of lifestyle intervention among people at high risk for diabetes. The DPS showed sustained positive changes in diet, physical activity and clinical outcomes.[124] The DPP found a 58% reduction in incidence rate of diabetes.[123] Following the DPP study, the DPP outcomes study (DPPOS) continued, in which the surviving cohort of the DPP were followed up from the year of 2002 to 2014. Although no significant difference was observed in the aggregate microvascular outcome in the total cohort, a lower prevalence of microvascular complications was found in those who did not develop diabetes than those who developed diabetes during the 15 years of follow-up.[125]

Another study (shown as #7 in Table 1-3) in patients with prediabetes (IGT) used short message service (SMS) to deliver knowledge about diabetes and lifestyle modification with the goal to prevent diabetes.[126] Participants in both the control and SMS group were provided with booklets containing information on diabetes and healthy behaviours. Participants in the control group received usual care. For the SMS group, the text message database was developed by a multidisciplinary team including doctors, nurses, and dieticians, and was based on theories of behavioural change. The content of text messages covered four themes: 1) knowledge about diabetes and prediabetes, 2) lifestyle modification, 3) social norms of how others would appreciate the lifestyle modification, 4) self-efficacy enhancing statements. One example of message under the theme 4) was given as follows: “Walking 30 min a day, you can do it”. In the first 3 months, text messages were sent 3 times a week. The frequency of sending text messages

gradually reduced over the rest of the study until 24 months. Results showed lower incidence of diabetes at 12 months in intervention group (5.56%) than in control group (16.00%). Relative risk (RR) of diabetes onset was 0.35 and the number needed to treat (NNT) for preventing diabetes was 9.57. At 24 months, RR increased to 0.62 with a NNT of 10.58. Mean BMI decreased over time in the intervention group and remained stable in control group. The mean changes in waist circumference and lipid profile were not significantly different between groups. Based on the results, the SMS program had the potential to reduce the risk for people with prediabetes to develop diabetes.[126] This study was the first RCT to examine the efficacy of delivering lifestyle information via mobile phone SMS in Chinese and provided preliminary evidence that a SMS intervention had the potential to prevent diabetes in Chinese drivers. However, the findings may not be generalized to the general Chinese population because the study was conducted in professional drivers only. Another limitation was that behavioural changes could not be evaluated due to a low rate of response to the lifestyle questions at follow-up assessment.

One of the studies in people with prediabetes (shown as #8 in Table 1-3) used a combination of intensive lifestyle intervention and low-GI meal replacement.[127] The intervention lasted for 3 months and monthly follow-up visits for body weight, blood glucose, and dietary measurements continued until 1 year. At baseline, both control and intervention group received counselling on healthy eating and exercise, and both groups were encouraged to follow Chinese national guidelines[128,129] for healthy eating and physical activity. In addition, the intervention group received intensive lifestyle intervention and daily low-GI meal replacement during the first 3 months of the study. The meal replacement was used to replace breakfast food items such as milk, soymilk, congee, and provided 227 kcal/d. The primary components of the meal

replacement came from soybean, oats and flaxseed. The lifestyle intervention included two aspects. One was to provide individualized eating instructions on food exchanges and low-GI foods, and the other was to provide recommendations on exercise. Results showed that the decreases in body weight, BMI, body fat, and waist and hip circumference were significantly greater in the intervention group than in the control at 12 months. No significant differences were observed between groups in terms of BP and lipid profile. The reductions in glucose and A1C levels were significantly greater in the intervention group compared with the control group. The rate of reversion back to normal glucose regulation during the 1-year study period was significantly higher in the intervention group compared to the control group (39.0% vs. 7.5%), and the rate of progression to diabetes was 14.6% in the intervention group and 17.5% in the control group. One of the strengths of this study was the use of low GI meal replacement, which might improve the compliance to dietary advice regarding low GI food and the consistency in dietary changes among participants. However, the study did not assess the actual dietary changes. Although data about diet were collected at monthly follow-ups according to the authors, no analyses were reported. Thus, it is unclear which component (advice on diet and exercise, regular contact, and meal replacement) of the intervention contributed to the biological improvement in participants.

Two of the studies (shown as #1 and #9 in Table 1-3) conducted in China examined the effects of lifestyle interventions on pregnancy and neonatal outcomes in women with GDM. In the study[130] by Cao et al., 275 pregnant women with GDM were randomly assigned into a control group or an intensive therapy group. The intensive therapy consisted of individualized diabetes education, dietary and exercise advice, and instructions on glucose self-monitoring. Patients in this group were asked to perform self-monitoring of blood glucose four times per day until glucose levels

remained in the recommended range for 2 weeks. The control group received education on diet, exercise, and self-monitoring of blood glucose. However, the difference from the intensive therapy was that glucose self-monitoring was suggested but not required as frequently. Results showed that the rate of premature birth and neonatal care unit (NCU) admission was significantly lower in the intensive therapy group after the intervention. The average birth weight was significantly lower in the intensive therapy group than in the control group. There were no significant differences between the two groups in hypoglycemia, respiratory distress syndrome, stillbirth, or pregnancy complications of the mothers. Study-related therapies were terminated after delivery. Only 40 women from the intensive therapy group and 41 women from the standard therapy group were available for follow-up, which happened in the 1 to 3 years following delivery. The incidence rate of diabetes and prediabetes was similar between two groups at follow-up. However, at the follow-up, women in the intervention group had a significantly smaller waist circumference, higher HDLC levels, and lower glucose levels 30 min after a glucose load.[130]

In the study[131] by Yang et al., 700 women with GDM were randomized into either a control group receiving usual care or an intervention group receiving shared care. The intervention group received individualized consultations and group sessions and performed regular self-monitoring of blood glucose, while the control group only attended one hospital-based education session. For the intervention group, the protocol of the intervention arm in the Australian Carbohydrate Intolerance Study in Pregnant Women (ACHOIS) trial[132] was adapted to suit the cultural needs of the participants. Results from this study showed that birth weight of infants in the intervention group was lower than in the control group, which was consistent with the study by Cao et al.[130]. The rate of macrosomia defined as birth weight $\geqslant$ 4.0 kg was 11.2% in the intervention group

and 17.5% in the control group with RR of 0.64. The incidence rate of pregnancy-induced hypertension (PIH) was 8.0% in the intervention group compared to 4.4% in the control group with RR of 1.80. GDM is associated with adverse pregnancy outcomes and women with GDM have higher risk of developing T2D after pregnancy.[133] These two studies among Chinese women with GDM demonstrated that comprehensive treatment incorporating lifestyle modification had the potential to improve pregnancy and neonatal outcomes and prevent or delay the incidence of T2D. However, the study by Cao et al.[130] did not assess behavioural changes and compliance to the treatment thus lacking explanation for the role of different components of treatment in the biological changes. In addition, in the study by Cao et al., the main difference in treatment between intervention group and control group was focused on blood glucose self-monitoring.[130] Hence, the effect of lifestyle modification in this study was hard to interpret.

In the two studies (shown as #6 and #10 in Table 1-3) conducted with Chinese immigrants in the US,[134,135] culturally tailored diabetes education was delivered by program educators including registered nurse, registered dietitian, certified diabetes educator and health educator, in the format of group sessions. To ensure the cultural appropriateness, the intervention materials were written in Chinese, and the educators incorporated Chinese food items in the education.[135] Other culturally relevant adaptions included listing nutrition information for common Chinese food and using Chinese-oriented tools such as rice bowls, soup bowls, and Chinese-style dining utensils to illustrate serving sizes.[134] In the study by Sun et al.,[135] the intervention included handouts and booklets developed based on the American Diabetes Association (ADA) standards[136], as well as 12 bi-weekly 90-minute support group sessions that covered topics on meal planning, medication adherence, blood glucose monitoring, physical activities, eye and foot care, dental care, stress management, and blood pressure and cholesterol control. In the study by Wang and Chan,[134] four

60-minute group sessions were delivered during the 10-week intervention, which covered topics on diet, exercise, medication, and self-care. Education sessions were all delivered using the language requested by participants, i.e., Cantonese or Mandarin. Both studies[135,137] observed statistically significant decreases in A1C (-0.8% and -1.0%, respectively). The study by Sun et al. also demonstrated significantly improved diabetes knowledge at 6 months. However, no significant changes were observed in diabetes self-care activities including physical activity, dietary regimen and blood glucose monitoring, thus weakening the linkage between the intervention program and improved outcomes.[135] In the study by Wang and Chan, diabetes quality of life (DQOL) was significantly improved, and 42% of the participants had a reduction in BMI. In terms of acceptability, 100% of the participants were "very satisfied" with this culturally tailored diabetes program and 92% were "very satisfied" or "somewhat satisfied" with the Chinese-oriented course content.[134]

Overall, positive effects were seen in different types of lifestyle interventions for diabetes in different Chinese populations, either in China or in the US. Studies on Chinese in other countries were not found, indicating the need for more studies in the area of lifestyle interventions on Chinese diaspora, given that lifestyle interventions have been efficacious in other populations and Chinese are widely spread outside China, such as in Canada.[138]

Timely interventions for prediabetes is important because many people with prediabetes will progress to diabetes, and some diabetic complications such as heart disease and nerve damage may already begin during prediabetes.[2] Previous research showed that without intervention, individuals with prediabetes progress to T2D 3.6 years earlier than those who receive lifestyle interventions.[6] From this review, it was found that lifestyle interventions were also effective in

delaying the onset of diabetes and complications in Chinese with prediabetes.[125-128] According to IDF,[4] more than 21 million live births were affected by diabetes during pregnancy in 2013. Women with GDM and their infants could also benefit from lifestyle interventions based on the findings from this review.[120,131]

Chinese with T2D, as the focus population of this thesis, could also benefit from lifestyle interventions. In the study conducted in China,[116] improved glycemic control and diabetes knowledge were observed in Chinese with T2D who received community-based lifestyle intervention which included group education and discussions. In the two studies conducted in the US,[135,137] similar positive changes were also observed in Chinese immigrants after intervention, such as improved diabetes knowledge, BP, A1C and diabetes quality of life. The cultural sensitivity of the intervention programs was very likely an important contributor to the success of the interventions in Chinese immigrants since 100% of the participants were "very satisfied" with the culturally adapted program in one study[137] and high attendance was also observed in the other study.[135]

In terms of the format for intervention delivery, the majority of the studies used group education sessions. One study pointed out that the reason was for cost-effectiveness and the additional benefit of participants helping each other. However, according to findings from the Peer Support, Empowerment, and Remote Communication Linked by Information Technology (PEARL) program, peer support via frequent telephone calls did not improve cardiometabolic risks or psychological well-being among Hong Kong Chinese patients with T2D. According to the CDA guidelines,[1] individual counselling may be more appropriate for patients with SES. Therefore, special considerations may be needed when deciding the format of delivering intervention in

population with lower SES. One of the studies used SMS[126] to deliver information on diabetes and lifestyle modification and was effective in preventing the progression from prediabetes to diabetes. One of the advantages of this approach is that it saves time for patients and patients can have access to the diabetes information almost anywhere. With the modern technology becoming available and accessible to more and more people, innovative ways to deliver diabetes education could be considered, such as Telehealth (often called videoconference) that is "a secure technology in healthcare facilities across Alberta that connects healthcare providers with patients in different locations".[139] Telehealth has been strongly recommended by the CDA.[140]

In summary, lifestyle interventions incorporating modifications in diet and physical activities have the potential to prevent and control diabetes and diabetic complications in Chinese populations. Cultural relevance may be essential in interventions for Chinese immigrants. More research is needed for Chinese immigrants in countries with large Chinese population such as Canada to provide information for the design and implementation of culturally relevant programs. Although comprehensive therapy combining different aspects of diabetes care such as diet, physical activity, medication compliance and blood glucose monitoring should be more effective, research focusing on one single aspect such as diet is also needed to determine the effect of each component. In addition, the majority of the studies in this review did not assess behavioural changes such as those related to diet and physical activities. In future studies, the assessment of behavioural changes may help explain why biological changes occurred and what components in an intervention contributed to these changes.

1.1.8 Existing culturally tailored resources for Chinese in Canada

Although no published studies were found on lifestyle interventions for Chinese in Canada, there has been work to develop culturally tailored resources. Health Canada provides EWCFG in different languages including Chinese. However, it is literally translated instead of culturally adapted. The CDA has been promoting cultural diversity in diabetes treatment. There is a support line providing diabetes information, support and referral services to people affected by diabetes in Cantonese and Mandarin across Canada. Multicultural resources are available on the CDA website, where there is a section dedicated to Chinese: Diabetes in the Chinese Community. On the website (www.diabetes.ca), there are translated materials and postings about times and locations of education programs held in Ontario and British Columbia, the two provinces in Canada with large Chinese populations. However, people from other regions such as Alberta are unlikely to attend the programs. Plus, there may be a of lack situational relevance in those programs developed for other provinces due to differences in diet, lifestyle or other aspects related to diabetes management. Clearly, efforts have been put into developing culturally tailored resources for Chinese in Canada to manage their diabetes. However, relevant resources for Chinese in Alberta are not available yet.

1.2 Rationale

About 387 million people had diabetes in 2014, which will rise to 592 million by 2035.[4] T2D accounts for 90% of all diabetes.[5] Diabetes can lead to devastating complications affecting life expectancy and quality of life.[1] Among different aspects of diabetes care, lifestyle modification is a fundamental component. Meal planning has been shown to improve metabolic and clinical outcomes in individuals with diabetes.[21,141–143] In Chinese populations, lifestyle interventions that contain a dietary component also showed beneficial effects on diabetes prevention and treatment.

Chinese are the second largest ethnic minority in Canada[138] and are at high risk of developing diabetes.[144] Culturally sensitive and individualized nutrition therapy is recommended.[1] However, research on Chinese Canadians with T2D is rare and nutrition therapy designed for Chinese living in Alberta is not available. This gap needs to be bridged for better diabetes management among ethnic Chinese.

1.3 Objectives & hypotheses

The objectives of this thesis include: 1) to assess the dietary needs among Chinese with T2D or prediabetes living in Edmonton; 2) to design a culturally relevant menu plan incorporating the 4-A Framework as a practical tool for Chinese immigrants in Edmonton to manage diabetes; 3) to pilot-test the feasibility and efficacy of the menu plan combined with individual nutrition counselling.

We hypothesize that the culturally tailored menu plan combined with nutrition counselling is feasible and effective in improving diabetes knowledge, diet quality and metabolic outcomes among Chinese immigrants with T2D in Edmonton.

This work is expected to lead to development of specialized resources for Chinese immigrants with diabetes. In addition, if the resource development and implementation is successful, it will provide proof-of-principle of the value of utilizing the 4-A Framework across cultures in developing such resources, which would predict its utility in developing materials and programming for other ethnic groups.

2 Dietary needs assessment among Chinese immigrants with T2D in Edmonton

2.1 Introduction

2.1.1 Dietary and cultural transitions impose challenges on immigrants' diabetes management

In past few decades, the nutrition transition towards more processed and energy-dense foods in Western countries has contributed to high prevalence of chronic diseases and conditions such as obesity, diabetes and cardiovascular diseases.[145] Developing countries including China have also experienced the transition because of globalization.[146] During the 1980's, the consumption of foreign fast foods, oils, packaged foods and soft drinks increased rapidly in China especially in large cities, where these foods were increasingly imported.[147] Fast food chains expanded and successfully took the place of some traditional Chinese restaurants in large cities like Beijing in the 1990's.[148] Incidence of chronic diseases such as obesity and diabetes increased during this period of time, when diet composition shifted and energy intake from fat increased dramatically.[147]

The chronic disease situation could be worse among immigrants to Western countries because they tend to further increase the consumption of fats and sweets.[82,149] Moreover, immigrants experience a transition that is not only confined to diet or nutrition, but also involves adaptation to a new culture, termed "acculturation".[150] This may exacerbate the impact of nutrition transition on health outcomes, because immigrants face challenges from many aspects, including language, social norms and the shift of social status, that come along with acculturation (as

discussed in Chapter 1). A relatively low level of acculturation, which is common among first-generation immigrants, could result in barriers that impede disease treatment and management. For example, lack of English fluency might limit access to diabetes-related knowledge, which attenuates patients' capacity for diabetes management activities such as monitoring blood glucose.[151] Chinese is the second largest ethnic minority in Canada,[138] and has been identified as a high-risk population for diabetes, with higher risk than Canadians of European descent.[144] According to a previous study, Chinese-Americans are more prone to diabetes than their peers living in China, possibly due to the lifestyle shift resulting from western social and cultural influence.[55]

2.1.2 The need for understanding challenges of nutritional management of T2D in Chinese immigrants

Nutrition therapy is effective in lowering A1C by 1-2% in diabetes patients.[152] Compared with many other immigrant groups, Chinese retain their traditional diet more faithfully and for a longer time after immigration.[153] Generally prescribed diets for T2D are difficult to adopt[154–156,157] and it is even more complicated among immigrants due to the influence of culture and ethnicity on their dietary behaviours.[158]

Improving dietary adherence has been a focus of many studies. A study of individuals with renal disease showed that higher acceptability of prescribed diet was associated with higher adherence,[159] which may also apply to interventions for T2D. Food acceptability is closely connected to sensory characteristics of food such as palatability.[68] Moreover, cultural acceptance is also an important aspect of food acceptability. A culturally relevant, flexible dietary intervention improved adherence and metabolic parameters in Mexican T2D patients.[78] A pilot study among Chinese Americans with T2D showed that a culturally tailored self-management

program effectively sustained participation and improved diabetes knowledge and glycemic control.[135]

The nutritional information currently available for Chinese Canadians are mostly literal translations of Canadian guidelines, such as EWCFG[22] and some resources from the Canadian Diabetes Association[160]. Most of these resources either lack consideration of Chinese culture, such as literal translations; or are only available regionally, such as diabetes self-management programs held in Vancouver.[160] These limitations might impede effective utilization of the resources by Chinese immigrants in Edmonton. In order to achieve high acceptability and adherence to a nutritional education program, a needs assessment is necessary to help researchers or health professionals gain an understanding of the target population before developing the program. [161] This is in line with the CDA guidelines,[162] which suggest that diabetes treatment should be individualized based on the preferences and background of the patients, thus warranting an understanding of the needs of the specific patients, that is, in this case, the Chinese immigrants with T2D in Edmonton. However, no research has previously been done on this specific population.

2.1.3 Significance of the research

The research is very likely to benefit Chinese immigrants with T2D in Edmonton, or in Alberta at large. The needs assessment helps researchers learn about Chinese immigrants' current diet quality and identify the problem areas, so that future education programs can be targeted so as to make significant improvements in diet quality, which could lead to better glycemic control. Chinese is one of the largest minority groups in Canada and in Edmonton, making up about 4-5% of the population.[138] With increasing diabetes prevalence in Chinese immigrants, more attention needs to be paid to this population in order to reduce the burden on the healthcare

system and individuals. This study could potentially inform decisions for immigrants' diabetes care immigrants by policymakers and health professionals.

2.1.4 Purpose statement

This study addresses the dietary needs of Chinese immigrants with T2D in Edmonton. A convergent mixed methods design was used, which involved separate collection and analysis of quantitative and qualitative data, and their integration in the discussion. In this study, quantitative data was collected from questionnaires to assess the degree of acculturation, dietary adherence, and food acceptability. These data were used to determine if there were correlations between dietary adherence, acculturation and food acceptability. Qualitative data was collected from one-on-one interviews to explore barriers Chinese immigrants faced in their dietary management of T2D. In this Chapter, the quantitative and qualitative results are merged in the discussion to provide a more comprehensive picture of the enablers and barriers to better nutrition. Both forms of data examine the research questions from different angles and perspectives, thus the merging helps to develop a more complete understanding of the dietary needs in Chinese immigrants and the obstacles to higher dietary adherence and diet quality.

2.1.5 Research questions

In order to identify the needs of Chinese immigrants with T2D in Edmonton and to provide information for nutrition intervention program development, the following research questions were examined:

1) What is the current diet quality among Chinese immigrants in Edmonton? Is diet quality related to blood glucose control?

2) What component(s) in the diet of Chinese immigrants need(s) improvement?

3) Are there correlations between acculturation, food acceptability and diet quality?

4) What sociodemographic and other factors influence the food choices and diet quality of Chinese immigrants?

5) What resources are available for Chinese immigrants to help them manage diabetes through diet?

6) What are the barriers for Chinese immigrants to adhering to current recommendations?

7) To what extent do these barriers to dietary adherence correspond to diet quality?

8) How do the quantitative data collected from questionnaires versus qualitative data collected from interviews complement each other and contribute to a better understanding of the dietary needs of Chinese immigrants?

2.2 Methods

A convergent mixed methods approach was applied to obtain a better understanding of the dietary needs and to answer the specific research questions mentioned above (Section 2.1.5). Quantitative data and qualitative data were collected and analyzed separately, and integrated in the discussion section.

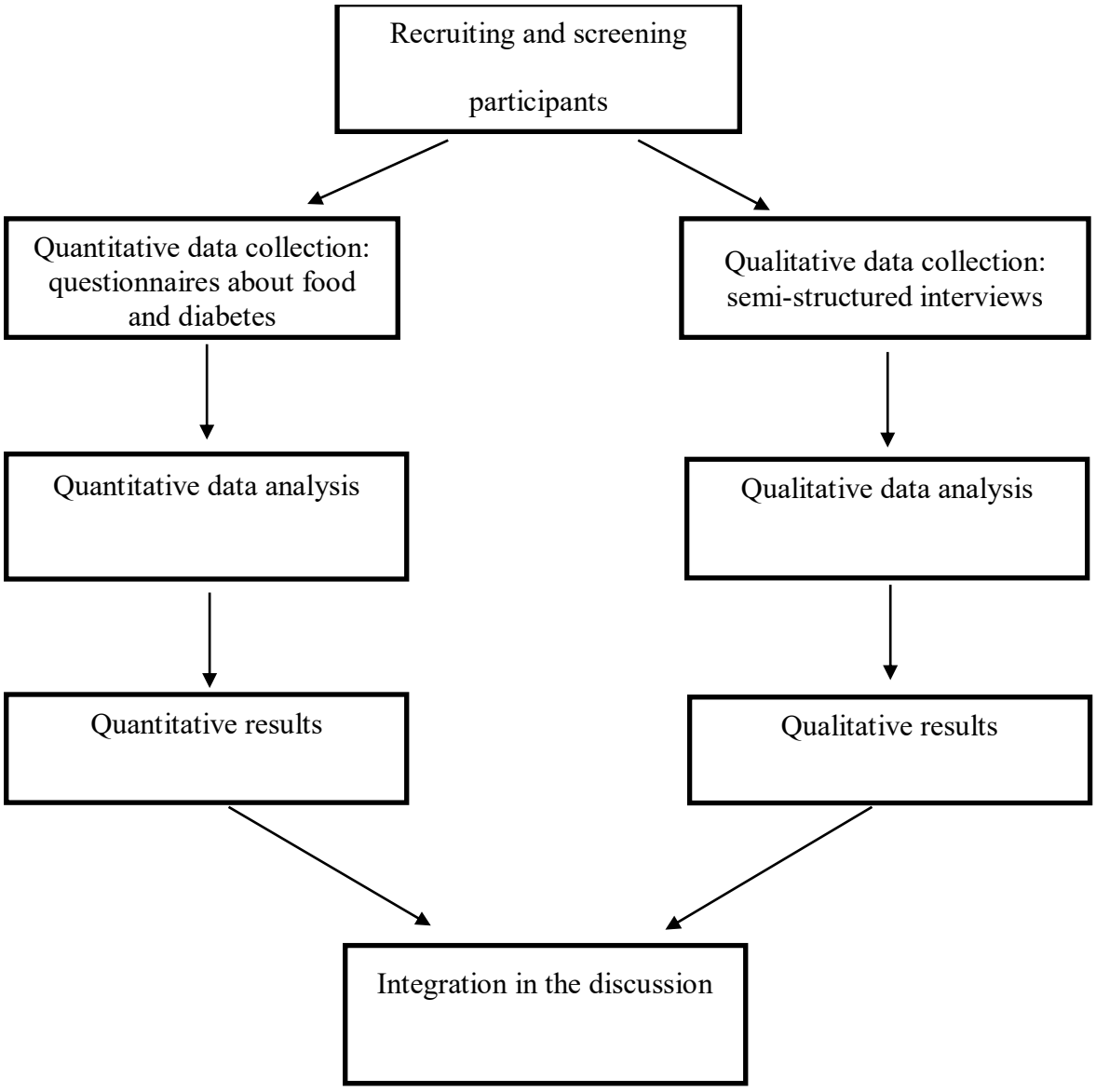
2.2.1 Overall study design

This study - *Dietary Needs Assessment of Ethnic Chinese with T2D* - was approved by the University of Alberta Research Ethics Board (approval number: Pro00023449). A procedural

diagram can be found in Figure 2-1. A bilingual study coordinator who spoke English and Mandarin Chinese held two meetings with each participant individually at the Clinical Research Unit at the University of Alberta after participants gave written consent. The two meetings were about one week apart, allowing participants to finish a three-day food record in between (Section 2.2.2.5). Each meeting took about one hour.

At the first meeting, A1C (Section 2.2.2.2) and anthropometric measurements (Section 2.2.2.3) were taken, and participants filled out a set of questionnaires to obtain demographic information, and information about diabetes treatment and diet (Section 2.2.2.4). Then, participants were given instructions on how to complete a three-day food record, which they needed to complete in the following week. At the second meeting, the food records were reviewed with participants and any missing information was added. Then, a semi-structured one-on-one interview was conducted with each participant. Interviews were recorded on a digital recorder.

Figure 2-1 Procedural diagram for the convergent mixed methods design



2.2.2 Quantitative data collection

2.2.2.1 Participants

The study population was Chinese immigrants with T2D or prediabetes living in Edmonton. Purposive sampling was used to select the most appropriate participants for this study. According to the most recent census data about ethnic origins, there were 53,665 individuals who self-reported as ethnic Chinese in Edmonton metropolitan areas in 2006. The most recent census data showed that the Alberta population[163] was 4,120,900 and the population with diabetes[164] was 171,906 in 2014. Based on this, the diabetes rate was 4.2% in Alberta. Moreover, T2D is about 90% of all diabetes cases.[5] Using these data, it can be estimated that the Chinese population with diabetes in Edmonton is about 2027. Due to the relatively small target population, the goal of sample selection was to recruit 20 participants, with the same individuals providing both quantitative and qualitative data. Ideally, sample size for qualitative research should be based on data saturation. However, it is suggested that "Although the idea of saturation is helpful at the conceptual level, it provides little practical guidance for estimating sample sizes for robust research prior to data collection."[165] According to an analysis of 560 PhD studies with qualitative research, the most common sample sizes were 20 or 30 followed by 40, 10 and 25.[165] Hence, the sample size of 20 is acceptable for the basic interpretive qualitative research in this study.

The inclusion criteria were: Chinese descent, 35 years of age or older, self-reported being diagnosed with T2D or prediabetes, living in North America for at least one year, able to read and write English or Chinese.

Recruitment methods included posters in hospitals, pharmacies, clinics, Chinese grocery stores and community centres, and advertisement in Chinese newspapers in Edmonton, Alberta.

Prospective participants who contacted the study coordinator were screened over the telephone to determine if they met the inclusion criteria. Those meeting the criteria were invited to a meeting at the University of Alberta as described above (Section 2.2.1), where written informed consent was obtained.

2.2.2.2 A1C

A1C was measured with a finger prick blood sample using an autoanalyser (DCA 2000®+, Siemens Diagnostics). Quality control procedures were performed routinely to ensure proper functioning of the equipment.

2.2.2.3 Anthropometric measurements

Body weight, height and waist circumference were measured in accordance with the recommended procedures in the WHO STEPS Surveillance Manual[166] with minor adjustment. A stadiometer (Measurement Concepts & Quick Medical, North Bend, USA) was used to measure height. Participants were asked to remove footwear and headgear, stand with feet together, heels against the backboard, and look straight ahead with eyes and ears at the same level. The measure arm was then moved down to the participant's head while the participant was asked to breathe in and stand tall. The reading in centimetres with 2 decimals from the digital panel was then recorded. Height was measured twice and an average was calculated. An electronic weighing scale (Healthometer, Boca Raton, USA) was used to measure weight. Participants were asked to remove footwear and heavy clothing, step onto scale with one foot on each side of the scale, stand still, face forward, and place arms at their sides. Weight in kilograms and pounds were then recorded. Body mass index was calculated based on the measured body weight and height. To measure waist circumference, the last palpable rib and the top of the hipbone were identified by

the study coordinator using the area between the thumb and index finger. The participant wrapped the measuring tape around himself and then positioned the tape at the midpoint of the last palpable rib and the top of the hip bone. The tape was checked that it was horizontal across the back and front of the participant and as parallel with the floor as possible. The participant was asked to stand with feet together with weight evenly distributed to both feet, breathe normally for a few breaths and then the measurement was taken after a normal expiration. The measurement was read to the nearest 0.1cm. Each participant was measured twice and the average was calculated. For ethnic Chinese, *central obesity* is defined as waist circumference equal to or greater than 90cm in men and equal to or greater than 80cm in women[167]. Central obesity is one of the markers for metabolic syndrome[167] and is closely related to insulin resistance[168–170].

2.2.2.4 Questionnaires

Questionnaires can be found in Appendices A-F. Demographic information including age, income, education, and immigration duration was collected through a questionnaire. The general health and diabetes treatment questionnaire collected information about diabetes treatment, medications and complications. Acculturation was assessed by a questionnaire adapted from the Suinn-Lew Asian Self-identity Acculturation Scale which is a validated scale for the assessment of acculturation among Asian-Americans.[171] The only change made to the scale was that the word *Asian* was replaced with *Chinese*, so that it was more specific to Chinese participants. It consisted of 21 questions inquiring about various aspects of culture and identity including preferences for language, food, music, movie, and ethnicity of friends. A score was obtained through adding up the answers for all 21 questions and then dividing the total value by 21. Scores could range from 1 (low acculturation) to 5 (high acculturation). Food acceptability was

assessed by a questionnaire asking to what extent the foods in the diet recommended to them by their healthcare team were personally and culturally acceptable. A food acceptability score was calculated by summing up the answers for 5 close-ended questions. The score could range from 5 (low acceptability) to 25 (high acceptability). Perceived dietary adherence was evaluated by a validated questionnaire[172] asking how often in the previous week (days out of 7 days) people had followed each of 9 recommendations from the CDA Nutrition Therapy Guidelines.[152] A perceived dietary adherence score was calculated by adding up answers for the 9 questions, and could range from 0 (low adherence) to 63 (high adherence). Physical activity was assessed by the Godin Leisure-Time Exercise Questionnaire, which acquired the frequency of strenuous, moderate and mild physical activities.[173] Scores for both total physical activity and health-contributed physical activity were calculated. The health-contributed physical activity score considered only strenuous and moderate activities because it was suggested that mild physical activities contribute little to health improvement.[173] All questionnaires were available in both English and Chinese. The original English questionnaires were translated into Chinese by the study coordinator, which were then translated back to English by another bilingual researcher. The translated English questionnaires were compared to the original version to ensure accuracy of the Chinese translation. Any discrepancies were modified.

2.2.2.5 Three-day food record

At the end of the first meeting, each participant was given instructions on how to complete a three-day food record and was asked to complete recording in the following week. They were asked to record two working days and one non-working day unless they were not working or retired. At the second meeting, the study coordinator reviewed the food records with participants and asked participants for any missing information, such as units for food, missed food and

drinks and other details. The food records were used to analyze participants' dietary intakes and diet quality.

2.2.3 Quantitative data analysis

Three-day food records were entered into the *esha* Food Processor Diet Analysis software version 10.9.0.0 (Salem, USA) for the analysis of calories and nutrients. The first and second priorities were given to Health Canada and USDA when choosing databases from the Food Processor. For some Chinese foods that were not included in the Food Processor databases, the Food Nutrient Finder at the Centre for Food Safety website of Hong Kong Government[174] and the Food Composition Table from the Taiwan Government website[175] was referenced for nutrient content, which was then manually entered into the Food Processor to complete the analysis.

Estimated Energy Requirement (EER) was calculated for each participant using the Interactive DRI for Healthcare Professionals, which is an online tool available at the Food and Nutrition Information Center located at the National Agricultural Library of USDA.[176] Information including sex, age, height, weight and physical activity level of each participant was entered for the calculation of EER. The caloric intake calculated from food records was compared to EER, so that under-reporting of food intake could be identified. The actual dietary adherence was reflected by participants' Healthy Eating Index (HEI) scores. The HEI scoring criteria were adapted from the American HEI 2005 scoring criteria, and reflected the recommendations of Canada's Food Guide, the DRIs and the Canadian Diabetes Association.[177] A higher HEI score reflected higher adherence to the current dietary recommendations. The scoring criteria included 11 components, which were divided into 2 categories, i.e., *adequacy* and *moderation*. Adequacy included 8 components, that is, total vegetables and fruit, whole fruit, dark green and orange

vegetables, total grains, whole grains, milk and alternatives, meat and alternatives, and unsaturated fat. Moderation included three components, that is, saturated fats, sodium, and "other foods". Total HEI score and separate scores for each component were calculated. An HEI score could range from 0 (low diet quality) to 100 (high diet quality). A dietary adequacy score was calculated by summing up the 8 adequacy components, and could range from 0 (low adequacy) to 60 (high adequacy). A dietary moderation score was calculated by summing up the 3 moderation components, and could range from 0 to 40. Unlike adequacy score, a high moderation score indicated lower intake of saturated fats, sodium and calories from "other foods".

GraphPad Prism version 5.01 software (San Diego, USA) was used for t-test, descriptive and correlation analyses. D'Agostino and Pearson Omnibus normality test was used to test the data for normality. Non-parametric Mann-Whitney U-test and correlation test were used for non-normal data. Correlation tests were conducted between acculturation and demographic, lifestyle and health-related variables, between food acceptability and health-related variables, and between HEI and different variables. Pearson correlation test was used for continuous normal data and Spearman correlation for non-normal data and categorical data such as education. Variables including A1C, food acceptability, HEI and other diet quality components were compared between lean and central obese participants using unpaired t-test. A p-value < 0.05 was considered statistically significant and <0.10 was noted as a trend, given the small number of participants.

2.2.4 Qualitative data collection

At the second meeting, a one-on-one semi-structured interview was conducted with each participant in English or Chinese depending on the participant's preference. All interviews were recorded using a digital voice recorder. Each interview lasted about 40 minutes on average, and included three parts, namely, introduction, questions, and summary. The introduction started with a brief explanation of the objective of the study and interview. The interviewer would then let the participant know that they could stop at any time if they needed to take a break or if they did not want to answer a question. After making sure the participant understand the procedure, the interviewer would start the interview based on the protocol prepared in advance. The interview protocol can be found in the Appendix H. A few of the major questions were as follows: *What dietary and nutritional recommendations have you received for diabetes management? What are the advantages and disadvantages of these recommendations? What barriers have you had to adhering to a healthy diet or the recommendations from current resources? What influence your food choices? What do you think if we develop a Chinese menu plan for diabetes?* The interviews usually started with general questions followed by more specific and probing questions. The actual questions asked and the sequence of questions might be different among participants, depending on the participant's answer to each question. At the end, the interviewer would summarize the interview with the participant and confirm the main points the participant had conveyed and ask the participant to add anything missed or correct the researcher if there was any misinterpretation.

2.2.5 Qualitative data analysis

Interviews were transcribed verbatim from the digital recordings by the bilingual interviewer. Transcriptions were coded manually in Microsoft Word. Codes were then translated into English

if the original language used in the interview was Chinese. Codes were categorized and themes were generated to answer the research questions. The goal of coding in content analysis is not to count words or phrases used by participants, but to "fracture" the data and sort them into appropriate categories.[178] Categorizing involves identifying patterns that are evident in the setting and expressed by participants.

2.2.6 Establishing quality for the qualitative component of the study

2.2.6.1 Credibility

The goal of credibility is to "demonstrate that the inquiry was conducted in such a manner as to ensure that the subject was appropriately identified and described".[179] Questions that could be asked are such as, "How congruent are your findings with reality?". [180] The researcher wants to reach the goal that the findings reflect the participants' views and interpretations rather than a fabrication from the researcher's own biases and assumptions.

One strategy used to obtain credibility is *member checking*, where the researcher solicits participants' opinions on the accuracy and credibility of the analyses, interpretations and conclusions.[181] More specifically, for this study, the preliminary analysis including codes, themes was communicated back to the participants to ask for their views and evaluation of veracity, which helped eliminate the impact of investigator biases as much as possible.

Another strategy for credibility is researcher responsiveness, which refers to the researcher's creativity, sensitivity, flexibility and skill.[182] The researcher *per se* is an instrument for obtaining quality in a qualitative study.

2.2.6.2 Transferability

Transferability is another criterion for quality evaluation in qualitative research. Equivalent terms such as "external validity" or "generalizability" are also used.[180] Instead of generalizing in a statistical sense from a random sample to population, qualitative researchers may focus more on the extent to which the findings from one single study can be applied to others in similar situations.[179]

One strategy used to ensure transferability of this study is an *audit trail*, that is, "a detailed account of the methods, procedures, and decision points in carrying out the study".[180] Through a detailed record of all the procedures and decisions, others would find it easier decide to what degree they can apply these analytic results to their own situations or research questions. Another strategy that could help determine transferability is *rich, thick descriptions,* which provide a context of this study so that others can see if the contexts match and if findings can be transferred.[180]

2.3 Results

2.3.1 Quantitative results

2.3.1.1 Demographic and health characteristics

Fifteen individuals responded and were screened. All 15 respondents were eligible based on the inclusion criteria and were enrolled in the study. One participant decided to withdraw before returning for the second meeting. No detailed explanation for the withdrawal was given except that she changed her mind. All the other 14 participants completed the study including attending two visits and completing the 3-day food record.

Table 2-1 summarizes demographic and health-related information of the 14 participants. Eleven participants completed questionnaires in Chinese. The other three participants were given English questionnaires because they did not have a preference for Chinese or English. Age ranged from 38 to 82 with an average of 62 years, 57% were female, 50% were born in mainland China, and participants had been living in North American (Canada and the US) for an average of 23 years, ranging from 3 to 53 years. Half of the participants were retired, 14% had no income and completely relied on financial support from their children, and the mean household annual income per capita was C$19026, ranging from approximately $10000 to $35000. The mean acculturation score was 1.91. A table describing more detailed subscores of acculturation is included in Appendix N (page 343).

The average BMI was 24.2 kg/m^2, with the majority (71.4%) classified as normal weight and there were no individuals classified as obese. However, 64.3% had central obesity, which was defined as waist circumference ≥80cm in females, and ≥ 90cm in males.[162] Thirteen participants self-reported to have been diagnosed with T2D, and one with prediabetes. The diagnosis duration was 7 years on average, ranging from 0.5 to 28 years. The average A1C was 6.9% and 71% of the participants had an A1C lower than 7.0%.

Table 2-1 Participants' demographic and heath characteristics

Participants' demographic and health characteristics (n=14)		
Characteristics		**Mean ± SD or %**
Age (year)		62 ± 15 (38-82)
Age at immigration (year)		39 ± 19 (14-68)
Years in North America		23 ± 17 (3-53)
Household annual income (C$) (n=13)		36500 ± 18737
Household annual income per capita (C$) (n=13)		19026 ± 8381
A1C (%)		6.9 ± 1.3
Duration of diabetes (year)		7.0 ± 7.7 (0.5-28)
BMI (kg/m^2)		24.2 ± 2.7
Waist circumference (cm)	Females(n=8)	86.5 ± 8.3
	Males(n=6)	92.9 ± 11.6
Central obesity		64.3%
Acculturation score (minimum 1, maximum 5)		1.91 ± 0.42
HEI score (minimum 0, maximum 100)		67.7 ± 10.9
Perceived dietary adherence score (minimum 0, maximum 63)		40.7 ± 8.3
Health contributed physical activity score (minimum 0, no		16.4 ± 17.2 (0-56)
Overall physical activity score (minimum 0, no maximum)		25.8 ± 17.1 (0-68)
Education	Less than high school	36%
	High school	7%
	College diploma	36%
	University degree	7%
	Post-graduate degree	14%
Employment	Retirement income	50%
	Wages and salaries	36%
	No income (receive money from or live with	14%
Place of birth	Mainland China	50.0%
	Taiwan	14.3%
	Hong Kong	14.3%
	Southeast Asia	21.4%

2.3.1.2 Correlation of acculturation with demographic, lifestyle and health-related variables

The acculturation score could be 5 maximum and 1 minimum based on the scale we used. A score of 5 indicates highly acculturated to the Canadian culture, while a score of 1 indicates the participant was not acculturated to the Canadian culture but maintained the traditional Chinese culture. The mean score of the participants was 1.91, indicating relatively low acculturation. Table 2-2 shows the correlation between acculturation and demographic, lifestyle and health-related variables. Among the demographic variables, it was found that acculturation was negatively correlated with age ($p=0.003$) and positively correlated with household income ($p=0.022$). There was a trend to positive correlations between acculturation and education ($p=0.055$) and a trend to negative correlations between acculturation and sodium score ($p=0.051$). Dietary moderation included three components, that is, saturated fats, sodium and "other foods". Higher scores for these components mean lower intakes, or better moderation. Among the lifestyle and health-related variables, acculturation was positively correlated with preference for western food ($p=0.046$). We did not find correlation between acculturation and other variables, such as A1C, BMI, HEI and physical activity score.

Table 2-2 Correlation of acculturation with demographic, lifestyle and health-related variables

Correlation of acculturation with demographic, lifestyle and health-related variables (n=14)			
Variables		**r**	**P value**
Demographic variables	Age	-0.73	0.003*
	Education	0.52	0.055#
	Household income (n=13)	0.63	0.022*
	Years in North America	0.11	0.717
Lifestyle and health-related variables	Preference for western food	0.54	0.046*
	Food acceptability (n=9)	-0.49	0.184
	Perceived dietary adherence	-0.28	0.339
	HEI	-0.22	0.450
	Dietary adequacy score	0.08	0.794
	Dietary moderation score	-0.36	0.204
	Saturated fats score	-0.18	0.527
	Sodium score	-0.53	0.051#
	"Other foods" score	-0.01	0.961
	A1C	0.08	0.778
	BMI	0.18	0.547
	Health-contributed physical activity score	-0.03	0.923
P value is based on two-tailed, Pearson correlation analysis, except for education, dietary moderation score, saturated fats score, other foods score and A1C, which are based on Spearman correlation. *P value<0.05 is considered statistically significant. #P<0.1 is considered a trend. Scores for dietary moderation, saturated fats, sodium and "other foods" were calculated based on HEI scoring criteria. Higher scores indicate lower intakes of these components.			

2.3.1.3 Dietary intakes

Table 2-3 on the next page summarizes the caloric and nutrient intakes, which were compared with the recommendations from the CDA 2013 guidelines.[1] The total energy intake was 1928 kcal on average, ranging from 1088 to 3568 kcal. Eight out of fourteen participants under-reported and four participants over-reported energy intake when compared with the EER. The majority (64.3%) of participants met the recommendation for carbohydrate intake as 45-60% of total calories. In terms of protein intake, 42.9% exceeded and 21.4% were below the recommendation. Almost half of participants consumed more than recommended total fat, and almost half of them consumed saturated fat above the recommended upper limit, which is 7% of total calorie intake. Fibre intake was far from ideal, with 78.6% of participants below the recommendation. Sodium intake may be another concern, since 50% were above the upper limit. Unpublished data about food composition from our research group (Bell, R. et al, personal communication) were used for the calculation of added sucrose intake. All participants met the recommendation for added sucrose of no more than 10% of daily energy intake, although higher intake of added sucrose among participants was correlated with longer stay in North America($r=0.56$, $p=0.037$).

Table 2-4 summarizes the intakes of food from four food groups as specified in Eating Well with Canada's Food Guide. Whole grain intakes were also listed in the table. No participants met the recommendation for milk and alternatives. Only 21.4% were consuming the recommended servings of grain products and whole grains. Most participants were meeting the recommendations for vegetables and fruit (64.3%), and meat and alternatives (71.4%).

Table 2-3 Daily caloric and nutrient intake

Daily caloric and nutrient intake (n=14)					
Variables	**Mean ±SD**	**CDA or other guidelines recommendation**	**Participants meeting recommendation**	**Above upper limit**	**Below lower limit**
TDC	1928±662 kcal (1088-3568)				
Carbohydrate	51.4±10.8 % of TDC (35.6-77.1)	45-60% of TDC	64.3%	7.1%	28.6%
Protein	19.7±4.0 % of TDC (13.9-25.4)	15-20% of TDC	35.7%	42.9%	21.4%
Fat	29.9±9.2 % of TDC (9.6-44.4)	20-35% of TDC	50.0%	42.9%	7.1%
Saturated fat	7.6±3.4 % of TDC (2.8-15.5)	<7% of TDC	57.1%	42.9%	n/a
Added oils	9.5±6.63ml (0-23)	30-45ml[#]	0%	0%	100%
Fiber	22.7±9.8 g (13.3-46.0)	25-50g	22.4%	0%	78.6%
Added sucrose	2.2±2.3 % of TDC (0-7.9)	<10% of TDC	100%	0%	n/a
Sodium	2691±1865 mg (605-8256)	UL=2300mg* AI=1500mg(≤50y) * AI=1300mg(51-70y)* AI=1200mg(>70y) *	35.7% [a]	50.0% [b]	14.3% [c]

[#]Recommendation from Canada's Food Guide, *Dietary Reference Intakes Canada, [a] percentage of subjects with sodium intake between AI (adequate intake) and UL (tolerable upper intake level), [b] percentage of subjects with sodium intake exceeding UL, [c] percentage of subjects with sodium intake below AI.
Abbreviation: TDC means total daily calories.

Table 2-4 Intake of food from different food groups

Intakes of food from different food groups (n=14)						
Variables		**Servings (Mean ± SD)**	**Canada's Food Guide recommendation**		**Subjects with intake meeting recommendation**	
			19-50 yr	***51+ yr***	**By sex**	**Overall**
Vegetables & Fruit	F	7.2±2.5	7-8	7	75.0%	64.3%
	M	8.8±3.0	8-10	7	50.0%	
Grain products	F	5.5±1.4	6-7	6	25.0%	21.4%
	M	6.9±3.7	8	7	16.7%	
Whole grains	F	1.4±1.0	3-3.5	3	12.5%	21.4%
	M	2.6±2.4	4	3.5	33.3%	
Milk & Alternatives	F	0.7±0.5	2	3	0	0
	M	1.0±0.4	2	3	0	
Meat & Alternatives	F	3.6±1.7	2	2	75.0%	71.4%
	M	3.3±0.9	3	3	66.7%	
F: Females (n=8), M: Males (n=6)						

2.3.1.4 Correlations between HEI and demographic, lifestyle and health-related variables

The average HEI was 67.7 (SD=10.9). Table 2-5 summarizes the correlations between HEI and demographic, lifestyle and health-related variables. The only significant correlation found was between HEI and perceived dietary adherence score (p=0.006). HEI was not correlated with other health-related variables such as A1C, BMI and physical activity score, or demographic variables such as age, education and income.

Table 2-5 Correlation of HEI score with demographic, lifestyle and health-related variables

Correlation of HEI score with demographic, lifestyle and health-related variables (n=14)			
Variables		**r**	**P value**
Demographic variables	Age	0.43	0.125
	Education	-0.32	0.268
	Household income (n=13)	-0.28	0.363
	Household income per capita (n=13)	0.39	0.187
	Years in North America	0.24	0.416
Lifestyle and health-related variables	Preference for western food	0.11	0.710
	Perceived dietary adherence score	0.69	0.006*
	A1C	-0.08	0.787
	BMI	-0.17	0.569
	Health-contributed physical activity score	0.27	0.353
P value is based on two-tailed, Pearson correlation analysis, except for education and A1C, which were based on Spearman correlation. *P value < 0.05 is considered statistically significant.			

2.3.1.5 Correlations between food acceptability and diet quality and other health-related variables

Only nine participants completed the food acceptability questionnaire, because the other participants reported that they did not have a recommended diet to follow. As shown in Table 2-6, food acceptability was positively correlated with perceived dietary adherence ($p=0.003$), HEI ($p=0.012$), dietary moderation ($p=0.017$) and sodium score ($p=0.004$). There was a trend to negative correlation ($p=0.059$) between food acceptability and saturated fats intake shown as the percentage of total daily energy intake. We did not find correlation between food acceptability and A1C or BMI.

Table 2-6 Correlation of food acceptability with diet quality and other health-related variables

Correlation of food acceptability with diet quality and other health-related variables (n=9)		
Variables	**Pearson r**	**P value**
Perceived dietary adherence score	0.85	0.003*
HEI	0.79	0.012*
Dietary adequacy score	-0.57	0.108
Dietary moderation score	0.78	0.017*
Saturated fats (kcal %)	-0.66	0.059[#]
Saturated fats score	0.47	0.213
Sodium score	0.85	0.004*
"Other foods" score	0.53	0.148
A1C	-0.03	0.948
BMI	-0.49	0.184
P value is based on two-tailed, Pearson correlation test, except for dietary moderation score, saturated fats (kcal %), saturated fats score, "other foods" score and A1C, which were based on Spearman correlation test. *P value < 0.05 is considered statistically significant. [#] P value < 0.1 is considered a trend. Higher scores for dietary moderation, saturated fats, sodium and "other foods" indicate lower intakes of these components.		

2.3.1.6 Comparison between central obese and lean participants

Table 2-7 summarizes the comparisons of some variables between participants with and without central obesity. Food acceptability ($p=0.027$) and HEI ($p=0.029$) were both significantly higher in lean participants than in central obese participants. There was a trend that lean participants tended to have higher perceived dietary adherence score ($p=0.085$) and health-contributed physical activity score ($p=0.072$), compared with central obese participants. There were no significant differences in demographic variables such as age, education and income.

Table 2-7 Comparison of variables between lean and central obese subjects

Comparison of variables between lean and central obese subjects			
Variables	**Lean (n=5)** (Mean±SD)	**Central obese (n=9)** (Mean±SD)	**P value**
Food acceptability score	20.7 ± 3.2 (n=3)	12.2 ± 4.7(n=6)	0.027*
HEI	75.9±6.3	63.2±10.4	0.029*
Added sucrose (kcal %)	2.1±1.4	2.3±2.8	0.606
Dietary adequacy score	35.7±7.7	35.5±7.2	0.965
Dietary moderation score	35.5±3.3	30.3±9.5	0.364
Saturated fats score	9.7±0.3	7.9±2.9	0.785
Sodium score	7.6±1.8	6.1±3.5	0.390
"Other foods" score	18.2±3.7	16.3±4.6	0.637
Preference for western food score	1.98±0.71	1.70±0.71	0.493
Perceived dietary adherence score	45.80±9.71	37.89±6.21	0.085#
Health-contributed physical activity score	27.40±22.38	10.22±10.69	0.072#
Acculturation score	1.73±0.29	2.01±0.47	0.255
Years in North America	26±21	21±15	0.650
A1C (%)	6.4±0.5	7.1±1.5	0.345
Age	65±10	61±17	0.632
Education	2±2	4±1	0.116
Household income per capita	22880±8805	17310±8099	0.289
P value is based on two-tailed, unpaired t-test, except for added sucrose (kcal %), dietary moderation score, saturated fats score, "other foods" score, A1C, and education, which were based on Mann Whitney U-test. *P value < 0.05 is considered statistically significant. #P value < 0.1 is considered a trend. Higher scores for dietary moderation, saturated fats, sodium and "other foods" indicate lower intakes of these components.			

2.3.2 Qualitative results

2.3.2.1 Current dietary recommendations for Chinese immigrants

According to the qualitative interviews, Chinese immigrants in Edmonton have limited awareness of current dietary information for diabetes management. EWCFG was the main resource. Some participants had only received general recommendations from their family doctors, such as to reduce sugar, fat and total calories intake and to lose weight without further information about how to accomplish these goals. CDA guidelines were only mentioned by one participant. Sources of dietary information included the Chinese Community Center, family and friends, diabetes educators, family doctors, newspapers and the internet. Seminars at the Chinese Community Center were the only source of culturally relevant dietary information for many immigrants. Activities at the Chinese Community Center included diabetes screening, seminars given by a Chinese dietician and diabetes-related seminars given by non-Chinese health professionals such as nurses and translated by a bilingual staff member at the community center. Pamphlets such as EWCFG in Chinese were provided at seminars at the community center.

2.3.2.2 Perceived advantages and disadvantages of current dietary recommendations

In terms of advantages, most participants had found at least one or two pieces of useful information from the current dietary recommendations. For example, a few participants talked about glycemic index (GI), which they learned about from diabetes educators. One participant had been following a low GI diet, although his blood glucose remained high according to his own observation. Another helpful recommendation was about portion control. One participant [DAC04] said, *"……at least they show me the big difference between you eating the same amount of food in one portion, and the same amount of food you divided into small portions……*

Before, I had misunderstood that. The same amount of food, I eat it all at the same time and once a day, that's what I did before. But after I went to the class, I learned that there was big difference. I shouldn't have a big portion, even though it's the same amount of food."

Although current dietary recommendations have shown some beneficial effects towards shaping Chinese immigrants' dietary behaviour, there were also disadvantages that needed to be addressed. One of them was that the current dietary recommendations lacked consideration of Chinese culture and the dietary habits of Chinese immigrants, which was reflected in the interviews with some of the participants. For example, participant [DAC04] said, "……*But they are all Canadian cuisine, you know. When I looked through the information, none of them mentioned anything that I normally eat. So I had to work with the information and the food that I eat at home. I did not get exactly the information on what I eat. It's not helping, it's not helping me. Like, for people who follow Canadian diet, it helps them a lot. But as for me, it didn't help at all..... I just felt sometimes frustrated when the food that we eat, like those I eat every day, can't be found on the Food Guide. Because what we eat is not the majority, so they wouldn't do it.*" Participants would either have to give up on those foods or continue eating them while worrying about their effects on blood sugar control. According to some participants, the second disadvantage was that current recommendations were too general and lacked detailed instructions on meal planning. Another disadvantage, seemingly contradictory to the second one, was that the EWCFG was too complicated and confusing to some participants. One participant did not follow EWCFG because he thought it was too much trouble to follow it. Another participant did not follow the recommendations because she was confused about some recommendations, for example, she was recommended to eat a portion of meat the size of her palm, but she was not sure if that was for one meal or for one day. However, rather than a

disadvantage of the recommendations, this seems to be more related to the delivery of the recommendations. The misunderstanding of the recommendations could be possibly due to the literacy level of the patient as well as the way how the education was delivered.

2.3.2.3 Barriers to adhering to current dietary recommendations

Language was one of the main barriers among Chinese immigrants to adhering to current dietary recommendations, especially among the elderly and those with lower English proficiency. One participant did not attend the diabetes education program that her doctor referred her to because she could not speak English and her English-speaking daughter was not available to accompany her at that time. Another participant did not read any dietary information because it was mostly in English, which she could not read.

Besides language, time was another barrier. Some participants, especially those who were working and had family to take care of, simply did not have much time to spend on reading guidelines and translating guidelines into practical meal plans. One participant [DAC02] was hoping for the invention of some sort of instant diabetic food that can be easily stored and reheated in order to improve feasibility and save time. Another participant [DAC05] reported he could not spare much time despite being already retired. He said, *"……you would think that you would have more time to spend after you get retired, but I feel I still don't have enough time, and that is probably my biggest barrier (to healthy eating)……*" This participant was attending a lot of activities including golf, Tai Ji, and organizing several choirs and Chinese immigrants groups, and that was why he did not have enough time for following the dietary recommendations.

Other barriers to adhering to recommendations included lack of willpower and adequate dietary knowledge, cravings, personal taste preferences and eating out, such as eating at parties and

family get-togethers and eating during traveling. For example, one participant [DAC01] mentioned, *"……like, my co-workers or friends, they have birthday parties or things like that, and I would eat a lot of cakes and drink a lot of beers before I even realize it. Sometimes I get together with friends, and I would easily eat a lot at a BBQ, such as chicken wings, burgers or hotdogs. I could easily eat a lot of these foods if I was not careful.*"

2.3.2.4 Factors influencing food choices

Personal taste preference was one of the factors that influenced food choices among many participants. One participant [DAC04] said, *"……and personal preference, that is, for example, if they recommended some food which I don't like, I won't eat it but will try to find an alternative…… ".* Another participant [DAC08] said, *"……I didn't follow it at all. I just know the basic. I just eat what I want."*

Food price was another important factor influencing participants' decisions on food choices. One participant [DAC09] said, *"……My wife and I just go to the market, buy whatever is available, cheap and appropriate for us. We didn't put much effort into meal planning."*

Nutrition and health concerns also played a role in determining food choices. One participant said, "*Now when I buy food, I always read the label. If there is a lot of sugar in it, I won't buy it.*" Another participant [DAC13] said, *"Just my diabetes. Diabetes affects my food choices. Without diabetes, I'd be able to eat anything. It wouldn't matter if I ate a little more or a little less……"*

Other factors mentioned by participants included food quality and variety, origin of food and convenience related to food shopping.

2.3.2.5 Opinions on developing a Chinese menu plan

Most participants showed support and excitement about the idea of developing a Chinese menu plan for their diabetes self-management. One participant [DAC12] said, "*If you could provide Chinese immigrants with a menu plan, I'm in urgent need. I need it very much! I hope you guys can provide this kind of information, guiding us on meal planning.*" Another participant [DAC14] said, "……*I hope to see the Chinese menu plan. Especially for Chinese people, it will be very useful, because most of us don't eat western food very often. Of course sometimes we do. Like, when we go to banquets, we would also eat western food……*" When asked about the format, participants tended to prefer a more flexible rather than a fixed menu plan. One participant [DAC04] said, *"……The (nutrition) breakdown in details. Once I have that in details, then I can follow…… Like, I can incorporate the information I have and then can prepare it with my own menu, right? I really need to know, one cup of cooked white rice, jasmine (rice) for example, one cup of the cooked rice, what is the percentage of carbohydrates and sugar. And then because I know myself, I'm only allowed how many units of carbohydrate. That's why I've started counting since the morning……"*Another participant [DAC11] suggested, *"……you can provide several options. What to eat for breakfast and what to eat for lunch and dinner. You can provide a few options, because if there's only one option and we don't have the ingredients for it, we won't be able to follow it ……"*

Other suggestions on the menu plan included: simple and easy to follow, considering the whole family and not just the patients themselves, inclusive of different types of food including dessert and drinks, based on research evidence, financially accessible, use of spices to improve taste, appropriate for both treatment and prevention of T2D, modifying traditional recipes to reduce

unhealthy ingredients. These suggestions will be taking into account when designing and implementing the Chinese menu plan intervention in the next phase.

2.4 Discussion

The purpose of this study was to learn about the dietary needs among Chinese immigrants with T2D in Edmonton to provide information for nutritional programming. More specific objectives were to investigate their diet quality, to identify the dietary components that need improvement, to examine the relationships between acculturation, diet quality and various variables, to explore factors that influence their food choice and diet quality, to explore barriers to adhering to current recommendations. A convergent mixed methods design integrating quantitative and qualitative data was used to obtain a fuller understanding of the needs in Chinese immigrants in terms of dietary management of diabetes.

2.4.1 Chinese immigrants' diet needed improvement

The Chinese immigrants in this study had an average daily energy intake of 1928 kcal. Almost 60% of the participants under-reported their energy intake relative to EER, possibly due to underestimation of portion sizes, which is a general weakness of food records.[183] But it should be noted that physical activity was also self-reported, which means the calculated EER might be higher or lower than the actual requirement. The average HEI score was 67.7, which was higher than the average score of Canadians aged 51-70 years (men 57.7, women 61.3).[177] A diet with an HEI score between 51 and 80 is categorized as 'needs improvement' [184]. The specific nutrient intakes that could be a focus for intervention included total fat, saturated fat, unsaturated fat, sodium and dietary fibre, which were either excessive or inadequate compared with recommendations from the CDA or Health Canada guidelines.[152]

Regarding the intakes of food from different food groups defined in EWCFG, most participants consumed recommended servings for fruit and vegetables, and meat and alternatives, which might be a result of high amount of vegetables in traditional Chinese diet as well as increased consumption of meat, fruit and vegetables after immigration as shown by a previous study.[82] On the other hand, no participant met the recommendation for milk and alternatives. Based on the HEI scoring system, the score for milk and alternatives ranges from 0 to 10, with 10 representing meeting the recommendation and 0 representing no consumption of milk and alternatives. The average score of participants in this study was 3.17, while the average score of the Canadian general population was 5.5 according to the 2004 Canadian Community Health Survey.[177] The lower score among Chinese immigrants might be explained by the fact that traditional Chinese diet is low in milk and other dairy products, and participants in this study appear to have persisted with this tradition.

Canadian adults aged 19-50 need 1000 mg calcium every day, and adults aged 51 and older need 1200 mg every day.[185] EWCFG recommend 2 servings of milk and alternatives every day for adults aged 19-50 and 3 servings for adults aged 51 and older to help meet calcium requirements and maintain bone health.[22] By food intake alone, no participants in this study met the requirement for calcium. The average daily calcium intake by food was 626mg. Thirty-six percent of the participants were not taking any form of calcium supplements.

How to improve calcium intake through food source or supplements or both, should be one of the foci of future research and nutrition education programs in Chinese immigrants. Cultural background and traditional dietary pattern should be taken into account.[162] Because soy products are common in a traditional Chinese diet[186] and the calcium content and absorption are similar

between soy products and cow's milk,[187,188] encouraging the consumption of soy milk, tofu and other soy products might be a better solution than increasing milk intake in Chinese immigrants. Moreover, according to a study in 43,176 Chinese men and women aged 45-74 years in Singapore, consumption of unsweetened soy was negatively correlated with diabetes risk.[189] Educating Chinese immigrants on choosing unsweetened calcium-fortified soy products is important.

Only a small portion of participants consumed recommended servings of grain products and whole grains, and the scores for these two components were similar with the average scores of Canadians.[177] The inadequate consumption of whole grains likely contributes to the inadequate fibre intake in most participants, because the consumption of fruit and vegetables, the other major contributor for dietary fibre, was mostly adequate. From three-day food records, we found that the traditional staple foods such as white rice and noodles remained staples among participants. This was consistent with previous finding that staple foods usually remain unchanged for the longest time after immigration.[190]

2.4.2 Acculturation and A1C were not correlated with diet-related variables

Previous studies have shown correlations between acculturation and food related variables in various immigrant populations.[191–195] Contrary to our expectation, acculturation was not correlated with food acceptability, perceived dietary adherence or HEI in our study. However, there was a trend for inverse correlation between acculturation and sodium score ($p=0.051$). The sodium score was calculated based on HEI, and a higher sodium score represents lower intake. This is almost consistent with a previous finding that in Chinese American women, acculturation

was associated with lower dietary moderation which contains components such as sodium and saturated fat intake.[195]

In our study, the only three variables correlated with acculturation were age, household income and preference for Western food. Participants who were younger tended to be more acculturated, which was consistent with previous research showing that acculturation was negatively correlated with age.[55] Participants with higher household income also had higher acculturation score. Those that were more acculturated had higher preference for Western food, which presumably led to increased consumption of Western food although this was not specifically examined. It has been well documented that dietary modifications have significant effect on blood sugar control.[196–198] However, we did not find correlations between A1C and any of the food or diet related variables, although the small sample size and the small range of A1C among participants might have made it difficult to detect relationships.

2.4.3 Diet quality was correlated with food acceptability

Because the HEI scoring criteria are based on recommendations from EWCFG, many of which are closely replicated in the CDA guidelines, a higher HEI score indicates better diet quality and higher adherence to the recommendations. Among the participants, better diet quality was associated with higher food acceptability, indicating that food acceptability might predict the actual food choice. As mentioned in the *Methods* section above, the HEI included two categories, that is, adequacy and moderation. According to our results, food acceptability was associated with overall diet quality (HEI) and dietary moderation, but not adequacy.

In terms of moderation, almost half of the participants were consuming saturated fats and sodium that were above recommendations from the CDA guidelines[152] or Dietary Reference Intakes.

Higher intake of sodium was associated with lower food acceptability, and a similar trend was observed between saturated fats and food acceptability. Likewise, the trend to negative correlation between acculturation and sodium intake is in line with previous research that found an association between acculturation and less dietary moderation,[195] indicating that the Chinese immigrants might gradually lose their dietary moderation in the process of acculturation. The direct cause of less moderation could be increased consumption of fast foods or processed foods high in fat and sodium.[82,199] Moreover, we found that the intake of added sucrose was positively correlated with years in North America($r=0.56$, $p=0.04$). These findings were consistent with previous research showing that Chinese immigrants in western countries increased their consumption of soft drinks, fats, sweets and salty snacks.[82,149,190] Food acceptability may be a better indicator of diet quality than acculturation, since there was a strong correlation between diet quality and food acceptability, while there was only a trend to correlation between diet quality and acculturation. Food acceptability may be a more direct measurement related to dietary intake, while acculturation is a broader concept that involves many aspects of culture including language, religion, folkways and beliefs.[200]

2.4.4 Lean participants appeared to have higher food acceptability and diet quality than central obese participants

Since central obesity is one of the conditions of metabolic syndrome[201] and associated with increased risk of hypertension in Chinese,[202] we compared lean and central obese participants in terms of lifestyle and health-related variables. We observed that lean participants had higher food acceptability and better diet quality, although further studies are needed to determine a causal relationship. The average dietary moderation score and saturated fats score were both higher in lean participants (35.5 and 9.7, respectively) than in central obesity participants (30.0 and 7.9,

respectively), although the differences were not significant. A trend to lower health-contributed physical activity score in central obese participants indicated that central obesity might be related to less moderate and strenuous physical activity, which is consistent with previous research showing that a high level of physical activity reduced central obesity incidence.[203] Future studies in larger cohorts that adjust for physical activity and other confounders may help determine the relationship between diet quality and central obesity.

2.4.5 Factors influencing food choices

Taste preference, food price, nutrition and health concerns were among the most frequently reported factors that influenced food choices. From the three-day food records, it was found that participants ate traditional food for the most part, especially for lunch and dinner. This finding is consistent with the data collected from qualitative interviews in our study as well as previous research on Chinese immigrants[83]. Taste preferences develop early in an individual's life and thus the cultural background and traditional cuisine are the best predictor of taste preference.[161] To some participants, taste was the most important thing when it comes to eating. During the interviews, participants requested a menu plan that contained mostly Chinese cuisine. One participant suggested that the traditional Chinese recipes be modified to contain less fat and salt so that they could enjoy traditional food while being healthy.

Another important aspect was food price, especially for those Chinese immigrants with lower income, who comprised most of the participants. Even for one participant with higher income, price was an important concern because he was used to being thrifty. Being thrifty was common among many elderly participants and they could not justify spending much money on food.

Hence, financial accessibility should be considered when designing nutrition programs for this population.

Nutrition and health concerns were also a popular factor that influenced Chinese immigrants' decisions on choosing food. Some participants would like to follow a healthy diet because of the fear of complications or inconvenience caused by diabetes. One participant said, *"……It's like my sister, she has diabetes……One time she fell down, and then after that, she had to use wheelchair for a few years. So I don't want that, you know."* Other factors mentioned by participants included food quality and variety, and convenience, which will all be considered in the menu plan development in the next phase of the project.

When asked about their opinions on developing a Chinese menu plan to help them manage their diet, most participants showed support and said they looked forward to the menu plan. Some participants hoped that the menu plan would be flexible and provide multiple options for each meal in case some ingredients were not available at home, and another participant said she would use the menu plan as a guideline and incorporate it into her own diet instead of following it verbatim. These suggestions will all be considered in the menu plan development.

2.4.6 Limited resources for Chinese immigrants' dietary management

Interviews of participants found that dietary resources targeted at Chinese immigrants were very limited. Some immigrants were not even aware of existing resources such as the CDA website, where there is diabetes management information written in Chinese. Many participants had heard of EWCFG, but not many of them made good use of it due to various reasons including time constraints, poor understanding, and so on, which will be elaborated in section 2.4.7. Some participants only received general recommendations, such as to reduce sugar and fat intake and

to lose weight, from their healthcare professionals. Others came to these conclusions based on "common sense". One participant said, "Most people know this. People with diabetes should have smaller portions for each meal and eat more often. Most people know these basic things. We all know we should eat less sweets and fats and more vegetables……"

2.4.7 Disadvantages of current recommendations and perceived barriers to healthy eating

Language, eating out, cravings, and lack of practical recommendations based on Chinese culture were most frequently reported barriers to healthy eating. Lack of information written in Chinese was one of the disadvantages of current dietary recommendations, and prevented Chinese immigrants from following the recommendations properly. Even though the EWCFG was translated into Chinese and available on the Health Canada website, some senior participants with low computer skills could not access it easily. Moreover, the literally translated guideline did not take into account the cultural background and dietary patterns of Chinese immigrants. As a result, many participants thought the current information was not helpful and felt frustrated when they had to give up some traditional food that they grew up with. According to the quantitative assessment of acculturation, the study sample had a relatively low acculturation, which means they leaned more toward to the Chinese than westernized lifestyle. This has been reflected on their perceived barriers such as language and lack of cultural relevance of current recommendations. Culturally relevant guidelines written in a language that immigrants are familiar with could help overcome these barriers.

Another barrier to healthy eating or to adhering to recommendations was eating out in restaurants or at get-togethers with family and friends. Overeating and eating unhealthy food were common

when eating out. This is consistent with previous literature on Chinese immigrants as well as other populations[82,204–206]. Providing patients with tips on how to eat healthy in restaurants and at parties could be helpful. Cravings and time constraints were also mentioned by the Chinese immigrants as barriers to adhering to recommendations, which is in line with previous research in Chinese and other populations.[44,83,207,208]

2.4.8 Complementarity of the quantitative and qualitative data

A prominent strength of mixed methods is that the research problems can be studied from multiple angles and perspectives for a fuller understanding[209]. Specifically for convergent mixed methods design, researchers can compare the two types of data, use one type of data to confirm the other, and merge the results obtained through the two types of methods. Quantitative methods were used to assess the biological characteristics, diet quality, and acculturation. Factors influencing food choice and diet quality were assessed using quantitative questionnaires as well as qualitative interviews. Although acculturation was not purposefully evaluated in the interviews, it could be reflected through the interviews. According to the quantitative scale, the average acculturation was relatively low in the study sample, which could be reflected in the following preferences found in interviews: speaking Chinese, reading information written in Chinese, eating Chinese food most of the time, going to the Chinese Community Center for health seminars. In terms of diet quality, participants who reported less difficulty in following current recommendations in their interviews tended to have higher diet quality (HEI) based on the quantitative assessment of their diet. Developing methods to help patients overcome the barriers could potentially improve their diet quality, which warrants further research.

2.4.9 Strengths and limitations

One of the strengths of our study is the use of mixed methods. The dietary needs and barriers to following current recommendations are complex and a full understanding is not easily obtained with either quantitative or qualitative method only. The second strength of the study is that height, weight and waist circumferences were measured following standard protocols instead of being self-reported, which increased the accuracy. Another strength is that the sample had a wide range of age and immigration duration, which makes it more representative of the Chinese immigrant population. We also included prediabetes as one of the inclusion criteria, as the needs assessment serves as a reference for not only treatment but also prevention of diabetes.

There are several limitations of our study. First, the small sample size may have impeded the detection of significant correlations as well as the generalizability of the findings, particularly with respect to diet acceptability because only nine of 14 participants reported having a recommended diet. Second, most of the participants had a relatively low A1C, which might attenuate the ability to detect significant correlations between A1C and other variables. Another limitation is that qualitative data collection and analysis were not conducted concurrently due to time and human resource constraints. Concurrent data collection and analysis could help determine data saturation, which determines an ideal sample size. However, according to a detailed analysis of qualitative research studies, a sample size of 10-20 is among the most common sample sizes.[165] Hence, a sample size of 14 is acceptable.

2.5 Summary

This study identified intake of milk and alternatives, dietary fibre, sodium and fats as sub-optimal among Chinese immigrants in Canada. Focusing efforts on acceptable substitutes for

dairy as well as increasing fibre could yield improved dietary intakes. Choosing low-sodium sauces and lean meat should also be emphasized. Culturally relevant education programs may be needed to enhance immigrants' knowledge on healthy eating practice and food choices because the staple foods remained traditional among immigrants and most participants showed support to the idea of developing a Chinese menu plan. Lack of culturally relevant information written in Chinese and lack of detailed instructions on meal planning are perceived disadvantages of current dietary recommendations and prevented Chinese immigrants from following recommendations properly. These limitations should be considered in future nutrition programming. Dietary recommendations with flexibility and adequate details on meal planning were requested by Chinese immigrants in Edmonton. Food acceptability, rather than acculturation, may be a better indicator of dietary adherence and diet quality, especially dietary moderation. Hence, it is important to find the factors that determine food acceptability, and take these factors into consideration when developing dietary interventions.

3 Menu plan development

3.1 Introduction

3.1.1 General approaches to meal planning

Nutrition therapy and counselling play an important role in diabetes treatment and self-management, and can improve glycemic control.[1] General approaches to meal planning for diabetes include carbohydrate counting, paying attention to glycemic index, exchange lists, and various methods for determining appropriate portions.[24,210,211] Providing patients with menu plans and grocery lists combined with counselling is another feasible and effective strategy for weight control and diabetes management.[21,141,142] Patients who received structured menu plans reported favourable changes in food stored at home and perceived barriers to weight loss.[142] No further benefit was seen when patients received actual meals prepared from the menus indicating that the menu plans were the more effective component than food provision for structuring patients' dietary behaviour.[142]

Optimal diabetes treatment including nutrition therapy should be individualized based on patients' preferences and cultural background[1,212]. A highly structured, strictly-administered diet plan may not work for everyone and could result in low adherence in some patients[213]. Psychological well-being, especially that related to the strictness of diabetes treatment regimen was the most frequently reported barrier to diabetes care among 3890 diabetes patients in a cross-sectional study conducted in New Zealand[213]. According to a case study of a 47-year-old woman with T2D[210], using a non-diet (weight loss) approach that emphasized healthy food choices, meal timing and lifestyle exercise significantly improved glycemic and weight control and lipid profile. Before using the non-diet approach, the patient had tried several diets for

weight loss but she was not successful and became frustrated. It is worth noting that she had a history of depression related to her role as the caretaker for her mother with Alzheimer's disease. Hence, the stress and time constraints might have made a strict meal plan less practical for this patient. In contrast to a structured meal plan, the non-diet approach views the patient as an individual with individual needs and empowers the patient to take control of their own decisions about meal planning and the goals and changes they want to attain.[210]

Both the non-diet approach and a structured meal plan have their merits. Integrating the flexibility of the non-diet approach with the structure of a meal plan may fit the preferences and lifestyle of some individuals. In a study conducted in the US, diabetic patients who received individualized 2-week menu plans reported that menus were helpful in terms of recipes, setting portion sizes and self-monitoring.[141] In a previous menu plan study in our group that was carried out among Canadians with T2D in Alberta, the research coordinator provided individual counselling during patients' weekly visits and taught patients how to substitute ingredients in recipes and make adjustments based on their preferences. These strategies made the menu plan more flexible and individualized. Patients reported using the menu plan 5 days a week on average during the 12-week study and had significant reduction in A1C, body weight and fat mass.[21] The menu plan used in that study was developed using foods that were familiar to people living in Alberta; however, it was not directed at any particular ethnic group. Recent immigrants or other individuals with low acculturation to mainstream dietary patterns might also have low adherence because of the importance of taking cultural acceptability into account[150,162,214].

3.1.2 Needs assessment among Chinese immigrants with T2D

From the needs assessment of Chinese immigrants with T2D in Edmonton (Chapter 2), we found that participants lacked culturally relevant guidelines or information to follow for their diabetes management including healthy eating. The most common resource for dietary management that participants were aware of was EWCFG, which was literally translated into Chinese and available on the Health Canada website[22]. Some senior participants thought that the EWCFG was too complicated to use and some of the recommendations were not clear enough to them, which could be due to many factors including low literacy, lack of nutrition and diabetes knowledge, and how the knowledge is delivered. For example, one participant stated that she heard of eating a portion of meat about the size of her palm but was not sure if that was for one meal or for one day. She received this information at a diabetes seminar in the Chinese community center in Edmonton. Lack of opportunities to ask questions or talk to the educator individually could have resulted in poor understanding of the information delivered. A one-on-one or a more individualized delivery of the knowledge that takes into account the literacy skills of the patient may be more effective.[212] The EWCFG recommended different servings of each food group for persons of different sex and age. However, some participants felt it was too complicated and could not figure out how to count servings. Some other participants thought that the EWCFG was too general and lacked detailed instructions on meal planning and how to meet the EWCFG recommendations. During the needs assessment, most participants expressed their opinion that they needed more detailed recommendations incorporating meal planning instructions and that a menu plan containing Chinese recipes would be very helpful to them.

3.1.3 PPEP and the 4-A Framework

The menu plan used for our previous diabetes nutrition interventions[20,21] was developed largely based on the 4-A Framework, which is derived from the food security literature[45], stipulating that foods included in nutrition programs should be *Adequate*, *Accessible*, *Acceptable* and *Available*. *Adequacy* means the diet meets guidelines for health and facilitates dietary improvements that lead to better primary (blood glucose control) and secondary outcomes (complications, e.g. kidney failure). *Accessible* summarizes the factors associated with financial and physical accessibility of foods. Foods must be *Acceptable* from multiple perspectives: hedonic qualities, culture, traditions and consumption habits. Foods must also be generally *Available* to the consumer population of interest, e.g., locally grown or regularly imported. The PANDA research group previously developed The Pure Prairie Eating Plan based on the 4-A Framework. The PPEP includes four weeks of complete daily menus, including three meals and three snacks. The plan also includes recipes, weekly grocery lists and cooking tips. Detailed description of PPEP can be found in section 1.2.5. A PPEP prototype had positive effects on A1C and body weight control among Albertans with T2D in a 12-week intervention when delivered with individualized counselling[21] or with small group-based education.[20] Hence, we decided to adopt the 4-A Framework for the Chinese menu plan hoping to achieve similar effects in Chinese immigrants.

3.1.4 Objective

The objective was to develop a flexible menu plan that 1) translates the nutritional recommendations from national guidelines for healthy eating and diabetes management into healthy Chinese recipes and practical meal planning instructions, 2) adheres to the 4-A Framework, that is, is based on foods that are adequate, accessible, available and acceptable.

3.2 Methods

3.2.1 Applying the 4-A Framework

In order to ensure the nutritional ***Adequacy***, which is part of the 4-A Framework, we set a criterion that the menu plan include two examples of daily menus with either one or multiple dishes per meal (Appendix J). Each example was followed by nutrition analysis and food serving counts to show participants how to arrange the diet in order to meet adequate intake of nutrients such as dietary fibre recommended by the CDA nutrition therapy guidelines[152] and servings of food from different food groups recommended by the EWCFG. Recipes in the two examples were all picked from the menu plan and page numbers were included for easy reference. The two examples also conformed to the acceptable macronutrient distribution range (AMDR) for diabetes patients[152]. Some traditional recipes were purposely modified to increase the proportion of vegetables to meat, so that it would be easier for patients to attain a balanced diet using the recipes provided.

To ensure the ***Accessibility***, ingredients were mostly picked from Superstore and T&T supermarket which are two grocery chains where the participants would go often for grocery shopping. In fact, most of the ingredients except for certain Chinese foods are also easily accessible in other local grocery stores. Superstore carries most of the ingredients used in the menu plan and was selected as a reference because the food prices there are generally lower than some other stores. Thus, the foods in the menu plan can also be financially accessible to most participants.

Eating is deeply embedded in early development of an individual, and the best predictor of food preferences, habits and attitudes is his/her ethnic background and traditional cuisine instead of

any biological measure[215]. According to the needs assessment (Chapter 2), a great proportion of the diets among Chinese immigrants in Edmonton remained traditional Chinese. As a result, we adopted a criterion that the menu plan include mostly traditional Chinese recipes and allowed participants the flexibility of selecting their preferred number of recipes for every meal in order to achieve ***Acceptability***. Other criteria were that the recipes had to taste good and be reasonably simple and quick to make. Therefore, we tried to cook and taste every recipe in the menu plan to make sure the taste was good because according to the needs assessment, taste was one of the most frequently reported reasons for eating food that was not recommended. Also, some quick recipes were included such as microwaved fish fillet, because time was another barrier to healthy eating according to the needs assessment.

Finally, most ingredients used in the menu plan are ***Available*** in most grocery stores all year round in Edmonton, except for a few that were seasonal and mainly available in Chinese grocery stores. In brief, the Chinese menu plan was built based on the 4-A Framework while considering the specific dietary patterns of Chinese immigrants in Edmonton.

3.2.2 Recipes and nutrition analysis

There are 81 recipes in total. Some were developed by the study coordinator, some were adapted from Chinese recipe websites[216], and others were adapted from a cookbook developed by the CDA Edmonton Branch Asian Community Volunteer group in 2002. Recipes were purposely selected to include cuisine from different regions of China and to meet participants' needs. Although not every single type of cuisine was included, the general dietary habits in Northern and Southern China were taken into account. For example, many types of Northern Chinese cuisine tend to have a heavy taste and darker colour with the use of a large amount of soy sauce,

while for some southern regions such as Cantonese and Hong Kong, a lighter taste and colour are more common. However, in order to ensure the healthiness, most original recipes were modified such as reducing salt and sugar. Before developing recipes, a general process was adopted to ensure that guidelines were met and consistency of approach. To ensure accuracy, repeatable results and good taste, recipes were tested, using ingredients purchased from Superstore and T&T supermarket in Edmonton. The amount of each ingredient was measured using measuring cups, spoons or a kitchen scale. Detailed cooking methods were recorded during recipe testing. To address guidelines and nutritional balance, adaptations were made to reduce salt and fat, replacing saturated fat with vegetable oils, and adjust the proportion of vegetables to meat, to make sure daily intake of sodium and saturated fat did not exceed the upper limit of DRI or CDA guidelines when consuming recommended servings of food from each food group. No added sugar was used except for one dessert soup and two other recipes with very limited amount of sugar added. For vegetable dishes, each serving usually contained approximately 2 EWCFG servings of vegetables. For recipes that contained meat, one serving usually contained 1 EWCFG serving of vegetables and half a EWCFG serving of meat and alternatives. The sodium content for each serving was around 200mg (100~300mg). Nutrition analysis of the recipes was done using the Food Processor Diet Analysis and Fitness Software (version 10.9.0, ESHA research, Salem, Oregon) and a nutrition facts table was generated and put beside each recipe. Language has been one of the barriers for immigrants to access diabetes knowledge and resources[151]. It is recommended that the original copy of health information be composed in the needed languages.[217] This helps to avoid loss of cultural relevance when translating information from another language. Hence, in order to assist immigrants to overcome the language barrier, recipes were originally written in Chinese. Recipes titles and ingredients were bilingual in the menu

plan. The original Chinese was translated into English for the purpose of clarification, and to make it easier for those with lower level of English proficiency to identify the foods in non-Chinese grocery stores.

3.2.3 Consulting target population

As one strategy to ensure acceptability, some Chinese immigrants with T2D were consulted for their suggestions on the design of the menu plan after an outline was made. This part of the study was approved by the University of Alberta Research Ethics Board (study ID: Pro00050028). Participants from the previous dietary needs assessment study reported in Chapter 2 (study ID: Pro00023449) were contacted and six participants agreed to participate and contribute input into the menu plan. The research coordinator met with each participant individually at the University of Alberta Clinical Research Unit. After participants gave consent, the research coordinator showed the participant the menu plan outline and explained to them briefly how the menu plan was developed. Participants would have already known about the menu plan because they all participated in the previous study. After participants reviewed each section, the researcher asked participants if they had any suggestions on the design, such as the layout and food selections, or if they wanted more information to be added. The draft menu plan was amended to take into account participants' suggestions.

3.2.4 Differences from the PPEP

Although the Chinese menu plan followed the same 4-A Framework as the PPEP did, there are some differences between the two. Firstly, some food ingredients that are consumed by Chinese people but not often found in a Canadian cookbook, such as lotus root, black and white fungi, lily buds, were included in the menu plan. From the needs assessment conducted prior to

designing the Chinese menu plan, it was found that Chinese immigrants had difficulties in incorporating some Chinese food ingredients or recipes into their diet because they were not aware of the nutrition information. They felt frustrated because of the struggle between glycemic control and their tradition (Chapter 2). Providing Chinese food ingredients, and recipes with nutritional analyses in the menu plan could help with this issue so that patients could make informed decisions when choosing from traditional foods. The second obvious difference is that the cooking methods were mostly traditional Chinese. According to the needs assessment among Chinese immigrants in Edmonton, they consumed Chinese food and used Chinese cooking methods most of the time, so the recipes in this menu plan were primarily traditional Chinese recipes. Lastly, in contrast to the fixed daily menus that include one recipe for each of the three meals in PPEP, the Chinese menu plan relies on participants themselves to design their daily menus. All recipes are listed based on their main ingredients such as beef, pork, vegetables, which is similar to the format of most Chinese restaurant menus. Although the recipes were not listed as daily menus for every single day, two examples of a daily menu were provided that included either one or multiple dishes for each meal. The reason why we designed the Chinese menu plan this way instead of following the pattern of PPEP is because the dietary patterns among Chinese immigrants are distinct from a typical western dietary pattern. It has been shown that Chinese-Americans' breakfast is mostly westernized because of convenience while lunch and dinner still remain traditional[84]. Traditional Chinese dinner and lunch include multiple main dishes and the number of dishes may depend on the size of the family. Hence, daily menus that include one recipe for each meal are not practical to Chinese families.

3.3 Results and discussion

3.3.1 Feedback from participants

The six participants provided their feedback on the outline before the menu plan was finally completed. The feedback can be categorized into several aspects: recipes and food selections, cooking methods, and nutrition information. Participants suggested that the menu plan show the salt and cholesterol content in recipes in addition to macronutrients. Participants also suggested inclusion of some food ingredients and recipes that they used frequently. In terms of cooking methods, steaming was suggested in addition to boiling, stir-frying, stewing and microwaving which were already highlighted in the menu plan. Participants were satisfied with the layout of the menu plan and the flexibility of creating individualized menus using the recipes provided. The menu plan was modified and more recipes and nutrition information were added based on the feedback. It is recommended by the American Diabetes Association that individuals with diabetes should be actively engaged in self-management and treatment planning.[212] One of the examples is collaborative development of eating plans with their health care providers.[212] This step in the menu plan development obtained important input from patients which could improve the acceptability of the menu plan, and help to avoid additional work needed to modify the menu plan after it is completed.

3.3.2 Menu plan content

The objective was to develop a menu plan for Chinese immigrants with T2D that translates recommendations into practical Chinese recipes and meal planning instructions, based on the 4-A Framework. A menu plan (Appendix M) was developed that consists of three main sections,

that is, *introduction* (Appendix M, page 254), *how to use the menu plan* (Appendix M, pages 255-259), and *recipes* (Appendix M, pages 260-342 and Table 3-1).

In the *introduction* section, the PANDA project, of which the Chinese menu plan is a component, is briefly explained. It is also explained to readers how the Chinese menu plan can contribute to health and diabetes management. For example, it is mentioned that this Chinese menu plan translates recommendations from EWCFG and CDA nutrition therapy guidelines into traditional and practical recipes with nutrition analysis of every recipe, so that people can choose recipes wisely for their daily menus.

In the *how to use* section, examples were provided to show how to make use of the recipes and other information in the menu plan to design their own daily menus that meet the recommendations of EWCFG and CDA nutrition therapy guidelines. From the three-day food records collected during needs assessment (Chapter 2), it was found that the number of dishes per meal varied among Chinese immigrants, which could be one, two or a few, especially for lunch and dinner. Because of this dietary characteristic of Chinese immigrants, it is not practical to provide fixed daily menus. This menu plan allows the flexibility of users designing their own menus by choosing preferred number of dishes for each meal.

In the *recipes* section, all recipes are grouped based on the main ingredients, such as vegetables, seafood, pork, chicken, beef, as well as the type of recipes, such as soup and dessert. Aside from those categories, there is also a group named “meat alternatives” in the recipe list, which mainly includes tofu and egg dishes. We hoped that the addition of this group would increase the awareness of and encourage the consumption of meat alternatives, which is recommended by EWCFG. Tofu is a popular traditional Chinese food ingredient. However, on most Chinese

restaurant menus, tofu dishes are grouped in vegetables except when cooked with meat. Knowing that tofu belongs to the meat group instead of vegetables group, immigrants could possibly reduce the consumption of meat, which contains more saturated fat, and increase consumption of vegetables in order to meet the recommended servings. On some recipe pages throughout the menu plan, there are healthy tips related to the recipe or certain ingredients. Table 3-1 shows a typical recipe. Beside every recipe, there is a nutrition facts table generated by the Food Processor software, which has the same format as a standard nutrition facts table that can be found on a food package in a Canadian grocery store. However, the micronutrients part (vitamin A, vitamin C, calcium and iron) of the table was trimmed off because the information for these nutrients was sometimes incomplete due to missing information in the database. Another reason is that the macronutrients and sodium were our main focus, so we did not want to distract patients with more information such as vitamin C and vitamin A. Table 3-2 shows the nutrition facts table for the recipe in Table 3-1. The nutrition facts tables were included not only for the purpose of showing nutrition information of a recipe to help Chinese immigrants make informed choices when creating their daily menus, but also to help them practice and form the habit of label reading. Nutrition facts tables can be used to compare different products to make better food choices, to control the intake of a specific nutrient, and to learn about nutrition information of foods[218], which was one of the pieces of information requested by Chinese immigrants during needs assessment. It has been shown in a study that nutrition label reading is associated with healthier eating and food choices in the Korean population[219]. It was anticipated that the incorporation of nutrition facts tables in this menu plan could contribute to improvement of food choices and dietary quality in Chinese immigrants.

Table 3-1 An example of a recipe

什錦炒肉丁 Stir-fried Pork with Assorted Vegetables

（四人份 Serves 4）

材料 Ingredients：

豬裡脊肉 pork loin	½ 杯（90 克）
黃瓜 cucumber	1½ 杯（180 克）
玉米粒 sweet corn	½ 杯
紅甜椒 sweet pepper, red	½ 個
菜籽油 canola oil	1 湯匙
花椒粉 Sichuan pepper powder	1/8 茶匙
小香蔥 green onion	1 根
蒜 garlic	3 瓣
生薑 ginger root	2 片
減鹽醬油 less sodium soy sauce	1½ 湯匙
料酒 cooking wine	½ 茶匙
醋 vinegar	1 茶匙

製作方法 Directions：

1. 豬裡脊肉用清水浸泡，去除血水，切丁。
2. 黃瓜和紅甜椒切丁。蔥切段，薑、蒜切片。
3. 醬油、料酒和醋量好，倒入小碗備用。
4. 炒鍋燒熱，倒入量好的一湯匙油，依次放入花椒粉、蔥薑蒜爆香。
5. 倒入之前量好的醬油、料酒和醋，接著放入豬肉丁，翻炒 1 分鐘。
6. 倒入黃瓜和甜椒丁，翻炒 1 分鐘。
7. 加水 2 湯匙（30 毫升），蓋上鍋蓋，煮 4 分鐘左右即可。

Table 3-2 An example of a nutrition facts table

Nutrition Facts	
Serving Size (124g)	
Servings Per Container	
Amount Per Serving	
Calories 120	Calories from Fat 60
	% Daily Value*
Total Fat 7g	**11**%
Saturated Fat 1.5g	**8**%
Trans Fat 0g	
Cholesterol 15mg	**5**%
Sodium 220mg	**9**%
Total Carbohydrate 9g	**3**%
Dietary Fiber 1g	**4**%
Sugars 2g	
Protein 6g	

3.3.3 Strengths and limitations

Overall, the Chinese menu plan has some strengths. It was developed based on the 4-A Framework which was used in previous menu plan development by our research group and has been shown to benefit diabetic patients in Alberta[21]. How the 4-A Framework was applied in the Chinese menu plan has been described in section 3.2.1. Another strength is that the menu plan incorporated results from needs assessment among the target population – Chinese immigrants, which is essential for an effective nutrition education program or intervention[161] and the concept was reviewed by participants from the target population during its development. There are some limitations of this menu plan. Due to lack of time, only recipe titles and ingredients were translated from Chinese into English. Cooking directions and other information was shown only in Chinese. As a result, second generation immigrants who cannot read Chinese but are willing to follow a Chinese menu plan would find it difficult to use. Full translations will be added in future if needed. Another limitation is related to the diversity of Chinese cuisine. Although effort was put into covering recipes from different parts of China, limited time and resources for the menu plan meant it could not be exhaustive at this time.

4 Pilot test

4.1 Introduction

4.1.1 Impact of T2D

Diabetes is a leading cause of renal, cardiovascular and eye- and foot-related complications globally.[220] These complications are highly prevalent in people with T2D, and about 40% of them develop at least one of these complications in their lifetime, which impairs the quality of life.[221] Cardiovascular disease is the leading cause of death in diabetic patients and occurs much more often than in people without diabetes.[222] T2D accounts for 85% to 95% of all diabetes in high-income countries and may account for an even larger proportion in middle- and low-income countries.[5] According to the International Diabetes Federation (IDF),[4] the number of people with T2D is increasing in every country. In 2014, 387 million people had diabetes, and this will rise to 592 million by 2035. Diabetes caused 4.9 million deaths in 2014. In Canada, the estimated prevalence of diabetes was 6.8% in 2009, which equates to 2.4 million Canadians. That number was projected to grow to 3.7 million by 2019.[1]

In terms of cost, diabetes caused at least 612 billion US dollars in global health expenditure in 2014, which was about 11% of total expenditure on adults, according to IDF.[4] In Canada, the estimated cost related to diabetes was $12.2 billion in 2012, which was expected to rise to $16.9 billion by 2020.[222] Effective diabetes management is needed to help reduce the economic burden.

4.1.2 The increasing Chinese population with T2D in Canada

According to the most recent Census data available, the Chinese population is 1,216,570 in Canada, and 120,275 in Alberta. Chinese is the second largest ethnic minority in Canada and the

largest in Alberta.[138] According to a cohort study in Ontario,[144] diabetes incidence increased from 1.3 to 19.6 per 1000 person-years in Canadians with Chinese origins and from 7.8 to 10.0 in those with European origins between 1996 and 2005. The rapid and dramatic increase of diabetes incidence in the Chinese population in such a short period of time suggests that environmental and behavioural factors might play a more important role than genetics in the increase.[220] These environmental and behavioural factors may include availability of unhealthy snacks and fast food, the adoption of unhealthy eating habits[82,84,149] and physical inactivity[223,224].

4.1.3 Importance of cultural relevance and flexibility in nutrition therapy for T2D

Since environmental and behavioural factors may have great influence on the rapid increase of diabetes incidence in Chinese immigrants, effort should be put into modifying and improving these factors. The important role of nutrition therapy in the management of diabetes has been emphasized by the CDA clinical practice guidelines.[1] Nutrition therapy helps to reduce A1C by 1%-2%,[21,225–227] and further improvement in clinical and metabolic outcomes can be achieved when nutrition therapy is combined with other components of diabetes care.[228,229] The CDA guidelines also stress the importance of individualizing nutrition therapy to accommodate patients' age, treatment goals, preferences, needs, culture, lifestyle, economic status, readiness to change and abilities.[152] Culturally tailored diabetes education programs have been shown to improve diabetes knowledge, satisfaction and metabolic outcomes in ethnic minorities.[135,214,230]

Menu planning combined with nutrition counselling is an effective approach to nutrition therapy.[21,142] However, there lacks evidence to support rigid adherence to a single diet prescription.[152] Moreover, menu planning that incorporates some flexibility of substituting ingredients and recipes based on personal preferences has been shown to effectively improve

glycemic and weight control.[21] According to the needs assessment conducted prior to the menu plan development, flexibility in menu planning was requested by Chinese immigrants with T2D in Edmonton.

4.1.4 Purpose statement

This study is a pilot test of the menu plan in Chinese immigrants with T2D in Edmonton to provide information for modification of the menu plan and for future larger studies. An intervention mixed methods design is used to examine if and how the menu plan combined with nutrition counselling can improve Chinese immigrants' diabetes knowledge, dietary intake, and metabolic outcomes. In this study, quantitative data was collected from anthropometric and biochemical measurements and questionnaires to assess biological changes, diet quality, the degree of acculturation, food acceptability, diabetes knowledge before and after intervention. Qualitative data was collected from one-on-one interviews at the end of intervention to explore how the menu plan combined with nutrition counselling helped or did not help Chinese immigrants to manage their diet for diabetes. The quantitative and qualitative results are merged in the discussion. The qualitative data could provide context and more detailed explanations for the quantitative results obtained before and after intervention.

4.1.5 Research questions

The following research questions were examined in this study:

1) Does the Chinese menu plan combined with nutrition counselling improve Chinese immigrants' biological outcomes, diet quality, food acceptability, diabetes knowledge?

2) What are Chinese immigrants' perceived dietary changes after intervention?

3) What are the determinants of food choices among Chinese immigrants?

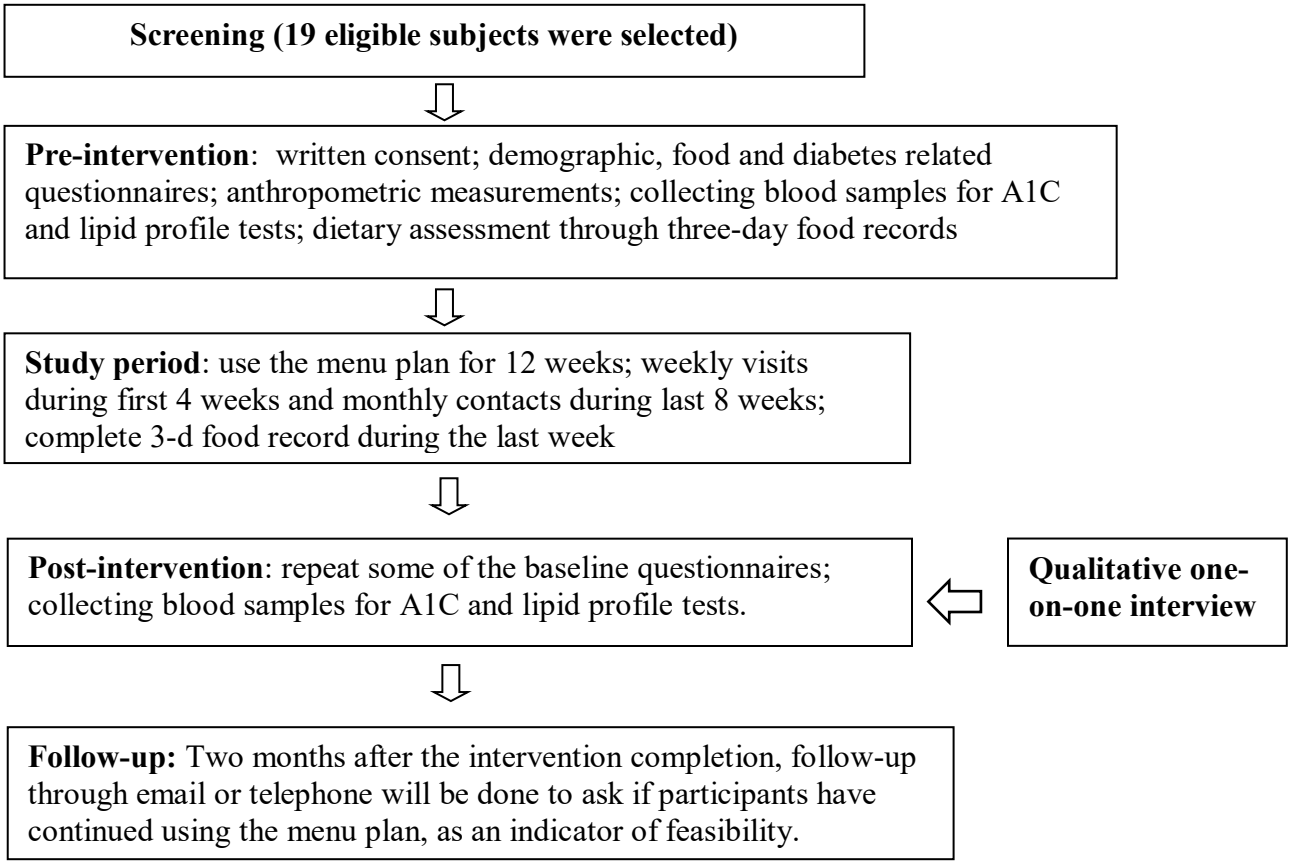
4) What are Chinese immigrants' perceived advantages and limitations of the menu plan and other nutritional resources provided in the study?

4.2 Methods

4.2.1 Overall study design

This study – *Pilot test of a Chinese menu plan for type 2 diabetes* - was approved by the University of Alberta Research Ethics Board (approval number: Pro00053775). An intervention mixed methods design was used. Qualitative interview data were added to the intervention trial at the end of the intervention in order to learn about participants' experiences of using the menu plan and other resources provided. Quantitative data and qualitative data were collected and analyzed separately, and integrated in the discussion section. A procedural diagram is shown in Figure 4-1 on the next page.

Figure 4-1 Study procedure of the pilot test



All sessions involved individual counselling. Each participant had 6 visits in total. At the pre-intervention visit (first visit), each participant gave written consent. Instructions for completing three-day food records were provided by the bilingual study coordinator, who spoke English and Mandarin Chinese, at the Clinical Research Unit at the University of Alberta.

The second visit usually happened one week after the first visit, allowing participants to complete the 3-day food records. The second visit was divided into two sessions. The first session was pre-intervention assessment, including fasting blood sample collection, anthropometric measurements and filling demographic, diabetes and food related questionnaires. The second session was individual nutritional counselling, which marked the start of the intervention. The nutrition counselling during the second visit was focused on EWCFG, the third visit was focused on how to use the menu plan and methods for portion control, the fourth visit was focused on glycemic index and food label reading, and the fifth one was a grocery store tour where the study coordinator taught participants tips for healthy food shopping. The weekly nutrition counselling sessions were all held at the University of Alberta except for the fifth meeting, which was conducted in the T&T supermarket, a Chinese grocery chain in Canada. Each nutritional counselling session lasted for one and a half hour on average. Participants were asked to use and follow the menu plan and other nutritional information that was discussed during each visit. Every participant was provided with a workbook (Appendix I) to facilitate goal setting and reviewing, which was intended to motivate participants to improve their diets. During the 8^{th} week of the intervention, the study coordinator contacted participants through email or telephone, whichever the participant preferred. The study coordinator asked participants if they had any questions about using the menu plan and other resources and discussed the questions if they had any. During the 11^{th} week, the study coordinator contacted all participants

to remind them to complete another 3-day food record during the 12th week and set a date for final assessment at the end of the 12th week or during the 13th week.

The final assessment (sixth visit) was conducted at the clinical research unit at the University of Alberta, which had similar procedure as the baseline assessment (second visit), including blood sample collection, anthropometric measurements and questionnaire completion. Qualitative one-on-one interviews were added at this time to collect more detailed information about participants' experiences in using the menu plan and following the nutritional recommendations provided during weekly individual counselling in the first month of the intervention.

Two months after completing the 12-week study, each participant was contacted by the study coordinator through email or telephone. The study coordinator asked participants if they had continued using the resources and if they had new suggestions or questions. All interviews and counselling were conducted in Mandarin Chinese except for three participants who couldn't speak Mandarin but could speak English.

4.2.2 Quantitative data collection

4.2.2.1 Participants

The study population was Chinese immigrants with T2D or prediabetes living in Edmonton. Purposive sampling was used to select the most appropriate participants for this study. Based on the Statistics Canada Census, it can be estimated that the Chinese population with diabetes in Edmonton is about 2027 (see Chapter 2). Due to the relatively small target population, the goal of sample selection was to recruit 25 participants, with the same individuals providing both quantitative and qualitative data. Ideally, the sample size for qualitative research should be based

on data saturation. However, as indicated in Chapter 2, determining sample size based on saturation is not straightforward.[165] Hence, the sample size of 25 is acceptable for the basic interpretive qualitative research in this study. In addition, based on the A1C result from the pilot study of the PPEP, that is, a reduction of 1% and SD of 0.86%, to achieve a power of 0.8 with alpha of 0.05, only 11 participants are needed. Thus the target sample size of 25 will fulfill the quantitative power requirements.

The inclusion criteria were: Chinese ethnicity, 35 years of age or older, self-reported being diagnosed with T2D or prediabetes, able to read and write English or Chinese. The exclusion criteria were gastrointestinal diseases and renal diseases that would preclude an individual from following a diet recommended by the CDA guidelines.

Recruitment methods included posters in hospitals, pharmacies, clinics, Chinese grocery stores, Chinese community centres, direct contact with physicians seeing Chinese patients and advertisement in Chinese newspapers in Edmonton, Alberta. Prospective participants who contacted the study coordinator were screened over the telephone to determine if they met the inclusion criteria. Those meeting the criteria were invited to a meeting at the University of Alberta as described above (Section 4.2.1), where written informed consent was obtained.

4.2.2.2 A1C and lipid profile

A1C and lipid profile were measured pre- and post-intervention. A1C was measured with a finger prick blood sample using an autoanalyser (DCA 2000®+, Siemens Diagnostics). Quality control procedures were performed routinely, according to the manufacturer's instructions to ensure proper functioning of the equipment. The concentrations of serum total cholesterol (TC), high-density lipoprotein cholesterol (HDLC) and triglycerides (TG) were tested using enzymatic

colorimetric assays. Fasting blood samples (≥9 hours) were collected by a trained nurse or technician at the Clinical Research Unit at the University of Alberta. The bilingual study coordinator was present at the sample collection to act as a translator for participants who could not speak English. Immediately after sample collection, samples were kept at room temperature for 10-15 minutes, and then centrifuged at the speed of 3500 rpm for 10 minutes. Serum was then collected and stored at -80°C until assays were performed. Assays were performed in one batch using reagent kits from a single lot (Wako Chemicals USA, Inc). Low-density lipoprotein cholesterol (LDLC) concentrations were calculated using the Friedewald Formula[231] (LDLC= TC - HDLC- TG/5). Cholesterol ratio was calculated as TC divided by HDLC.

4.2.2.3 Anthropometric and blood pressure measurements

Body weight, height, WC and BP were measured pre-intervention and post-intervention in accordance with the recommended procedures in the WHO STEPS Surveillance Manual[166] with minor adjustment. Detailed procedures for the anthropometric measurements are described in Chapter 2, Section 2.2.2.3. BP measurements also followed the WHO manual. Before taking the measurements, the participant was asked to sit quietly and rest for 15 minutes with his legs uncrossed. Three BP measurements were taken on a digital automatic blood pressure monitor (UA-767CN; LifeSource, Japan), with three minutes in between every two consecutive measurements. The participant was informed on the readings only after the whole process is completed. The mean of the last two readings was calculated.

4.2.2.4 Questionnaires

The questionnaires (Appendices A-F) used in the dietary needs assessment study (chapter 2) were also used in this study. These included demographic questionnaire, General health and

diabetes treatment questionnaire, Suinn-Lew Asian Self-identity Acculturation Scale[171], food acceptability questionnaire, perceived dietary adherence questionnaire[172], Godin Leisure-Time Exercise Questionnaire[173]. Detailed description of these questionnaires can be found in section 2.2.2.4. In addition, the diabetes knowledge test (Appendix J) was used. The diabetes knowledge test was used to measure and compare participants' diabetes knowledge before and after intervention. The test was adapted from Michigan Diabetes Research and Training Center's diabetes knowledge test[232], a validated tool for diabetes knowledge assessment which includes 23 multi-choice items that are related to various aspects of diabetes and diabetes care such as diet, glucose monitoring, and diabetic complications. Because our study was mainly focused on nutrition, seven items were selected as the diabetes knowledge test for this study, which were mostly related to nutrition. Each item has one correct answer. The highest possible score for the test was 7, which meant the participant answered all 7 items correctly. At last, the adherence to the menu plan and other recommendations was assessed using a single question asking participants the percentage of time during the 12-weeks when they followed the menu plan and other resources provided.

As described in Chapter 2, all questionnaires were available in English and traditional Chinese. The original English questionnaires were translated into Chinese by the study coordinator, which were then translated back to English by another bilingual researcher. The translated English questionnaires were compared to the original English version to ensure accuracy of the translation. Any discrepancies were modified.

4.2.2.5 Three-day food record

Three-day food records were collected at baseline and final assessment to compare diet quality before and after intervention. The same procedures used in the pilot study of the PPEP[47] were followed with cultural adaptions. Instructions for how to record food intake were provided at a participant's first visit. Samples of recordings were included in the 3-day food record sheets. Participants were asked to record two working days and one non-working day unless they were not working or retired. When participants brought back the food records, the study coordinator reviewed the food records with participants and asked participants for any missing information, such as units for food, missed food and drinks and other details.

4.2.3 Quantitative data analysis

Three-day food records were entered into the *esha* Food Processor Diet Analysis software version 10.9.0.0 (Salem, USA) for the analysis of calories and nutrients. The same procedure was followed as in Chapter 2, Section 2.2.3. The first and second priorities were given to Health Canada and USDA when choosing databases from the Food Processor.

Diet quality was assessed using Healthy Eating Index (HEI), which is the same tool used in the needs assessment study (Chapter 2, Section 2.2.3). The HEI scoring criteria were adapted from the American HEI 2005 scoring criteria, and reflected the recommendations of EWCFG, the DRIs and the CDA-CPG.[177] Detailed description of the scoring criteria can be found in Chapter 2, Section 2.2.3.

GraphPad Prism version 5.01 software (San Diego, USA) was used for descriptive analyses, paired t-test and Wilcoxon matched pairs test. D'Agostino and Pearson Omnibus normality test was used to test the data for normality. Wilcoxon matched pairs test was used for non-normal

data. A p-value of < 0.05 was considered statistically significant and <0.10 was noted as a trend, given the small number of participants.

4.2.4 Qualitative data collection

A one-on-one semi-structured interview was conducted with each participant in English or Chinese depending on the participant's preference. All interviews were recorded using a digital voice recorder. Each interview lasted about 40 minutes on average, and included three parts, namely, introduction, questions, and summary. The introduction started with a brief explanation of the objective of the study and interview. The interview protocol can be found in the Appendix L. The major questions were as follows: *What is your general impression of this program? What did you learn through this program? What changes has the intervention brought about to your dietary habits? What factors do you consider when you buy, cook, and eat food? How have these factors changed comparing to before you participated in the study? To what extent have you followed the resources we provided? What obstacles have you had to using the resources we provided including the menu plan? How would you modify the menu plan or the program to make them more helpful to you?* The interviews usually started with general questions followed by more specific and probing questions. The actual questions asked and the sequence of questions might be different among participants, depending on the participant's answer to each question. At the end, the interviewer summarized the interview with the participant and confirmed main points the participant had conveyed and asked the participant to add anything missed or correct the researcher if there was any misinterpretation.

4.2.5 Qualitative data analysis

The same procedure for qualitative data analysis described in Chapter 2 (Section 2.2.5) was used in this study. Interviews were transcribed verbatim by the bilingual interviewer. Coding was conducted manually in Microsoft Word. Codes in Chinese were then translated into English. Codes from all transcriptions were then categorized and themes emerged.

4.3 Results

4.3.1 Quantitative results

4.3.1.1 Demographic characteristics

Of 25 respondents screened, there were 19 participants who initially enrolled in this study. Seventeen participants completed the 12-week study and post-intervention assessment, including three-day food records and interview. The other two participants attended all education sessions but missed the post-intervention assessment due to travel.

Table 4-1 summarizes the demographic characteristics of the 17 participants who completed the study. The mean age of participants was 66 years. The age at immigration ranged from 15 to 74. The length of stay in North America ranged from 2 to 56 years. The average household annual income was $57470, and the average annual income per capita was $21794. The duration of diabetes ranged from 0.5 to 31 years with an average of 11 years. The mean acculturation score collected through the Suinn-Lew Asian Self Identity Acculturation Scale was 1.91. Participants' education levels ranged from "Less than high school" to "Above University", and "High school" was the most common education level, followed by "Above University". The majority of the participants were retired; others were self-employed or earning salaries or wages. About 70% of

participants were born in mainland China, and others were born in Hong Kong, Taiwan or Southeast Asia.

Table 4-1 Participants' demographic characteristics

Characteristics (n=17)		**Mean ± SD or %**
Age (year)		66 ± 8 (51-76)
Age at immigration (year)		45 ± 19 (15 - 74)
Years in North America		21 ± 19 (2 - 56)
Household annual income (C$)		57470 ± 40045 (20999 - 120000)
Household annual income per capita (C$)		21794 ± 15131
Duration of diabetes (year)		11 ± 8 (0.5 - 31)
Acculturation score		1.91 ± 0.43 (1.43 - 2.67)
Education completed	Less than high school	17.6%
	High school	29.4%
	College	11.8%
	University	17.6%
	Above University	23.5%
Employment	Retired	82.4%
	Wages and salaries	11.8%
	Self-employed	5.9%
Place of birth	Mainland China	70.6%
	Taiwan	5.9%
	Hong Kong	17.6%
	Southeast Asia	5.9%

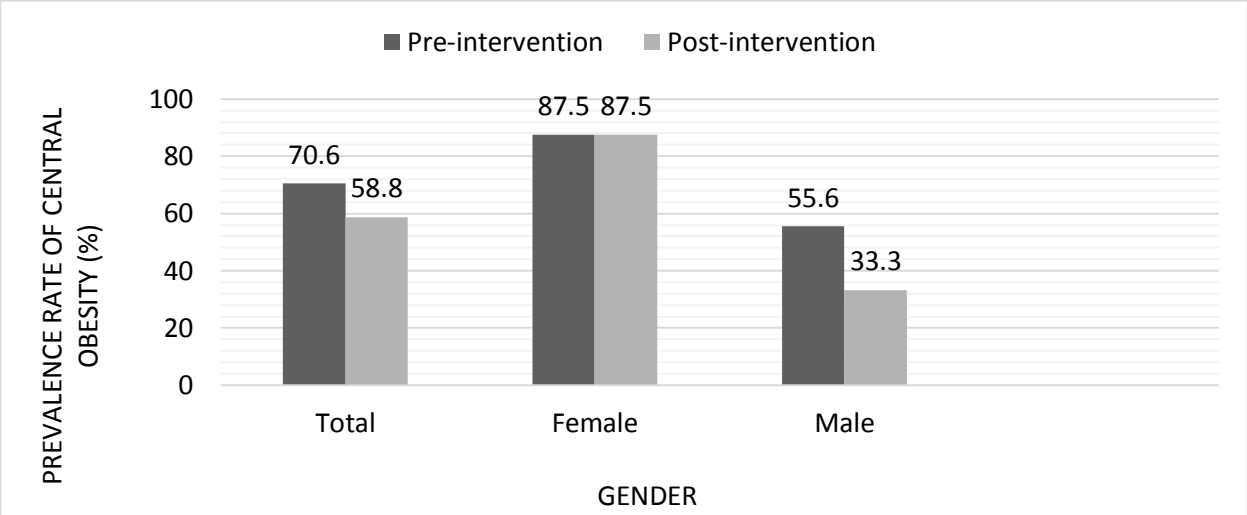
4.3.1.2 Changes in biological characteristics

Biological measurements at pre- and post-intervention are shown in Table 4-2 on the next page. Compared to pre-intervention, waist circumference (p=0.004), total cholesterol (p=0.007) and LDLC (p=0.007) were significantly decreased after the 12-week intervention. There was a trend for a decrease in body weight (p=0.07) and BMI (p=0.09). No significant changes were observed in A1C, TG, HDLC, cholesterol ratio (TC divided by HDLC), or blood pressure (BP). The mean A1C was 7.8% and 7.6% and the mean BMI was 24.3 kg/m^2 and 23.9 kg/m^2 at pre- and post-intervention, respectively. Figure 4-2 compares the prevalence rates of central obesity at pre- and post-intervention. The proportion of central obesity in all participants was 70.6% pre-intervention and 58.8% post-intervention (p=0.721), the proportion in female participants was 87.5% pre- and post-intervention, and the proportion in male participants was 55.6% pre-intervention and 33.3% post-intervention (p=0.637). Figure 4-3 shows the percentage of participants with A1C $\leq$ 7.0%, which was 52.9% at pre-intervention and 64.7% at post-intervention (p=0.728). Plot graphs for biological characteristics pre- and post-intervention are shown in Appendix O (pages 344-346).

Table 4-2 Changes in biological variables

Biological variables (n=17)	**Pre-intervention (mean ± SD)**	**Post-intervention (mean ± SD)**	**Mean of differences (mean ± SD)**	**P value**
Body weight (kg)	66.2 ± 9.3	65.2 ± 8.5	-1.0 ± 2.1	0.066
BMI (kg/m^2)	24.3 ± 2.5	23.9 ± 2.4	-0.4 ± 0.8	0.093
WC (cm)	90.9 ± 8.5	88.8 ± 7.6	-2.0 ± 2.5	0.004
A1C (%)	7.8 ± 2.4	7.6 ± 2.3	-0.13 ± 0.49	0.425
TG (mg/dl)	174.0 ± 97.9	172.8 ± 136.8	-1.2 ± 88.8	0.897
TC (mg/dl)	216.6 ± 51.7	195.2 ± 52.6	-21.4 ± 28.2	0.007
HDLC (mg/dl)	74.8 ± 20.9	72.0 ± 18.0	-2.8 ± 20.5	0.583
LDLC (mg/dl)	106.9 ± 50.8	88.6 ± 54.0	-18.4 ± 24.6	0.007
Cholesterol ratio (TC/HDLC)	3.2 ± 1.5	2.8 ± 0.8	-0.4 ± 1.4	0.276
Systolic BP (mmHg)	120 ± 20	117 ± 16	-3 ± 12	0.375
Diastolic BP (mmHg)	69 ± 12	69 ± 11	0 ± 7	0.945
P value is based on two-tailed, paired t-test for all variables except for A1C, TG and Cholesterol ratio, which were based on two-tailed, Wilcoxon matched pairs test. P value < 0.05 is considered statistically significant; P value < 0.1 is considered a trend. Abbreviations: BMI: body mass index; WC: waist circumference; TG: triglycerides; HDLC: high-density lipoprotein cholesterol; LDLC: low-density lipoprotein cholesterol; BP: blood pressure				

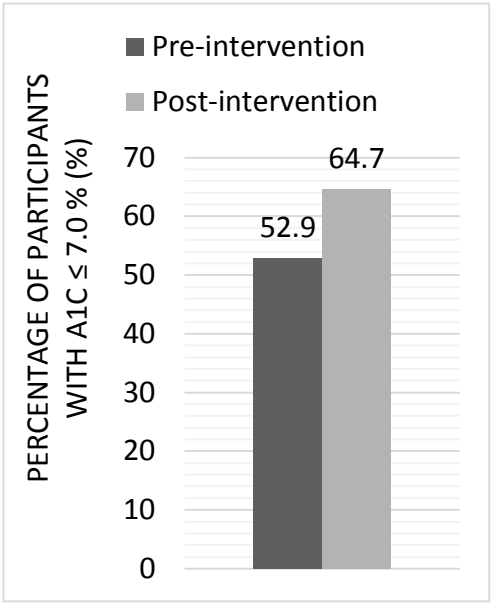
Figure 4-2 Changes in prevalence rate of central obesity by gender



P values from Fisher's exact test:

Total: p=0.721; Female: p=1.000; Male: p=0.637

Figure 4-3 Changes in proportion of participants with A1C ≤ 7%



The p value from Fisher's exact test was 0.728.

4.3.1.3 Changes in daily caloric and nutrient intake

Table 4-3 summarizes participants' daily calories and nutrients intake at pre- and post-intervention. The CDA-CPG recommendations for each nutrient are also shown in the table. There was a trend ($p=0.06$) for a decrease in total daily calories at post-intervention. The distribution range of macronutrients showed no significant differences over the study. The daily intake of saturated fats, added oils, dietary fibre, added sucrose, sodium, calcium and cholesterol also kept stable. Plot graphs for daily caloric and nutrient intake pre- and post-intervention are shown in Appendix P (pages 347-349).

Table 4-3 Changes in daily caloric and nutrient intake

Variables	Recommendations from CDA-CPG and other guidelines	Pre-intervention (mean ±SD)	Post-intervention (mean ±SD)	Mean of differences (mean ±SD)	P
TDC (kcal)		1950±720	1652±497	-299±603	0.058
Carbohydrate (% of TDC)	45-60	49.3±11.0	49.7±10.2	0.4±10.3	0.776
Protein (% of TDC)	15-20	20.2±4.8	21.9±4.3	1.7±5.3	0.204
Fat (% of TDC)	20-35	29.9±8.3	30.4±7.6	0.6±6.8	0.735
Saturated fat (% of TDC)	< 7	7.3±2.4	7.5± 2.0	0.1±1.9	0.772
Added oils (ml)	30-45[1]	10.0 ±6.6	8.5±5.4	-1.4±5.9	0.315
Dietary fibre (g)	25-50	25.3±11.7	26.15±13.8	0.8±13.9	0.805
Added sucrose (% of TDC)	< 10	1.2±1.3	1.4±1.6	0.2±1.0	0.377
Sodium (mg)	< 2300[2]	2293±1096	2017±818	-275±981	0.264
Calcium (mg)	RDA=1000 mg for males 51-70 years old; RDA=1200mg for males > 70 years old and females >51 years old; UL = 2000mg for females and males > 51 years old[2]	719 ± 364	843 ± 336	124 ± 341	0.152
Cholesterol (mg)	< 200[3]	331 ± 170	342 ± 187	11 ± 130	0.731

[1]Recommendation from Canada's Food Guide, [2]Dietary Reference Intakes Canada. [3] American Diabetes Association recommendation. P value is based on two-tailed, paired t-test for all variables except for Carbohydrate, which was based on two-tailed, Wilcoxon matched pairs test. P value < 0.05 is considered statistically significant; P value < 0.1 is considered a trend.
Abbreviations: TDC: Total daily calories. CDA-CPG: Canadian Diabetes Association Clinical Practice Guidelines.

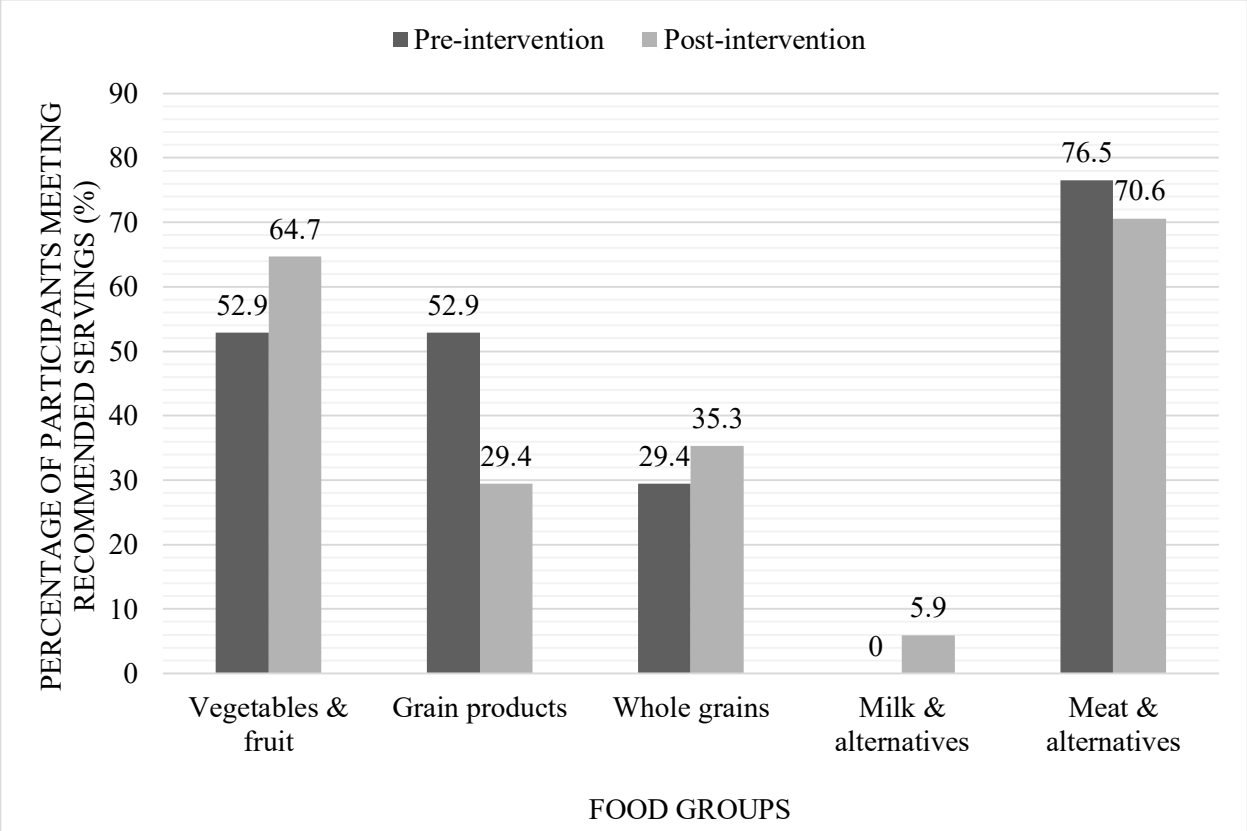
4.3.1.4 Changes in the consumption of foods from different food groups

Table 4-4 summarizes the servings of food from different food groups consumed by participants at pre- and post-intervention. There was a significant decrease in servings of grain products ($p=0.024$) at post-intervention, while whole grains remained the same. No significant change was observed in the servings of vegetables and fruit. There was a trend for an increase in the servings of milk and alternatives ($p=0.083$) and a decrease in the servings of meat and alternatives ($p=0.092$) at post-intervention compared with pre-intervention. As shown in Figure 4-4, the percentage of participants consuming recommended servings of food from different food groups did not change significantly. Plot graphs for servings of food from different food groups pre- and post-intervention are shown in Appendix Q (page 350-351).

Table 4-4 Changes in servings of food from different food groups

Food groups	Pre-intervention (mean ± SD)	Post-intervention (mean ± SD)	Mean of differences (mean ± SD)	P value
Vegetables & fruit (servings)	7.5 ± 4.5	9.3 ± 4.3	1.8 ± 4.5	0.107
Grain products (servings)	6.5 ± 2.8	5.4 ± 2.7	-1.1 ± 1.8	0.024
Whole grains (servings)	2.3 ± 2.1	2.4 ± 1.7	0.0 ± 1.9	0.949
Milk & alternatives (servings)	0.9 ± 0.9	1.3 ± 0.8	0.3 ± 0.8	0.083
Meat & alternatives (servings)	4.3 ± 2.6	3.5 ± 1.8	-1.7 ± 0.1	0.092
P value is based on two-tailed, paired t-test for all variables except for Vegetables & fruit, which was based on two-tailed, Wilcoxon matched pairs test. P value < 0.05 is considered statistically significant; P value < 0.1 is considered a trend.				

Figure 4-4 Changes in the proportion of participants meeting the servings of food recommended by EWCFG



P values from Fisher's exact test:

Vegetables & fruit: p=0.728; Grain products: p=0.296; Whole grains: p=1.000; Milk & alternatives: p=1.000; Meat & alternatives: p=1.000

4.3.1.5 Changes in diet quality and diabetes care related variables

Table 4-5 summarizes the changes in diet quality and other variables that are related to diabetes self-care. Diet quality was evaluated using HEI. The score for specific components of HEI were also shown in the table. Significant improvement was observed in total HEI score ($p=0.010$), total vegetables and fruit score ($p=0.027$), as well as dark green and orange vegetables score ($p=0.008$). The perceived dietary adherence score was also significantly increased ($p<0.0001$). However, there was a significant decrease in total grains score ($p=0.034$), indicating decreased consumption of grain products that were below the recommended adequate intake of grains. Meanwhile, there was a trend for improvement in dietary adequacy score ($p=0.056$) and milk and alternatives score ($p=0.096$). No significant changes were observed in dietary moderation score or its components, including saturated fats, sodium and "other foods" score. Physical activity was assessed using the Godin Leisure-Time Exercise Questionnaire. No significant difference was found between pre- and post-intervention physical activity scores. Food acceptability ($p=0.039$) and diabetes knowledge ($p=0.009$) were both significantly improved. Plot graphs for diet quality and other diabetes care related results at pre- and post-intervention are shown in Appendix R (pages 352-356).

Table 4-5 Changes in diet quality and other diabetes care related variables

Variables		**Pre-intervention (mean ±SD)**	**Post-intervention (mean ±SD)**	**Mean of differences (mean ±SD)**	**P value**
HEI score		72.7 ± 8.3	78.0 ± 5.4	5.3 ± 7.5	0.010
Dietary adequacy score		36.9 ± 9.4	40.7 ± 5.8	3.8 ± 7.5	0.056
Adequacy components	Total vegetables & fruit score	7.8 ± 2.6	9.1 ± 1.6	1.3 ± 2.2	0.027
	Whole fruit score	3.7 ± 1.7	4.1 ± 1.4	0.4 ± 2.2	0.421
	Dark green & orange vegetables score	3.9 ± 1.6	5.0 ± 0.1	1.0 ± 1.6	0.008
	Total grains score	4.2 ± 1.1	3.7 ± 1.4	-0.5 ± 0.9	0.034
	Whole grains score	2.8 ± 2.0	3.1 ± 1.9	0.3 ± 2.0	0.525
	Milk & alternatives score	3.2 ± 2.9	4.3 ± 2.5	1.1 ± 2.6	0.096
	Meat & alternatives score	9.0 ± 2.4	9.3 ± 1.6	0.3 ± 1.7	0.688
	Unsaturated fat score	2.4 ± 1.3	2.2 ± 1.6	-0.2 ± 1.5	0.587
Dietary moderation score		35.7 ± 4.0	37.2 ± 2.4	1.6 ± 3.9	0.122
Moderation components	Saturated fats score	9.1 ± 1.2	9.2 ± 0.9	0.2 ± 1.1	0.568
	Sodium score	7.3 ± 3.0	8.0 ± 1.8	0.8 ± 2.7	0.269
	“Other foods” score	19.4 ± 1.7	20.0 ±0.1	0.6 ± 1.7	0.250
Physical activity score		24.7 ± 18.1	21.6 ± 14.3	-3.1 ± 16.4	0.452
Perceived dietary adherence score		41 ± 11	51 ± 8	10 ± 7	<0.0001
Food acceptability score		19 ± 3	21 ± 3	1 ± 2	0.039
Diabetes knowledge score		4.9 ± 1.6	5.8 ± 1.2	0.9 ± 1.2	0.009

A higher score for HEI or its components indicates higher diet quality. More specifically, a higher score for an adequacy component indicates higher intake of that component, while a higher score for a moderation component indicates lower intake of that component.
P value is based on two-tailed, paired t-test for all variables except for Dark green & orange vegetables score, Meat & alternatives score and “Other foods” score, which were based on two-tailed, Wilcoxon matched pairs test. P value < 0.05 is considered statistically significant; P value < 0.1 is considered a trend.
Abbreviations: HEI: healthy eating index.

4.3.2 Qualitative results

4.3.2.1 Nutritional knowledge gained

According to the qualitative data collected from one-on-one interviews, all participants reported that they learned some useful nutritional knowledge during this study, which included servings of different food groups recommended by EWCFG, how much is one serving, glycemic index (GI), the concept of "meat alternatives", and how to read food labels. For example, participant [PC03] said, "*I learned that following the Canada's Food Guide is beneficial to health and blood sugar control…… the Canada's Food Guide recommend 7 servings of vegetables and fruit, 3 servings of milk and 2 servings of meat per day. I basically follow this*." About meat alternatives, participant [PC06] mentioned, "*I used to eat a lot of meat, but now I learned that I don't need that much meat. Instead, I can have some meat alternatives, such as beans and tofu. I didn't know this before.*" GI was also new to many participants. Participant [PC15] said, "*I've been trying to eat less food that has a high GI. I didn't know those foods had a high GI before I participated in this study. I just ate whatever I felt like and didn't know the appropriate amount of food that I should eat every day. Now I know I should drink more milk, and have more dark green and orange vegetables.*" How to read food labels and nutrition facts table was another useful piece of information learned by many participants. Participant [PC04] said, "*Since I participated in this study, I've learned how to read food labels. Now every time I go to shopping for food, I read the labels so that I know the nutrient content of the food. I didn't know about food labels before*." Participant [PC07] said, "*I've learned how to read a nutrition facts table. I didn't pay attention to the serving size on a label before, but now I know that the amount of nutrients shown in a table are for the serving size specified*."

4.3.2.2 Dietary changes

In addition to the dietary assessment through PDAQ and 3-day food records, participants' perceived dietary changes were also talked about in interviews. Participants reported various aspects of changes in their diet and diet-related behaviours. A general change was making healthier food choices. Participant [PC01] said, "*Now I know which food group the food belongs to, and what food is good to diabetics and what is not……I used to have a lot of drinks other than water, but since I participated in this study, I started to drink more water……Now I eat pizza much less often than before because I don't think it's very healthy, and I eat more salads so that I can increase my vegetables intake.*" Participant [PC06] said, "*Now when I feel hungry, I won't eat ice cream. Before, I liked sweet things, but now I will think about it……I try to eat some raw celeries and cucumbers……more veggies and carrots. Because I always feel hungry, I can have that (vegetables) for snacks.*" Another dietary change made by many participants was reducing portion sizes. Participant [PC17] said, "*I used to have a big portion of meat. But now I know one serving of meat recommended by Canada's Food Guide is 75 grams, so I try to keep that in mind when I eat meat and won't eat too much. I need to control, otherwise my waist will get bigger……*" Participant [PC03] said, "*I like to eat cherries. I used to eat 40 or 50 cherries all at once, a big bowl. Now I try to control myself, and just eat 20 pieces each time*." Another common dietary change was increasing vegetables and fruit and adding dark green and orange vegetables in the diet. Participant [PC05] said, "*Now I eat more vegetables and fruit than before, and increased the variety as well. Now I eat not only grapes, but also apples, mangoes and other fruit. You asked me to write down on the workbook how many servings of different food I eat every day, and I see that I can get a higher score if I add dark green and orange vegetables to my diet. It reminds me to eat more vegetables*." Participant [PC19] said, "*I was already eating*

quite a lot of vegetables in my opinion, but now I found that was not enough (compared to the recommendations). So I'm trying to eat more vegetables and fruit." Participant [PC17] said, "*Now I add dark green vegetables and orange fruit. I didn't think about this before*." Reducing added sugar, fat and salt was another dietary change. Participant [PC12] said, "*I used to eat fried doughnut, but now I've gradually reduced that.*" Participant [PC04] said, "*Now when I eat at a restaurant, I feel some food is too sweet, and I would stop eating it. I don't like sweet food that much anymore……*" Participant [PC14] said, "*I've reduced oil and soy sauce when I cook. I used to add a lot of oil and sugar when I cook fish, and it tasted good. Now I use less oil*." Another dietary change was substituting food with lower GI for food with high GI. One common example was having more brown rice instead of white rice. Participant [PC05] said, "*I try to buy food with lower GI. We've started to eat brown rice. My wife and I used to eat a lot of white rice, but now we eat more brown rice……Because rice is our staple food, I think that being able to change this habit is a great improvement for me*." Participant [14] said, "*My staple food now is half brown rice and half white rice, and we eat the long-grain rice. We used to eat white rice and white steamed bun only, but now my whole family start to eat brown rice and whole wheat bun……Since I participated in this study, my wife and daughter also started to eat brown rice with me.*" Another dietary change was increasing meat alternatives and reducing meat intake. Participant [PC12] said, "*I replace some meat with soy products, especially tofu. I heard a little bit about this before, but the concept of meat alternatives was not very clear to me. Now I know it*." Participant [PC11] said, "*I've been eating less meat than before because I learned that peanut butter, eggs and beans are meat alternatives. So I have reduced meat in my diet*." Reading food labels was one of the changes related to food purchasing. Participant [PC11] said, "*When I go grocery shopping, I look at the nutrition information. I didn't pay attention to it*

before. But now I read the nutrition facts tables." Participant [PC18] said, "……*I pay more attention to the food labels now. Before I did look at the food labels, but I would just glance at it, 'OK, OK, not much sugar'. But now I will also look at other items, like protein, oil content, and so on. So I will pay a little bit more attention to the food label as compared to before*." Another dietary change was about snacks. Some participants did not have the habit of eating snacks before and some used to eat unhealthy snacks. Since participating in this study, they reported adding healthy snacks and reducing unhealthy snacks in their diet. Participant [PC11] said, "*I used to eat cookies and sweets as snacks, but now I have milk, fruit and nuts instead*." Participant [PC19] said, "*I've been eating more vegetables and fruit than before. For example, I like to eat a fruit as a snack so that I can increase my fruit intake*." Another dietary change was increasing milk intake. Participant [PC14] said, "*I'm not used to drinking milk because I never drank milk when I was little. But theoretically milk is good to your bone, so I try to improve this. Every morning I drink 250 ml. Sometimes if I don't feel like it in the morning, I would drink it in the evening.*"

4.3.2.3 Changes in the factors influencing food choices

All participants considered nutrition and health as important determinants to their food choices after participating in the study, whereas many participants did not even think about nutrition when they were buying food before. Food price, taste and the needs of other family members used to be the main factors influencing decisions about food choice. Participant [PC03] said, "*I didn't think much about the nutritional aspect of food before when I went grocery shopping, I only considered the price and what my family wanted to eat. But now when I buy food, I start to think about the balance of different food and buy more dark green vegetables like spinach and lettuce, which I usually wouldn't buy before*." Participant [PC14] said, "……*Now I usually ask*

them (his daughter and son-in-law) to buy some vegetables and fruit……mainly considering health." In addition to nutrition, the colour and taste of food was still important factors that influenced food choices. Participant [PC03] said, "*Besides nutrition, you also need to consider the colour, aroma and taste of food. For example, if I cooked a tomato and egg stir-fry, I would also cook a bok choy, which is green. This way, I have all the different colours, red, green, white and yellow……*"

4.3.2.4 Difficulties in adhering to the menu plan and other nutritional resources

Perceived barriers to following the menu plan and other resources included eating out, time constraints, inconvenience related to buying and measuring food, personal dietary habits and food price. About eating out, participant [PC17] said, "……*It's hard to follow the recommendations when I eat out. Sometimes we eat western fast food. The kids like to eat western fast food like MacDonald. Sometimes they like to eat hotdogs and pizza."* Participant [PC03] talked about the time constraints, "*Sometimes I don't have that much time. For example, it recommends we eat fish at least twice a week. But sometimes I can only cook once. I need to go to school and spend time with family, so I don't have that much time to cook complicated dishes.*" Participant [PC06] mentioned the inconvenience about shopping for vegetables, "*If you buy veggie, you save at home for about 3 days, right? But I don't go shopping often..... Because I don't always drive. My husband drive. I have to ask him to go with me*." Participant [PC12] talked about personal habits as an obstacle, "*I read the menu plan, it is good. I tried to use some recipes when I had time. But if you want to change your habits that has been there with you for decades, it's not easy to do within three months. We will continue trying to follow these resources after the study is done.*" Another barrier was related to measuring food. Participant [PC04] said, "*For some mixed dishes, it's difficult to measure…… I always need to measure the*

food, which is kind of inconvenient."

4.3.2.5 Advantages of the menu plan

During interviews, participants talked about their impression of the menu plan. All participants liked this intervention program and thought it was helpful, and most participants liked the menu plan. The advantages of the menu plan reported by participants included flexibility, cultural relevance, and ease of use. Cultural relevance included Chinese language, Chinese recipes and dietary patterns. Participant [PC03] said, "……*It's not difficult, because you don't have to cook exactly like the menu plan……For example, if it says bok choy, you can substitute another vegetable*." Participant [PC05] said, "*My diet is mostly Chinese, and I don't eat western food very often. So this is a very good program. Many Chinese foods are very oily and I remind my friends and family to eat less oily food when we eat out*." Participant [PC17] mentioned the simplicity of the menu plan, "*I think the menu plan is very good, and perfect for me, because I like to cook simple dishes. The recipes on the menu plan are very easy to adhere to*." Participant [PC18] said, "*The menu plan is not that much different from my own cooking. Yeah, very, I mean, simple, very generic, and everyone can follow*."

4.3.2.6 Suggestions for improvements and future directions

At the end of interviews, participants were asked to give suggestions for improvement of the intervention program if they would like to. A few participants gave some suggestions. These included 1) find a Cantonese-speaking coordinator so that those who can only speak Cantonese can also participate in the intervention; 2) add more recipes for noodles and dessert in the menu plan; 3) include cooking demonstrations in the education sessions; 4) create videos of the educational resources so that it's easier to understand and remember; 5) add group sessions so

that participants can share experience with each other; 6) incorporate exercise into the intervention program.

4.3.2.7 Adherence rate

The dropout rate was 10.5% (2 participants). These two participants attended all four weekly education sessions but missed the post-intervention assessment. The education sessions had high attendance. All participants attended all sessions except for two participants who missed one session. The rate of adherence to the menu plan and other recommendations provided in the study was assessed through self-report. The mean adherence rate during the 12-week of study period was 74.4±21.6 %. Two months after participants completed the 12-week study, the study coordinator contacted them through phone calls or emails as they preferred. The purpose of the follow-up was to learn about whether participants were continuing following the menu plan and other nutritional resources after they finished the study. Five participants couldn't be reached for the follow-up due to phone service cancellation, being out of the country and other unknown reasons. Among the 12 participants who responded, 92% of them continued using the menu plan and other resources, and reported that they maintained the dietary changes made during the study, such as substituting whole grains for refined grains, increasing vegetables and milk intake, and portion control. The reason for not continuing using the menu plan in the 8% of the participants (1 participant) was because of time constraints, however, this participant continued using the plate method to control proportions of food and ensured servings of vegetables recommended by EWCFG.

4.4 Discussion

The purpose of this study was to pilot-test the feasibility and efficacy of the Chinese menu plan combined with nutrition counselling in improving Chinese immigrants' diet quality, diabetes knowledge and biological outcomes related to diabetes. The following paragraphs discuss the changes in these aspects among participants with comparisons to our own recent studies and the literature, and the advantages and limitations of the intervention program.

4.4.1 Improvement in biological outcomes

Central obesity is one of the markers for metabolic syndrome.[1] In our study, the significantly lowered WC post-intervention indicated a reduction of abdominal fat, which could potentially improve insulin sensitivity and glycemic control.[169] The reduction in WC was consistent with previous studies of PPEP in the general population of Canadians in the PANDA project.[20,21] Previous lifestyle intervention studies in Chinese populations have shown inconsistent results about waist circumference and visceral fat. Xu et al.[127] found that individuals in the intervention group had significantly greater reductions in WC and body fat mass compared with those in the control group, although no significant difference in changes of visceral fat area was observed. A study in Chinese women with GDM showed that women who received intensive treatment including lifestyle modifications had significant smaller WC at follow-up (1-3 years after delivery) compared with those in the control group.[130]

In our study, the proportion of participants with A1C $\leq$ 7.0% was 52.9% pre-intervention and 62.7% post-intervention. Statistical analysis showed no significant improvement in A1C, which might be due to relatively low A1C among participants at pre-intervention and the relatively short duration of intervention that might not have allowed the A1C changes to occur. A previous

pilot test of the PPEP conducted by our research group showed significant reduction in A1C in the general Canadian population.[21] This previous pilot test had similar sample size and starting A1C levels as the current study, suggesting that there could be other reasons for the different findings about A1C between the two studies. The Diabetes Prevention Program in the US found significant differences in A1C levels in individuals with IGT among different racial and ethnic groups: 5.78% for whites, 5.93% for Hispanics, and 6.00% for Asians.[233] The Asian population with IGT in the US had a higher A1C than whites. However, another study conducted in China suggested the use of a lower A1C cut point (6.3%) than the international recommendation of 6.5% for diabetes diagnosis.[234] Differences in the distribution of hyperglycemic categories also exist. Previous studies found that the proportions of patients in Europe[235] with isolated IFG, isolated IGT, and IFG with IGT were 40%, 31%, and 29%, respectively; while the proportions were 19%, 44%, and 37% in Asian populations.[236] All of these findings indicate the possibility of ethnic effects on glycemic regulation including A1C levels. A1C alone may not be a good choice of parameter for comparing glycemic control across ethnic minority groups. Employing a different measurement such as glucose tolerance test or FBG test might help to detect the changes in glycemic control in Chinese populations. For example, a previous lifestyle intervention study conducted in China[116] found significant improvement in FBG post-intervention among Chinese patients with T2D, although there were also studies[127,135,137] that found statistically significant A1C reductions in Chinese populations receiving lifestyle interventions with various lengths of duration.

Other biological outcomes measured in this study included lipid profile and blood pressure. It is known that people with diabetes have much higher risk for CVD than people without diabetes.[1] Lowered LDLC can reduce the risk of CVD.[237] In our study, TC ($p=0.007$) and LDLC

(p=0.007) were both significantly reduced post-intervention. No significant changes were observed in TG, HDLC, TC/HDLC ratio and blood pressure. In a previous pilot study with the PPEP[21], HDLC was significantly increased post-intervention while no changes were observed in TC and LDLC, and a trend for decreased TG was found. In a larger study of the PPEP[20], improvement was observed in TC, LDLC, HDLC and diastolic BP at post-intervention and the improvement was sustained at 6 month follow-up except for BP. Participants in the current study had relatively well-controlled blood pressure to begin with and no participants changed their antihypertensive medications during the study except for one participant who reduced the dose as her doctor prescribed. However, the previous larger study of PPEP in Albertans with similar baseline BP levels found significant improvement in BP. The different outcomes about BP might be partially explained by the different sodium intake. The study of PPEP found significant reduction in sodium intake[20,21], which was not observed in this study although reducing sodium intake was a focus of this study. Sauces and seasonings with reduced sodium were used in the menu plan and sodium content was listed beside every recipe. Alternative strategies may be needed to reduce sodium intake in Chinese immigrants. In addition, ethnicity might have influence on biological outcomes. The UK Prospective Diabetes Study[238] demonstrated significant differences among ethnicities in terms of BP and lipid profile outcomes during 9 years of follow-up. The increase in systolic BP and the decrease in TG levels at 9 years were both greater in Afro-Caribbean patients than in whites and Asian Indian patients after adjusting for antihypertensive therapy. However, this study found no difference in A1C among ethnicities. A study conducted with healthy individuals in Malaysia[239] found that the TC/HDLC ratio and the LDLC/HDLC ratio were both significantly higher in Indians than in Chinese suggesting ethnic effects on blood lipid regulation. A previous diabetes prevention study[127]

conducted in China demonstrated similar pattern of changes in lipid profile to our study. One limitation of our study was that the antidiabetic medication information could not be accurately documented, because some participants did not follow their prescription but took medications occasionally when they felt necessary. But overall, participants did not change their medications during the study as they self-reported, except for a few who reduced the doses or frequency of their antidiabetic medications by themselves. A few participants had very low LDLC levels especially post-intervention, which might be related to the use of statins, a type of cholesterol-lowering medication. The lipid profile results suggested that these participants might need a medication reduction. However, because LDLC concentrations were estimated using the Friedewald Formula instead of measured directly, there might be under-estimation of LDLC.

No significant change was observed in physical activity score. Thus, the changes in biological outcomes were less likely due to physical activity rather than dietary changes, which will be discussed in the following section.

4.4.2 Improvement in diet quality and food acceptability

Grain products were reduced by 1.1 servings on average, to 5.4 (± 2.7) servings, which is below the servings recommended by EWCFG (6 servings for females > 51 years old, 7 servings for males > 51 years old).[22] This finding corresponded to the significant decrease in the total grains score calculated based on HEI scoring criteria. In spite of the unfavourable change in total grains, the overall diet quality represented by HEI was still improved significantly. Regarding HEI, previous studies with the PPEP showed either an increase or no changes.[20,21] One thing that needs to be noted is that the whole grains intake was not decreased despite the decrease in total grains. The decrease was mainly in refined grain products. The qualitative data further confirmed

the finding. Participants reported replacing some refined grains with whole grains (such as brown for white rice), which seemed to indicate an increase in whole grains. However, the 3-day food records did not reflect an increase in whole grains. A few participants mentioned that they had been eating brown rice during the study, but they just ran out of brown rice and hadn't got a chance to buy more. This might be a reason why the dietary data in the 3-day food records did not show an increase in whole grains. Adding another 3-day food record in the middle of the study could have showed a better picture of the dietary changes.

The results in this study showed no changes in dietary moderation which included sodium, saturated fats and "other foods" intake, but a trend for improvement in dietary adequacy. This could partially be explained by the relatively high moderation score at baseline. The baseline scores for the three moderation components were close to the maximum scores especially saturated fats and "other foods", thus leaving little space for improvement. The mean acculturation score of participants in our study was 1.91±0.43, indicating relative low acculturation. A previous research study in the US showed that increasing acculturation was significantly associated with increased dietary variety and adequacy and lowered dietary moderation in Chinese immigrants with low education.[240] Thus, the low acculturation might have contributed to high moderation to begin with. Previous studies of the PPEP have shown inconsistent results about dietary moderation. The previous pilot test of PPEP[21] found no significant changes in sodium and saturated fats intake, while the larger study[20] found significant reduction in sodium and saturated fats intake. The small sample sizes of the pilot studies might have impeded the detection of significant changes. Among the dietary adequacy components, the total vegetables and fruit score and the dark green and orange vegetables score were both significantly increased, and a trend for increase in milk and alternatives was observed. According

to the qualitative data collected through interviews, the increase in dark green and orange vegetables score could be a result of two factors: the first one is that participants lacked knowledge about the importance of dark green and orange vegetables before and the knowledge gained through the study helped them make better choices; the second factor is that a traditional Chinese diet does not lack dark green vegetables such as bok choy, seaweed and spinach,[241] so it might not be difficult to increase these vegetables in the diet. Plus, the menu plan included recipes using these dark green Chinese vegetables. A traditional Chinese diet is abundant in vegetables,[242] however, there were still some participants who had very low intake of vegetables at baseline. Through conversations with these participants, three reasons emerged. One of the reasons was lack of time. One participant had a busy and unstable work schedule and often had no time for a proper lunch. She usually kept packaged snacks such as cookies in her car that she could eat as lunch. Individualized advice was given to this participant, which included bringing to work vegetables such as baby carrots, cherry tomatoes and cucumbers that required little or no preparation, or to prepare cooked lunch the night before. Twelve weeks later at the post-intervention assessment, the participant had dramatically increased her vegetables intake. The second reason was due to personal dietary habits. One participant was having very few vegetables at baseline, about 2 servings per day, and sometimes she had only grain products in a meal, such as steamed bun. This participant came from a northern province in China where wheat flour-made foods are very popular and she had followed their tradition. After the baseline dietary assessment, the study coordinator informed her that her vegetables intake was far from adequate and the importance of vegetables was explained to her. At the post-intervention assessment, this participant's vegetables intake increased and met the EWCFG recommendation. The third reason for the low intake of vegetables at baseline was mentioned by a participant who

thought the vegetables here in Canada were not as tasty as those in her hometown. As a result, she consumed very few vegetables. This was challenging because it was not easy to change an individual's taste preference. However, this participant was encouraged to try different recipes and cooking methods to make the vegetables tastier. During the interview at post-intervention, the participant talked about how she had found some tasty recipes from the menu plan and from other sources which were helpful to her. Her vegetables intake increased at post-intervention, although not by a significant amount.

According to the dietary needs assessment (Chapter 2), milk and alternatives consumption in Chinese immigrants was far from adequate, and was much lower than that in the general Canadian population, which raised the concern about inadequate calcium intake. In this pilot test, a trend for increase in milk and alternatives was observed. During interviews, participants mentioned increased milk and alternatives intake, which included milk, yoghurt, cheese and soy milk. Milk is not part of a traditional Chinese diet. Just as a participant said, he was not used to drinking milk and he did not start to drink milk until recently. Lactose intolerance is highly prevalent in Chinese.[243] However, according to a study with Chinese families in the US, taste, texture, and use of additives and growth hormones had greater influence on dairy choice than lactose intolerance.[244] Our study seemed to confirm this trend. During interviews, "not used to drinking milk" was mentioned most frequently as the reason for low dairy intake while lactose intolerance was rarely mentioned. According to the 3-day food records, yoghurt was a popular choice as a milk alternative among participants, which was perceived as beneficial to health. Soy milk, another milk alternative, is common in a traditional Chinese diet.[186] However, the problem with some brands of soy milk was added sugar and not being fortified with calcium and vitamin D. Participants were encouraged to choose low-sugar or no-sugar soy milk that was fortified with

calcium. During grocery tours, it was demonstrated to participants how to look for the information on a food package and how to read food labels to help them make healthier food choices. In addition to milk and alternatives, consumption of other sources of calcium were also encouraged, such as tofu and dark green leafy vegetables. The mean calcium intake by food alone was 719 (±364) mg pre-intervention and 843 (±336) mg post-intervention. However, statistical analysis showed no significant difference in calcium intake. Only three participants reported taking calcium supplementations and there were no changes during the study.

There was a trend for decrease in total daily energy intake post-intervention, which was similar to findings from previous studies of the PPEP in the general population of Canadians in Alberta. The only negative dietary change observed was the decreased intake of grains that ended up below the servings recommended by EWCFG.[22] The reason might be the increased intake of other food groups such as vegetables and milk products. Strategies for maintaining the adequate intake of all food groups may be needed to help achieve an adequate and balanced diet.

According to the findings from the dietary needs assessment (Chapter 2), HEI, food acceptability and perceived dietary adherence are correlated with one another. In this pilot test, HEI and perceived dietary adherence were both significantly improved after intervention, along with the significant increase in food acceptability. The importance of food acceptability has been demonstrated in previous studies about nutrition interventions. Higher satisfaction and acceptability of a nutrition program was associated with better adherence and clinical outcomes.[159] A culturally tailored diabetes education program also demonstrated high acceptability and positive effects on glycemic control among Chinese immigrants with T2D in the US.[137] According to the qualitative data in our study, participants appreciated the simplicity

and cultural relevance of the menu plan and nutritional counselling, which contributed to the improved food acceptability and dietary adherence.

4.4.3 Determinants of food choices

Both the 3-day food records and the interviews have shown positive changes in food choices, such as choosing more dark green and orange vegetables, choosing healthier snacks instead of cookies and ice cream, substituting food with lower GI for food with higher GI and choosing less food high in fat and sugar. The reason for the positive changes was a shift in determinants of food choices. At the post-intervention interview, all participants reported nutrition and health as the most important determinants of their food choices, whereas many participants did not even think about nutrition when they were shopping for food before (as noted in interviews in this cohort and also in the participants in Chapter 2). Taste, food price and the needs of other family members were formerly the main factors influencing decisions about food choice and food purchasing. According to some participants, one of the roles of the menu plan and the intervention program was a reminder of healthy eating and healthy food choices. The shift of the priority from taste and cost to nutrition might be because of the increased nutritional knowledge. A previous study showed that focusing on healthy food choices instead of a strict meal plan was effective in improving food intake, glycemic control and lipid profile in diabetic patients.[210] It is important to teach patients the knowledge about how different types of food and nutrients affect blood glucose so that patients can make the right food choices. For patients who consider the strictness of a meal plan a barrier, being in control of their own meal planning and food choice decisions could give them more flexibility and potentially increase adherence to nutrition therapy.

Family support might have facilitated the positive changes. One of the recommendations developed by a lay panel of individuals with T2D in collaboration with diabetes professionals was to provide education and training not only to patients and professionals but also to the community including family, employers and general community members.[245] During the study, participants were encouraged to bring their spouses to the meetings. Although, only two participants brought spouses to one of the meetings, many participants reported that they received support from family. For example, some participants' spouses or children drove them to the meetings and came to pick them up every time and encouraged them to come to the meetings when they felt too lazy to do so. Some participants reported dietary changes in their family members as well, including substituting brown rice for white rice and following the menu plan. However, there were also participants who reported neutral position of their family, i.e., no positive or negative influence from their family. It has been shown that Chinese immigrants tend to value the well-being of the whole family more than individuals' health, which is highly influenced by the traditional collectivistic social orientation.[96] Hence, family support is an indispensable contributor to optimal diabetes self-management especially among Chinese immigrants who retain traditional values. Lack of diabetes knowledge among family members can be a barrier to family support. On-going education needs to be provided to the family as well as larger communities.

4.4.4 Changes in diabetes knowledge

The diabetes knowledge score increased significantly at post- compared with pre- intervention. As the authors of the test suggested, the questions should be adapted to a specific research study so that the questions reflect the content of the intervention or education programs.[232] Since this study was mainly focused on nutrition and dietary improvement, only nutrition-related questions

were selected from the knowledge test plus another question about A1C. For example, one question asked participants to pick one food item that has the highest carbohydrate content from the following four items: roasted chicken, Swiss cheese, baked potato and peanut butter. Being aware of the nutrients content helps participants make healthy food choices. Improvement in diabetes knowledge was also observed in studies with Chinese immigrants in the US who attended culturally tailored diabetes education programs, although different tools were used to assess the diabetes knowledge.[135,137] The interview data in our study further confirmed the improvement in diabetes knowledge related to nutrition, including GI of different food, how to read nutrition facts table, recommended servings of different food groups. Participants had applied the gained knowledge to their actual diets, and this has been reflected in their positive dietary changes. Previous research also proved the effectiveness of culturally tailored interventions in improving diabetes knowledge in Asian immigrants.[135,246] Diabetes knowledge is fundamental for diabetes self-management. For example, in nutrition therapy, diabetes knowledge related to nutrition enables patients to carry out their own meal planning. The brochure provided to participants in his study included GI information for traditional Chinese staples such as steamed bun and noodles, which helped participants make healthier food choices.

4.4.5 Perceived advantages and limitations of the program

According to the interviews at the end of the study, all participants were satisfied with this intervention program and thought it was helpful, and most participants liked the menu plan, which can be reflected in the food acceptability questionnaire. The food acceptability score was significantly increased post-intervention. The advantages of the menu plan reported by participants included flexibility, cultural relevance, and ease of use. Cultural relevance was related to Chinese language, Chinese recipes and dietary patterns. The flexibility contributed to

higher adherence. Instead of fixed daily menus, this menu plan provided participants with Chinese recipes and examples of how to make an individualized daily menu. The number of dishes per meal tends to vary largely among Chinese families. The 3-day food records as well as the interviews have confirmed this. Some participants had only one dish per meal and some had six dishes per meal, which was depending on personal habits as well as the number of persons in a household. Previous research reported that the strictness of diabetes treatment regimen could lead to low adherence and mental stress in patients.[213] It has been demonstrated in a previous intervention study that a flexible and culturally relevant nutritional program could improve compliance and clinical outcomes.[78] We hoped to increase acceptability and adherence by allowing participants the flexibility of choosing preferred number of recipes for each meal and choosing their preferred recipes for each day. In the long run, this approach can improve participants' knowledge and skills for meal planning instead of make them rely on a fixed menu plan.

In spite of the advantages, there were still some barriers to adhering to the menu plan and other resources provided in this study including EWCFG, low GI food list, portion control and label reading. The barriers were related to eating out, time constraints, inconvenience to shop for and measure food, personal dietary habits and food prices. Some participants were still having problems when eating out, part of which was due to compromising with family members. Although family support was common among the participants, compromise was still inevitable especially because of the collectivism in traditional Chinese culture.[247] Some participants made an effort to reduce portion sizes and order healthier food when eating out. However, this is very difficult if healthier options are not available in restaurants and food stores. As suggested by the consensus conference between diabetes patients and professionals, the community is in need of

education.[245] For example, restaurants should be educated about the needs of diabetic patients. Adding diabetes-friendly food options on restaurants' menus could help eliminate this barrier and promote healthy eating in the general population as well, which can further contribute to the prevention of diabetes and other chronic diseases. Policymaking by the government may need to be involved in this process. Time constraints has been a common barrier in different populations,[208] and it was reported by participants in this study. Although simple recipes were deliberately included in the menu plan to address the needs of individuals with tight schedules, further effort was needed to streamline the educational materials and supporting resources. Inconvenience related to measuring food was another perceived barrier in some participants, while in others, measuring food was perceived as very easy. This barrier might be overcome by cooking demonstration and practice which was suggested by a participant. Personal dietary habits were another perceived barrier because they were not easy to be changed in the short period of time of the intervention. However, in the long term, this might not be a barrier if an individual changes his or her unhealthy dietary habits gradually with the help of an individualized treatment. From diabetes educators' perspectives,[76] barriers to patients' dietary adherence are multifaceted, and include psychological, social, and cultural factors. The Chinese menu plan helped to overcome cultural barriers by providing examples of traditional food ingredients and recipes. Providing nutrition counselling in Chinese by a Chinese study coordinator was another facilitating factor. In this study, the social barrier reported was related to compromising for other family members. Family plays an important role in chronic disease management in different cultures.[248,249] Specifically for Chinese, a patient may place the well-being of the family in front of his or her own health, which is largely influenced by the collectivistic social orientation of traditional Chinese culture.[96] Psychological barriers were not

mentioned by many participants. Only one participant talked during a counselling session about the stress he would face if he was to count how much food he ate every day. Lack of motivation to change and to maintain the change was perceived by diabetes educators as a barrier to dietary and physical activity adherence among diabetes patients.[76] However, lack of motivation did not emerge as a barrier in this study. The fact that participants volunteered in the study indicated a relative strong motivation to change. Thus the sample may not be representative of the general population with T2D in terms of motivation to change.

At the end of interviews, participants were asked to give suggestions for improvement of the intervention program if they would like to. A few participants gave suggestions, which reflected the possible limitations of this study. These included 1) to add a Cantonese-speaking coordinator; 2) to add more recipes for noodles and dessert; 3) to include cooking demonstrations during the education sessions; 4) to create videos of the educational materials; 5) to add group sessions; 6) to incorporate exercise into the intervention program. These suggestions provide directions for future research. For example, in future larger studies, group sessions can be added where participants can have discussions and share experience, which was an approach adopted by the larger study of the PPEP.[20]

4.4.6 Feasibility

The rate of adherence to the menu plan and other recommendations provided in the study was about 74%. During interviews, most participants reported that they started to follow the EWCFG, choose low GI food, and read food labels most of the time. Many participants perceived these as new knowledge that they never had before. Most participants were using the menu plan as a guide or reference, which was what it was intended for. The nutrition facts table of each recipe

helped participants make more informed choices. The number of dishes varies greatly among different Chinese households. Thus providing a fixed menu plan with a certain number of recipes for each meal is not practical. Instead, this menu plan listed all recipes based on their main ingredients and provided a few examples of daily menus with different numbers of dishes per meal. The servings count for each meal and the whole day was also shown in the examples to ensure adequate servings of food from four food groups recommended by EWCFG. Participants could choose recipes from the menu based on their preferences and create their own daily menu. Participants were satisfied with the flexibility, which increased the feasibility of the menu plan. Another important feature of the menu plan was that all recipes were Chinese recipes. According to the needs assessment (Chapter 2) and the dietary assessment in this study, Chinese immigrants in Edmonton consumed Chinese food most of the time. A menu plan with Chinese recipes met their needs and increased acceptability.

4.5 Summary

Improvement in diabetes knowledge, diet quality and biological outcomes were observed in Chinese immigrants with T2D after following a Chinese menu plan and attending nutrition counselling provided by a Chinese study coordinator for 12 weeks. However, total grains adequacy decreased, which was the only negative dietary change observed. Future studies and programs may need to pay attention to this food group in Chinese immigrants with T2D. The flexibility and cultural relevance of the intervention program have contributed to its acceptability and feasibility among Chinese immigrants. Previous studies about lifestyle interventions in Chinese populations were mostly conducted using education materials containing general recommendations, either culturally tailored or not. Our study incorporated a culturally relevant

menu plan to translate general nutritional recommendations into recipes and meal planning instructions, thus adding to the literature about the feasibility and efficacy of menu planning in Chinese. Moreover, no literature has been found about dietary interventions in Chinese immigrants in Canada. This pilot study adds to the literature important information about Chinese immigrants with T2D in Canada, providing reference for future larger studies and nutrition program development for this ethnic population at high risk for diabetes. The study also has limitations. One is that the adherence to the menu plan was self-reported, which might impair its accuracy. Another limitation is that the biological measurements and dietary assessment were only conducted at baseline and post-intervention. Adding more assessment during the study may provide a better picture of the biological and dietary changes throughout the 12 weeks. This pilot test provides information for future larger studies in Chinese immigrants.

5 General discussion and implications

5.1 Summary of objectives and results

The purpose of this thesis was to bridge the gap in the literature regarding knowledge about feasible and effective nutritional self-management programs for Chinese immigrants with T2D in Canada, which was fulfilled through the following three phases: 1) assessment of the dietary needs among Chinese with T2D or prediabetes living in Edmonton; 2) design of a culturally relevant menu plan incorporating the 4-A Framework as a tool for Chinese immigrants in Edmonton to manage diabetes through diet; 3) pilot-testing of the feasibility and efficacy of the menu plan combined with individual nutrition counselling.

Before developing and implementing a nutrition education or intervention program, needs assessment is necessary so as to ensure that the programs are relevant to the target population or communities.[161] As shown in Chapter 2, the proportion of Chinese immigrants with T2D or prediabetes whose diet needed improvement was 71.4% based on the HEI. The nutrients and food groups that needed the most improvement included sodium, dietary fibre, saturated fat and milk and alternatives. Taste, cost and nutrition and health were important factors that influenced food choice. Barriers to adhering to current nutritional recommendations included language, cultural irrelevance of current recommendations, time constraints, lack of knowledge, personal taste preference, eating out, and lack of awareness of existing resources.

A culturally tailored menu plan for Chinese immigrants was subsequently developed, which was described in Chapter 3. Following the 4-A Framework, the menu plan was developed based on the findings from needs assessment as well as current nutritional guidelines. The feasibility and efficacy of the menu plan were assessed in the following phase, as shown in Chapter 4.

Chapter 4 showed that Chinese immigrants with T2D in Edmonton had improvement in diabetes knowledge, diet quality and biological outcomes after following the Chinese menu plan combined with individual nutrition counselling for 12 weeks. The attendance and adherence were high, indicating the acceptability and feasibility of the program.

The findings proved the value of utilizing the 4-A Framework across cultures in developing specialized resources for diabetes management. This work is expected to lead to utility of the 4-A Framework in resources development and programming for other ethnic groups.

5.2 Developing a culturally tailored menu plan as part of the PANDA toolbox

In order to help Chinese immigrants overcome barriers to dietary adherence, a cultural tailored menu plan was developed, as part of the PANDA project.[250] The full title of PANDA is "Practical behavioural modifications for type 2 diabetes treatment: Physical Activity and Nutrition for Diabetes in Alberta". The PANDA project is led by a multidisciplinary research group, including researchers from disciplines such as physical education, physiology, medicine, agricultural, food and nutritional science and economics. The fundamental objective of all studies in the PANDA project is to contribute to a practical "toolbox" of diet and physical activity that individuals with T2D will adhere to. As an important dietary management tool, the PPEP (a 4-week menu plan described in Chapter 1) has been developed by the PANDA research team and tested in Canadians with mixed ethnicities. Studies among Albertans with T2D have shown beneficial effects of PPEP on diet quality and biological outcomes.[20,47] As recommended by the CDA-CPG,[1] cultural background needs to be taken into account in diabetes treatment. Considering the large population of ethnic Chinese in Canada as well as in Alberta,[138] we developed a Chinese menu plan to include in the PANDA toolbox. The Chinese menu plan was

developed based on the 4-A Framework, which has been used to guide the development of the PPEP. The 4-A refers to Adequacy, Availability, Accessibility and Acceptability. A menu plan that meets the 4-A can help ensure adequate nutrients intake and improve adherence among individuals with T2D. Aside from adequacy, moderation was considered because high sodium and saturated fats intake was found in the dietary needs assessment. Traditional Chinese recipes were modified to reduce the use of sodium and saturated fats. Nutrition facts tables showing the content of sodium and saturated fats in each recipe were also included in the menu plan to help Chinese immigrants make appropriate choices. In addition to cultural barriers, personal and societal barriers were also taken into account when developing the menu plan. For example, quick recipes were included in order to overcome time constraints. Most recipes used affordable ingredients to help overcome the barrier related to food prices. To improve acceptability, a group of Chinese immigrants who participated in the needs assessment were invited back to review the menu plan outline and the menu plan was modified based on their suggestions.

5.3 Effects of the culturally tailored resource for diabetes management

Significant improvements in biological outcomes, diet quality and diabetes knowledge were observed among Chinese immigrants with T2D after they attended individual nutrition counselling and followed the culturally tailored menu plan for 12 weeks (Chapter 4).

The improved biological outcomes included WC, and serum TC and LDLC concentrations. WC was lowered post-intervention, indicating a reduction of abdominal fat, which could potentially improve insulin sensitivity and glycemic control.[169] The reduction in WC was consistent with previous studies of PPEP in general Canadians in the PANDA project.[20,21] Previous lifestyle intervention studies among Chinese in China have shown inconsistent effects on WC and

visceral fat. Some found reduction in WC post-intervention,[127,130] while others found no changes.[116,126] There was also a study that found reduction in BMI and body fat but not in waist-to-hip ratio.[120] No known similar studies among Chinese immigrants measured WC. According to a cohort study in China,[251] both BMI and WC increased significantly in Chinese adults from 1993 to 2009, and WC at equivalent BMIs was higher in 2009 than in 1993. Moreover, multiple studies[252–255] have shown that ethnic minorities are more prone to central obesity than the majority populations in North America and in Europe, although the proportions of contribution from genetics or environment are not clear yet. The reduced WC observed in our study indicates an important role of culturally tailored nutritional intervention in treatment and prevention of central obesity among ethnic minorities, which may further contribute to reduced risks for cardiometabolic disorders.[170,256]

In our study (Chapter 4), no improvement in A1C was observed after the 12-week intervention, which was inconsistent with previous studies of the PPEP in general Canadians with T2D.[21] In our study, TC and LDLC were both significantly reduced while no changes were observed in TG, HDLC, TC/HDLC ratio and BP post-intervention. In a previous pilot study with the PPEP,[21] HDLC was significantly increased while no changes were observed in TC and LDLC, and a trend for decreased TG was found. In a larger study of the PPEP[20], improvement was observed in TC, LDLC, HDLC and diastolic BP. The different patterns of changes in biological outcomes might be related to ethnic differences. The proportions of diabetes patients with isolated IFG, isolated IGT, and IFG with IGT are different between European populations and Asian populations.[235,236] The American Diabetes Prevention Program found significantly higher A1C in Asians with IGT than in whites with IGT.[233] Thus, the same A1C level in different ethnic groups may indicate different outcomes in glycemic control. The UK Prospective Diabetes Study[238]

demonstrated differences among ethnicities in terms of BP and lipid profile outcomes during 9 years of follow-up. A study conducted with healthy individuals in Malaysia[239] found that the TC/HDLC ratio and the LDLC/HDLC ratio were both higher in Indians than in Chinese suggesting ethnic effects on blood lipid regulation within Asian subgroups. A previous diabetes prevention study[127] conducted in China demonstrated similar pattern of changes in lipid profile to our study.

Diabetes knowledge is fundamental for diabetes self-management. Without proper diabetes knowledge related to nutrition, it is difficult for patients to perform meal planning on their own. According to the pilot study (Chapter 4), diabetes knowledge was significantly improved among Chinese immigrants post-intervention, which was consistent with previous studies of culturally tailored education programs in Chinese immigrants in the US.[135,137] The interview data in our study confirmed the improvement in diabetes knowledge related to nutrition, including knowledge about GI, how to read nutrition facts tables, and recommended servings of different food groups.

As shown in Chapter 4, Chinese immigrants with T2D had significantly improved diet quality after following the Chinese menu plan combined with individual nutrition counselling for 12 weeks, which was consistent with the finding from the Phase 2 study of PPEP in general Canadians with T2D.[20] The specific dietary components improved included vegetables and fruit, and dark green and orange vegetables. A trend for increase in milk and alternatives was also observed. In contrast, a previous lifestyle intervention study conducted in Greece[257] found significant reduction in dark green and orange vegetables, which might be due to seasonal differences of the availability, as explained by the authors. Our study was conducted from March

to August, thus the increased consumption of vegetables and fruit might be related to the increased availability. Future larger studies can address the seasonal effects on food intake among Chinese immigrants. Although most participants in the dietary needs assessment met the recommendation for vegetables and fruit and the mean servings of vegetables and fruit was above the recommended as well, the significant increase indicates the feasibility of further improvement. In terms of milk and alternatives, the low intake of dairy products among Chinese populations has been demonstrated by previous studies.[244,258] Calcium inadequacy has been observed in our needs assessment study (Chapter 2) and a previous study in ethnic Chinese in Edmonton[259] as well as in Chinese Americans.[244] Although Chinese immigrants reportedly increase dairy products in their diet after immigration to North America,[82] the increase is likely insufficient. Because milk is not part of a traditional Chinese diet, other sources of calcium were recommended to participants in our study, such as soy products and leafy vegetables. Furthermore, there has been research showing correlation between consumption of soy products and improved lipid profile and decreased diabetes risk[189,260], which further justifies the promotion of soy products among Chinese immigrants. At post-intervention, participants reported an increase not only in soy products such as soy milk and tofu, but also in dairy products such as milk, yoghurt and cheese. This finding indicates that besides promoting culturally appropriate food, introducing "new food" outside of the traditional culture is also a feasible way to improve diet quality.

According to the dietary needs assessment (Chapter 2), half of the participants had sodium intake above the Tolerable Upper Intake Level[33] and the mean daily sodium intake of the participants was 2691mg. A previous study has found even higher sodium intake of 3623 mg/day among ethnic Chinese at the age of 18-58 recruited at the University of Alberta Campus.[261] Added salt

and condiments high in sodium such as soy sauce are major contributors to high sodium intake in ethnic Chinese both in and outside of China.[261,262] It is well known that high sodium intake can lead to hypertension, which is a risk factor for CVD.[263] In the menu plan, reduced-sodium soy sauce and limited amount of added salt were used as a strategy to reduce sodium intake among Chinese immigrants. In addition, the sodium content of every recipe was listed in the nutrition facts table beside the recipe as a reminder for participants to control sodium intake. However, no decrease was observed, which might be due to relatively low intake of sodium at baseline, thus making it hard to detect further reduction. Nevertheless, alternative strategies for sodium reduction may be needed.

The only negative dietary change observed was the reduction in total grains that ended up below recommendations.[22] Only a small proportion of participants consumed recommended servings of grain products and whole grains, and the scores for these two components calculated based on HEI scoring criteria were similar to the mean scores of general Canadians.[177] The low intake of grains was unexpected, because grain products such as rice are abundant in a traditional Chinese diet[264] and a previous study found no reduction in rice consumption among Chinese immigrants in Canada compared with before immigration.[265] The lower-than-recommended intake of grains among participants might be due to an intentional reduction as suggested by their family physicians in order to control blood sugar. However, the percentage of calories that came from carbohydrate remained in the recommended range, which might be attributable to the increase of other carbohydrate sources, such as vegetables, fruit and beans. Strategies for maintaining the balance among different food groups may be needed. With the economic development, refined grains such as white rice and foods made with white wheat flour have become more available and dominated the staple foods in China.[266] It seems that Chinese immigrants have retained the

habit of consuming refined grains. During our study, participants were encouraged to increase whole grain consumption by replacing part of the refined grains with whole grains such as brown rice and whole-wheat flour. However, no changes in whole grains consumption were observed based on the 3-day food records although during interviews, participants reported behavioural changes such as substituting brown rice for white rice. Adding more 3-day food records during the 12-week may help detect changes in whole grains consumption.

5.4 Feasibility of the Chinese menu plan among Chinese immigrants with T2D

According to the results from the pilot study (Chapter 4), the menu plan is a feasible tool for Chinese immigrants to improve their diet, which was reflected in the high adherence and reduced barriers.

The self-reported rate of adherence to the menu plan and other recommendations provided during individual nutrition counselling was about 74%. In the post-intervention interviews, most participants reported behavioural changes that reflected the adherence to recommendations, such as starting to follow EWCFG, choosing foods with lower GI, and reading food labels. Most participants were using the menu plan as a guide. The nutrition facts table of each recipe helped participants make informed decisions. For example, participants compared their own recipes to recipes in the menu plan and estimated the sugar and sodium content of their own recipes so that appropriate adjustment could be made. At two-month follow-up after the 12 weeks of intervention, participants reported sustained behavioural changes related to diet, such as food label reading, substituting brown rice for white rice, and increasing vegetables and fruit intake.

Nutrition therapy is known to be the most difficult to adhere to among different components of diabetes self-management.[150] According to the dietary needs assessment in Chinese immigrants

with T2D (Chapter 2), barriers to dietary adherence could be personal, cultural, or societal. Reduction of the barriers was reported by participants after receiving the culturally tailored menu plan and nutrition counselling (Chapter 4).

Personal barriers were related to personal traits, knowledge and lifestyle, which included lack of willpower, lack of nutritional knowledge, time constraints, and temptation or cravings. Some participants had the motivation but lacked the determination to change and to maintain the change. Barriers such as cravings and time constraints are also common among the general population.[44,83,207,208] Although knowledge alone is not enough to induce positive changes, it is fundamental in optimal diabetes management. Lack of nutritional knowledge for diabetes management hinders improvement in diet quality and food choices.[267] Providing counselling in Chinese facilitated improvement in diabetes knowledge. Although simple recipes were deliberately included in the menu plan to address time constraints, some participants still reported time constraints as a barrier. This might be due to the extra effort required to measure food, which emerged as a new barrier in the menu plan study (Chapter 4). In order to meet the recommended servings of different foods, some measuring is necessary. Although plate/bowl methods and handy portion guide[268] were taught to participants for easier and quicker measuring, it appears that more strategies are needed to overcome time constraints.

The second category identified was cultural barriers. Culture is an important factor to consider when developing and implementing nutrition interventions because culture has a deep imprint on food habits.[269] For Chinese immigrants in Canada, the strong contrast between their traditional culture and the Canadian culture poses an obstacle to following the Canadian nutrition guidelines. One of the cultural barriers reported by participants in the needs assessment study

was language, which has been a common barrier causing ineffective communication between healthcare providers and patients using a second language.[270] Although the Chinese version of EWCFG has been available on the Health Canada website, some senior participants with low computer skills could not access it easily. Moreover, the literal translation of the guidelines did not take into account the cultural background and dietary patterns of Chinese immigrants. As a result, many participants thought the guidelines were not helpful and felt frustrated when they had to give up some traditional foods that they grew up with due to lacking nutritional knowledge about those foods. One may argue that Chinese immigrants can simply follow the guidelines in China. However, several reasons make this impractical. First, acculturation happens more or less after immigration, which leads to different dietary patterns in Chinese immigrants from what they had in their original country,[82,240] although a large proportion of traditional diet is retained. Second, the food environment in Canada is different from that in China, including food quality, availability and accessibility. For example, some literature indicates that supermarkets in developing countries typically provide processed and packaged foods, while the availability of fresh food in supermarkets is growing slower.[271,272] Asian Americans in a focus group study reported excess food consumption with greater access after immigration.[158] Another study found that reduced access to traditional Chinese food contributed to altered eating habits among Chinese Americans after immigration, and the primary place where immigrants went to for grocery shopping switched from independent vendors in open markets to large supermarkets after immigation.[82] Third, the geographical difference may influence the dietary requirement of some nutrients such as Vitamin D. Because of the higher latitude and colder weather in Canada than in most parts of China, which can lead to lower rate of vitamin D synthesis in the skin, Chinese immigrants might need to take more vitamin D through food or supplements. For the

foregoing reasons, nutrition programs that take into account the specific needs of Chinese living in Canada are needed. According to participants in the menu plan study, cultural barriers were largely reduced with the help of the culturally tailored nutrition counselling and menu plan that was developed based on the 4-A Framework. One of the 4 As in the framework is Acceptability, which includes not only personal but also cultural acceptability. The cultural relevance of the resources conformed to the Acceptability, and improved adherence to dietary recommendations among Chinese immigrants with T2D.

Societal barriers to dietary adherence were also reported by participants during the needs assessment. These included food prices and eating out, which is consistent with previous literature on Chinese immigrants as well as other populations[44,204–206]. In order for behavioural changes, a favourable environment is needed as a facilitator. Smaller environment such as family and communities and larger environment such as a society all have influences on an individual's behaviour including eating behaviour.[273] Lack of diabetes-friendly food options in restaurants can be frustrating for diabetes patients and makes it hard to adhere to nutritional recommendations even when an individual has the knowledge and motivation. A previous study has shown that chefs and owners in Chinese restaurants in the US have limited nutritional knowledge about sodium and need education and training in food preparation and marketing lower salt food to customers.[274] Menu revision and labeling in restaurant has been shown to improve healthy food choices among customers.[275] However, this was not within the scope of this study. Instead, some tips and recommendations were provided to participants to reduce barriers to healthy eating at restaurants. Some participants made an effort to reduce frequency of eating out, to control overeating, and to reduce food with much added sugar when eating out. In terms of food cost, which is related to Accessibility, another A in the 4-A Framework, efforts

was made through using affordable food ingredients in the recipes in the menu plan. Only one participant in the menu plan study mentioned food prices or cost as a barrier.

According to the dietary needs assessment, being unaware of existing resources was another obstacle for Chinese immigrants to adhere to nutritional recommendations. The CDA website has dedicated a section for Chinese immigrants, where one can find diabetes management materials written in Chinese.[160] However, most participants in the dietary needs assessment study were not aware of the resource. How to increase the awareness of existing resources among Chinese immigrants in Edmonton needs to be addressed. In Edmonton, Chinese community centre, Chinese newspapers, Chinese grocery stores and physicians who see Chinese patients can be considered as mediums for promoting culturally relevant resources as the majority of participants found the recruiting information about the studies through these mediums.

Overall, the culturally tailored menu plan combined with individual nutrition counselling reduced barriers to dietary adherence and received high adherence. Hence, it is a feasible approach to dietary therapy among Chinese immigrants with T2D.

5.5 Contribution to the literature on culturally adapted interventions

The literature on cultural adaptions of interventions for ethnic minorities is sparse,[220] but has been growing in the past decade. More literature is found in South Asians than in other subgroups of Asian immigrants in Western countries. In general, culturally adapted education programs and lifestyle interventions have been effective in improving diabetes knowledge, biological outcomes and program acceptability in Asian immigrants with prediabetes or T2D (see below), except the DHIAAN (a diabetes prevention program for Surinamese South Asians

in the Netherlands) study[276] that found no effects but high attrition among South Asians in the Netherlands.

Two studies[135,277] about culturally tailored interventions in Asian immigrants reported using the community-based participatory research (CBPR) approach, which is defined as "systematic inquiry with the participation of those affected by an issue to education and action for social change".[278] Besides researchers and health professionals, patients or community partners also engaged as equal and active partners in the research process. Both studies lasted for 6 months. One of these two studies was conducted among Korean Americans,[277] and found no changes in BMI, WC or glycemic control but improvement in diabetes knowledge after a 6-month culturally tailored diabetes prevention program that was delivered in a community setting. The authors reported that the curriculum was adapted from existing materials validated in minorities, and findings from a formative study were incorporated to increase cultural sensitivity. Participants showed high acceptability of the program. The other study that applied CBPR approach was conducted among Chinese Americans,[135] and offered diabetes education and support group sessions in a medical office setting. Patients were involved in the curriculum design, which was based on the ADA standards. To ensure cultural appropriateness, all materials were written in Chinese and culturally relevant physical activities and food items were incorporated in the curriculum. In contrast to the study among Korean Americans, this study found improvement in A1C. However, similar results were found regarding improvement in diabetes knowledge and high attendance.

Two studies[134,276] used the empowerment model, which has been advocated by health professionals in patient care.[279] Patient empowerment is "centered on the belief that patients

should be in control of their own care and that behavioural changes and adherence to therapies cannot be achieved unless patients internalize the need for self-change."[280] One of these two studies was the DHIAAN study.[276] It was conducted in general practice among South Asians in the Netherlands and adopted motivational interviewing as the basis for intervention. Formative research was used to develop the culturally tailored intervention. However, no positive effects in weight status and metabolic profile were observed at 1-year follow-up and the drop-out rate was high, suggesting the difficulty of realizing health benefits in general practice and that the approach may not be appropriate for this population. The other study that reported using the empowerment model was conducted among Chinese Americans.[134] The empowerment model was used to provide culturally adapted resources so as to empower patients with proper knowledge needed for decision-making regarding lifestyle choices and diabetes self-management. Cultural values and culturally relevant dietary habits and exercise were incorporated in the curriculum. In contrast to the DHIAAN study[276] that found no effects in South Asians in the Netherlands, significant improvement in A1C and quality of life were observed in this study.[134] Moreover, high satisfaction was reported by participants. However, there are some differences in the study design between the two studies. The Chinese study[134] had shorter follow-up than the DHIAAN study. The DHIAAN[276] intervention was delivered by health professionals as part of their daily practice, while the Chinese study was delivered by the investigator and a registered nurse. The differences in the study design and study population might contribute to the divergent findings.

Some other studies of culturally tailored lifestyle interventions in South Asian immigrants that did not report using a framework were also found in the literature. One was the Prevention of diabetes and obesity in South Asians (PODOSA) study, which was family-based.[281] Because the

investigators recognized the importance of family in influencing an individual's dietary behaviour in the South Asian culture, they were hoping to incorporate family support. The intervention was adapted from the FDPS,[124] an effective diabetes prevention program for the general Finnish population. Cultural adaptions of the program were based on personal experiences of the investigators, collaborators and the trial staff. Reduction was observed in body weight and WC at 3-year follow-up. Another study[282] chose a Sikh temple as the venue for intervention implementation in a South Asian community in the UK. Different culturally relevant tools were used in this study, such as culturally tailored health presentation, providing healthy alternative foods cooked based on recipes developed by a Sikh dietitian, posters displaying simple messages and a health fair. The evaluation showed that choosing the temple as the venue for the intervention program was highly acceptable among participants. The Sikh temple is a focal point in Sikhs' lives and a place for acquiring spiritual knowledge, thus making it a natural home to the lifestyle intervention program. The choice of location for intervention implementation could therefore be an important consideration among ethnic groups.

As discussed above, some of the previous studies adopted a theoretical model to guide the study design, while others did not use a model or did not report using a model. In terms of the development of culturally adapted resources per se, no known publications mentioned use of an overarching framework to guide the development process. The 4-A Framework has been used to guide the development of PPEP, which proved to be an effective tool for dietary management in general Canadians with T2D.[20,21] The 4-A Framework was subsequently used in the Chinese menu plan development because it has several advantages. First, one of the As in the 4-A Framework is Acceptability, which denotes both personal and cultural acceptability. Hence, the 4-A Framework per se contains the cultural relevance of a program, thus making it an

appropriate framework for resource developing across cultures. In addition, the other three components of the 4-A Framework, Adequacy, Availability and Accessibility, take into account different aspects that may influence in individual's dietary behaviour while ensuring the adequacy of the diet. For example, physical and financial accessibility are important factors that affect dietary adherence among individuals with diabetes, which is evident in the literature[44,208,283] and confirmed in our study among Chinese immigrants.

Another contribution is that this thesis research adds to the existing literature that it found that menu planning combined with nutrition counselling is feasible and effective among Chinese immigrants. Most of the published studies among Asian immigrants used educational materials but not a menu plan, except for one study among South Asians that incorporated provision of healthier alternatives of traditional food at a Sikh temple.[282] Our study provides preliminary results about menu planning in Chinese immigrants, which may lead to the test and utility of this approach among Chinese immigrants in other countries as well as other Asian subgroups. A larger study is needed to verify the relative effects of the menu plan by comparing to a group of participants receiving nutrition counselling alone.

We are hoping that the culturally tailored menu plan can be utilized in general practice to provide culturally relevant guidance to more diabetes patients. However, careful modification and assessment of the menu plan may be needed before its promotion in a clinical setting as it has been shown that realizing health benefits of a lifestyle intervention in general practice is difficult.[276] Also, the cost-effectiveness of delivery by health professionals in general practice needs to be evaluated. Alternative venues and approaches could be considered such as delivery by community health workers at Chinese community centers, Chinese grocery stores, and other

locations where Chinese immigrants gather or visit often. Indeed, a systematic review has found that health education for ethnic minorities with T2D delivered by community health workers is the most effective, followed by that delivered by nurses and dietitians.[284] We are also hoping that the research leads to the development of more culturally adapted resources for ethnic groups. The menu plan developed in this research might be restricted to similar locations where food availability and accessibility is similar to Edmonton, Alberta. However, researchers or health professionals from other places can assess the actual situation and adapt the menu plan accordingly. Moreover, the formative research approach used to develop the menu plan and the 4-A Framework that guided the development of the menu plan may be widely used in other regions and populations.

5.6 Strengths and limitations

This thesis research has several strengths. Firstly, a needs assessment among the target population was conducted before the menu plan development. The needs assessment identified suboptimal food and nutrient intakes and barriers to dietary adherence, thus providing key elements for the menu plan and relevant education materials to focus on, which could potentially improve acceptability and efficacy of the menu plan. Secondly, the Chinese menu plan development followed the 4-A Framework, which has guided the developing of the PPEP, an effective menu plan for general Canadians to manage diet for diabetes.[20,21] Another strength is that the menu plan study assessed behavioural changes related to diet, which has been omitted in most previous intervention studies among Chinese populations. Behavioural changes help to explain biological outcomes. Moreover, some biological changes may not occur in a short period of time, so the assessment of behavioural changes can provide an indicator for possible

biological changes in a longer term. In addition, literature about culturally tailored interventions for Chinese living in Canada is rare. This thesis helps to narrow the gap and provides information for future larger studies among Chinese immigrants.

There are also some limitations. One of them is that only those who could speak Mandarin Chinese or English were included in the studies. Future larger studies need to include immigrants who can only speak Cantonese to evaluate whether the menu plan combined with nutrition counselling has the same effects in the Cantonese-speaking population in Edmonton. Another limitation is that physical activity was self-reported instead of objectively monitored. Although there were no changes in physical activity according to the self-report, there might be errors that could have influenced the biological results. Future larger studies can use pedometer for more accurate measurement.

5.7 Future directions

As the preliminary results have shown positive effects of the culturally tailored menu plan combined with nutrition counselling, a larger randomized controlled trial could be conducted in future to further confirm the effects. Furthermore, future studies are needed to identify the optimal venue and approach to promote the menu plan and other culturally relevant resources.

6 Conclusions

This research identified suboptimal diet quality among Chinese immigrants with T2D. The specific dietary components that needed improvement include grains and whole grains, milk and alternatives, saturated fats and sodium. There are both personal and environmental barriers to dietary adherence, including language, time constraints, lack of basic nutritional knowledge and cultural relevant resources, high food prices and lack of healthier food options in restaurants. A flexible culturally tailored menu plan taking into account the specific needs of the target population combined with individual nutrition counselling was feasible and effective in improving diabetes knowledge, diet quality and biological outcomes among Chinese immigrants with T2D, although no effects on A1C were observed. Future larger studies could combine different markers, such as fasting blood glucose or oral glucose tolerance to test the effects on glycemic control. Needs assessment before developing and implementing a nutrition program may contribute to higher acceptability and efficacy of the program. All in all, the research helped narrow the gap in the literature about culturally tailored dietary interventions for Chinese immigrants and provided important information on menu planning among Asian immigrants. The 4-A Framework has the potential to be generalized across cultures to guide development of culturally tailored resources for diabetes management.

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Appendices

Appendix A

DEMOGRAPHIC QUESTIONNAIRE

Please write or mark the appropriate answer for the following questions.
Date: _____
Age: _____
Gender: Male / Female
Years with diabetes diagnosis: _____
Years in North America: _____
Education:
Please put a checkmark in the box

- ☐ Less than high school
- ☐ High school graduate
- ☐ Some college or university (have some post-secondary education, but not completed)
- ☐ College
- ☐ University graduate
- ☐ Post graduate

Employment

- ☐ Wages and salaries
- ☐ Income from self-employment
- ☐ Retirement income (pensions, old age security and GIS, etc.)
- ☐ Unemployed (not including retirement)
- ☐ Other ( )

Household annual income:

- ☐ ≤ $ 20,999
- ☐ $ 21,000 to $39,999
- ☐ $ 40,000 to $ 59,999
- ☐ $ 60,000 to $ 79,999
- ☐ $ 80,000 to $ 99,999
- ☐ $ 100,000 to $ 119,999
- ☐ ≥ $ 120,000

Number of people in the household: _____

Marital Status: ☐ Married ☐ Single

人口學問卷

請寫出或標出恰當答案。
日期: _____
年齡: _____
性別: 男 / 女
已確診糖尿病年數: _____
已在加拿大生活幾年：_____

受教育程度:
請在符合您的選項前打勾.

- □ 高中以下
- □ 高中畢業
- □ 專科或本科肄業（接受過高等教育但未完成）
- □ 專科
- □ 本科
- □ 研究生或以上

受雇狀態:

- □ 薪資
- □ 個體經營
- □ 退休（養老金，養老保障以及收入保證金等）
- □ 失業（不包括退休）
- □ 其他，請注明（ ）

家庭年收入:

- □ ≤ $ 20,999
- □ $ 21,000 to $39,999
- □ $ 40,000 to $ 59,999
- □ $ 60,000 to $ 79,999
- □ $ 80,000 to $ 99,999
- □ $ 100,000 to $ 119,999
- □ ≥ $ 120,000

目前家庭成員人數: _____

婚姻狀態：□ 已婚 □單身

Appendix B

The Suinn-Lew Asian Self Identity Acculturation
(adapted for Chinese)

INSTRUCTIONS: The questions which follow are for the purpose of collecting information about your historical background as well as more recent behaviors which may be related to your cultural identity. Choose the one answer which best describes you.

1. What language can you speak?
1. Chinese only
2. Mostly Chinese, some English
3. Chinese and English about equally well (bilingual)
4. Mostly English, some Chinese
5. Only English

2. What language do you prefer?
1. Chinese only
2. Mostly Chinese, some English
3. Chinese and English about equally well (bilingual)
4. Mostly English, some Chinese
5. Only English

3. How do you identify yourself?
1. Oriental
2. Chinese
3. Asian-Canadian
4. Chinese-Canadian
5. Canadian

4. Which identification does (did) your mother use?
1. Oriental
2. Chinese
3. Asian-Canadian
4. Chinese-Canadian
5. Canadian

5. Which identification does (did) your father use?
1. Oriental
2. Chinese
3. Asian-Canadian
4. Chinese-Canadian
5. Canadian

6. What was the ethnic origin of the friends and peers you had, as a child up to age 6?
1. Almost exclusively Chinese, Asian-Canadians, Orientals
2. Mostly Chinese, Asian-Canadians, Orientals
3. About equally Asian groups and Anglo groups
4. Mostly Anglos, Blacks, Hispanics, or other non-Asian ethnic groups
5. Almost exclusively Anglos, Blacks, Hispanics, or other non-Asian ethnic groups

7. What was the ethnic origin of the friends and peers you had, as a child from 6 to 18?
1. Almost exclusively Chinese, Asian-Canadians, Orientals
2. Mostly Chinese, Asian-Canadians, Orientals

3. About equally Asian groups and Anglo groups
4. Mostly Anglos, Blacks, Hispanics, or other non-Asian ethnic groups
5. Almost exclusively Anglos, Blacks, Hispanics, or other non-Asian ethnic groups

8. Whom do you now associate with in the community?

1. Almost exclusively Chinese, Asian-Canadians, Orientals
2. Mostly Chinese, Asian-Canadians, Orientals
3. About equally Asian groups and Anglo groups
4. Mostly Anglos, Blacks, Hispanics, or other non-Asian ethnic groups
5. Almost exclusively Anglos, Blacks, Hispanics, or other non-Asian ethnic groups

9. If you could pick, whom would you prefer to associate with in the community?

1. Almost exclusively Chinese, Asian-Canadians, Orientals
2. Mostly Chinese, Asian-Canadians, Orientals
3. About equally Asian groups and Anglo groups
4. Mostly Anglos, Blacks, Hispanics, or other non-Asian ethnic groups
5. Almost exclusively Anglos, Blacks, Hispanics, or other non-Asian ethnic groups

10. What is your music preference?

1. Only Chinese music
2. Mostly Chinese
3. Equally Chinese and English
4. Mostly English
5. English only

11. What is your movie preference?

1. Chinese-language movies only
2. Chinese-language movies mostly
3. Equally Chinese/English -language movies
4. English-language movies mostly
5. English-language movies only

12. What generation are you? (circle the generation that best applies to you:)

1. 1st Generation = I was born in China or country other than Canada.
2. 2nd Generation = I was born in Canada, either parent was born in China or country other than Canada.
3. 3rd Generation = I was born in Canada, both parents were born in Canada and all grandparents born in China or country other than Canada.
4. 4th Generation = I was born in Canada, both parents were born Canada and at least one grandparent born in China or country other than Canada and one grandparent born in Canada.
5. 5th Generation = I was born in Canada, both parents were born in Canada, and all grandparents also born in Canada.
6. Don't know what generation best fits since I lack some information.

13. Where were you raised?

1. In China only
2. Mostly in China, some in Canada
3. Equally in China and Canada
4. Mostly in Canada, some in China
5. In Canada only

14. What contact have you had with China?

1. Raised one year or more in China

2. Lived for less than one year in China
3. Occasional visits to China
4. Occasional communications (letters, phone calls, etc.) with people in China
5. No exposure or communications with people in China

15. What is your food preference at home?

1. Exclusively Chinese food
2. Mostly Chinese food, some Canadian
3. About equally Chinese and Canadian
4. Mostly Canadian food
5. Exclusively Canadian food

16. What is your food preference in restaurants?

1. Exclusively Chinese food
2. Mostly Chinese food, some Canadian
3. About equally Chinese and Canadian
4. Mostly Canadian food
5. Exclusively Canadian food

17. Do you

1. Read only Chinese?
2. Read Chinese better than English?
3. Read both Chinese and English equally well?
4. Read English better than Chinese?
5. Read only English?

18. Do you

1. Write only Chinese?
2. Write Chinese better than English?
3. Write both Chinese and English equally well?
4. Write English better than Chinese?
5. Write only English?

19. If you consider yourself a member of the Chinese group (Chinese, Chinese-Canadian, etc., whatever term you prefer), how much pride do you have in this group?

1. Extremely proud
2. Moderately proud
3. Little pride
4. No pride but do not feel negative toward group
5. No pride but do feel negative toward group

20. How would you rate yourself?

1. Very Chinese
2. Mostly Chinese
3. Bicultural
4. Mostly Westernized
5. Very Westernized

21. Do you participate in Chinese occasions, holidays, traditions, etc.?

1. Nearly all
2. Most of them
3. Some of them
4. A few of them

5. None at all

22. Rate yourself on how much you believe in Chinese values (e.g., about marriage, families, education, work):

1	2	3	4	5
(do not believe)				(strongly believe in Chinese values)

23. Rate yourself on how much you believe in Canadian (Western) values:

1	2	3	4	5
(do not believe)				(strongly believe in Canadian values)

24. Rate yourself on how well you fit when with other Chinese:

1	2	3	4	5
(do not fit)				(fit very well)

25. Rate yourself on how well you fit when with other Canadians who are non-Chinese (Westerners):

1	2	3	4	5
(do not fit)				(fit very well)

26. There are many different ways in which people think of themselves. Which ONE of the following most closely describes how you view yourself?

1. I consider myself basically Chinese. Even though I live and work in Canada, I still view myself basically as Chinese.
2. I consider myself basically as a Canadian. Even though I have a Chinese background and characteristics, I still view myself basically as a Canadian.
3. I consider myself as a Chinese-Canadian, although deep down I always know I am Chinese.
4. I consider myself as a Chinese-Canadian, although deep down, I view myself as a Canadian first.
5. I consider myself as a Chinese-Canadian. I have both Chinese and Canadian characteristics, and I view myself as a blend of both.

華人自我認證涵化程度

說明：下列問題用於收集有關您的歷史背景以及您最近的與文化特性相關的行為的信息。請選擇最貼切的答案。

1.您會講什麼語言？

1. 只有中文
2. 主要是中文，少量英文
3. 中文和英文幾乎同樣好（雙語）
4. 主要是英文，少量中文
5. 只有英文

2. 您更傾向於哪種語言？

1. 只有中文
2. 主要是中文，少量英文
3. 中文和英文幾乎同樣好（雙語）
4. 主要是英文，少量中文
5. 只有英文

3. 您如何界定自己？

1. 東方人
2. 中國人
3. 亞裔加拿大人
4. 華裔加拿大人
5. 加拿大人

4. 您的母親使用哪個身份？

1. 東方人
2. 中國人
3. 亞裔加拿大人
4. 華裔加拿大人
5. 加拿大人

5. 您的父親使用哪個身份？

1. 東方人
2. 中國人
3. 亞裔加拿大人
4. 華裔加拿大人
5. 加拿大人

6. 在 6 歲以前，您的朋友和同伴的民族血統是？

1. 幾乎全部是中國人，亞裔加拿大人，東方人
2. 主要是中國人，亞裔加拿大人，東方人
3. 幾乎同樣多的亞洲群體和歐裔群體
4. 主要是歐裔，非裔，拉美裔，或其他非亞裔族群
5. 幾乎全部是歐裔，非裔，拉美裔，或其他非亞裔族群

7. 從 6 到 18 歲，您的朋友和同伴的民族血統是？

1. 幾乎全部是中國人，亞裔加拿大人，東方人
2. 主要是中國人，亞裔加拿大人，東方人
3. 幾乎同樣多的亞洲群體和歐裔群體
4. 主要是歐裔，非裔，拉美裔，或其他非亞裔族群
5. 幾乎全部是歐裔，非裔，拉美裔，或其他非亞裔族群

8. 現在您在社區中與誰來往？

1. 幾乎全部是中國人，亞裔加拿大人，東方人
2. 主要是中國人，亞裔加拿大人，東方人
3. 幾乎同樣多的亞洲群體和歐裔群體
4. 主要是歐裔，非裔，拉美裔，或其他非亞裔族群
5. 幾乎全部是歐裔，非裔，拉美裔，或其他非亞裔族群

9. 如果可以選擇，您在社區中更傾向於與誰來往？

1. 幾乎全部是中國人，亞裔加拿大人，東方人
2. 主要是中國人，亞裔加拿大人，東方人
3. 幾乎同樣多的亞洲群體和歐裔群體
4. 主要是歐裔，非裔，拉美裔，或其他非亞裔族群
5. 幾乎全部是歐裔，非裔，拉美裔，或其他非亞裔族群

10. 您的音樂偏好是？

1. 只有華語音樂
2. 主要是華語音樂
3. 華語音樂和英語音樂同等
4. 主要是英語音樂
5. 只有英語音樂

11. 您的電影偏好是？

1. 只有華語電影
2. 主要是華語電影
3. 幾乎同樣多的華語電影和英文電影
4. 主要是英文電影
5. 只有英文電影

12. 您是哪一代？（請圈出最適合您的那一代）

1. 第一代 = 我出生在中國或其他加拿大以外的國家。
2. 第二代 = 我出生在加拿大，父母中至少一個出生在中國或其他加拿大以外的國家。
3. 第三代 = 我和父母都出生在加拿大，祖父母以及外祖父母都出生在中國或其他加拿大以外的國家。
4. 第四代 = 我和父母都出生在加拿大，祖父母和外祖父母中至少有一個出生在加拿大，並且至少有一個出生在中國或其他加拿大以外的國家。
5. 第五代 = 我、父母以及祖父母和外祖父母都出生在加拿大。
6. 由於缺少信息， 我不知道我屬第幾代。

13. 您是在哪裡被撫養長大的？

1. 只在中國

2. 主要在中國，少部分在加拿大
3. 幾乎同樣多的時間在中國和加拿大
4. 主要在加拿大，少部分在中國
5. 只在加拿大

14. 您與中國有什麼聯繫？

1. 在中國生活過一年或以上
2. 在中國生活過少於一年
3. 偶爾到中國探訪
4. 與生活在中國的人偶爾交流（書信，電話等等）
5. 與生活在中國的人沒有接觸或交流

15. 您在家中的食物偏好是？

1. 只有中國食物
2. 主要是中國食物，少部分加拿大食物
3. 幾乎同樣多的中國和加拿大食物
4. 主要是加拿大食物
5. 只有加拿大食物

16. 您在飯店中的食物偏好是？

1. 只有中國食物
2. 主要是中國食物，少部分加拿大食物
3. 幾乎同樣多的中國和加拿大食物
4. 主要是加拿大食物
5. 只有加拿大食物

17. 您…？

1. 只能閱讀中文
2. 比起英文，能更好地閱讀中文
3. 中文和英文閱讀水平同樣好
4. 比起中文，能更好地閱讀英文
5. 只能閱讀英文

18. 您…？

1. 只能寫中文
2. 比起英文，能更好地寫中文
3. 中文和英文書寫水平同樣好
4. 比起中文，能更好地寫英文
5. 只能寫英文

19. 如果考慮自己作為華人群體（華人，華裔加拿大人，加拿大的華人等等，不論您傾向於哪個術語）的一員， 您對這個群體有多少自豪感？

1. 非常自豪
2. 比較自豪
3. 有點自豪
4. 無自豪感但對該群體並無負面態度

5. 無自豪感並對該群體持有負面態度

20. 您會如何評價自己？

1. 非常中國化
2. 多半中國化
3. 雙重文化
4. 多半西化
5. 非常西化

21. 您參與華人的慶典、節日或傳統嗎？

1. 幾乎全部
2. 大多數
3. 部分
4. 少數
5. 根本不參與

22. 您在多大程度上主張中國的價值觀（例如關於婚姻，家庭，教育和工作）？請給自己打分。

1（不主張） 2 3 4 5（強烈主張）

23. 您在多大程度上主張加拿大（西方）的價值觀？請給自己打分。

1（不主張） 2 3 4 5（強烈主張）

24. 您與其他華人是否合得來？請給自己打分。

1（合不來） 2 3 4 5（非常合得來）

25. 您與非華裔加拿大人（西方人）是否合得來？請給自己打分。

1（合不來） 2 3 4 5（非常合得來）

26. 人們會用很多不同的方式來評價自己。 下列哪一項最能描述您是如何看待自己的？

1. 我基本上認為自己是中國人。儘管在加拿大生活和工作，我仍然認為自己基本上是中國人。
2. 我基本上認為自己是加拿大人。儘管我有中國的背景和特點，我仍然認為自己基本上是加拿大人。
3. 我認為自己是華裔加拿大人，儘管內心深處我一直知道自己是中國人。
4. 我認為自己是華裔加拿大人，儘管內心深處我首先把自己看作加拿大人。
5. 我認為自己是華裔加拿大人。我同時具有中國和加拿大的特點，我把自己看作是兩者的融合。

Appendix C

FOOD ACCEPTABILITY QUESTIONNAIRE

Please circle the appropriate response.

Food acceptability refers to foods that are personally and culturally acceptable to you. For example, are the foods recommended in a diet for Type 2 diabetes those that you want to eat?

1. In thinking about the foods that are part of a diet that you follow for your diabetes, how likely is it that you will regularly eat these foods?

Very unlikely Neutral Very likely

2. When choosing to buy foods that you prepare at home, how often do you choose foods that are part of a diet that you follow for your diabetes?

Never Seldom Usually Often Always

3. When you choose foods that are **NOT** part of your recommended diet, what are the main 3 reasons for this?

Reason 1_____

Reason 2_____

Reason 3_____

4. Since you were first diagnosed with diabetes, has your enjoyment of foods that are part of your recommended diet:

Decreased Stayed about the same Increased

5. Since you were first diagnosed with diabetes, has the frequency of eating food away from home:

Decreased Stayed about the same Increased

6. How many days out of the week do you enjoy the foods that are part of your recommended diet?

0 1 2 3 4 5 6 7

7. How many days of the week do you find yourself seeking out foods that are **NOT** part of your recommended diet?

0 1 2 3 4 5 6 7

8. How many days of the week do you eat foods that are part of your ethnic heritage?

0 1 2 3 4 5 6 7 N/A

9. How many days of the week do you eat foods that are **NOT** part of your ethnic heritage?
0 1 2 3 4 5 6 7 N/A

10. Has this changed since you were diagnosed with diabetes?
Yes No Don't know

11. How many days of the week do you eat foods that you would not have chosen to eat if you did not have Type 2 diabetes?
0 1 2 3 4 5 6 7

12. Do you eat foods that are produced locally (i.e. grown or produced in Alberta)?
Yes No Don't know

13. Do you believe those foods produced locally in Alberta are more diabetes friendly than those from elsewhere?
Yes Neutral No Don't know

14. Provide a list of the foods that you eat that are part of your diet for treating your diabetes and that are produced locally. Be as specific as possible.

Information about Your Recommended Diet

15. From the information you have received about your diabetes diet, is it clear to you:

What kinds of foods will be most beneficial for you?	Yes	No
What kinds of foods to avoid?	Yes	No
How often you should eat?	Yes	No
Which foods to keep handy for snacks?	Yes	No
Which foods are helpful on a sick day?	Yes	No
The glycemic index of foods that you eat	Yes	No
Foods which fill you up	Yes	No

食物可接受性問卷

請選出恰當的回答。

食物可接受性是指您從個人和文化角度可以接受的食物。例如，2 型糖尿病推薦飲食中的食物是否是您想要吃的？

1. 考慮您糖尿病飲食計劃中的食物，您有多大可能性會經常吃這些食物？
   很不可能　　中立　　很可能

2. 當購買在家中準備的食物時，您多久選擇一次糖尿病飲食計劃中的食物？
從不　　很少　　經常　　通常　　總是

3. 當您選擇推薦飲食**以外**的食物時，最主要的 3 個理由是什麼？

   理由 1_____

   理由 2_____

   理由 3 _____

4. 從您最初被診斷為糖尿病以來，對推薦飲食中食物的喜歡程度有何變化？
   降低了　　幾乎保持不變　　提高了
5. 從您最初被診斷為糖尿病以來，外出吃飯的頻率有何變化？
   減少了　　幾乎保持不變　　增加了
6. 您在一周內有幾天喜歡吃推薦膳食中的食物？
0　1　2　3　4　5　6　7

7. 您在一周內有幾天想要吃推薦膳食**以外**的食物？
   0　1　2　3　4　5　6　7

8. 您在一周內有幾天會吃您的民族特有食物？

   0　1　2　3　4　5　6　7　不適用

9. 您在一周內有幾天會吃民族特色**以外**的食物？
   0　1　2　3　4　5　6　7　不適用

10. 這從您被診斷為糖尿病以來有任何變化嗎？
是　　否　　不知道

11. 在一周內，您有幾天會吃那些如果您沒有糖尿病就不會吃的食物？
0　　1　　2　　3　　4　　5　　6　　7

12. 您吃當地生產的食物嗎（在阿爾伯塔生長或生產的食物）？
是　　否　　不知道

13. 您認為阿爾伯塔當地生產的食物比起其它地方的食物更有利於糖尿病人嗎？
是　　中立　　否　　不知道

14. 請列出您食用的並且屬您的推薦膳食的當地食物。儘量詳細。

關於您的推薦膳食的信息

15. 在您收到的關於您的糖尿病的信息中，下列內容是否清楚：

什麼類型的食物對您最有利？	是	否
要避免哪些種類的食物？	是	否
吃東西的頻率？	是	否
手邊備有哪些食物作為零食？	是	否
哪些食物會在身體不適的時候有所幫助？	是	否
您所吃的食物的血糖指數	是	否
會增加飽腹感的食物	是	否

Appendix D

DIETARY ADHERENCE QUESTIONNAIRE

Please Circle the best answer.

The questions below ask you about your diabetes diet activities during the past 7 days. If you were sick during the past 7 days, please think back to the last 7 days that you were not sick.

1. How many of the last SEVEN DAYS have you followed a healthful eating plan such as Eating Well with Canada's Food Guide with appropriate serving sizes?

   0 1 2 3 4 5 6 7

2. On average, over the past MONTH, how many WEEKS have you followed your eating plan for diabetes?

   0 1 2 3 4

3. On how many of the last SEVEN DAYS did you eat the number of fruit and vegetable servings you are supposed to eat based on Canada's Food Guide (women aged19 – 50: 7–8 servings; males aged 19 – 50: 8 – 10 servings; women and men over 50: 7 servings)?

   0 1 2 3 4 5 6 7

4. On how many of the last SEVEN DAYS did you eat carbohydrate-containing foods with a low Glycemic Index? (Example: dried beans, lentils, barley, pasta, low fat dairy products)

   0 1 2 3 4 5 6 7

5. On how many of the last SEVEN DAYS did you eat foods high in sugar as cakes, cookies, desserts, candies, etc.?

   0 1 2 3 4 5 6 7

6. On how many of the last SEVEN DAYS did you eat foods high in fibre such as oatmeal, high fibre cereals, whole grain breads?

   0 1 2 3 4 5 6 7

7. On how many of the last SEVEN DAYS did you space carbohydrates evenly throughout the day?

   0 1 2 3 4 5 6 7

8. On how many of the last SEVEN DAYS did you eat fish or other foods high in omega-3 fats?

   0 1 2 3 4 5 6 7

9. On how many of the last SEVEN DAYS did you eat food which contained or was prepared with canola, walnut, olive, or flax oils?

   0 1 2 3 4 5 6 7

10. On how many of the last SEVEN DAYS did you eat foods high in fat (such as high fat dairy products, fatty meat, fried foods or deep fried foods)?

    0 1 2 3 4 5 6 7

11. On how many of the last SEVEN DAYS did you consume any alcohol?

    0 1 2 3 4 5 6 7

12. On how many of the last SEVEN DAYS did you consume red wine?

    0 1 2 3 4 5 6 7

膳食依從性問卷

請選出最佳答案。

下列問題有關過去 7 天內您的糖尿病飲食活動。 如果您在過去 7 天內生病，請回想之前未生病的 7 天。

1. 在過去的**7天**中, 您有幾天遵循了具有適當份餐量的健康飲食計劃，比如加拿大食物指南Eating Well with Canada's Food Guide ？
   0 1 2 3 4 5 6 7
2. 平均而言，在過去的一個月中，您有幾個星期遵循了糖尿病的飲食計劃？
   0 1 2 3 4
3. 在過去7天中，您有幾天吃了“加拿大飲食指南”所指示的份量的水果和蔬菜？（女19-50歲：7-8份； 男19-50歲：8-10份；男女50歲以上：7份）
   0 1 2 3 4 5 6 7
4. 在過去7天中，您有幾天吃了具有低血糖指數的含碳水化合物的食物（例如，幹豆，扁豆，大麥，意大利面，低脂乳製品）？
   0 1 2 3 4 5 6 7
5. 在過去7天中，您有幾天吃了高糖食物（例如蛋糕，曲奇，甜點，糖果等）？
   0 1 2 3 4 5 6 7
6. 在過去7天中，您有幾天吃了高纖維食物， 比如燕麥片，高纖維麥片粥，全麥麵包？
   0 1 2 3 4 5 6 7
7. 在過去7天中，您有幾天將碳水化合物均勻地分開食用？
   0 1 2 3 4 5 6 7
8. 在過去7天中， 您有幾天吃了魚或其它富含Ω-3脂肪酸的食物？
   0 1 2 3 4 5 6 7
9. 在過去7天中，您有幾天吃了含有菜籽油、核桃油、橄欖油或亞麻籽油或者用它們準備的食物？
   0 1 2 3 4 5 6 7
10. 在過去7天中， 您有幾天吃了高脂食物（比如高脂乳製品、肥肉、油煎或油炸食物）？
    0 1 2 3 4 5 6 7
11. 在過去7天中，您有幾天喝過酒？
    0 1 2 3 4 5 6 7
12. 在過去7天中，您有幾天喝過紅酒？
    0 1 2 3 4 5 6 7

Appendix E

Godin Leisure-Time Exercise Questionnaire

Considering a **7-Day period** (a week), how many times on average do you do the following kinds of exercise for **more than 15 minutes?**

Times Per Week

A. STRENUOUS PHYSICAL ACTIVITY
(heart beats rapidly, sweating)

(e.g., running, jogging, hockey, soccer, squash, cross country skiing, judo, roller skating, vigorous swimming, vigorous long distance bicycling, vigorous aerobic dance classes, heavy weight training) _____

B. MODERATE PHYSICAL ACTIVITY
(not exhausting, light perspiration)

(e.g., fast walking, baseball, tennis, easy bicycling, volleyball, badminton, easy swimming, alpine skiing, popular and folk dancing) _____

C. MILD PHYSICAL ACITIVITY
(minimal effort, no perspiration)

(e.g., easy walking, yoga, archery, fishing, bowling, lawn bowling, shuffleboard, horseshoes, golf, snowmobiling) _____

Considering a **7-Day period** (a week), how often do you engage in any regular activity long enough to work up a sweat (heart beats rapidly)?

1. Often 2. Sometimes 3. Never/rarely

閒暇時間體育鍛煉問卷

以 7 天（一周）作為一個週期，您平均進行以下鍛煉（多於 15 分鐘）幾次？

每週幾次

A. 高強度體育活動（心跳迅速，流汗）
（例如， 跑步，慢跑，曲棍球，足球，壁球，越野滑雪，柔道，輪滑，劇烈游泳，劇烈長距離單車，劇烈有氧舞蹈，重量訓練）

_____

B. 中等強度體育活動（輕度流汗，無極度疲勞感）
（例如，快步走，壘球，網球，慢速騎自行車，排球，羽毛球，慢速游泳，高山滑雪，流行和民族舞蹈）

_____

C. 輕微體育活動（極不費力，不流汗）
（例如，慢走，瑜伽，射箭，釣魚，保齡球，草地保齡球，沙狐球，擲馬蹄鐵，高爾夫，雪地機車）

_____

以 7 天（一周）為一個週期，您多久進行一次時間長度足以流汗的運動（心跳迅速）？

1. 經常　　2. 有時　　3. 從不/很少

Appendix F

GENERAL HEALTH AND DIABETES TREATMENT QUESTIONNAIRE

Diabetes Treatment (please check all items that apply):

- ☐ Lifestyle (Diet + Exercise)
- ☐ Oral antidiabetic drugs
- ☐ Insulin

Please list all medications you take on a regular basis:

MEDICATION	CONDITION IT IS USED FOR	FREQUENCY	DOSE	BEFORE/AFTER FOOD

Have you been diagnosed by a doctor as having… (Please check that all apply)

	Heart trouble
	Cancer
	Chronic asthma, emphysema, or bronchitis?
	Osteoporosis
	Arthritis
	High blood pressure
	High cholesterol
	Hepatitis
	Back problem
	Foot problems

	Allergies
	Trouble hearing
	Trouble seeing
	Bladder control difficulties
	Balance problem or frequent falls
	Burning foot
	Poor appetite
	Kidney problems
	Other health problems

Are you a… (Please check one)

- ☐ Current, regular smoker
- ☐ Occasional smoker
- ☐ Former smoker
- ☐ Non-smoker

一般健康狀況及糖尿病治療問卷

糖尿病治療（選出所有適用選項）：

- □ 生活方式（飲食+鍛煉）
- □ 口服抗糖尿病藥
- □ 胰島素

請列出所有的您定期服用的藥物。

藥物名稱	用於什麼狀況	服用頻率	劑量	飯前/後

是否被醫生診斷為患有……(請選出所有適用的選項)

	心臟病		過敏
	癌症		聽力障礙
	慢性哮喘，肺氣腫或支氣管炎		視力障礙
			膀胱控制障礙
	骨質疏鬆		平衡問題或頻繁摔倒
	關節炎		
	高血壓		燒灼足
	高膽固醇		食欲不振
	肝炎		腎病
	背部問題		其他健康問題
	足病		

您是……(請選擇一項)

- □ 目前經常吸煙
- □ 偶爾吸煙
- □ 曾經吸煙
- □ 不吸煙

Appendix G

Three-day Food Record

三天飲食記錄

姓名/編號: _____

記錄日期: ___/_____ (月/日)

___/_____ (月/日)

___/_____ (月/日)

注意事項

- 請務必記下您在三天內**所有的**飲食攝入（包括零食和飲料，等等）。
- 儘量隨身攜帶飲食記錄表，並且在餐後**儘快**記錄，以免遺忘。
- 請在記錄表中填寫以下信息：

1. 您所記錄的是**哪一天**（日期）的飲食。
2. **用餐時間、地點及場合**。 例如：8:40—家中—早餐；10:30am—辦公室—零食。
3. 在“**食物及飲料名稱**”這一欄，請記錄您吃的所有食物和飲料的名稱。
4. 在“**詳細描述**”這一欄，請提供食物成份的詳細描述（名稱、口味、品牌、標籤信息等），以及您的攝入量：

   （1） 若是直接購買的食物，請寫出購買地點（e.g. T&T），以及食物的詳細描述，若有可能，請將食物的**營養成份標籤**剪下，並附于此記錄表；

   （2） 若在飯店就餐，請記錄食物詳細成份及您的摄入量，并記錄飯店名稱，以便于查詢食物營養成份；

   （3） 若是自家製作的食物，請記錄食譜（可借助於 cup、gram、ounce、teaspoon 及 tablespoon 等衡量單位），以及食物成份的**詳細**描述，例如，all-purpose white flour 1 cup， 2% milk 200ml 等等， 而不僅僅是 flour，milk。
5. 在“烹飪方法”一欄，寫出食物的製作方法，例如，蒸，煮，煎，炸，炒，等等。

- 如果您有任何疑問，請隨時聯繫本研究負責人鄧斐月，電話：**780-263-9729**，郵箱：**feiyue@ualberta.ca**

樣本　　第 **1** 天　　**2012** 年 **3** 月 **9** 日　　星期五

用餐時間、地點及場合	食物及飲料名稱	詳細描述 記錄食物**成份的名稱**並描述**口味、品牌、標籤信息**等； 用 cup, ml, g, oz ,teaspoon, tablespoon 等單位描述攝入量。		烹飪方法
		成份	**攝入量**	
8:00am 家中—早餐	海鮮烏冬面	冷凍烏冬面，讚岐	200 g	煮
		冷凍去頭基圍蝦	7 pieces	
		冷凍蛤蜊	⅓ cup	
		香菜	½ cup	
		橄欖油	½ teaspoon	
		芝麻油	½ teaspoon	
		鹽，table salt	1 teaspoon	
		五香豆干， 本末	75 g	
	豆漿	日昇 低糖高鈣豆漿皇	1cup (250ml)	
10:40am 辦公室-零食	腰果	原味	½ cup	
	牛奶	1%	125 ml	
	草莓	冷凍	6 pieces	

*請列出您攝入的營養補充物 (營養素名稱、品牌名稱，以及劑量和標籤信息等):

Calcium + D3 (Jamieson), 650mg Calcium+ 400IU Vitamin D3, 每天一粒

————————————————————————————————

第____ 天　　___年____月____日　　星期____

用餐時間、地點及場合	食物及飲料名稱	詳細描述 記錄食物**成份的名稱**并描述**口味**、**品牌**、**標籤信息**等；用 cup, ml, g, oz ,teaspoon, tablespoon 等單位描述攝入量。		烹飪方法
		成份	**攝入量**	

*請列出您攝入的營養補充物 (營養素名稱、品牌名稱，以及劑量和標籤信息等):

Appendix H

Interview protocol
Dietary Needs Assessment of Chinese with Type 2 Diabetes

***Opening section**:*

Welcome and thank you for coming to the interview today. The goal of my research is to develop a menu plan specifically for Chinese people with type 2 diabetes living in Canada. As the first step, I need to know more about your dietary needs. And that is the purpose of the interview today. More specifically, I want to get the information about your dietary preferences, what you like and don't like about your diet, your barriers to following a healthier diet, or your expectation for a diet plan that you would like to follow to manage your diabetes, and so on.

Your opinions are extremely important to the research, and I want you to feel free to tell me exactly what you think. So I can know what you need and then try my best to meet your needs in the menu plan development, which is the next step of the project. But your participation today is voluntary, and you can withdraw at any time, for any reason. Also, if you have any questions or want to take a break during the interview, please let me know. Now before we get started, do you have any questions?

Question section:

1. What dietary information or recommendations have you received to control your diabetes?

2. How did you get the information?

3. How has the information worked for you in terms of diabetes management?

4. What are the advantages and disadvantages of the current information?

5. What is your usual diet? What influences your food choices?

6. What are your food-related health beliefs, if you have any? How have these beliefs affected you and your diet?

7. What are the barriers, if any, for you to adhering to the current information about diet that you have received to control your diabetes?

8. What do you think of a Chinese menu plan for diabetes management? What would you expect from such a menu plan?

9. In the end, do you have anything else to add?

Closing section:

Thank you for sharing your opinions. The information you provided are critical to the development of an effective menu plan. We are open to suggestions, so please feel free to contact me when you have new ideas come up later on. And then based on your preferences and the recommended nutritional intake for diabetes, we will devise a menu plan for Chinese people with type 2 diabetes in Alberta.

華人二型糖尿病患者膳食需求評估訪問計劃

介紹部分：

首先感謝您參與今天的訪問。本研究的目標是為居住在加拿大的華人二型糖尿病患者發展一份菜單計劃。作為這一研究的第一步，我想瞭解一下您的飲食需求以及是什麼阻礙了您遵循更為健康的飲食。這也是今天訪問的主要目的。您的觀點和想法對本研究至關重要，在本次訪問中，您可以自由地表達自己的真實想法。我們不會在結果報告中暴露您的真實名字和身份。在瞭解了您的飲食需要之後，我們會盡力在下一步的菜單發展過程中相應地滿足這些需要。

您的參與是完全自願的，您可以隨時終止本次訪問。如果您在本次訪問過程中有任何疑問或者想要休息，請隨時告訴我。在我們正式開始之前，您有什麼問題嗎？

問題部分：

1. 關於糖尿病的控制，您收到了什麼樣的飲食方面的信息或指導？
2. 您如何獲得這些飲食信息的？
3. 這些飲食信息對於您的糖尿病管理起到了什麼樣的作用？
4. 您認為這些飲食信息或指導有什麼長處和短處？
5. 您的飲食通常是什麼樣子的？是什麼影響您的飲食選擇？
6. 您有什麼關於飲食的健康信念？這些信念如何影響您的飲食的？
7. 您遵循現有的飲食信息和指導的時候遇到過什麼阻礙？
8. 您對針對華人糖尿病管理的健康菜單有什麼看法？如果為華人二型糖尿病患者發展一個文化特異性的菜單， 您對它會有什麼樣的期待？
9. 最後，您還有什麼要補充的嗎？

結束部分：

非常感謝您分享這些關於飲食的信息。您提供的信息能夠幫助我們發展一份有效並且能被華人接受的文化特異性的菜單。我們樂意廣泛地採納建議，如果您在今後有什麼新的想法，請隨時聯繫我。我們會盡力將這些想法融入到一份利於控制二型糖尿病的菜單計劃中。

Appendix I

華人二型糖尿病菜單計劃的初步試驗

練習簿

參與者編號：_____

開始日期：_____

結束日期：_____

健康飲食是預防和治療糖尿病過程中一個非常重要的部分，但同時也被認為是最難實施的。我們希望通過這個菜單計劃研究課題，幫助您逐漸養成健康飲食習慣。

第 1 周

改變飲食習慣並不容易，讓我們首先想一下，從健康飲食中能得到什麼好處，又有什麼是您可能需要放棄的？

“得”（對於我自己）	“失”（對於我自己）	應對計劃（在儘量減少損失的情況下，盡可能多的得到好處）
“得”（對於我身邊的人）	“失”（對於我身邊的人）	應對計劃

學習任務 1：《加拿大食品指南》

學習任務 2：練習計算食物份數

小練習： 首先辨別下表中的每一種食材分別對應加拿大食品指南的哪個類別。然後，參照食品指南對於“多少是一份” 的規定，計算這些食材的份數，將其寫在相應的空格中。

製作一份炒烏冬面所需的主要材料	食品指南份數				
	蔬菜和水果	**糧食類食品**	**奶類和替代品**	**肉類和替代品**	**添加的油**
熟的烏冬面 ½ 杯					
青椒 ½ 個					
胡蘿蔔 ⅛ 杯					
生的豬裡脊肉 45 克					
豆腐 50 克					
菜籽油 ¼ 湯匙					
總的					

學習任務 3：量度食物份量的一些簡單方法（GPS 中間兩頁：碟量法 + 簡易份量指南）

設定第 1 周的目標

現在請在下表中寫下您在接下來一個星期的每一天計劃吃四個食品類別中的食物各多少份？

回家後，每天在表中記下實際吃的份數，從而進行對比，看是否達到自己設定的目標。如果您實際吃的份數達到了加拿大食品指南的推薦，請在表格中對應的那一天打鉤。

遵循加拿大食品指南

	星期一	星期二	星期三	星期四	星期五	星期六	星期日
蔬菜和水果							
糧食類食品							
肉類和替代品							
奶類和替代品							

爭取獎勵分！

（如果做到了下列某一項，請在對應的空格中打鉤。）

	星期一	星期二	星期三	星期四	星期五	星期六	星期日
吃至少一份深綠色蔬菜							
吃至少一份橙色蔬菜							
吃一份肉類替代品							
吃一份魚							
口渴的時候就喝水							

我的目標是一天得_____分（打鉤的個數）。

檢查自己的目標完成情況（每天的總得分）

星期一	星期二	星期三	星期四	星期五	星期六	星期日

我會用以下方法來幫助自己控制恰當的飲食份量：

使用碟量法。 ☐

使用簡易份量指南。 ☐

使用菜單計劃中的食譜。 ☐

制定購物清單。 ☐

其他目標：

_____

_____

_____

_____

_____

_____

_____

您有多大的信心可以在接下來一周內達到自己的目標？

1. 一点	2. 不太	3. 中等	4. 很有	5. 极度

您覺得一周內有幾天能確保達到目標？

0 1 2 3 4 5 6 7

第 2 周

首先回顧上周的目標完成情況：
上一個星期有幾天完成了飲食目標？

_____

什麼起了作用：
在完成目標的那幾天，您做了什麼讓自己能夠完成目標？

_____

_____

_____

什麼不起作用：
在沒有完成目標的那幾天，您做了什麼？

_____

_____

_____

誰幫了忙？
您有沒有告訴其他人關於您設定的飲食目標？
有　　沒有

您周圍有沒有能夠幫您完成飲食目標的人？
有　　沒有

您的朋友、同事或家人如何能夠幫您完成您設定的飲食目標？

遇到的困難與挑戰	應對策略

學習任務 1：如何使用《菜單計劃》和營養成分表

小練習：閱讀營養成分表（從菜單計劃中找幾個例子進行對比）

學習任務 2：飲食規劃和菜單設計

小練習：從菜單計劃中挑選喜歡的食譜組成一天的菜單，確保食物份量達到食品指南的推薦。

學習任務 3：升糖指數

設定第 2 周的目標

現在請在下表中寫出您在接下來一個星期的每一天計劃吃四個食品類別中的食物各多少份？

回家後，每天在表中記下實際吃的份數，從而進行對比，看是否達到設定的目標。如果您實際吃的份數達到了加拿大食品指南的推薦，請在表格中對應的那一天打鉤。

遵循加拿大食品指南

	星期一	星期二	星期三	星期四	星期五	星期六	星期日
蔬菜和水果							
糧食類食品							
肉類和替代品							
奶類和替代品							

爭取獎勵分！

（如果做到了下列某一項，請在對應的空格中打鉤。）

	星期一	星期二	星期三	星期四	星期五	星期六	星期日
吃至少一份深綠色蔬菜							
吃至少一份橙色蔬菜							
吃一份肉類替代品							
吃一份魚							
口渴的時候就喝水							

我的目標是一天得_____分（打鉤的個數）。

檢查自己的目標完成情況（每天的總得分）

星期一	星期二	星期三	星期四	星期五	星期六	星期日

我會用以下方法來幫助自己控制恰當的飲食份量：

使用碟量法。 ☐

使用簡易份量指南。 ☐

使用菜單計劃中的食譜。☐

制定購物清單。 ☐

其他目標：

_____

_____

_____

_____

_____

_____

_____

您有多大的信心可以在接下來一周內達到自己的目標？

1. 一点	2. 不太	3. 中等	4. 很有	5. 极度

您覺得一周內有幾天能確保達到目標？

0 1 2 3 4 5 6 7

第 3 周

首先回顧上周的目標完成情況：
上一個星期有幾天完成了飲食目標？

_____

什麼起了作用：
在完成目標的那幾天，您做了什麼讓自己能夠完成目標？

_____

_____

_____

什麼不起作用：
在沒有完成目標的那幾天，您做了什麼？

_____

_____

_____

誰幫了忙？
您有沒有告訴其他人關於您設定的飲食目標？
有　　沒有

您有能夠幫您完成飲食目標的人嗎？
有　　沒有

您的朋友、同事或家人如何能夠幫您完成您設定的飲食目標？

_____

_____

_____

分享您的菜單計劃使用經歷：

您喜歡這份菜單計劃的什麼地方？

_____

_____

下周您會採取什麼不同的措施或者方法？

_____

_____

如果您有對食譜進行改編，是哪些原因促使您這樣做？

_____

_____

學習任務 1：閱讀食品包裝上的標簽

份量（serving size）：對同類食品的營養成分進行比較時，比如含糖量的高低，要注意表格中列出的份量大小。

成分（ingredients）： 食品包裝上的食物成分列表，是按照重量從大到小的順序排列。排在前面的表示含量較高，排在後面的表示含量較低。例子。

設定第 3 周的目標

現在請在下表中寫出您在接下來一個星期的每一天計劃吃四個食品類別中的食物各多少份？

回家後，每天在表中記下實際吃的份數，從而進行對比，看是否達到設定的目標。如果您實際吃的份數達到了加拿大食品指南的推薦，請在表格中對應的那一天打鉤。

遵循加拿大食品指南

	星期一	星期二	星期三	星期四	星期五	星期六	星期日
蔬菜和水果							
糧食類食品							
肉類和替代品							
奶類和替代品							

爭取獎勵分！

（如果做到了下列某一項，請在對應的空格中打鉤。）

	星期一	星期二	星期三	星期四	星期五	星期六	星期日
吃至少一份深綠色蔬菜							
吃至少一份橙色蔬菜							
吃一份肉類替代品							
吃一份魚							
口渴的時候就喝水							

我的目標是一天得_____分（打鉤的個數）。

檢查自己的目標完成情況（每天的總得分）

星期一	星期二	星期三	星期四	星期五	星期六	星期日

我會用以下方法來幫助自己控制恰當的飲食份量：

使用碟量法。 ☐

使用簡易份量指南。 ☐

使用菜單計劃中的食譜。 ☐

制定購物清單。 ☐

其他目標：

_____

_____

_____

_____

_____

_____

_____

您有多大的信心可以在接下來一周內達到自己的目標？

1. 一点	2. 不太	3. 中等	4. 很有	5. 极度

您覺得一周內有幾天能確保達到目標？

0 1 2 3 4 5 6 7

第 4 周

首先回顧上周的目標完成情況：
上一個星期有幾天完成了飲食目標？

_____

什麼起了作用：
在完成目標的那幾天，您做了什麼讓自己能夠完成目標？

_____

_____

_____

什麼不起作用：
在沒有完成目標的那幾天，您做了什麼？

_____

_____

_____

防止 "退步"現象（飲食又回到不健康的狀態）：

考慮到生活中可能會遇到的阻礙，比如工作忙碌、偶爾生病等，長期堅持健康飲食、完成設定的目標並不是一件容易的事。如果沒有完成設定的飲食目標，您會作何感想？

提前計劃，找到“高危”情況的應對策略（高危情況是指那些阻礙您達到健康飲食目標的情況）。

您有沒有曾經在選擇健康食物的時候遇到過麻煩或阻礙？如果有，請列出。

如果您在嘗試健康飲食的過程中遇到過阻礙，是什麼幫助您克服這些阻礙的？

誰在您遇到阻礙的時候能夠幫您克服阻礙，並且繼續堅持健康飲食？

朋友	同事	家人	寵物

為了幫助您在健康飲食的道路上繼續前行，請在下表中寫出針對不同阻礙的解決方案：

困難和阻礙（在哪些情況下很難完成目標）	**解決方案**（有什麼措施可以幫您克服這些困難，堅持完成目標）

設定第 4 周的目標

現在請在下表中寫出您在接下來一個星期的每一天計劃吃四個食品類別中的食物各多少份？

回家後，每天在表中記下實際吃的份數，從而進行對比，看是否達到設定的目標。如果您實際吃的份數達到了加拿大食品指南的推薦，請在表格中對應的那一天打鉤。

遵循加拿大食品指南

	星期一	星期二	星期三	星期四	星期五	星期六	星期日
蔬菜和水果							
糧食類食品							
肉類和替代品							
奶類和替代品							

爭取獎勵分！

（如果做到了下列某一項，請在對應的空格中打鉤。）

	星期一	星期二	星期三	星期四	星期五	星期六	星期日
吃至少一份深綠色蔬菜							
吃至少一份橙色蔬菜							
吃一份肉類替代品							
吃一份魚							
口渴的時候就喝水							

我的目標是一天得_____分（打鉤的個數）。

檢查自己的目標完成情況（每天的總得分）

星期一	星期二	星期三	星期四	星期五	星期六	星期日

我會用以下方法來幫助自己控制恰當的飲食份量：

使用碟量法。 ☐

使用簡易份量指南。 ☐

使用菜單計劃中的食譜。 ☐

制定購物清單。 ☐

其他目標：

_____

_____

_____

_____

_____

_____

_____

您有多大的信心可以在接下來一周內達到自己的目標？

1. 一点	2. 不太	3. 中等	4. 很有	5. 极度

您覺得一周內有幾天能確保達到目標？

0 1 2 3 4 5 6 7

課外活動：超市購物指導

PANDA Physical Activity & Nutrition for Diabetes in Alberta

Participant ID _____

Appendix J

Diabetes Knowledge Test

Please circle the right answer.

1. The diabetes diet is:

a. the way most American people eat

b. a healthy diet for most people

c. too high in carbohydrate for most people

d. too high in protein for most people

2. Which of the following is highest in carbohydrate?

a. Baked chicken

b. Swiss cheese

c. Baked potato

d. Peanut butter

3. Which of the following is highest in fat?

a. 2% low fat milk

b. Orange juice

c. Corn

d. Honey

4. Glycosylated hemoglobin (hemoglobin A1C) is a test that is a measure of your average blood glucose level for the past:

a. day

b. week

c. 6-12 weeks

d. 6 months

5. What effect does unsweetened fruit juice have on blood glucose?

a. Lowers it

b. Raises it

c. Has no effect

6. Which should not be used to treat low blood glucose?

a. 3 hard candies

b. 1/2 cup orange juice

c. 1 cup diet soft drink

d. 1 cup skim milk

7. Eating foods lower in fat decreases your risk for:

a. nerve disease

b. kidney disease

c. heart disease

d. eye disease

糖尿病營養知識測驗

請選出您認為正確的一項

1. 糖尿病飲食是：

a. 大多數加拿大人的飲食

b. 適合於大多數人的健康飲食

c. 對大多數人來說，其中的碳水化合物含量太高

d. 對大多數人來說，其中的蛋白質含量太高

2. 下列哪一項的碳水化合物含量最高？

a. 烤雞肉

b. 瑞士乾酪

c. 烤馬鈴薯

d.花生醬

3. 下列哪一項的脂肪含量最高？

a. 2% 低脂牛奶

b. 橙汁

c. 玉米

d. 蜂蜜

4. 糖化血紅蛋白（A1c）可以反映您過去多長一段時間的平均血糖水平？

a. 一天

b. 一個星期

c. 6-12 個星期

d. 6 個月

5. 未加糖的果汁對血糖有什麼影響？

a. 降低血糖

b. 升高血糖

c. 無影響

6. 下列哪一項不應該用來應對低血糖？

a. 三顆糖果

b. 半杯橙汁

c. 一杯無糖減肥飲料

d. 一杯脫脂牛奶

7. 吃低脂肪的食物可以降低下列哪種疾病的患病風險？

a. 神經疾病

b. 腎病

c. 心臟病

d. 眼睛疾病

Appendix K

Sample 例子 1（每餐兩個菜式 two dishes per meal）

菜單		食物的原料	加拿大食品指南份數
早餐	雜糧粥（2 份） (見食譜，第 15 頁)	薏米 1/12 杯 (20 毫升) 小黃米 1/12 杯 (20 毫升) 黑米 1/12 杯 (20 毫升) 糙米 1/12 杯 (20 毫升)	2 份 糧食類 1 份 水果 1 份 肉類替代品
	原味腰果	原味腰果 4 湯匙（60 毫升）	
	木瓜	木瓜 ½ 個	
上午零食	鷹嘴豆泥和梳打餅乾	低鹽/無鹽梳打餅乾 30 克 鷹嘴豆泥 3 湯匙	1 份 糧食類 ¼ 份 肉類替代品 1 份 奶類替代品
	強化豆奶	強化豆奶 1 杯	
午餐	四季豆炒雞肉(2 份) (見食譜，第 40 頁)	主料（2 份的量）： 雞肉 ½ 杯（90 克） 四季豆 1 杯	1 份 糧食類 1¼ 份 肉類和替代品 4 份 蔬菜 1 份 奶類替代品
	番茄炒蛋（1 份） (見食譜，第 34 頁)	主料： 番茄 1 杯（1 個） 雞蛋 ½ 個	
	混合米飯 (白米:糙米=1:1)	混合米飯 ½ 杯（熟的）	
	優酪乳	2%低脂優酪乳 175 克	
下午零食	蘋果	中等大的蘋果 1 個	1 份 水果
晚餐	蒸蘆筍（1 份）	蘆筍 6 根	2 份 糧食類食品 2 份 蔬菜 ½ 份 肉類
	青椒炒肉片（1 份） (見食譜，第 62 頁)	主料： 青椒 ½ 個 豬裡脊 ¼ 杯（45 克）	
	混合米飯 (白米:糙米=1:1)	混合米飯 1 杯（熟的）	
晚上零食	全麥麵包 1% 低脂牛奶	全麥麵包 ½ 片（每片 35 克） 1%低脂牛奶 1 杯	½ 份 糧食類食品 1 份 奶類

一天攝入的總份數			6½ 份　糧食類食品 8 份　蔬菜和水果 3 份　肉類和替代品 3 份　奶類和替代品

營養分析	**如何根據自己的卡路里需求量調整菜單：**
卡路里：1926 千卡 碳水化合物： 278 克 膳食纖維：28 克 蛋白質：88 克 脂肪：56 克 飽和脂肪：13 克 膽固醇：229 毫克 鈉：1694 毫克	通過以下方式可以減少 200 千左右： • 早餐減去木瓜（減少 60 千卡） • 晚餐米飯減少半杯（減少 105 千卡） • 晚上零食減去半杯牛奶（減少 50 千卡） 通過以下方式可以增加 200 千卡左右： • 午餐增加半杯米飯 (增加 105 千卡) • 下午零食增加 6 克/5 個杏仁（增加 35 千卡） • 晚餐增加一個梨 (增加 60 千卡)

Sample 例子 2（每餐一個菜式 one dish per meal）

菜單		**食物的原料**	**加拿大食品指南份數**
早餐	吐司和豆漿	全麥吐司麵包　1 片 無糖無鹽花生醬 1 湯匙 強化豆漿　1 杯 藍莓　½ 杯	1 份　水果 1 份　糧食類 1 份　奶類替代品 ½ 份　肉類替代品
上午零食	鷹嘴豆泥和餅乾	鷹嘴豆泥　6湯匙(90毫升) 全麥梳打餅乾　30 克	1份　糧食類 ½份　肉類替代品
午餐	什錦炒肉丁（2 份） (見食譜，第 68 頁)	主料(2 份的量)： 豬裡脊肉　¼杯（45 克） 黃瓜　¾杯（90 克） 玉米粒　¼杯 紅甜椒　¼個	2 ½份 蔬菜 2 份　糧食類 ½份　肉類
	糙米	煮熟的糙米　1 杯	
下午零食	餅乾和優酪乳	30 克　粉葛餅乾 175 毫升　低脂原味優酪乳	1 份　糧食類食品 1 份　奶類和替代品
晚餐	蘆筍炒蝦（2 份） (見食譜，第 52 頁)	主料（2 份的量）： 蘆筍　1½杯 (18 條中等大小) 蝦　½杯 (90 克)	3 份　蔬菜 2 份　糧食類食品 1 份　肉類
	白米飯	煮熟的白米飯 1 杯	

晚上零食	橙子（柳丁）	橙子（柳丁） 1 個	1 份 水果
一天攝入的總份數			7½ 份 蔬菜和水果 7 份 糧食類食品 2 份 奶類和替代品 2½份 肉類和替代品

營養分析	**如何根據自己的卡路里需求量調整菜單：**
卡路里： 1833 千卡 碳水化合物：258 克 膳食纖維：30 克 蛋白質：82 克 脂肪：59 克 飽和脂肪：12 克 膽固醇：177 毫克 鈉：1836 毫克	通過以下方式可以減少 200 千卡左右： • 晚餐的米飯減少半杯（減少 105 千卡） • 略去晚上作為零食的柳丁（減少 50 千卡） • 下午的零食減少 15 克餅乾（減少 45 千卡） 通過以下方式可以增加 200 千卡左右： • 晚餐增加 200 毫升 2%的低脂奶（增加 100 千卡） • 上午零食多加一個蘋果（增加 50 千卡） • 下午零食多加一湯匙碎的核桃仁（增加 50 千卡）

Appendix L

Pilot test of a Chinese menu plan for T2D - Interview Script

Introduction:

First, I want to thank you for coming. Through this interview, I want to learn about your experience of using this menu plan, any obstacles you might have had, and suggestions about the plan, which will be used as a reference to modify the menu plan. Your opinions are very important to the research, so please feel free to talk about what you really think. Any identifiable information will be removed in the report of the study. Your participation is voluntary. You can end the interview or withdraw from the study anytime you want. If you have any questions or want to take a break during the interview, please let me know. Before we get started, do you have any questions?

Questions: (*Actual questions might be slightly different*)

1. What is your general impression of this menu plan?
2. What have you learned since you participated in this study?
3. What information or tools in this program were helpful to you? How did they help you?
4. How has your diet changes since you participated in this study?
5. What factors influence your food choice? How about before you participated?
6. How do your family and friends around you influence your diet?
7. What health beliefs do you have? How do these beliefs influence your diet?
8. To what extent have you been following the menu plan and other nutritional recommendations?
9. What barriers have you had to adhering to the menu plan and other nutritional recommendations we provided?
10. What suggestions do you have for this menu plan?
11. In the end, do you have anything to add?

Summary:

Thank you very much for sharing the information, which will help us with improving the menu plan. After modifying the menu plan, we might have a larger study to test it and hopefully promote it among Chinese who need such a culturally relevant nutrition guide.

華人二型糖尿病菜單計劃初步試驗訪問腳本

介紹部分：

首先感謝您參與今天的訪問。這次訪問主要是瞭解一下您使用這份菜單計劃的經歷、使用過程中遇到的困難、以及您對這份菜單計劃的看法和改善建議。您提供的反饋意見將會作為修改該菜單計劃的參考。希望您在訪問過程中能夠表達自己的真實想法。任何個人身份信息都不會在結果報告中出現。您的參與是完全自願的，您可以隨時終止本次訪問。如果您在訪問過程中有任何疑問或者想要休息，請隨時告訴我。在我們正式開始之前，您有什麼問題嗎？

問題部分：

1. 您對這份菜單計劃的總體印象是什麼？
2. 參加這個研究以來，您學到了什麼東西？
3. 整個研究過程中，哪些內容或環節對你有所幫助？體現在哪？
4. 參加這個研究給你的飲食帶來了什麼樣的變化？
5. 參加研究之後，是哪些因素影響您的飲食選擇？與之前相比有什麼不同？
6. 家人或您身邊的人對您的飲食有什麼影響？
7. 您有什麼樣的關於飲食的健康理論？
8. 您在多大程度上遵循我們提供的菜單計劃和其他飲食推薦？是哪些原因導致您沒有完全遵循?
9. 您在使用這個菜單計劃的 3 個月內遇到過什麼困難？
10. 針對這個菜單計劃和整個項目，您有什麼樣的建議？
11. 最後，您有什麼要補充的嗎？

結束部分：

非常感謝您提供這些反饋意見，這些信息能夠幫助我們完善這份菜單計劃。我們之後會對這個菜單計劃進行大規模的試驗和推廣，希望能夠對您以及其他華人患者有所幫助。

Appendix M

華人二型糖尿病菜單計劃

A Chinese Menu Plan for Type 2 Diabetes



阿爾伯塔大學

University of Alberta

PANDA (Physical Activity and Nutrition for Diabetes in Alberta) 課題組

2015年 編印

目錄

1 前言

Physical Activity and Nutrition for Diabetes in Alberta （PANDA）是一個跨學科、多層面的的課題項目， 旨在通過營養幹預和體育鍛煉的方法，改善患有二型糖尿病的阿爾伯塔居民的代謝控制，降低糖尿病並發癥的發病率，從而提高生活質量。作為該項目的分支，我們專門針對華人的飲食習慣制定了這一份菜單計劃，為華人患者提供飲食指導和參照。

1.1 健康飲食與二型糖尿病

二型糖尿病的治療方法一般包括飲食、鍛煉 或者服用處方藥， 目的在於使血糖維持在推薦的正常範圍內（ 4-7 mmol/L）。

健康飲食是治療二型糖尿病的重要基礎。 加拿大糖尿病協會臨床實踐準則提供了針對二型糖尿病患者關於碳水化合物、蛋白質、脂肪以及其他營養素的建議。該準則建議二型糖尿病患者遵循 加拿大食品指南， 從蔬果、糧食、乳製品和替代品以及肉類和替代品四大類當中攝取多樣化的食物，確保營養均衡。

1.2 這份菜單計劃將怎樣促進您的健康飲食？

根據加拿大統計局2006年普查結果，在加拿大，華人是繼南亞裔之後第二大少數民族群體；而在阿爾伯塔省，華人是最大的少數民族群體，大約佔據該省總人口的4.2%，並且其中大部分是第一代移民。對於少數民族尤其是移民來說，由於語言、文化和生活習慣等方面的差異， 將加拿大的營養推薦轉化為實際操作並非易事。 考慮到此， 我們設計了這份“華人二型糖尿病菜單計劃”， 意在幫助華人患者更好地遵循加拿大糖尿病協會（Canadian Diabetes Association）和加拿大食品指南（Canada’s Food Guide）的飲食建議，將籠統的推薦轉化為實際可行的菜單。

這份菜單計劃的可行性體現在以下幾方面：一是，所用到的食材全部取自當地的連鎖超市，容易購買；二是，多數食材並不昂貴，經濟上可行；三是，食材選擇以及烹飪方法考慮到了華人的飲食習慣，更易被接受；另外，這份計畫給出了不同的一日菜單例子供您參考（見第3-5頁）， 您可以仿照這些例子，結合自己的飲食偏好制定個性化的日常菜單，通過幾次練習，您就可以熟練地為自己量身定制符合營養推薦的一日三餐及零食。逐漸地，健康飲食將自然而然成為您的一種習慣。值得一提的是，這份菜單計劃並非只適用於糖尿

病患者，它也可以幫助預防和延緩二型糖尿病的發生，所以不妨邀請家人和身邊的朋友共同使用，相互督促和鼓勵。此外，這份計畫也含有一些烹飪方法和小貼士，並列出了每個食譜的營養成分分析，以供您參考。

這份菜單計劃將協助您在享用傳統食物的同時， 遵循營養治療的原則， 達到營養均衡。 我們希望這份菜單計畫能對您的二型糖尿病管理有所幫助。

2. 怎樣使用這份菜單計劃

2.1 怎樣利用這份計劃中的食譜來創建您自己的日常菜單

這個菜單計劃十分靈活，您可以從中挑選出您喜歡的食譜，組合成為一天的菜單。您也可以對這些食譜進行修改和原料替換，使其符合您的口味。表格1列出了加拿大食品指南推薦的四大食物類別，以及多少是所謂的“一份”。請查閱附帶的《加拿大食品指南》，找到針對不同年齡和性別的食品類別推薦攝入量，以及其他關於飲食與運動的建議。值得註意的是， 這份菜單計劃的目的不是為了取代醫療人員給您的建議，而是為了協助您更好地實行這些建議，使其具體化以便操作。

您不需嚴格遵循每一個食譜，可以根據個人偏好和健康目標對食譜做出調整，並且自行決定一日菜單中選用哪些食譜。比如，您可以在每天晚上計劃好第二天的菜單，或者在每個週末計劃好下一個星期的菜單，以便於提前購買食材。下頁中的例子1 和2 向您展示了如何制定一天的菜單，使四大食物類別符合推薦的份量。這份計劃提供的每個食譜都附有營養分析，這些營養分析是針對“每一份”（食譜當中有標明份數），而不是整個食譜的量。您可以根據每餐食用的菜式種類的多少，決定吃一份或者多份。例如，如果您每餐只吃一道菜，您可能需要吃兩份的量甚至更多；如果每餐菜式種類較多，每道菜您可能只需要一份、半份或者更少，這樣加起來才不會過量。 另外，加拿大食品指南建議減少飽和脂肪比如豬油、牛油等的使用，盡量選用不飽和脂肪，包括菜籽油/芥花油、玉米油、亞麻籽油、橄欖油、花生油、豆油以及葵花籽油等植物油，每人每天的食用量控制在兩到三湯匙（30-45毫升）。烘焙糕點的時候，如果需要用到黃油（butter），盡量用軟質人造黃油（soft margarine）代替。在購買人造黃油的時候，注意選擇非氫化的（non-hydogenated）。

表格1. 加拿大食品指南推薦的四大食品類別以及一份食品的例子

（可以依據此表格對食譜中的食材進行替換）

蔬菜和水果	糧食類食品
• ½ 杯 熟的葉類蔬菜 • 1 杯 生的葉類蔬菜 • ½ 杯 新鮮、冷凍或罐裝水果、根莖類和瓜類蔬菜 • ¼ 杯 水果乾 • ½ 杯 純蔬菜汁/水果汁 • 1個 中等大小的水果例如香蕉、蘋果、梨、橙子（柳丁）等 • 2-3個 小型水果例如杏、無花果	• ½ 杯 熟的米飯、粥、麵 • ½ 個/ 35 克 餅類、饅頭 • 1片 / 35 克 麵包片 • ½ 個/ 45克 硬麵包圈（bagel） • ¾ 杯/ 150克 熱麥片粥 • 30 克 冷麥片 • 30克 餅乾
奶類和替代品	**肉類和替代品**
• 1 杯 牛奶、強化豆奶 • ½ 杯 罐裝濃縮淡奶 • ¾ 杯/ 175 克 半固體優酪乳 • 200毫升 液體優酪乳 • 50 克 乳酪	• 75克/125 毫升 熟的海鮮、瘦肉 (生肉稍重，約90克) • 150克 豆腐 • 2個 雞蛋 • ¾ 杯 熟的或罐裝豆子 • 2 湯匙 花生醬或堅果醬 • ¼ 杯 去殼堅果或籽類 • ¾ 杯 鷹嘴豆泥

例子 1（每餐兩個菜式）

菜單		食物的原料	加拿大食品指南份數
早餐	雜糧粥（2 份） (見食譜，第 15 頁)	薏米 1/12 杯 (20 毫升) 小黃米 1/12 杯 (20 毫升) 黑米 1/12 杯 (20 毫升) 糙米 1/12 杯 (20 毫升)	2 份 糧食類 1 份 水果 1 份 肉類替代品
	原味腰果	原味腰果 4 湯匙（60 毫升）	
	木瓜	木瓜 ½ 個	
上午零食	鷹嘴豆泥和梳打餅乾	低鹽/無鹽梳打餅乾 30 克 鷹嘴豆泥 3 湯匙	1 份 糧食類 ¼ 份 肉類替代品 1 份 奶類替代品
	強化豆奶	強化豆奶 1 杯	
接下頁→			

午餐	四季豆炒雞肉(2 份) (見食譜，第 40 頁)	主料（2 份的量）： 雞肉 ½ 杯（90 克） 四季豆 1 杯	1 份 糧食類 1¼ 份 肉類和替代品 4 份 蔬菜 1 份 奶類替代品
	番茄炒蛋（1 份） (見食譜，第 34 頁)	主料： 番茄 1 杯（1 個） 雞蛋 ½ 個	
	混合米飯 (白米:糙米=1:1)	混合米飯 ½ 杯（熟的）	
	優酪乳	2%低脂優酪乳 175 克	
下午零食	蘋果	中等大的蘋果 1 個	1 份 水果
晚餐	蒸蘆筍（1 份）	蘆筍 6 根	2 份 糧食類食品 2 份 蔬菜 ½ 份 肉類
	青椒炒肉片（1 份） (見食譜，第 62 頁)	主料： 青椒 ½ 個 豬裡脊 ¼ 杯（45 克）	
	混合米飯 (白米:糙米=1:1)	混合米飯 1 杯（熟的）	
晚上零食	全麥麵包 1% 低脂牛奶	全麥麵包 ½ 片（每片 35 克） 1%低脂牛奶 1 杯	½ 份 糧食類食品 1 份 奶類
一天攝入的總份數			6½ 份 糧食類食品 8 份 蔬菜和水果 3 份 肉類和替代品 3 份 奶類和替代品

營養分析	**如何根據自己的卡路里需求量調整菜單：**
卡路里：1926 千卡 碳水化合物： 278 克 膳食纖維：28 克 蛋白質：88 克 脂肪：56 克 飽和脂肪：13 克 膽固醇：229 毫克 鈉：1694 毫克	通過以下方式可以減少 200 千左右： • 早餐減去木瓜（減少 60 千卡） • 晚餐米飯減少半杯（減少 105 千卡） • 晚上零食減去半杯牛奶（減少 50 千卡） 通過以下方式可以增加 200 千卡左右： • 午餐增加半杯米飯 (增加 105 千卡) • 下午零食增加 6 克/5 個杏仁（增加 35 千卡） • 晚餐增加一個梨 (增加 60 千卡)

例子 2（每餐一個菜式）

菜單		食物的原料	加拿大食品指南份數
早餐	吐司和豆漿	全麥吐司麵包　1 片 無糖無鹽花生醬 1 湯匙 強化豆漿　1 杯 藍莓　½ 杯	1 份　水果 1 份　糧食類 1 份　奶類替代品 ½ 份　肉類替代品
上午零食	鷹嘴豆泥和餅乾	鷹嘴豆泥　6湯匙(90毫升) 全麥梳打餅乾　30 克	1份　糧食類 ½份　肉類替代品
午餐	什錦炒肉丁（2 份） (見食譜，第 68 頁)	主料(2 份的量)： 豬裡脊肉　¼杯（45 克） 黃瓜　¾杯（90 克） 玉米粒　¼杯 紅甜椒　¼個	2 ½份 蔬菜 2 份　糧食類 ½份　肉類
	糙米	煮熟的糙米　1 杯	
下午零食	餅乾和優酪乳	30 克　粉葛餅乾 175 毫升　低脂原味優酪乳	1 份　糧食類食品 1 份　奶類和替代品
晚餐	蘆筍炒蝦（2 份） (見食譜，第 52 頁)	主料（2 份的量）： 蘆筍　1½杯 (18 條中等大小) 蝦　½杯 (90 克)	3 份　蔬菜 2 份　糧食類食品 1 份　肉類
	白米飯	煮熟的白米飯　1 杯	
晚上零食	橙子（柳丁）	橙子（柳丁）　1 個	1 份 水果
一天攝入的總份數			7½ 份 蔬菜和水果 7 份　糧食類食品 2 份　奶類和替代品 2½份　肉類和替代品

營養分析	**如何根據自己的卡路里需求量調整菜單：**
卡路里：　1833 千卡 碳水化合物：258 克 膳食纖維：30 克 蛋白質：82 克 脂肪：59 克 飽和脂肪：12 克 膽固醇：177 毫克 鈉：1836 毫克	通過以下方式可以減少 200 千卡左右： • 晚餐的米飯減少半杯（減少 105 千卡） • 略去晚上作為零食的柳丁（減少 50 千卡） • 下午的零食減少 15 克餅乾（減少 45 千卡） 通過以下方式可以增加 200 千卡左右： • 晚餐增加 200 毫升 2%的低脂奶（增加 100 千卡） • 上午零食多加一個蘋果（增加 50 千卡） • 下午零食多加一湯匙碎的核桃仁（增加 50 千卡）

2.2 更多食譜的網站鏈接

您可以在下列網站中找到健康美味的以西式為主的食譜：

Alberta Pulse Growers

http://pulse.ab.ca/consumers/recipes/

Canolainfo.org

http://www.canolainfo.org/recipes/recipes.php

Dietitians of Canada

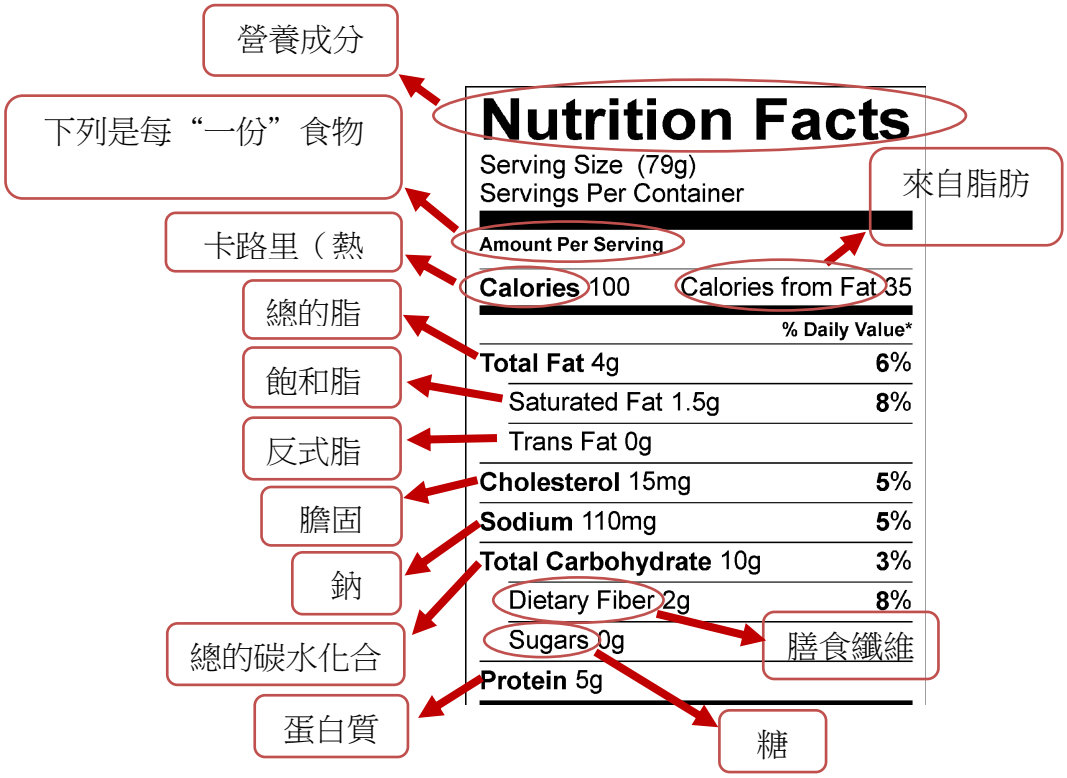
http://www.dietitians.ca/Your-Health/Plan-Shop-Cook/Cook-Healthy.aspx

Pulse Canada

http://www.pulsecanada.com/food-health/recipes/

3. 食譜

3.1 營養標籤使用說明：



1. 營養成分表中每一種營養成分後面對應的百分數表示“一份”食物提供了這一營養成分每日需求量的百分之幾，這個需求量是基於一個普通成年人每天 2000 千卡的飲食，從而給您一個大致的參照。您的卡路里需求可能會高於或低於這個量，由年齡、性別、體重和運動量等因素決定。

2. 本計劃中的每個食譜後面都有標明份數（大多是四人份），請用食譜的食物總量除以份數，即得出每一份食物的量。營養成分表中的營養含量是針對每一份食物而不是整個食譜。需要注意，食譜中的“一份”並非加拿大食品指南規定的一份。

3. 在您使用該計劃中的食譜或者購買其他食物的時候，請注意閱讀營養成分表，盡量控制鈉 (sodium) 的每日攝入量在 2300mg 以下（大約相當於 6 克食鹽）。很多食物本身含有鈉，所以在烹飪過程中要控制額外添加的食鹽或含鹽調料如醬油、蠔油、料酒等。

3.2 湯粥類

三文魚西洋菜湯 Watercress and Salmon Soup

（四人份）

材料：

西洋菜 watercress	4 杯
低鹽罐頭雞湯 low sodium chicken broth	½ 杯
三文魚 salmon	200 克
生薑 ginger root	3 片
無花果乾 dried figs	2 枚
減鹽醬油 less sodium soy sauce	2 茶匙
芝麻油 sesame oil	¼ 茶匙

Nutrition Facts

Serving Size (123g)
Servings Per Container

Amount Per Serving

Calories 120	Calories from Fat 50
	% Daily Value*
Total Fat 6g	**9%**
Saturated Fat 1g	**5%**
Trans Fat --g	
Cholesterol 30mg	**10%**
Sodium 140mg	**6%**
Total Carbohydrate 4g	**1%**
Dietary Fiber 1g	**4%**
Sugars 2g	
Protein 12g	

製作方法：

1. 把魚肉切片，拌入減鹽醬油，醃 10 分鐘備用。
2. 放 4 杯水在煲中燒滾，倒進西洋菜及無花果乾，煮滾 5 分鐘。
3. 加入其它材料及芝麻油，再滾 5 分鐘即可。

小貼士

1. 為了節省時間， 您可以購買罐裝湯羹。 很多罐裝湯羹的含鹽量非常高， 請注意閱讀營養標籤，選擇低鹽的品牌或種類。

*該食譜參照了加拿大糖尿病協會 Edmonton 支部編印的康健食譜。

什菜瘦肉湯 Mixed Vegetables and Pork Soup

(四人份)

材料：

芹菜 celery	½ 杯（1 條芹菜莖）
甜菜根 beet	½ 杯
包心菜 cabbage	1 杯
番茄 tomato	1 杯（1 個大的）
土豆 potato	½ 杯（半個）
瘦豬肉 lean pork	200 克
減鹽醬油 less sodium soy sauce	1 茶匙
食鹽 salt	¼ 茶匙

Nutrition Facts

Serving Size (171g)
Servings Per Container

Amount Per Serving	
Calories 110	Calories from Fat 30
	% Daily Value*
Total Fat 3g	**5%**
Saturated Fat 1g	**5%**
Trans Fat 0g	
Cholesterol 30mg	**10%**
Sodium 250mg	**10%**
Total Carbohydrate 9g	**3%**
Dietary Fiber 2g	**8%**
Sugars 4g	
Protein 12g	

製作方法：

1. 將瘦豬肉洗淨，切成粒，用醬油和食鹽醃約 1 小時。
2. 切其他材料成小塊，連同 5 杯清水入鍋。
3. 用猛火煮沸後，轉成慢火炆 15 分鐘。
4. 放入瘦肉，再炆 15 分鐘。

小貼士

1. 為了減少食鹽攝入， 請不要將儲鹽瓶放在餐桌上。 盡量選擇低鹽調料例如低鹽醬油，減少高鹽調味料的使用。

*該食譜參照了加拿大糖尿病協會 Edmonton 支部編印的康健食譜。

蓮藕排骨湯 Lotus Root and Spararib Soup

（四人份）

材料：

排骨 spareribs	½ 杯
蓮藕 lotus root	2 杯
生薑 ginger root	2 片
小香蔥 green onion	1 根
食鹽 salt	1/8 茶匙
水 water	4 杯

Nutrition Facts

Serving Size (79g)
Servings Per Container

Amount Per Serving

Calories 100	Calories from Fat 35
	% Daily Value*
Total Fat 4g	**6%**
Saturated Fat 1.5g	**8%**
Trans Fat 0g	
Cholesterol 15mg	**5%**
Sodium 110mg	**5%**
Total Carbohydrate 10g	**3%**
Dietary Fiber 2g	**8%**
Sugars 0g	
Protein 5g	

製作方法：

1. 排骨洗淨，焯水（冷水下鍋，待水開後再煮 5 分鐘），撈出排骨，沖洗乾淨，轉入高壓鍋。

2. 蓮藕切塊，薑和蔥切片，放入高壓鍋中。

3. 往鍋中加入水和食鹽，燉 40 分鐘左右即可，也可根據個人喜好延長時間。

白菜扇貝湯 Bok Choy and Scallop Soup

（四人份）

材料：

白菜 bok choy	4 杯
扇貝 scallop	1 杯（180 克）
菜籽油 canola oil	1 茶匙
小香蔥 green onion	1 根
食鹽 salt	1/3 茶匙
水 water	5 杯

Nutrition Facts

Serving Size (118g)
Servings Per Container

Amount Per Serving

Calories 60	Calories from Fat 15
	% Daily Value*
Total Fat 1.5g	**2%**
Saturated Fat 0g	**0%**
Trans Fat 0g	
Cholesterol 15mg	**5%**
Sodium 310mg	**13%**
Total Carbohydrate 3g	**1%**
Dietary Fiber 1g	**4%**
Sugars 1g	
Protein 9g	

製作方法：

1. 白菜切小塊，蔥切段。
2. 鍋燒熱，放入油，接著放入蔥翻炒幾下。
3. 放入扇貝和白菜，翻炒幾下，倒入水，大火煮 10 分鐘，放入鹽，攪拌均勻即可。

菠菜番茄蛋湯 Spinach Tomato Egg Soup

（四人份）

材料：

菠菜 spinach	4 杯
雞蛋 egg	2 個
番茄 tomato	1 杯
食鹽 salt	¼ 茶匙
水 water	4 杯

Nutrition Facts

Serving Size (101g)
Servings Per Container

Amount Per Serving

Calories 50	Calories from Fat 25
	% Daily Value*
Total Fat 2.5g	**4%**
Saturated Fat 1g	**5%**
Trans Fat 0g	
Cholesterol 105mg	**35%**
Sodium 250mg	**10%**
Total Carbohydrate 3g	**1%**
Dietary Fiber 1g	**4%**
Sugars 2g	
Protein 4g	

製作方法：

1. 番茄洗淨切塊，菠菜洗淨備用。
2. 鍋中放入水和番茄，煮開後，打入雞蛋。
3. 水再次煮開後放入菠菜，煮到菠菜變軟即可。
4. 放鹽，攪勻，即可盛出。

小貼士

1. 雞蛋是一個很好的蛋白質來源， 同時也可以增強飽腹感。為了控制脂肪攝入量，您可以多選用蒸或煮的方式來烹飪，減少油炒蛋的攝入。

海帶裡脊湯 Seaweed Soup

（四人份）

材料：

蒸熟的海帶 steamed seaweed	1 杯
胡蘿蔔 carrot	1 根 (½ 杯)
冬瓜 wax gourd	½ 杯
豬裡脊肉 pork loin	200 克
菜籽油 canola oil	2 茶匙
食鹽 salt	¼ 茶匙
花椒粉 sichuan pepper powder	⅛ 茶匙
小香蔥 green onion	1 根
生薑 ginger root	1 片
減鹽醬油 less sodium soy sauce	1 茶匙
醋 vinegar	½ 茶匙
水 water	5 杯

Nutrition Facts

Serving Size (108g)
Servings Per Container

Amount Per Serving

Calories 100	Calories from Fat 35
	% Daily Value*
Total Fat 3.5g	**5%**
Saturated Fat 0.5g	**3%**
Trans Fat 0g	
Cholesterol 25mg	**8%**
Sodium 290mg	**12%**
Total Carbohydrate 4g	**1%**
Dietary Fiber 1g	**4%**
Sugars 1g	
Protein 13g	

製作方法：

1. 海帶洗淨，用蒸鍋蒸熟，切塊。
2. 豬裡脊肉洗淨切塊，焯水（豬肉冷水下鍋，水開後再煮 3 分鐘），撈出洗淨。
3. 將胡蘿蔔和冬瓜切成小塊。
4. 鍋燒熱，倒入油，放入花椒粉炒香，再放入蔥、薑，倒入醬油和醋。
5. 將豬裡脊肉倒入鍋中，翻炒一分鐘，倒入海帶和胡蘿蔔，繼續翻炒幾下。
6. 加水 5 杯，煮開後，轉小火，煮 20 分鐘。
7. 放入冬瓜，再煮 10 分鐘，出鍋前加鹽即可。

小貼士

1. 為節省時間，可以一次多蒸一些海帶，放入冰箱冷凍，需用時取出解凍即可。

鱈魚粥 Cod Congee

（四人份）

材料：

白米 white rice	1/6 杯
糙米 brown rice	1/6 杯
水 water	5 杯
鱈魚 cod	180 克
料酒 wine	¼ 茶匙
豆腐皮 tofu skin	50 克
白菜 bok choy	1 杯
生薑 ginger root	2 片
食鹽 salt	½ 茶匙

Nutrition Facts

Serving Size (93g)
Servings Per Container

Amount Per Serving

Calories 110	Calories from Fat 15
	% Daily Value*
Total Fat 1.5g	**2%**
Saturated Fat 0g	**0%**
Trans Fat 0g	
Cholesterol 20mg	**7%**
Sodium 190mg	**8%**
Total Carbohydrate 13g	**4%**
Dietary Fiber 1g	**4%**
Sugars 0g	
Protein 11g	

製作方法：

1. 糙米洗淨，用清水浸泡 3 小時左右。
2. 鱈魚柳切片，用食鹽和料酒醃約半小時。
3. 將白菜和生薑切絲備用。
4. 把白米和浸泡過的糙米放入鍋中，加水 5 杯，中火煮 30 分鐘，不時攪拌。
5. 將鱈魚、薑絲和豆腐皮放入粥中，繼續煮 10 分鐘，不時攪拌，以防粘底。最後放入白菜，攪拌均勻即可。

*該食譜參照了加拿大糖尿病協會 Edmonton 支部編印的康健食譜。

雜糧粥 Mixed Grain Congee

（四人份）

材料：

薏米 pearl barley	1/6 杯
小黃米 millet	1/6 杯
黑米 black rice	1/6 杯
糙米 brown rice	1/6 杯
水 water	4 杯

Nutrition Facts

Serving Size (33g)
Servings Per Container

Amount Per Serving

Calories 120	Calories from Fat 10
	% Daily Value*
Total Fat 1g	**2%**
Saturated Fat 0g	**0%**
Trans Fat 0g	
Cholesterol 0mg	**0%**
Sodium 0mg	**0%**
Total Carbohydrate 25g	**8%**
Dietary Fiber 2g	**8%**
Sugars 0g	
Protein 3g	

製作方法：

1. 各種米洗淨，倒入電飯鍋中，加水，煮一個小時左右即可。

燕麥糊 Rolled Oats Porridge

(四人份)

材料：

燕麥片 rolled oats	½ 杯 (80 克)
藍莓 blueberry	¼ 杯
香蕉片 banana slices	¼ 杯
葡萄乾 raisin	¼ 杯

Nutrition Facts

Serving Size (47g)
Servings Per Container

Amount Per Serving

Calories 120	Calories from Fat 15
	% Daily Value*
Total Fat 1.5g	**2%**
Saturated Fat 0g	**0%**
Trans Fat 0g	
Cholesterol 0mg	**0%**
Sodium 0mg	**0%**
Total Carbohydrate 24g	**8%**
Dietary Fiber 3g	**12%**
Sugars 7g	
Protein 4g	

製作方法：

1. 鍋中加清水 2 ½ 杯（勿用熱水），將燕麥片倒入其中。
2. 水燒開後調成小火，煮 5 分鐘，不時攪拌，以防粘底。
3. 將燕麥糊倒入碗中，鋪上香蕉片、藍莓和葡萄乾即可。

小貼士

1. 盡量選購原味無添加的燕麥片。
2. 若購買即食麥片， 請閱讀營養標籤，盡量選擇低糖、低鹽、高纖維的。

*該食譜參照了加拿大糖尿病協會 Edmonton 支部編印的康健食譜。

3.3 素菜類

西芹百合 Celery and Lily Bud Stir-fry

（四人份）

材料：

芹菜 celery	2 杯
新鮮百合 lily bud	1 杯（大約 80 克）
胡蘿蔔 carrot	½ 杯
小香蔥 green onion	1 根
蒜 garlic	2 瓣
菜籽油 canola oil	1 湯匙
減鹽醬油 less sodium soy sauce	¼ 茶匙
食鹽 salt	1/8 茶匙

Nutrition Facts

Serving Size (83g)
Servings Per Container

Amount Per Serving

Calories 50	Calories from Fat 30
	% Daily Value*
Total Fat 3.5g	**5%**
Saturated Fat 0g	**0%**
Trans Fat 0g	
Cholesterol 0mg	**0%**
Sodium 130mg	**5%**
Total Carbohydrate 5g	**2%**
Dietary Fiber 2g	**8%**
Sugars 2g	
Protein 1g	

製作方法：

1. 胡蘿蔔、芹菜切片，放入開水焯 2 分鐘；百合焯水 15 秒，瀝乾，備用。
2. 炒鍋燒熱，放油，放入蔥和蒜，炒香。
3. 倒入胡蘿蔔和芹菜，翻炒 2 分鐘。
4. 倒入百合，翻炒 1 分鐘。
5. 放減鹽醬油和鹽，繼續翻炒 1 分鐘即可。

小貼士

1. 蔬菜焯水時間儘量短，以減少水溶性營養成分的流失，比如維生素 C。

百合玉米炒甜豆 Stir-fried Snap Peas with Lily Bud and Corn

（四人份）

材料：

新鮮百合 lily bud	½ 杯
玉米粒 sweet corn	1 杯
甜豆 snap peas	2 杯
小香蔥 green onion	1 根
蒜 garlic	3 瓣
生薑 ginger root	2 片
菜籽油 canola oil	2 茶匙
花椒粉 sichuan pepper powder	1/8 茶匙
減鹽醬油 less sodium soy sauce	2½ 茶匙
料酒 cooking wine	1 茶匙
醋 vinegar	1 茶匙
水 water	½ 杯

Nutrition Facts

Serving Size (123g)
Servings Per Container

Amount Per Serving

Calories 80	Calories from Fat 25
	% Daily Value*
Total Fat 2.5g	**4%**
Saturated Fat 0g	**0%**
Trans Fat 0g	
Cholesterol 0mg	**0%**
Sodium 125mg	**5%**
Total Carbohydrate 12g	**4%**
Dietary Fiber 3g	**12%**
Sugars 4g	
Protein 4g	

製作方法：

1. 蔥、薑、蒜切碎，備用。
2. 量好醬油、料酒和醋，倒入同一個小碗，備用。
3. 炒鍋燒熱，依次倒入油、花椒粉和蔥薑蒜，炒香。
4. 倒入之前量好的醬汁，接著倒入甜豆，翻炒一分鐘，加水半杯。
5. 煮兩分鐘之後，倒入玉米粒，攪勻。
6. 煮三分鐘之後，倒入百合再煮兩分鐘即可。

蘑菇炒秋葵 Mushroom and Okra Stir-fry

（四人份）

材料:

蘑菇 mushroom	3 杯
秋葵 okra	1 杯
小香蔥 green onion	1 根
蒜 garlic	2 瓣
菜籽油 canola oil	1 湯匙
減鹽醬油 less sodium soy sauce	4 茶匙
醋 vinegar	1 茶匙
料酒 cooking wine	1 茶匙
水 water	½ 杯

Nutrition Facts

Serving Size (202g)
Servings Per Container

Amount Per Serving

Calories 90	Calories from Fat 30
	% Daily Value*
Total Fat 3.5g	**5%**
Saturated Fat 0g	**0%**
Trans Fat 0g	
Cholesterol 0mg	**0%**
Sodium 200mg	**8%**
Total Carbohydrate 10g	**3%**
Dietary Fiber 2g	**8%**
Sugars 3g	
Protein 5g	

製作方法：

1. 蘑菇切片，秋葵切段，蔥蒜切碎。
2. 量好減鹽醬油、料酒和醋，倒入同一個小碗，備用。
3. 炒鍋燒熱，倒入油，放蔥和蒜爆香。
4. 秋葵和蘑菇同時下鍋，翻炒一分鐘，放入之前量好的醬油、料酒和醋，繼續翻炒一分鐘。
5. 加半杯水，蓋上鍋蓋，煮約 15 分鐘即可。

蒸蘆筍 Steamed Asparagus

（一人份）

材料：

蘆筍 asparagus	6 根(中等大小)

製作方法：

1. 電飯鍋或蒸鍋中倒入適量的水。

2. 新鮮蘆筍洗淨，放到蒸屜上（若無蒸屜，可用盤子代替），放入鍋中，蒸 8 分鐘左右即可。

Nutrition Facts

Serving Size (96g)
Servings Per Container

Amount Per Serving	
Calories 20	Calories from Fat 0
	% Daily Value*
Total Fat 0g	**0%**
Saturated Fat 0g	**0%**
Trans Fat --g	
Cholesterol 0mg	**0%**
Sodium 0mg	**0%**
Total Carbohydrate 4g	**1%**
Dietary Fiber 2g	**8%**
Sugars 2g	
Protein 2g	

小貼士

1. 加拿大食品指南推薦每人每天至少食用一種深綠色蔬菜，常見的包括西蘭花、小青菜、菠菜、青椒、四季豆、青豌豆、雪豆、義大利瓜/西葫蘆、蘆筍等等。

四季豆燉土豆 Green Beans and Potato Stew

（四人份）

材料：

土豆 potato	2 杯
四季豆 green beans	2 杯
菜籽油 canola oil	1½ 湯匙
小香蔥 green onion	1 根
蒜 garlic	1 瓣
減鹽醬油 less sodium soy sauce	4 茶匙
料酒 cooking wine	1 茶匙
醋 vinegar	1 茶匙
水 water	1½ 杯

Nutrition Facts

Serving Size (155g)
Servings Per Container

Amount Per Serving

Calories 140	Calories from Fat 50
	% Daily Value*
Total Fat 5g	**8%**
Saturated Fat 0g	**0%**
Trans Fat 0g	
Cholesterol 0mg	**0%**
Sodium 190mg	**8%**
Total Carbohydrate 21g	**7%**
Dietary Fiber 3g	**12%**
Sugars 2g	
Protein 3g	

製作方法：

1. 土豆削皮洗淨，切塊；四季豆洗淨，切段；蔥和蒜切碎。

2. 提前把醬油、料酒和醋測量好，倒入小碗中備用。

3. 鍋熱加油，放入蔥、蒜爆香，倒入第 2 步中量好的混合醬汁，接著倒入土豆和四季豆，翻炒 2 分鐘。

4. 加水，蓋上鍋蓋，中火燉 15 到 20 分鐘左右即可。

炒四季豆 Stir-fried Green Beans

（四人份）

材料：

四季豆 green beans	4 杯
菜籽油 canola oil	1 湯匙
小香蔥 green onion	1 根
蒜 garlic	2 瓣
花椒粉 sichuan pepper powder	1/8 茶匙
減鹽醬油 less sodium soy sauce	1 湯匙
料酒 cooking wine	½ 茶匙
醋 vinegar	½ 茶匙
水 water	1 杯

Nutrition Facts

Serving Size (122g)
Servings Per Container

Amount Per Serving

Calories 70	Calories from Fat 30
	% Daily Value*
Total Fat 3.5g	**5%**
Saturated Fat 0g	**0%**
Trans Fat 0g	
Cholesterol 0mg	**0%**
Sodium 140mg	**6%**
Total Carbohydrate 9g	**3%**
Dietary Fiber 4g	**16%**
Sugars 2g	
Protein 2g	

製作方法：

1. 四季豆和蔥切段，蒜切碎。
2. 將醬油、料酒和醋測量好，倒入小碗中備用。
3. 鍋熱加油，放入蔥蒜爆香，倒入調好的醬汁，立刻放入四季豆翻炒約 2 分鐘。
4. 加水 1 杯，蓋上鍋蓋，中火煮 12 分鐘左右即可，也可以根據自己的喜好調整加水量和烹飪時間。

小貼士

1. 為了防止過量飲食， 預先決定自己需要的食物量，將其盛放在您自己的餐盤或者碗中。這樣可以幫助您在聚餐時或者餐桌上菜式種類較多時，控制食物的攝入總量。

玉米豌豆炒西蘭花 Stir-fried Broccoli with Sweet corn and Peas

（四人份）

材料：

玉米粒 sweet corn	1 杯
青豌豆 green peas	1 杯
西蘭花 broccoli	2 杯
菜籽油 canola oil	2 茶匙
小香蔥 green onion	1 根
蒜 garlic	1 瓣
減鹽醬油 less sodium soy sauce	1 湯匙
醋 vinegar	1 茶匙
花椒粉 Sichuan pepper powder	1/8 茶匙

Nutrition Facts

Serving Size (131g)
Servings Per Container

Amount Per Serving

Calories 100	Calories from Fat 25
	% Daily Value*
Total Fat 3g	**5%**
Saturated Fat 0g	**0%**
Trans Fat 0g	
Cholesterol 0mg	**0%**
Sodium 190mg	**8%**
Total Carbohydrate 17g	**6%**
Dietary Fiber 3g	**12%**
Sugars 4g	
Protein 5g	

製作方法：

1. 西蘭花切成小塊，玉米和豌豆解凍，瀝乾。
2. 用湯匙和茶匙把減鹽醬油和醋量好，倒入同一個碗中，備用。
3. 鍋中放油，放入花椒粉、蔥、蒜，倒入上一步量好的醬汁。
4. 放西蘭花，翻炒 1 分鐘，再倒入玉米和豌豆，翻炒 1 分鐘。
5. 加半杯水，大火煮 8 分鐘左右即可出鍋。

小貼士

1. 經常嘗試不同的食物，以防產生厭倦感。 這份計劃中含有很多食譜和食物組合供您選擇。

東北地三鮮 Braised Eggplant with Green Pepper and Potato

（四人份）

材料：

茄子 eggplant	2 杯
土豆 potato	1 杯
青椒 green pepper	1 杯（1 個）
小香蔥 green onion	1 根
蒜 garlic	1 瓣
花椒粉 sichuan pepper powder	¼ 茶匙
減鹽醬油 less sodium soy sauce	5 茶匙
醋 vinegar	1 茶匙
菜籽油 canola oil	1 湯匙
水 water	2 杯

Nutrition Facts

Serving Size (149g)
Servings Per Container

Amount Per Serving

Calories 90	Calories from Fat 30
	% Daily Value*
Total Fat 3.5g	**5%**
Saturated Fat 0g	**0%**
Trans Fat 0g	
Cholesterol 0mg	**0%**
Sodium 230mg	**10%**
Total Carbohydrate 15g	**5%**
Dietary Fiber 3g	**12%**
Sugars 3g	
Protein 2g	

製作方法：

1. 茄子、土豆、青椒切塊，蔥、蒜切碎。
2. 把花椒粉、蔥和蒜放入小碗，量好醬油和醋，一起倒入其中，調勻備用。
3. 炒鍋燒熱，放油，倒入土豆，翻炒約五分鐘。
4. 倒入茄子，翻炒一分鐘。
5. 倒入青椒，翻炒片刻。
6. 倒入之前調好的醬汁，翻炒均勻。
7. 加兩杯水，煮 20 分鐘左右，大火收汁即可。

炒花菜 Stir-fried Cauliflower

（四人份）

材料：

花菜 cauliflower	4 杯
小香蔥 green onion	1 根
蒜 garlic	1 瓣
菜籽油 canola oil	1 湯匙
減鹽醬油 less sodium soy sauce	4 茶匙
醋 vinegar	1 茶匙
水 water	1 杯

Nutrition Facts

Serving Size (136g)
Servings Per Container

Amount Per Serving

Calories 60	Calories from Fat 35
	% Daily Value*
Total Fat 4g	**6%**
Saturated Fat 0g	**0%**
Trans Fat 0g	
Cholesterol 0mg	**0%**
Sodium 200mg	**8%**
Total Carbohydrate 6g	**2%**
Dietary Fiber 3g	**12%**
Sugars 3g	
Protein 3g	

製作方法：

1. 花菜切成小朵，蔥蒜切片 。
2. 量好醬油和醋，倒入同一個小碗中，備用。
3. 炒鍋燒熱，放油，蔥蒜爆香，倒入花菜，炒 2 分鐘。
4. 加一杯水，煮 8 分鐘左右即可出鍋。

清炒茼蒿 Stir-fried Garland Chrysanthemum

（四人份）

材料：

茼蒿 garland chrysanthemum	8 杯
小香蔥 green onion	1 根
蒜 garlic	2 瓣
花椒粉 sichuan pepper powder	1/8 茶匙
菜籽油 canola oil	4 茶匙
食鹽 salt	¼ 茶匙

Nutrition Facts

Serving Size (58g)
Servings Per Container

Amount Per Serving

Calories 50	Calories from Fat 45
	% Daily Value*
Total Fat 5g	**8%**
Saturated Fat 0g	**0%**
Trans Fat 0g	
Cholesterol 0mg	**0%**
Sodium 210mg	**9%**
Total Carbohydrate 2g	**1%**
Dietary Fiber 2g	**8%**
Sugars 0g	
Protein 2g	

製作方法：

1. 茼蒿洗淨，切段。蔥和蒜切碎。
2. 炒鍋燒熱，放油，放入蔥和蒜爆香。
3. 放茼蒿，翻炒 3 分鐘，放鹽，大火煮 2 分鐘即可出鍋。

醋溜藕片 Sour Lotus Root Slices

（四人份）

材料：

新鮮蓮藕 lotus root	4 杯
蒜 garlic	4 瓣
菜籽油 canola oil	1 湯匙
醋 vinegar	1 湯匙
食鹽 salt	1/6 茶匙

Nutrition Facts

Serving Size (130g)
Servings Per Container

Amount Per Serving

Calories 110	Calories from Fat 30
	% Daily Value*
Total Fat 3.5g	**5%**
Saturated Fat 0g	**0%**
Trans Fat 0g	
Cholesterol 0mg	**0%**
Sodium 150mg	**6%**
Total Carbohydrate 20g	**7%**
Dietary Fiber 4g	**16%**
Sugars 1g	
Protein 2g	

製作方法：

1. 藕洗淨，切薄片 ，用清水浸泡 5 分鐘，取出瀝乾備用。
2. 蒜切碎。
3. 炒鍋放油，燒熱，放入蒜爆香。
4. 倒入 1 湯匙醋，放藕片翻炒 5 分鐘。
5. 加水半杯，鹽 1/6 茶匙，蓋上鍋蓋大火煮 4 分鐘左右即可。

手撕包心菜 Hand-torn Spicy Cabbage

（四人份）

材料：

包心菜 cabbage	4 杯
乾辣椒 dried hot chili pepper	3 個
小香蔥 green onion	1 根
蒜 garlic	3 瓣
花椒粒 sichuan peppercorns	¼ 茶匙
菜籽油 canola oil	1 湯匙
減鹽醬油 less sodium soy sauce	1 湯匙
醋 vinegar	½ 茶匙
白砂糖 granulated sugar	少許（1/16 茶匙）
水 water	¼ 杯

Nutrition Facts

Serving Size (82g)
Servings Per Container

Amount Per Serving

Calories 50	Calories from Fat 30
	% Daily Value*
Total Fat 3.5g	**5%**
Saturated Fat 0g	**0%**
Trans Fat 0g	
Cholesterol 0mg	**0%**
Sodium 150mg	**6%**
Total Carbohydrate 6g	**2%**
Dietary Fiber 2g	**8%**
Sugars 3g	
Protein 1g	

製作方法：

1. 包心菜洗淨，用手撕成片 。蔥和蒜切碎。

2. 炒鍋中放入半湯匙油和少許糖，燒熱，加入花椒粒和乾辣椒炒香，倒入蔥和蒜爆香。

3. 倒入醬油和醋，放包心菜，翻炒 3 分鐘，加水 ¼ 杯，煮 4 分鐘即可。若喜歡比較軟的口感，可以延長煮的時間，並適當加水。

甜豆炒春筍 Stir-fried Snap Peas with Bamboo Shoots

（四人份）

材料：

甜豆 snap peas	2 杯
春筍 bamboo shoots	2 杯（320 克）
小香蔥 green onion	1 根
蒜 garlic	2 瓣
花椒粉 sichuan pepper powder	1/8 茶匙
菜籽油 canola oil	1 湯匙
減鹽醬油 less sodium soy sauce	4 茶匙
料酒 cooking wine	1 茶匙
醋 vinegar	1 茶匙

Nutrition Facts

Serving Size (170g)
Servings Per Container

Amount Per Serving

Calories 90	Calories from Fat 35
	% Daily Value*
Total Fat 4g	**6%**
Saturated Fat 0g	**0%**
Trans Fat 0g	
Cholesterol 0mg	**0%**
Sodium 190mg	**8%**
Total Carbohydrate 11g	**4%**
Dietary Fiber 4g	**16%**
Sugars 6g	
Protein 5g	

製作方法：

1. 春筍切片，用開水焯 2 分鐘，撈出，瀝乾。
2. 甜豆莢洗淨，蔥切段，蒜切片。
3. 將醬油、料酒和醋量好，倒入小碗中備用。
4. 鍋燒熱，放油，放入花椒粉、蔥和蒜爆香。
5. 倒入之前量好的醬汁，接著倒入甜豆和春筍，翻炒 1 到 2 分鐘。
6. 加水 1/3 杯，大火煮 4 分鐘即可。

蘋果炒雪豆 Snow pea and apple stir-fry

（四人份）

材料：

蘋果 apple	1 個（中等大）
雪豆 snow pea	2 杯
小香蔥 green onion	1 根
蒜 garlic	2 瓣
菜籽油 canola oil	1 茶匙
水 water	¼ 杯

Nutrition Facts

Serving Size (88g)
Servings Per Container

Amount Per Serving

Calories 50	Calories from Fat 10
	% Daily Value*
Total Fat 1.5g	**2%**
Saturated Fat 0g	**0%**
Trans Fat 0g	
Cholesterol 0mg	**0%**
Sodium 0mg	**0%**
Total Carbohydrate 9g	**3%**
Dietary Fiber 2g	**8%**
Sugars 6g	
Protein 2g	

製作方法：

1. 蘋果和雪豆洗淨，切塊。
2. 鍋熱加油，倒入蔥蒜爆香，倒入雪豆，中火翻炒一分鐘。
3. 加入蘋果，翻炒半分鐘。
4. 加水，蓋上鍋蓋煮 2-3 分鐘即可出鍋。

番茄燒茄子 Braised Eggplant with Tomato

（四人份）

材料：

番茄 tomato	2 杯（大約 2 個）
茄子 eggplant	2 杯（大約 1 個）
小香蔥 green onion	1 根
蒜 garlic	3 瓣
菜籽油 canola oil	1 湯匙
花椒粉 sichuan pepper powder	1/8 茶匙
減鹽醬油 less sodium soy sauce	1 湯匙
醋 vinegar	1 茶匙

Nutrition Facts

Serving Size (115g)
Servings Per Container

Amount Per Serving

Calories 60	Calories from Fat 30
	% Daily Value*
Total Fat 3.5g	**5%**
Saturated Fat 0g	**0%**
Trans Fat 0g	
Cholesterol 0mg	**0%**
Sodium 135mg	**6%**
Total Carbohydrate 6g	**2%**
Dietary Fiber 2g	**8%**
Sugars 3g	
Protein 1g	

製作方法：

1. 將番茄、茄子洗淨，切塊。
2. 鍋熱放油、花椒粉，再放蔥蒜爆香，倒入醬油和醋。
3. 番茄和茄子一起倒入，翻炒 1 分鐘。
4. 加水 1½ 杯，中火煮 15 分鐘即可。

雪豆胡蘿蔔燉蓮藕 Lotus Root Stew with Carrots and Snow Peas

（四人份）

材料：

蓮藕 lotus root	2 杯（大約一大節）
胡蘿蔔 carrot	1 杯（大約 2 根 18cm 長的）
雪豆 snow pea	1 杯
小香蔥 green onion	1 根
蒜 garlic	2 瓣
花椒粉 sichuan pepper powder	1/8 茶匙
菜籽油 canola oil	1 湯匙
減鹽醬油 less sodium soy sauce	1 湯匙
料酒 cooking wine	1 茶匙
醋 vinegar	1 茶匙

Nutrition Facts

Serving Size (133g)
Servings Per Container

Amount Per Serving

Calories 100	Calories from Fat 30
	% Daily Value*
Total Fat 3.5g	**5%**
Saturated Fat 0g	**0%**
Trans Fat 0g	
Cholesterol 0mg	**0%**
Sodium 190mg	**8%**
Total Carbohydrate 16g	**5%**
Dietary Fiber 3g	**12%**
Sugars 3g	
Protein 2g	

製作方法 ：

1. 胡蘿蔔和蓮藕洗淨，切成小塊。
2. 測量好減鹽醬油、料酒和醋，倒入同一個小碗中，備用。
3. 炒鍋燒熱，放油，依次放花椒粉、蔥和蒜爆香。
4. 倒入之前量好的醬油、料酒和醋，接著放蓮藕和胡蘿蔔，翻炒 2 分鐘。
5. 加兩杯水，大火燒開，轉中火燉 28 分鐘，倒入雪豆，攪勻，再煮 2 分鐘，大火收汁即可。

3.4 肉類替代品（豆製品、蛋類等）

佛手瓜炒鷹嘴豆 Chayote and Chickpea Stir-fry

（四人份）

材料：

佛手瓜 chayote	4 杯（大約 3-4 個）
煮熟或罐裝鷹嘴豆 chickpeas, cooked or canned	1 杯
減鹽醬油 less sodium soy sauce	4 茶匙
醋 vinegar	1 茶匙
菜籽油 canola oil	1 湯匙
小香蔥 green onion	1 根
蒜 garlic	1 瓣

Nutrition Facts

Serving Size (185g)
Servings Per Container

Amount Per Serving

Calories 120	Calories from Fat 40
	% Daily Value*
Total Fat 4.5g	**7%**
Saturated Fat 0g	**0%**
Trans Fat 0g	
Cholesterol 0mg	**0%**
Sodium 180mg	**8%**
Total Carbohydrate 17g	**6%**
Dietary Fiber 4g	**16%**
Sugars 5g	
Protein 5g	

製作方法：

1. 鷹嘴豆煮熟，或者直接用罐裝鷹嘴豆，瀝乾水分即可。
2. 佛手瓜切片，蔥和蒜切碎。
3. 炒鍋燒熱，放油，放入蔥和蒜爆香，倒入減鹽醬油。
4. 放入佛手瓜，翻炒 2 分鐘，再放鷹嘴豆，繼續炒 1 分鐘。
5. 加水半杯，蓋上鍋蓋，大火煮 6 到 8 分鐘左右即可。

小貼士

1. 購買罐裝鷹嘴豆的時候，注意食鹽含量。食用時，可以將罐中浸泡的液體倒掉，減少食鹽攝入。

番茄炒蛋 Tomato and Egg stir-fry

（四人份）

材料：

番茄 tomato	4 杯
雞蛋 egg	2 個
小香蔥 green onion	1 根
菜籽油 canola oil	2 茶匙
食鹽 salt	1/6 茶匙

Nutrition Facts

Serving Size (211g)
Servings Per Container

Amount Per Serving

Calories 90	Calories from Fat 45
	% Daily Value*
Total Fat 5g	**8%**
Saturated Fat 1g	**5%**
Trans Fat 0g	
Cholesterol 105mg	**35%**
Sodium 180mg	**8%**
Total Carbohydrate 7g	**2%**
Dietary Fiber 2g	**8%**
Sugars 5g	
Protein 5g	

製作方法：

1. 番茄切塊，蔥切段。
2. 炒鍋燒熱，放 1 茶匙油，打入雞蛋，炒熟，盛出備用。
3. 鍋中再放 1 茶匙油，放入蔥，倒入番茄，翻炒 2 分鐘。
4. 蓋上鍋蓋煮 3 分鐘，放入雞蛋和食鹽，攪勻即可關火。

青椒燒豆腐 Braised Tofu with Green Pepper

（四人份）

材料：

豆腐 tofu	300 克
青椒 green pepper	1 個（1 杯）
小香蔥 green onion	1 根
蒜 garlic	1 瓣
菜籽油 canola oil	1 湯匙
減鹽醬油 less sodium soy sauce	2 茶匙
醋 vinegar	½ 茶匙
食鹽 salt	¼ 茶匙
水 water	½ 杯

Nutrition Facts

Serving Size (125g)
Servings Per Container

Amount Per Serving

Calories 140	Calories from Fat 80
	% Daily Value*
Total Fat 9g	**14%**
Saturated Fat 1g	**5%**
Trans Fat 0g	
Cholesterol 0mg	**0%**
Sodium 250mg	**10%**
Total Carbohydrate 4g	**1%**
Dietary Fiber 1g	**4%**
Sugars 2g	
Protein 11g	

製作方法：

1. 豆腐和青椒切塊，蔥切段，蒜切碎。
2. 測量好醬油和醋，倒入同一個小碗中，備用。
3. 炒鍋燒熱，放油，放入蔥和蒜爆香，倒入上一步量好的醬油和醋。
4. 倒入豆腐和青椒，翻炒 3 分鐘。
5. 加半杯水，大火燒開，轉中火煮 5 分鐘，放 ¼ 茶匙鹽，攪勻，繼續煮 3 分鐘即可。

小貼士

1. 注意每日三餐有規律地進食，再加上兩餐中間的零食，這樣均勻的飲食安排，可以幫助控制血糖水準， 延長飽腹感時間， 從而減降低您想吃甜食的慾望。
2. 外出時隨身攜帶健康零食，例如水果和堅果，可幫助維持血糖水準， 防止低血糖。

韭菜燒豆腐 Braised Tofu with Chinese Chives

（四人份）

材料：

韭菜 Chinese chives	2 杯
豆腐 tofu	300 克
菜籽油 canola oil	1 湯匙
小香蔥 green onion	1 根
蒜 garlic	2 瓣
減鹽醬油 less sodium soy sauce	1½ 湯匙
醋 vinegar	½ 茶匙
水 water	½ 杯

Nutrition Facts

Serving Size (112g)
Servings Per Container

Amount Per Serving

Calories 90	Calories from Fat 50
	% Daily Value*
Total Fat 6g	**9%**
Saturated Fat 0.5g	**3%**
Trans Fat 0g	
Cholesterol 0mg	**0%**
Sodium 230mg	**10%**
Total Carbohydrate 4g	**1%**
Dietary Fiber 1g	**4%**
Sugars 2g	
Protein 6g	

製作方法：

1. 韭菜切段，豆腐切塊。蔥切段，蒜切碎。
2. 量好醬油和醋，倒入小碗備用。
3. 鍋中放油，燒熱，放蔥和蒜炒香。
4. 倒入量好的醬油和醋，以及豆腐，翻炒 2 分鐘。
5. 加半杯水，蓋上鍋蓋，大火燒開，轉中火煮 7 分鐘左右。
6. 放韭菜，攪勻，蓋上鍋蓋，繼續煮 3 分鐘即可出鍋。

韭菜炒蛋 Chinese Chives and Egg Stir-fry

（四人份）

材料：

韭菜 Chinese chives	2 杯
雞蛋 egg	2 個
菜籽油 canola oil	½ 湯匙
食鹽 salt	1/8 茶匙

Nutrition Facts

Serving Size (51g)
Servings Per Container

Amount Per Serving

Calories 60	Calories from Fat 40
	% Daily Value*
Total Fat 4.5g	**7%**
Saturated Fat 1g	**5%**
Trans Fat 0g	
Cholesterol 110mg	**37%**
Sodium 105mg	**4%**
Total Carbohydrate 1g	**0%**
Dietary Fiber 1g	**4%**
Sugars 1g	
Protein 4g	

製作方法：

1. 韭菜洗淨，切段。
2. 炒鍋中放入 1 茶匙油，燒熱，打入兩個雞蛋，炒熟，盛出備用。
3. 鍋中再放半茶匙油，放韭菜，炒 1 分鐘。
4. 把之前炒好的雞蛋倒入鍋中，放鹽 1/8 茶匙，繼續炒一分鐘，即可出鍋。

義大利瓜/西葫蘆炒蛋 Zucchini and Egg Stir-fry

（四人份）

材料：

義大利瓜/西葫蘆 zucchini	4 杯（約 600 克）
雞蛋 egg	2 個
小香蔥 green onion	1 根
菜籽油 canola oil	1 湯匙
減鹽醬油 less sodium soy sauce	1 茶匙
食鹽 salt	½ 茶匙

Nutrition Facts

Serving Size (155g)
Servings Per Container

Amount Per Serving

Calories 90	Calories from Fat 50
	% Daily Value*
Total Fat 6g	**9%**
Saturated Fat 1g	**5%**
Trans Fat 0g	
Cholesterol 105mg	**35%**
Sodium 230mg	**10%**
Total Carbohydrate 5g	**2%**
Dietary Fiber 1g	**4%**
Sugars 2g	
Protein 5g	

製作方法：

1. 把義大利瓜或者西葫蘆切片，蔥切段。
2. 雞蛋打入碗中，加半茶匙清水，攪勻。
3. 炒鍋燒熱，放入 1 茶匙油，倒入雞蛋，炒熟，盛出備用。
4. 往鍋中加入 2 茶匙油，放入蔥，倒入 1 茶匙醬油。
5. 倒入義大利瓜或西葫蘆翻炒 4 分鐘，加鹽，再倒入之前炒好的雞蛋翻炒 2 分鐘即可出鍋。

義大利瓜/西葫蘆燒豆腐 Braised Tofu with Zucchini

（四人份）

材料：

豆腐 tofu	300 克
義大利瓜/西葫蘆 zucchini	1 杯（150 克）
小香蔥 green onion	1 根
蒜 garlic	3 瓣
菜籽油 canola oil	2 茶匙
減鹽醬油 less sodium soy sauce	1 湯匙
料酒 cooking wine	1 茶匙
醋 vinegar	1 茶匙

Nutrition Facts

Serving Size (118g)
Servings Per Container

Amount Per Serving

Calories 80	Calories from Fat 40
	% Daily Value*
Total Fat 4.5g	**7%**
Saturated Fat 0g	**0%**
Trans Fat 0g	
Cholesterol 0mg	**0%**
Sodium 170mg	**7%**
Total Carbohydrate 4g	**1%**
Dietary Fiber 1g	**4%**
Sugars 2g	
Protein 6g	

製作方法：

1. 義大利瓜和豆腐分別切塊，蔥切段，蒜切片。
2. 量好醬油、料酒和醋，倒入同一個小碗，備用。
3. 炒鍋燒熱，倒入油，放入蔥蒜爆香（預留一部分蔥末最後用）。
4. 倒入之前量好的醬油、料酒和醋的混合物，立刻倒入豆腐和義大利瓜，翻炒一分鐘。
5. 加水半杯，大火燒開，之後轉中火煮 10 分鐘左右。
6. 出鍋前，撒上蔥末即可。

3.5 雞肉類

四季豆炒雞肉 Chicken and Green Bean Stir-fry

（四人份）

材料：

去皮雞腿肉 skinless chicken thigh	1 杯（180 克）
醃雞肉的調料：	
四川花椒粉 sichuan pepper powder	1/8 茶匙
減鹽醬油 less sodium soy sauce	2 茶匙
蒜粉或蒜蓉 garlic powder	1/8 茶匙
四季豆 green beans	2 杯
小香蔥 green onion	1 根
生薑 ginger root	2 片
減鹽醬油 less sodium soy sauce	2 茶匙
菜籽油 canola oil	2 茶匙
水 water	1 杯

Nutrition Facts

Serving Size (110g)
Servings Per Container

Amount Per Serving

Calories 100	Calories from Fat 40
	% Daily Value*
Total Fat 4.5g	**7%**
Saturated Fat 1g	**5%**
Trans Fat 0g	
Cholesterol 35mg	**12%**
Sodium 220mg	**9%**
Total Carbohydrate 5g	**2%**
Dietary Fiber 2g	**8%**
Sugars 1g	
Protein 10g	

製作方法：

1. 雞肉切碎或絞碎，用花椒粉、醬油和蒜粉醃製 15 分鐘左右。
2. 四季豆切段，蔥和生薑切片。
3. 炒鍋燒熱，放油 1 茶匙，放入醃好的雞肉，翻炒 6 分鐘左右，盛出備用。
4. 鍋中放油 1 茶匙，放入蔥、薑炒香，倒入 2 茶匙醬油。
5. 放入四季豆，翻炒 3 分鐘。
6. 加水 1 杯，煮十五分鐘左右。
7. 倒入之前炒好的雞肉，翻炒片刻，即可出鍋。

芹菜胡蘿蔔炒雞肉 Chicken Stir-fry with Celeries and Carrots

（四人份）

材料：

去皮雞腿肉 skinless chicken thigh　1 杯（180 克）

醃雞肉的調料：

四川花椒粉 sichuan pepper powder　1/8 茶匙

減鹽醬油 less sodium soy sauce　2 茶匙

蒜粉或蒜蓉 garlic powder　1/8 茶匙

芹菜 celery　1 杯

胡蘿蔔 carrot　1 杯（大約兩根 18cm 長的）

小香蔥 green onion　1 根

生薑 ginger root　2 片

減鹽醬油 less sodium soy sauce　2 茶匙

菜籽油 canola oil　2 茶匙

水 water　½ 杯

Nutrition Facts

Serving Size (112g)
Servings Per Container

Amount Per Serving

Calories 100	Calories from Fat 40
	% Daily Value*
Total Fat 4.5g	**7%**
Saturated Fat 1g	**5%**
Trans Fat 0g	
Cholesterol 35mg	**12%**
Sodium 260mg	**11%**
Total Carbohydrate 5g	**2%**
Dietary Fiber 1g	**4%**
Sugars 2g	
Protein 9g	

製作方法：

1. 雞腿肉切碎或絞碎，用花椒粉、醬油和蒜粉醃製 15 分鐘左右。
2. 葫蘆波和芹菜切片，蔥切段，生薑切片。
3. 炒鍋燒熱，放油 1 茶匙，放入醃好的雞肉，翻炒 6 分鐘左右，盛出備用。
4. 鍋中放油 1 茶匙，放入蔥薑爆香，倒入 2 茶匙醬油。
5. 放入胡蘿蔔和芹菜，翻炒 2 分鐘。
6. 加半杯水，煮十分鐘左右。
7. 倒入之前炒好的雞肉，翻炒片刻，即可出鍋。

雞肉生菜卷 Chicken Lettuce Wraps

（四人份）

材料：

去皮雞胸肉 chicken breast, skinless 1 杯（180 克）

豆芽菜 bean sprouts 1 杯

芹菜 celery 1 杯（大約 2 條芹菜莖）

香菇/冬菇 shiitake mushroom ½ 杯（大約 4 個）

胡蘿蔔 carrot ½ 杯（大約 1 條 18cm 長的）

小香蔥 green onion 1 條

生菜葉 lettuce 8 片葉子

菜籽油 canola oil 1 湯匙

減鹽醬油 less sodium soy sauce 1 湯匙

料酒 cooking wine 1 茶匙

醋 vinegar 1 茶匙

Nutrition Facts

Serving Size (135g)
Servings Per Container

Amount Per Serving

Calories 130	Calories from Fat 50
	% Daily Value*
Total Fat 5g	**8%**
Saturated Fat 0.5g	**3%**
Trans Fat 0g	
Cholesterol 25mg	**8%**
Sodium 200mg	**8%**
Total Carbohydrate 8g	**3%**
Dietary Fiber 2g	**8%**
Sugars 2g	
Protein 14g	

製作方法：

1. 放冬菇（香菇）在熱水中約 30 分鐘浸軟，洗淨瀝幹，切粒。
2. 雞胸肉焯水（冷水下鍋，煮至雞肉變白色），撈出，切粒。
3. 芹菜和胡蘿蔔切粒，蔥切段。
4. 量好減鹽醬油、料酒和醋，倒入同一個小碗，備用。
5. 鍋中放一茶匙油，倒入上一步量好的醬汁，接著放雞肉粒，翻炒 3-4 分鐘，盛出，備用。
6. 鍋中放 2 茶匙油，放入蔥段爆香，放入所有蔬菜，翻炒 2 分鐘。
7. 加水半杯，大火煮 3 分鐘之後，倒入雞肉粒，攪勻，繼續煮 1-2 分鐘收汁。
8. 炒熟後，將其包在生菜葉內食用即可。

*該食譜參照了加拿大糖尿病協會 Edmonton 支部編印的康健食譜。

雞腿肉燉蠔菇 Chicken and Mushroom Stew

（四人份）

材料：

蠔菇 oyster mushroom	2 杯
去皮雞腿肉 skinless chicken thigh	180 克
小香蔥 green onion	1 根
蒜 garlic	1 瓣
生薑 ginger root	2 片
菜籽油 canola oil	2 茶匙
減鹽醬油 less sodium soy sauce	1 湯匙
料酒 cooking wine	1 茶匙
醋 vinegar	1 茶匙

Nutrition Facts

Serving Size (117g)
Servings Per Container

Amount Per Serving

Calories 100	Calories from Fat 45
	% Daily Value*
Total Fat 5g	**8%**
Saturated Fat 1g	**5%**
Trans Fat 0g	
Cholesterol 35mg	**12%**
Sodium 190mg	**8%**
Total Carbohydrate 5g	**2%**
Dietary Fiber 1g	**4%**
Sugars 1g	
Protein 11g	

製作方法：

1. 雞腿肉用清水浸泡 1 小時，去除血水，切小塊。
2. 蠔菇洗淨，撕成塊，蔥、薑、蒜切碎。
3. 量好醬油、料酒和醋，倒入同一個小碗中，備用。
4. 炒鍋燒熱，放 2 湯匙油，放入蔥薑蒜爆香，倒入上一步量好的醬汁。
5. 倒入雞肉塊，翻炒 2 分鐘，倒入蘑菇，繼續炒 1 分鐘。
6. 加水 300 毫升左右，大火燒開，轉中火，燉 20 分鐘即可（也可以根據個人喜好延長或縮短燉的時間，並相應調整加水的量）。

青椒雞柳 Stir-fried Chicken Strips with Green Pepper

（四人份）

材料：

青椒 green pepper	2 個
去皮雞胸肉 skinless chicken breast	180 克
小香蔥 green onion	1 根
蒜 garlic	1 瓣
生薑 ginger root	2 片
菜籽油 canola oil	1 湯匙
減鹽醬油 less sodium soy sauce	1½ 湯匙
料酒 cooking wine	1 茶匙
醋 vinegar	1 茶匙

Nutrition Facts

Serving Size (142g)
Servings Per Container

Amount Per Serving

Calories 100	Calories from Fat 40
	% Daily Value*
Total Fat 4.5g	**7%**
Saturated Fat 0g	**0%**
Trans Fat 0g	
Cholesterol 25mg	**8%**
Sodium 230mg	**10%**
Total Carbohydrate 5g	**2%**
Dietary Fiber 1g	**4%**
Sugars 2g	
Protein 11g	

製作方法：

1. 雞胸肉用清水浸泡 1 小時，去除血水，洗淨，切細條。
2. 青椒切塊，蔥、薑、蒜切碎。
3. 量好醬油、料酒和醋，倒入同一個小碗中，備用。
4. 炒鍋燒熱，放半湯匙油，放入蔥薑蒜爆香，倒入上一步量好的醬汁。
5. 火稍微調小，以防糊鍋，倒入雞柳，翻炒 4 分鐘，盛出，備用。
6. 鍋中再倒入半湯匙油，放青椒，炒 2 分鐘。
7. 把雞柳倒回鍋中，繼續翻炒兩三分鐘，即可出鍋。

麻辣雞胗 Spicy Chicken Gizzards

（四人份）

材料：

雞胗 chicken gizzard	2 杯（360 克）
芹菜 celery	½ 杯
小香蔥 green onion	1 根
蒜 garlic	3 瓣
生薑 ginger root	3 片
四川花椒粉 sichuan pepper powder	½ 茶匙
菜籽油 canola oil	1 湯匙
幹辣椒 dried hot chili pepper	3 個
減鹽醬油 less sodium soy sauce	1½ 湯匙
料酒 cooking wine	1 茶匙
醋 vinegar	1 茶匙
水 water	3 杯

Nutrition Facts

Serving Size (118g)
Servings Per Container

Amount Per Serving

Calories 130	Calories from Fat 50
	% Daily Value*
Total Fat 5g	**8%**
Saturated Fat 0.5g	**3%**
Trans Fat 0g	
Cholesterol 215mg	**72%**
Sodium 280mg	**12%**
Total Carbohydrate 3g	**1%**
Dietary Fiber 0g	**0%**
Sugars 1g	
Protein 17g	

製作方法：

1. 雞胗洗淨切塊，焯水（冷水下鍋，水開後再煮 3 分鐘），撈出，瀝乾備用。
2. 蔥切段，薑、蒜切片。
3. 量好醬油、料酒和醋，倒入同一個小碗，備用。
4. 炒鍋燒熱，加油，放入花椒粉和乾辣椒，炒香，倒入蔥、薑、蒜爆香。
5. 倒入之前量好的醬汁，接著倒入雞胗翻炒 2 分鐘。
6. 加水 3 杯，大火燒開，轉中火燉 40 分鐘即可。出鍋前 10 分鐘，倒入芹菜。

棉豆燉雞胗 Chicken Gizzard and Lima Bean Stew

（四人份）

材料：

雞胗 chicken gizzard	2 杯（360 克）
棉豆 lima beans（可用其他豆類代替）	½ 杯
小香蔥 green onion	1 根
蒜 garlic	3 瓣
生薑 ginger root	3 片
菜籽油	1 湯匙
減鹽醬油 less sodium soy sauce	1 湯匙
料酒 cookign wine	1 茶匙
醋 vinegar	1 茶匙
水 water	3 杯

Nutrition Facts

Serving Size (128g)
Servings Per Container

Amount Per Serving

Calories 150	Calories from Fat 50
	% Daily Value*
Total Fat 5g	**8%**
Saturated Fat 0.5g	**3%**
Trans Fat 0g	
Cholesterol 215mg	**72%**
Sodium 210mg	**9%**
Total Carbohydrate 6g	**2%**
Dietary Fiber 1g	**4%**
Sugars 0g	
Protein 18g	

製作方法：

1. 雞胗洗淨切塊，焯水（冷水下鍋，水開後再煮 3 分鐘），撈出，瀝乾備用。
2. 蔥切段，薑、蒜切片。
3. 量好醬油、料酒和醋，倒入同一個小碗，備用。
4. 炒鍋燒熱，加油，放入花椒粉，炒香，倒入蔥薑蒜爆香。
5. 倒入之前量好的醬汁，放入雞胗翻炒 2 分鐘。
6. 加水 3 杯，大火燒開，轉中火燉 20 分鐘後，加入棉豆（或其他豆類，例如豌豆），繼續煮 20 分鐘左右，最後大火收汁即可。

腰果雞丁 Stir-fried Chicken with Cashew Nuts

（四人份）

材料：

去皮雞胸肉 skinless chicken breast	1 杯（180 克）
腰果 cashew nuts	¼ 杯
紅甜椒 sweet pepper, red	½ 杯（半個）
小香蔥 green onion	1 根
蒜 garlic	3 瓣
生薑 ginger root	2 片
花椒粉 sichuan pepper powder	¼ 茶匙
菜籽油 canola oil	1 湯匙
減鹽醬油 less sodium soy sauce	1½ 湯匙
料酒 cooking wine	1 茶匙
醋 vinegar	1 茶匙

Nutrition Facts

Serving Size (85g)
Servings Per Container

Amount Per Serving

Calories 140	Calories from Fat 70
	% Daily Value*
Total Fat 8g	**12%**
Saturated Fat 1g	**5%**
Trans Fat 0g	
Cholesterol 25mg	**8%**
Sodium 230mg	**10%**
Total Carbohydrate 5g	**2%**
Dietary Fiber 1g	**4%**
Sugars 1g	
Protein 12g	

製作方法：

1. 雞肉洗淨，用清水浸泡 1 小時，去除血水，切丁，備用。
2. 甜椒切丁。
3. 醬油、料酒和醋量好，倒入同一個小碗，備用。
4. 炒鍋燒熱，倒入油，依次放入花椒粉、蔥薑蒜爆香，倒入之前量好的醬汁。
5. 倒入雞丁，翻炒 2 分鐘，倒入甜椒丁，翻炒半分鐘。
6. 蓋上鍋蓋，燜 3-5 分鐘左右即可。
7. 出鍋前，倒入腰果，攪拌均勻即可。

小貼士

1. 堅果除了可以用於肉類和菜類的烹調當中，也是不錯的零食選擇， 但在購買時要注意是否有添加鹽。高鹽可能會引發高血壓， 因此， 盡量選擇低鹽或無鹽堅果。

板栗雞翅 Chicken Wing Stew with Chestnuts

（四人份）

材料：

雞翅中/ 根 chicken wings	8 個
板栗仁 chestnuts	1 杯
花椒粉 sichuan pepper powder	1/8 茶匙
小香蔥 green onion	1 根
生薑 ginger root	2 片
菜籽油 canola oil	1 茶匙
減鹽醬油 less sodium soy sauce	1 湯匙
番茄醬 ketchup	2 茶匙

Nutrition Facts

Serving Size (144g)
Servings Per Container

Amount Per Serving

Calories 290	Calories from Fat 150
	% Daily Value*
Total Fat 17g	**26%**
Saturated Fat 4.5g	**23%**
Trans Fat 0g	
Cholesterol 75mg	**25%**
Sodium 230mg	**10%**
Total Carbohydrate 13g	**4%**
Dietary Fiber 0g	**0%**
Sugars 1g	
Protein 19g	

製作方法：

1. 雞翅洗淨，焯水（雞翅冷水下鍋，燒開後再煮 3 分鐘，可以去除血污和部分脂肪），撈出，沖洗乾淨備用。

2. 蔥切段，生薑切片。

3. 醬油和番茄醬用茶匙和湯匙量好，備用。

4. 炒鍋燒熱，倒入油，待油稍熱，依次放入花椒粉、蔥和薑，爆香。

5. 倒入雞翅，翻炒一分鐘，調成中火，以免雞翅糊鍋。

6. 將之前量好的番茄醬和醬油倒入鍋中，翻炒均勻，加水 2 杯，放入板栗仁，蓋上鍋蓋，中火燉煮 30 分鐘即可。

糖醋蓮藕雞 Sweet and Sour Chicken with Lotus Root

（四人份）

材料：

蓮藕 lotus root	1 杯
去皮雞腿肉 skinless chicken thigh	360 克
小香蔥 green onion	1 根
生薑 ginger root	2 片
蒜 garlic	2 瓣
菜籽油 canola oil	2 茶匙
減鹽醬油 less sodium soy sauce	1 湯匙
料酒 cooking wine	1 茶匙
醋 vinegar	1 湯匙
白砂糖 granualted sugar	1/8 茶匙
花椒粉 sichuan pepper powder	1/8 茶匙

Nutrition Facts

Serving Size (135g)
Servings Per Container

Amount Per Serving

Calories 160	Calories from Fat 60
	% Daily Value*
Total Fat 7g	**11%**
Saturated Fat 1.5g	**8%**
Trans Fat 0g	
Cholesterol 75mg	**25%**
Sodium 230mg	**10%**
Total Carbohydrate 6g	**2%**
Dietary Fiber 1g	**4%**
Sugars 0g	
Protein 18g	

製作方法：

1. 蓮藕洗淨，切成小塊備用。蔥薑蒜切碎備用。
2. 將去皮去骨的雞腿肉焯水（冷水下鍋，燒開後再煮 3 分鐘），撈出備用。
3. 測量醬油、料酒和醋，一同倒入碗中備用。
4. 鍋熱加油，先放入白糖，炒到融化，放花椒粉和蔥薑蒜，接著倒入雞肉，炒一分鐘左右。
5. 倒入藕，繼續翻炒一分鐘，倒入醬油、料酒和醋，翻炒均勻。
6. 加水 3 杯，蓋上鍋蓋，水開後調成中火，煮 35 分鐘左右，最後大火收汁。

小貼士

1. 當您對食譜中的食材進行替換時， 請選擇同一個食品類別裡的食物。例如， 用一種蔬菜替換另外一種蔬菜，用一種肉類替換另一種肉類。

3.6 海鮮類

蝦仁燜南瓜 Shrimp and Pumpkin Stir-fry

（四人份）

材料：

蝦，去皮 shrimp, peeled	1 杯 (180 克)
日本小南瓜 kabocha	2 杯
菜籽油 canola oil	2 茶匙
小香蔥 green onion	1 根
蒜 garlic	1 瓣
生薑 ginger root	2 片
食鹽 salt	1/8 茶匙

Nutrition Facts

Serving Size (109g)
Servings Per Container

Amount Per Serving

Calories 90	Calories from Fat 30
	% Daily Value*
Total Fat 3g	**5%**
Saturated Fat 0g	**0%**
Trans Fat 0g	
Cholesterol 70mg	**23%**
Sodium 140mg	**6%**
Total Carbohydrate 5g	**2%**
Dietary Fiber 1g	**4%**
Sugars 1g	
Protein 10g	

製作方法：

1. 南瓜先用高壓鍋或蒸鍋蒸熟，挖去籽，切小塊。
2. 蝦解凍，洗淨瀝乾。
3. 蔥薑蒜切碎，備用。
4. 炒鍋放油，燒熱，放入蔥薑蒜炒香。
5. 倒入蝦，翻炒 3 分鐘，倒入南瓜，放鹽少許（1/8 茶匙），翻炒均勻即可出鍋。

鮮蝦炒芥蘭 Shrimp and Gai Lon Stir-fry

（四人份）

材料：

芥蘭 Gai Lon	4 杯
蝦，去皮 shrimp, peeled	½ 杯（90 克）
小香蔥 green onion	1 根
蒜 garlic	3 瓣
菜籽油 canola oil	1 湯匙
花椒粉 Sichuan pepper powder	1/8 茶匙
減鹽醬油 less sodium soy sauce	1½ 湯匙
料酒 cooking wine	1 茶匙

Nutrition Facts

Serving Size (81g)
Servings Per Container

Amount Per Serving

Calories 70	Calories from Fat 35
	% Daily Value*
Total Fat 4g	**6%**
Saturated Fat 0g	**0%**
Trans Fat 0g	
Cholesterol 35mg	**12%**
Sodium 240mg	**10%**
Total Carbohydrate 3g	**1%**
Dietary Fiber 1g	**4%**
Sugars 1g	
Protein 6g	

製作方法：

1. 蝦洗淨，瀝乾，備用。
2. 芥蘭洗淨，切段。蔥切段，蒜切片 。
3. 量好醬油和料酒，倒入同一個小碗中，備用。
4. 炒鍋燒熱，依次放入油、花椒粉、蔥和蒜，爆香。
5. 倒入蝦，翻炒半分鐘，倒入醬油和料酒，再倒入芥蘭，翻炒 2 分鐘。
6. 蓋上鍋蓋，煮 3 分鐘即可。

蘆筍炒蝦 Shrimp and Asparagus Stir-fry

（兩人份）

材料：

蘆筍 asparagus	1½ 杯（18 條中等大小）
蝦, 去皮 shrimp, peeled	½ 杯（90 克）
小香蔥 green onion	1 根
蒜 garlic	3 瓣
生薑 ginger root	2 片
菜籽油 canola oil	2 茶匙
花椒粉 sichuan pepper powder	⅛ 茶匙
減鹽醬油 less sodium soy sauce	2 茶匙
料酒 cooking wine	1 茶匙
醋 vinegar	1 茶匙

Nutrition Facts

Serving Size (213g)
Servings Per Container

Amount Per Serving

Calories 130	Calories from Fat 50
	% Daily Value*
Total Fat 6g	**9%**
Saturated Fat 0.5g	**3%**
Trans Fat 0g	
Cholesterol 70mg	**23%**
Sodium 260mg	**11%**
Total Carbohydrate 9g	**3%**
Dietary Fiber 3g	**12%**
Sugars 3g	
Protein 13g	

製作方法：

1. 蝦洗淨瀝乾。
2. 蘆筍洗淨，切小段。蔥切段，薑蒜切片 。
3. 醬油、料酒和醋量好，倒入小碗備用。
4. 炒鍋燒熱，倒入油，放入花椒粉、蔥薑蒜爆香，倒入上一步量好的醬汁。
5. 蝦和蘆筍同時下鍋，翻炒 1 分鐘。
6. 加水 ¼ 杯，蓋上鍋蓋，煮 5 分鐘左右即可。

清炒白菜蝦仁 Shrimp and Bok Choy Stir-fry

（四人份）

材料：

蝦 ，去皮 shrimp, peeled	1 杯（180 克）
白菜 Bok choy	4 杯
小香蔥 green onion	1 根
蒜 garlic	2 瓣
菜籽油 canola oil	2 茶匙
食鹽 salt	1/6 茶匙

Nutrition Facts

Serving Size (120g)
Servings Per Container

Amount Per Serving

Calories 80	Calories from Fat 30
	% Daily Value*
Total Fat 3g	**5%**
Saturated Fat 0g	**0%**
Trans Fat 0g	
Cholesterol 70mg	**23%**
Sodium 210mg	**9%**
Total Carbohydrate 3g	**1%**
Dietary Fiber 1g	**4%**
Sugars 1g	
Protein 10g	

製作方法：

1. 蔥、蒜切碎，白菜切段，蝦解凍，洗淨，瀝乾備用。
2. 炒鍋燒熱，放油，放入蔥和蒜爆香。
3. 放蝦，炒至變色，約 3 分鐘。
4. 放入白菜，翻炒 2 分鐘，加鹽 1/6 茶匙。
5. 蓋上鍋蓋，煮 5 分鐘即可。

蒸三文魚 Steamed Salmon

（兩人份）

材料：

三文魚 salmon	180 克
小香蔥 green onion	1 條
蒸魚豉油 soy sauce for sea food	1 茶匙

Nutrition Facts

Serving Size (95g)
Servings Per Container

Amount Per Serving

Calories 170	Calories from Fat 90
	% Daily Value*
Total Fat 10g	**15%**
Saturated Fat 2g	**10%**
Trans Fat --g	
Cholesterol 55mg	**18%**
Sodium 200mg	**8%**
Total Carbohydrate 0g	**0%**
Dietary Fiber 0g	**0%**
Sugars 0g	
Protein 18g	

製作方法：

1. 三文魚洗淨，用廚房紙巾將水分吸乾，擺放在盤子內。
2. 將蒸魚豉油均勻塗抹在魚表面，撒上蔥花。
3. 將魚放在蒸鍋內，蒸 15 分鐘左右即可。

微波爐巴沙魚柳 Microwaved Basa Fillet

（兩人份）

材料：

巴沙魚柳 basa fillet	180 克
雪豆 snow peas	½ 杯
蒸魚豉油 soy sauce for sea food	1 茶匙
菜籽油 canola oil	½ 茶匙
小香蔥 green onion	1 根
生薑 ginger root	1 片

Nutrition Facts

Serving Size (92g)
Servings Per Container

Amount Per Serving

Calories 80	Calories from Fat 25
	% Daily Value*
Total Fat 2.5g	**4%**
Saturated Fat 0.5g	**3%**
Trans Fat 0g	
Cholesterol 35mg	**12%**
Sodium 125mg	**5%**
Total Carbohydrate 2g	**1%**
Dietary Fiber 1g	**4%**
Sugars 1g	
Protein 11g	

製作方法：

1. 巴沙（龍利）魚柳放在盤中，表面每隔 1 吋用刀橫割，便於調料滲入。
2. 將菜籽油和蒸魚豉油均勻塗抹在魚柳表面。
3. 蔥薑切絲，撒在表面。
4. 將雪豆均勻地撒在魚柳上面，放入微波爐，加熱 4 分鐘即可（或者根據魚柳的量相應整烹飪時間）。

*該食譜參照了加拿大糖尿病協會 Edmonton 支部編印的康健食譜。

鱈魚燜豆腐 Braised Cod with Tofu

（四人份）

材料：

鱈魚柳 cod fillet	180 克（ 1 杯）
豆腐 tofu	300 克
小香蔥 green onion	1 根
生薑 ginger root	2 片
蒜 garlic	2 瓣
花椒粉 Sichuan pepper powder	1/8 茶匙
菜籽油 canola oil	2 茶匙
減鹽醬油 less sodium soy sauce	4 茶匙
料酒 cooking wine	1 茶匙
醋 vinegar	1 茶匙

Nutrition Facts

Serving Size (134g)
Servings Per Container

Amount Per Serving

Calories 110	Calories from Fat 40
	% Daily Value*
Total Fat 4.5g	**7%**
Saturated Fat 0.5g	**3%**
Trans Fat 0g	
Cholesterol 20mg	**7%**
Sodium 240mg	**10%**
Total Carbohydrate 3g	**1%**
Dietary Fiber 0g	**0%**
Sugars 1g	
Protein 14g	

製作方法：

1. 將鱈魚柳和豆腐切塊，蔥切段，薑、蒜切片。
2. 醬油、料酒和醋量好，倒入同一個小碗中備用。
3. 鍋燒熱，倒入油，待油稍熱，放花椒粉，接著放入蔥薑蒜爆香。
4. 往鍋中倒入之前調好的醬汁（醬油、料酒和醋），放豆腐和魚柳，翻炒一分鐘。
5. 加水 1 杯，中火燜 20 分鐘即可。

冬瓜魷魚仔 Baby Squid and Wax Gourd Stir-fry

（四人份）

材料：

魷魚仔 baby squid	1 杯（180 克）
冬瓜 wax gourd	2 杯
小香蔥 green onion	1 根
菜籽油 canola oil	2 茶匙
食鹽 salt	1/6 茶匙
水 water	½ 杯

Nutrition Facts

Serving Size (115g)
Servings Per Container

Amount Per Serving

Calories 70	Calories from Fat 25
	% Daily Value*
Total Fat 3g	**5%**
Saturated Fat 0g	**0%**
Trans Fat 0g	
Cholesterol 105mg	**35%**
Sodium 190mg	**8%**
Total Carbohydrate 3g	**1%**
Dietary Fiber 2g	**8%**
Sugars 0g	
Protein 7g	

製作方法：

1. 冬瓜切片，蔥切段。
2. 炒鍋燒熱，放油，放入蔥爆香。
3. 魷魚仔和冬瓜同時下鍋，炒至魷魚變色，約需一分鐘。
4. 加鹽 1/6 茶匙，水半杯，蓋上鍋蓋，煮 7 分鐘即可。

西蘭花魷魚仔 Baby Squid and Broccoli Stir-fry

（兩人份）

材料：

西蘭花 broccoli	2 杯
魷魚仔 baby squid	½ 杯（90 克）
小香蔥 green onion	1 根
蒜 garlic	1 瓣
生薑 ginger root	2 片
菜籽油 canola oil	2 茶匙
減鹽醬油 less sodium soy sauce	2 茶匙
料酒 cooking wine	½ 茶匙
醋 vinegar	½ 茶匙
水 water	½ 杯

Nutrition Facts

Serving Size (152g)
Servings Per Container

Amount Per Serving

Calories 120	Calories from Fat 50
	% Daily Value*
Total Fat 6g	**9%**
Saturated Fat 0.5g	**3%**
Trans Fat 0g	
Cholesterol 105mg	**35%**
Sodium 230mg	**10%**
Total Carbohydrate 9g	**3%**
Dietary Fiber 2g	**8%**
Sugars 2g	
Protein 10g	

製作方法：

1. 西蘭花洗淨，掰成小朵，魷魚仔洗淨，瀝乾。
2. 蔥切段，薑和蒜切片 。
3. 量好醬油、料酒和醋，倒入同一個小碗中，備用。
4. 炒鍋中放油，燒熱，放入蔥薑蒜，爆香，倒入上一步量好的醬汁。
5. 魷魚仔和西蘭花同時下鍋，翻炒 2 分鐘。
6. 加半杯水，蓋上鍋蓋，大火煮 5 分鐘即可。

青菜洋蔥炒魷魚 Stir-fried Squid with Bok Choy and Onion

（四人份）

材料：

魷魚 squid	1 杯（180 克）
小青菜 shanghai bok choy	3 杯
洋蔥 onion	1 杯
菜籽油 canola oil	2 茶匙
減鹽醬油 less sodium soy sauce	2 茶匙
料酒 cooking wine	1 茶匙
醋 vinegar	½ 茶匙

Nutrition Facts

Serving Size (144g)
Servings Per Container

Amount Per Serving

Calories 90	Calories from Fat 25
	% Daily Value*
Total Fat 3g	**5%**
Saturated Fat 0g	**0%**
Trans Fat 0g	
Cholesterol 105mg	**35%**
Sodium 150mg	**6%**
Total Carbohydrate 7g	**2%**
Dietary Fiber 1g	**4%**
Sugars 2g	
Protein 8g	

製作方法：

1. 魷魚、青菜和洋蔥分別切塊。
2. 量好減鹽醬油、料酒和醋，倒入同一個小碗，備用。
3. 炒鍋放油，燒熱，倒入上一步量好的醬汁，放洋蔥翻炒片刻，倒入魷魚翻炒一分鐘。
4. 放入青菜，繼續炒一分鐘。
5. 蓋上鍋蓋，煮 5 分鐘即可。

燴帶魚 Braised Hairtail Fish

（四人份）

材料：

帶魚 hairtail fish	400 克
小香蔥 green onion	1 根
蒜 garlic	3 瓣
生薑 ginger root	3 片
菜籽油 canola oil	1 湯匙
花椒粒 Sichuan peppercorns	¼ 茶匙（15 粒）
減鹽醬油 less sodium soy sauce	4 茶匙
料酒 cooking wine	1 茶匙
醋 vinegar	1 茶匙

Nutrition Facts

Serving Size (117g)
Servings Per Container

Amount Per Serving

Calories 160	Calories from Fat 70
	% Daily Value*
Total Fat 7g	**11%**
Saturated Fat 1.5g	**8%**
Trans Fat 0g	
Cholesterol 40mg	**13%**
Sodium 280mg	**12%**
Total Carbohydrate 2g	**1%**
Dietary Fiber 0g	**0%**
Sugars 0g	
Protein 20g	

製作方法：

1. 蔥、薑、蒜切碎。
2. 帶魚切段，放入盤子中，加入一茶匙料酒，塗抹均勻，醃製 15 分鐘。
3. 鍋中放兩茶匙油，燒熱，放入帶魚，以中火兩面煎熟，約需 5-7 分鐘，盛出。
4. 鍋中再放一茶匙油，放入花椒粒和蔥薑蒜爆香，倒入減鹽醬油和醋。
5. 接著把煎好的帶魚放入，加水半杯，大火煮 5 分鐘左右即可。

白菜木耳扇貝 Braised Scallop wtih Bok Choy and Black Fungi

（四人份）

材料：

白菜 bok choy	4 杯
木耳 black fungi	¼ 杯（泡發後體積翻倍）
扇貝 scallop	1 杯（180 克）
菜籽油 canola oil	1 湯匙
小香蔥 green onion	1 根
蒜 garlic	2 瓣
減鹽醬油 less sodium soy sauce	½ 湯匙
醋 vinegar	½ 茶匙
料酒 cooking wine	½ 茶匙
食鹽 salt	1/8 茶匙
水 water	¼ 杯

Nutrition Facts

Serving Size (126g)
Servings Per Container

Amount Per Serving

Calories 90	Calories from Fat 35
	% Daily Value*
Total Fat 4g	**6%**
Saturated Fat 0g	**0%**
Trans Fat 0g	
Cholesterol 15mg	**5%**
Sodium 260mg	**11%**
Total Carbohydrate 5g	**2%**
Dietary Fiber 2g	**8%**
Sugars 1g	
Protein 9g	

製作方法：

1. 木耳提前用清水洗淨，撕成小朵，泡發，約需 40 分鐘。
2. 炒鍋燒熱，放油，放入蔥和蒜爆香。
3. 倒入醬油、料酒和醋，接著倒入扇貝丁、木耳和白菜，翻炒 2 分鐘。
4. 加水 ¼ 杯，煮 7 分鐘，出鍋前加鹽 1/8 茶匙，攪拌均勻即可。

3.7 豬肉類

青椒炒肉片 Stir-fried Pork Slices wtih Green Pepper

（四人份）

材料：

青椒 green pepper	2 杯（2 個）
豬裡脊 pork loin	1 杯（180 克）
菜籽油 canola oil	1 湯匙
小香蔥 green onion	1 根
蒜 garlic	1 瓣
生薑 ginger root	2 片
減鹽醬油 less sodium soy sauce	5 茶匙
料酒 cooking wine	1 茶匙
醋 vinegar	1 茶匙

Nutrition Facts

Serving Size (143g)
Servings Per Container

Amount Per Serving

Calories 110	Calories from Fat 40
	% Daily Value*
Total Fat 4.5g	**7%**
Saturated Fat 0.5g	**3%**
Trans Fat 0g	
Cholesterol 25mg	**8%**
Sodium 260mg	**11%**
Total Carbohydrate 5g	**2%**
Dietary Fiber 1g	**4%**
Sugars 2g	
Protein 12g	

製作方法：

1. 裡脊肉用清水浸泡 1 小時，去除血水，洗淨，切薄片 。
2. 青椒切塊，蔥、薑、蒜切碎。
3. 量好醬油、料酒和醋，倒入同一個小碗中，備用。
4. 炒鍋燒熱，放半湯匙油，放入蔥薑蒜爆香，倒入上一步量好的醬汁。
5. 火稍微調小，以防糊鍋，倒入裡脊肉，翻炒 4 分鐘至九成熟，盛出，備用。
6. 鍋中再倒入半湯匙油，放青椒，炒 2 分鐘。
7. 把肉倒回鍋中，繼續翻炒兩三分鐘，即可出鍋。

魚香肉絲 **Spicy Pork**

（四人份）

材料：

豬裡脊肉 pork loin	1 杯（180 克）
（減鹽醬油 、料酒各 1 茶匙用於醃製豬肉）	
春筍 bamboo shoots	1 杯（140 克）
木耳 / 雲耳 black fungi	¼ 杯（泡發後體積翻倍）
青椒 green pepper	1 杯（1 個）
乾辣椒 dried hot chili pepper	4 個
小香蔥 green onion	1 根
蒜 garlic	5 瓣
生薑 ginger root	2 片
菜籽油 canola oil	1 湯匙
減鹽醬油 less sodium soy sauce	1 湯匙
老抽 dark soy sauce	1 茶匙
料酒 cooking wine	1 茶匙
醋 vinegar	1 茶匙

Nutrition Facts

Serving Size (142g)
Servings Per Container

Amount Per Serving

Calories 110	Calories from Fat 40
	% Daily Value*
Total Fat 4.5g	**7%**
Saturated Fat 0.5g	**3%**
Trans Fat 0g	
Cholesterol 25mg	**8%**
Sodium 220mg	**9%**
Total Carbohydrate 7g	**2%**
Dietary Fiber 3g	**12%**
Sugars 2g	
Protein 12g	

製作方法：

1. 木耳用水泡發，40 分鐘左右。
2. 豬裡脊肉切絲，用清水浸泡半個小時，瀝幹，加減鹽醬油和料酒個 1 茶匙醃制 15 分鐘。
3. 木耳和春筍切絲，用開水焯 2 分鐘，瀝幹備用。
4. 青椒、蔥、薑、蒜切絲。
5. 將一湯匙減鹽醬油、一茶匙老抽、一茶匙料酒和一茶匙醋量好，倒入同一個碗中，備用。
6. 炒鍋燒熱，放油，放入 4 個乾辣椒，炒 20 秒，放裡脊肉，翻炒 1 分鐘。
7. 放入蔥、薑、蒜，翻炒 1 分鐘，再放入春筍、木耳和青椒絲，繼續翻炒 3 分鐘。
8. 倒入之前量好的醬汁，翻炒一分半鐘，即可出鍋。

蒜薹燒排骨 Braised Spareribs with Garlic Flowering Stalk

（四人份）

材料：

排骨 spareribs	2 杯
蒜薹 garlic stalk	2 杯（300 克）
菜籽油 canola oil	½ 茶匙
花椒粉 sichuan pepper powder	⅛ 茶匙
小香蔥 green onion	1 根
減鹽醬油 less sodium soy sauce	1½ 湯匙
醋 vinegar	1 茶匙
水 water	½ 杯

Nutrition Facts

Serving Size (151g)
Servings Per Container

Amount Per Serving

Calories 280	Calories from Fat 150
	% Daily Value*
Total Fat 17g	**26%**
Saturated Fat 6g	**30%**
Trans Fat 0g	
Cholesterol 65mg	**22%**
Sodium 250mg	**10%**
Total Carbohydrate 12g	**4%**
Dietary Fiber 2g	**8%**
Sugars 0g	
Protein 20g	

製作方法：

1. 排骨洗淨，用高壓鍋燉熟，大約 20 分鐘。
2. 蒜薹和蔥切段。
3. 炒鍋放油少許（半茶匙），依次放入花椒粉和蔥，爆香，倒入醬油和醋。
4. 把蒜薹和燉好的排骨一起倒入，翻炒 3 分鐘，加半杯水，大火煮 5 分鐘即可。

小貼士

1. 減少油炸食物和肥肉的攝取。排骨的脂肪含量很高，不要過多食用，並且在烹飪或食用時，盡量剔去肥肉。
2. 為了節省時間，可以用高壓鍋一次多做一些排骨，放入冰箱冷凍，需用時取出解凍即可。

胡蘿蔔土豆燉排骨 Sparerib Stew with Potatoes and Carrots

（四人份）

材料：

排骨 spareribs	2 杯（360 克）
土豆 potato	1 杯
胡蘿蔔 carrot	2 杯（大約 4 個 18cm 長的）
乾辣椒 dried hot chili pepper	2 個
小香蔥 green onion	1 根
生薑 ginger root	2 片
八角 star anise	1 個
四川花椒粉 Sichuan pepper powder	¼ 茶匙
減鹽醬油 less sodium soy sauce	1 湯匙
醋 vinegar	1 茶匙

Nutrition Facts

Serving Size (209g)
Servings Per Container

Amount Per Serving

Calories 300	Calories from Fat 160
	% Daily Value*
Total Fat 18g	**28%**
Saturated Fat 7g	**35%**
Trans Fat 0g	
Cholesterol 60mg	**20%**
Sodium 270mg	**11%**
Total Carbohydrate 16g	**5%**
Dietary Fiber 3g	**12%**
Sugars 4g	
Protein 18g	

製作方法：

1. 排骨洗淨，切塊，焯水（冷水下鍋，水開後再煮 5 分鐘），撈出洗淨。
2. 土豆和胡蘿蔔切大塊。
3. 蔥切段，生薑切片。
4. 把所有材料放入高壓鍋，加水 1.5 杯，燉 35 分鐘左右即可。

青豆肉末 Stir-fried Ground Pork with Green Peas

(四人份)

材料：

青豌豆 green peas	2 杯
絞碎的瘦豬肉 ground pork, lean	1 杯（180 克）
菜籽油 canola oil	1 茶匙
小香蔥 green onion	1 根
生薑 ginger root	2 片
蒜 garlic	2 瓣
花椒粉 Sichuan pepper powder	1/8 茶匙
減鹽醬油 less sodium soy sauce	1 湯匙
料酒 cooking wine	1 茶匙
醋 vinegar	1 茶匙

Nutrition Facts

Serving Size (129g)
Servings Per Container

Amount Per Serving

Calories 170	Calories from Fat 70
	% Daily Value*
Total Fat 8g	**12%**
Saturated Fat 3g	**15%**
Trans Fat 0g	
Cholesterol 30mg	**10%**
Sodium 250mg	**10%**
Total Carbohydrate 11g	**4%**
Dietary Fiber 3g	**12%**
Sugars 4g	
Protein 13g	

製作方法：

1. 蔥薑蒜切碎。
2. 用茶匙量好減鹽醬油、料酒和醋，倒入同一個碗中備用。
3. 鍋燒熱，放入油，放入花椒粉、蔥、薑、蒜爆香，倒入上一步量好的醬汁，火稍微調小以防糊鍋。
4. 立刻倒入豬肉，翻炒 2 分鐘。
5. 接著放入青豌豆，繼續翻炒 3-5 分鐘，可以加少量水燜片刻。

麻婆豆腐 Mapo Tofu

（四人份）

材料：

豆腐 tofu	300 克
絞碎的豬瘦肉 lean gournd pork	½ 杯（90 克）
小香蔥 green onion	1 根
蒜 garlic	3 瓣
生薑 ginger root	2 片
菜籽油 canola oil	2 茶匙
花椒粒 Sichuan peppercorns	½ 茶匙
幹辣椒 dried hot chili pepper	3 個
減鹽醬油 less sodium soy sauce	1½ 湯匙
料酒 cooking wine	1 茶匙
醋 vinegar	1 茶匙

Nutrition Facts

Serving Size (114g)
Servings Per Container

Amount Per Serving

Calories 130	Calories from Fat 70
	% Daily Value*
Total Fat 8g	**12%**
Saturated Fat 2g	**10%**
Trans Fat 0g	
Cholesterol 15mg	**5%**
Sodium 250mg	**10%**
Total Carbohydrate 4g	**1%**
Dietary Fiber 0g	**0%**
Sugars 1g	
Protein 10g	

製作方法：

1. 豆腐切塊，用開水（水中放少許鹽）焯 2 分鐘，撈出瀝乾。
2. 醬油、料酒、醋量好，倒入小碗，備用。
3. 蔥切段，生薑和蒜切片。
4. 炒鍋燒熱，倒入油，放入乾辣椒和花椒粉，炒香。
5. 放入蔥、薑、蒜爆香，倒入之前量好的醬油、料酒和醋。
6. 立刻倒入碎豬肉，翻炒 2 分鐘。
7. 倒入豆腐，繼續翻炒 1 分鐘。
8. 加水半杯，中火煮 5 分鐘，最後大火收汁即可。

什錦炒肉丁 Stir-fried Pork with Assorted Vegetables

（四人份）

材料：

豬裡脊肉 porl loin	½ 杯（90 克）
黃瓜 cucumber	1½ 杯（180 克）
玉米粒 sweet corn	½ 杯
紅甜椒 sweet pepper, red	½ 個
菜籽油 canola oil	1 湯匙
花椒粉 Sichuan pepper powder	1/8 茶匙
小香蔥 green onion	1 根
蒜 garlic	3 瓣
生薑 ginger root	2 片
減鹽醬油 less sodium soy sauce	1½ 湯匙
料酒 cooking wine	½ 茶匙
醋 vinegar	1 茶匙

Nutrition Facts

Serving Size (124g)
Servings Per Container

Amount Per Serving

Calories 120	Calories from Fat 60
	% Daily Value*
Total Fat 7g	**11%**
Saturated Fat 1.5g	**8%**
Trans Fat 0g	
Cholesterol 15mg	**5%**
Sodium 220mg	**9%**
Total Carbohydrate 9g	**3%**
Dietary Fiber 1g	**4%**
Sugars 2g	
Protein 6g	

製作方法：

1. 豬裡脊肉用清水浸泡，去除血水，切丁。
2. 黃瓜和紅甜椒切丁。蔥切段，薑、蒜切片 。
3. 醬油、料酒和醋量好，倒入小碗備用。
4. 炒鍋燒熱，倒入量好的一湯匙油，依次放入花椒粉、蔥薑蒜爆香。
5. 倒入之前量好的醬油、料酒和醋，接著放入豬肉丁，翻炒 1 分鐘。
6. 倒入黃瓜和甜椒丁，翻炒 1 分鐘。
7. 加水 2 湯匙（30 毫升），蓋上鍋蓋，煮 4 分鐘左右即可。

土豆燉裡脊肉 Pork Loin and Potato Stew

（四人份）

材料：

豬裡脊肉 pork loin	2 杯（大約 360 克）
土豆 potato	2 杯（大約 2 個中等大的）
小香蔥 green onion	1 根
生薑 ginger root	2 片
菜籽油 canola oil	2 茶匙
花椒粉 Sichuan pepper powder	1/8 茶匙
八角 star anise	1 個
減鹽醬油 less sodium soy sauce	4 茶匙
老抽 dark soy sauce	1 茶匙
醋 vinegar	1 茶匙
料酒 cooking wine	½ 茶匙
水 water	¾ 杯

Nutrition Facts

Serving Size (181g)
Servings Per Container

Amount Per Serving

Calories 200	Calories from Fat 40
	% Daily Value*
Total Fat 4.5g	**7%**
Saturated Fat 1g	**5%**
Trans Fat 0g	
Cholesterol 45mg	**15%**
Sodium 280mg	**12%**
Total Carbohydrate 17g	**6%**
Dietary Fiber 1g	**4%**
Sugars 1g	
Protein 23g	

製作方法：

1. 豬裡脊肉切塊，焯水（豬肉冷水下鍋，水燒開後再煮 3 到 5 分鐘，撇去浮末），撈出。
2. 量好醬油、料酒和醋，倒入同一個小碗，備用。
3. 土豆切大塊。
4. 炒鍋放油，放入花椒粉、八角、蔥、薑，倒入豬肉翻炒 2 分鐘，倒入土豆塊，翻炒幾下。
5. 將豬裡脊和土豆轉入高壓鍋中，加水¾ 杯，燉 30 分鐘即可。

小貼士

1. 根據加拿大食品指南， 一份肉類只有 75 克熟肉（相當於生肉 90 克）， 大約是您手掌的大小，小拇指的厚度。大多數人每天只需兩到三份。 因此， 您可以選擇多吃蔬菜水果而不是肉類來增加飽腹感。在選擇肉類時，多選擇瘦肉， 比如魚類， 雞肉或者火雞。

3.8 牛肉類

香菇胡蘿蔔燉牛肉 Beef Stew with Mushrooms and Carrots

（四人份）

材料：

牛肉塊（肩頸肉）beef stew	2 杯（360 克）
胡蘿蔔 carrot	2 杯
香菇 shiitake mushroom	½ 杯
小香蔥 green onion	1 根
生薑 ginger root	2 片
八角 star anise	1 個
花椒粒 Sichuan peppercorns	¼ 茶匙
減鹽醬油 less sodium soy sauce	4 茶匙
料酒 cooking wine	1 茶匙
水 water	5 杯

Nutrition Facts

Serving Size (155g)
Servings Per Container

Amount Per Serving	
Calories 210	Calories from Fat 70
	% Daily Value*
Total Fat 8g	**12%**
Saturated Fat 3g	**15%**
Trans Fat 0g	
Cholesterol 65mg	**22%**
Sodium 270mg	**11%**
Total Carbohydrate 9g	**3%**
Dietary Fiber 2g	**8%**
Sugars 4g	
Protein 25g	

製作方法：

1. 香菇提前清洗，用溫水泡發（大約 3 個小時），切塊。
2. 牛肉切塊，焯水（冷水下鍋，水開後，再煮 3 分鐘），撈出洗淨備用。
3. 胡蘿蔔切塊，蔥、薑切片 。
4. 砂鍋中倒入 5 杯水，燒開後，倒入牛肉、香菇、蔥、生薑以及所有佐料，再次燒開後，轉小火燉 60 分鐘。
5. 倒入胡蘿蔔塊，攪拌均勻，繼續燉 30 分鐘即可。

小貼士

1. 為了節省烹飪時間，可以改用高壓鍋。
2. 香菇浸泡之前先清洗乾淨，浸泡香菇的水可以一起倒入鍋中，以防部分水溶性營養成分從水中流失。

西蘭花炒牛柳 Stir-fried Beef with Broccoli

（四人份）

材料：

牛裡脊肉 beef tenderloin	1 杯（180 克）
玉米澱粉 corn starch	1 茶匙
西蘭花 broccoli	2 杯
菜籽油 canola oil	2 茶匙
減鹽醬油 less sodium soy sauce	2 茶匙
老抽 dark soy sauce	1 茶匙
醋 vinegar	1 茶匙
料酒 cooking wine	1 茶匙
小香蔥 green onion	1 根
蒜 garlic	1 瓣
生薑 ginger root	1 片
花椒粉 Sichuan pepper powder	1/8 茶匙

Nutrition Facts

Serving Size (101g)
Servings Per Container

Amount Per Serving

Calories 100	Calories from Fat 35
	% Daily Value*
Total Fat 3.5g	**5%**
Saturated Fat 0.5g	**3%**
Trans Fat 0g	
Cholesterol 25mg	**8%**
Sodium 180mg	**8%**
Total Carbohydrate 4g	**1%**
Dietary Fiber 1g	**4%**
Sugars 1g	
Protein 11g	

製作方法：

1. 牛肉用清水浸泡 1 小時，洗去血水，切成細條，用澱粉抓勻，放置 30 分鐘。
2. 西蘭花切小塊，在開水中焯燙一兩分鐘，撈出，瀝乾。
3. 蔥切段，蒜切碎，生薑切片。
4. 量好減鹽醬油、料酒和醋，倒入同一個碗中，備用。
5. 鍋中放油，燒熱，放入花椒粉，再放入蔥薑蒜爆香，倒入之前量好的醬汁。
6. 放入牛柳翻炒 1-2 分鐘，倒入西蘭花，繼續翻炒 1 分鐘，即可出鍋。

土豆燉牛肉 Beef and Potato Stew

（四人份）

材料：

牛肉塊（肩頸肉）beef stew	2 杯（360 克）
土豆，中等大 potato	2 個（2 杯）
小香蔥 green onion	1 根
生薑 ginger root	2 片
八角 star anise	1 個
花椒粒 Sichuan peppercorns	¼ 茶匙
減鹽醬油 less sodium soy sauce	4 茶匙
料酒 cooking wine	1 茶匙
水 water	5 杯

Nutrition Facts

Serving Size (183g)
Servings Per Container

Amount Per Serving

Calories 230	Calories from Fat 80
	% Daily Value*
Total Fat 9g	**14%**
Saturated Fat 3.5g	**18%**
Trans Fat 0g	
Cholesterol 55mg	**18%**
Sodium 250mg	**10%**
Total Carbohydrate 18g	**6%**
Dietary Fiber 1g	**4%**
Sugars 1g	
Protein 20g	

製作方法：

1. 牛肉切塊，焯水（冷水下鍋，水開後，再煮 3 分鐘），撈出洗淨備用。
2. 土豆切塊，蔥切段，生薑切片。
3. 砂鍋中倒入 5 杯水，燒開後，倒入牛肉、蔥、生薑以及所有佐料，再次燒開後，轉小火燉 60 分鐘。
4. 倒入土豆塊，攪拌均勻，繼續燉 30 分鐘即可。

中式羅宋湯 Chinese-style Borscht

（六人份）

材料：

牛肉塊 beef stew	1½ 杯（270 克）
番茄 tomato	2 杯
胡蘿蔔 carrot	半杯
洋蔥 onion	半杯（ ¼ 個）
土豆 potato	1 杯（1 個中等大）
花椒粉 Sichuan pepper powder	⅛ 茶匙
八角 star anise	1 個
月桂香葉 bay leaves	3 片
小香蔥 green onion	1 根
蒜 garlic	2 瓣
生薑 ginger root	2 片
菜籽油 canola oil	2 茶匙
減鹽醬油 less sodium soy sauce	4 茶匙
老抽 dark soy sauce	1 茶匙
料酒 cooking wine	1 茶匙
醋 vinegar	1 茶匙

Nutrition Facts

Serving Size (150g)
Servings Per Container

Amount Per Serving

Calories 160	Calories from Fat 50
	% Daily Value*
Total Fat 6g	**9%**
Saturated Fat 2g	**10%**
Trans Fat 0g	
Cholesterol 35mg	**12%**
Sodium 190mg	**8%**
Total Carbohydrate 12g	**4%**
Dietary Fiber 2g	**8%**
Sugars 3g	
Protein 15g	

製作方法：

1. 牛肉洗淨，切丁，焯水（牛肉冷水下鍋，水開後再煮 3 分鐘），撈出洗淨。

2. 蔥切段，薑蒜切片 。

3. 砂鍋加水 6 杯（1.5 升），大火燒開，把所有調味料和牛肉一起倒入，水再次燒開後，轉小火慢燉。

4. 把番茄、洋蔥、土豆、胡蘿蔔都切成小塊。

5.牛肉燉一個小時之後，倒入所有蔬菜，攪拌均勻，再燉半個小時即可。

黃豆春筍燉牛肉 Beef Stew with Bamboo shoots and Soy Beans

（四人份）

材料：

春筍 bamboo shoots	1 杯
黃豆 soy bean	1/2 杯（泡發後 1 杯）
牛肉塊 beef stew	1½ 杯 (270 克)
小香蔥 green onion	1 根
生薑 ginger root	2 片
八角 star anise	1 個
花椒 Sichuan peppercorns	½ 茶匙
減鹽醬油 less sodium soy sauce	1½ 湯匙
料酒 cooking wine	1 茶匙
醋 vinegar	1 茶匙

Nutrition Facts

Serving Size (142g)
Servings Per Container

Amount Per Serving

Calories 220	Calories from Fat 90
	% Daily Value*
Total Fat 10g	**15%**
Saturated Fat 3g	**15%**
Trans Fat 0g	
Cholesterol 50mg	**17%**
Sodium 240mg	**10%**
Total Carbohydrate 7g	**2%**
Dietary Fiber 4g	**16%**
Sugars 3g	
Protein 26g	

製作方法：

1. 幹黃豆提前 8 小時用溫水泡發，可以早上上班之前準備，下班之後便可使用。
2. 牛肉焯水（冷水下鍋，水開後再煮 3 分鐘左右），撈出洗淨備用。
3. 另取一砂鍋，加水 8 杯，燒開後加入黃豆、牛肉、蔥、薑及所有醬汁調料。
4. 水再次燒開後，轉小火慢燉，一個半小時之後，加入春筍，攪勻，再燉 20 分鐘即可。

小貼士

1. 豆類是高纖維、低升血糖指數的食品。它們可以延長飽腹感的時間， 降低膽固醇並且減緩餐後血糖升高的速度。

3.9 麵飯類

白米飯 White Rice / 糙米飯 Brown Rice

製作方法：白米或糙米洗淨，加水煮熟即可，不加任何調料。

1 杯熟的白米飯營養成分如下：

Nutrition Facts

Serving Size (158g)
Servings Per Container

Amount Per Serving	
Calories 210	Calories from Fat 5
	% Daily Value*
Total Fat 0g	**0%**
Saturated Fat 0g	**0%**
Trans Fat --g	
Cholesterol 0mg	**0%**
Sodium 0mg	**0%**
Total Carbohydrate 45g	**15%**
Dietary Fiber 1g	**4%**
Sugars 0g	
Protein 4g	

1 杯熟的糙米飯營養成分如下：

Nutrition Facts

Serving Size (195g)
Servings Per Container

Amount Per Serving	
Calories 220	Calories from Fat 15
	% Daily Value*
Total Fat 2g	**3%**
Saturated Fat 0g	**0%**
Trans Fat --g	
Cholesterol 0mg	**0%**
Sodium 10mg	**0%**
Total Carbohydrate 45g	**15%**
Dietary Fiber 3g	**12%**
Sugars 1g	
Protein 5g	

小貼士

1. 米飯煮熟後體積大約變成煮之前的 3 倍，1 杯熟米飯約需 1/3 杯幹的米。

2. 保證每天至少一半的糧食類食品屬於全穀（ 糙米，全麥麵包，全麥麵條等）。 如果您不喜歡全穀食品的口感， 可以嘗試把精米麵和全穀食品混合，比如 60%的全麥麵包， 或者糙米白米混合食用。

什錦炒飯 Fried Rice with Vegetables

（四人份）

材料：

煮熟的白米飯 cooked white rice	1 杯
煮熟的糙米飯 cooked brown rice	1 杯
胡蘿蔔 carrot	¼ 杯（大約半根 18cm 長的）
洋蔥 onion	¼ 杯（大約 ¼ 個洋蔥）
蘆筍 asparagus	3 根
甜椒 sweet pepper	¼ 杯（大約¼ 個）
冷凍的豌豆 frozen green peas	¼ 杯
蘑菇 mushroom	¼ 杯
小香蔥 green onion	1 根
蒜 garlic	2 瓣
菜籽油 canola oil	2 茶匙
減鹽醬油 less sodium soy sauce	4 茶匙
醋 vinegar	1 茶匙

Nutrition Facts

Serving Size (163g)
Servings Per Container

Amount Per Serving

Calories 150	Calories from Fat 25
	% Daily Value*
Total Fat 3g	**5%**
Saturated Fat 0g	**0%**
Trans Fat 0g	
Cholesterol 0mg	**0%**
Sodium 200mg	**8%**
Total Carbohydrate 28g	**9%**
Dietary Fiber 2g	**8%**
Sugars 2g	
Protein 4g	

製作方法：

1. 米飯提前煮熟，可以使用前一天剩餘的米飯。
2. 所有蔬菜洗淨，切成小丁。
3. 炒鍋燒熱，放油，倒入蔥和蒜爆香。
4. 放減鹽醬油和醋，接著倒入所有蔬菜丁，翻炒 4 分鐘。
5. 轉成中火，倒入米飯，翻炒 2 分鐘，即可出鍋。

炒烏冬面 Stir-fried Udon

（四人份）

材料：

烏冬面 udon	2 杯
青椒 green pepper	2 個
胡蘿蔔 carrot	½ 杯
豬裡脊 pork loin	1 杯（180 克）
菜籽油 canola oil	1 湯匙
小香蔥 green onion	1 根
蒜 garlic	1 瓣
生薑 ginger root	2 片
減鹽醬油 less sodium soy sauce	4 茶匙
料酒 cooking wine	1 茶匙
醋 vinegar	1 茶匙

Nutrition Facts

Serving Size (229g)
Servings Per Container

Amount Per Serving

Calories 220	Calories from Fat 45
	% Daily Value*
Total Fat 5g	**8%**
Saturated Fat 1g	**5%**
Trans Fat 0g	
Cholesterol 25mg	**8%**
Sodium 350mg	**15%**
Total Carbohydrate 29g	**10%**
Dietary Fiber 1g	**4%**
Sugars 2g	
Protein 15g	

製作方法：

1. 烏冬面煮熟，撈出瀝乾備用。
2. 裡脊肉用清水浸泡 1 小時，去除血水，洗淨，切薄片 。
2. 青椒、胡蘿蔔切片 ，蔥、薑、蒜切碎。
3. 量好醬油、料酒和醋，倒入同一個小碗中，備用。
4. 炒鍋燒熱，放油，放入蔥薑蒜爆香，倒入上一步量好的醬汁。
5. 火稍微調小，以防糊鍋，倒入裡脊肉和胡蘿蔔，翻炒 5 分鐘左右。
6. 放入青椒，再炒 3 分鐘左右。
7. 倒入煮好的烏冬面，翻炒均勻即可出鍋。

鮮蝦白菜雞蛋麵 Egg Noodles with Shrimp and Bok Choy

（兩人份）

材料：

雞蛋麵 egg noodles	40 克乾的（煮熟之後 1 杯）
蝦，去皮 shrimp, peeled	½ 杯（90 克）
白菜 bok shoy	2 杯
小香蔥 green onion	1 根
生薑 ginger root	2 片
蒜 garlic	1 瓣
菜籽油 canola oil	1 茶匙
減鹽醬油 less sodium soy sauce	1 茶匙

Nutrition Facts

Serving Size (206g)
Servings Per Container

Amount Per Serving

Calories 190	Calories from Fat 40
	% Daily Value*
Total Fat 4.5g	**7%**
Saturated Fat 0.5g	**3%**
Trans Fat 0g	
Cholesterol 95mg	**32%**
Sodium 210mg	**9%**
Total Carbohydrate 23g	**8%**
Dietary Fiber 2g	**8%**
Sugars 1g	
Protein 14g	

製作方法：

1. 雞蛋麵煮熟，撈出備用。
2. 白菜切段，蔥薑蒜切片。
3. 鍋燒熱，放油，蔥薑蒜爆香，倒入蝦和白菜，翻炒 2 分鐘，蓋上鍋蓋燜 3 分鐘。
4. 倒入雞蛋麵，攪拌均勻，即可出鍋。

番茄雞蛋烏冬面 Udon with Tomato and Egg

（兩人份）

材料：

烏冬面 udon	1 杯（1 小袋，大約 200 克）
番茄 tomato	1 杯
雞蛋 egg	2 個
小香蔥 green onion	1 根
菜籽油 canola oil	1 茶匙
食鹽 salt	1/16 茶匙
水 water	½ 杯

Nutrition Facts

Serving Size (234g)
Servings Per Container

Amount Per Serving

Calories 230	Calories from Fat 70
	% Daily Value*
Total Fat 8g	**12%**
Saturated Fat 2g	**10%**
Trans Fat 0g	
Cholesterol 215mg	**72%**
Sodium 370mg	**15%**
Total Carbohydrate 28g	**9%**
Dietary Fiber 1g	**4%**
Sugars 3g	
Protein 11g	

製作方法：

1. 鍋燒熱，放入一茶匙菜籽油，打入雞蛋，翻炒一分鐘，倒入切好的番茄，翻炒半分鐘，加水半杯。

2. 水燒開後，放入烏冬面，加 1/16 茶匙食鹽，煮 5 分鐘左右即可出鍋（或根據包裝上的說明設定烹飪時間）。

小貼士

1. 烏冬面以及其他種類的麵條含鹽量可能較高，在購買時注意閱讀營養標籤，在烹飪和食用時儘量控制食鹽的添加量。

青椒扇貝烏冬面 Udon with Green Pepper and Scallop

（四人份）

材料：

烏冬面 udon	2 杯（大約 400 克，兩小包）
冷凍或新鮮扇貝 scallop	1 杯
青椒 green pepper	2 個（2 杯）
小香蔥 green onion	1 根
蒜 garlic	3 瓣
生薑 ginger root	2 片
菜籽油 canola oil	½ 湯匙
食鹽 salt	1/8 茶匙
水 water	3 杯

Nutrition Facts

Serving Size (222g)
Servings Per Container

Amount Per Serving

Calories 200	Calories from Fat 25
	% Daily Value*
Total Fat 2.5g	**4%**
Saturated Fat 0g	**0%**
Trans Fat 0g	
Cholesterol 25mg	**8%**
Sodium 340mg	**14%**
Total Carbohydrate 29g	**10%**
Dietary Fiber 1g	**4%**
Sugars 2g	
Protein 15g	

製作方法：

1. 青椒切小塊，蔥、薑、蒜切碎。扇貝解凍，洗淨備用。

2. 鍋中放油，燒熱，放入蔥薑蒜爆香，接著放入青椒和扇貝，翻炒 2 分鐘。

3. 加三杯水，燒開後，放入烏冬面，加鹽 1/8 茶匙，煮 5 分鐘即可（或根據烏冬麵包裝上的說明調整烹飪時間）。

中式秋葵蛤蜊義大利麵 Chinese-style Pasta with Clam and Okra

（四人份）

材料：

秋葵 okra	2 杯
蛤蜊 clam	1 杯（180 克）
小香蔥 green onion	1 根
蒜 garlic	1 瓣
生薑 ginger root	2 片
菜籽油 canola oil	1 湯匙
減鹽醬油 less sodium soy sauce	1½ 湯匙
醋 vinegar	1 茶匙
料酒 cooking wine	1 茶匙
乾的全麥義大利麵 whole wheat pasta 100 克(煮熟後 2 杯）	

Nutrition Facts

Serving Size (180g)
Servings Per Container

Amount Per Serving

Calories 170	Calories from Fat 40
	% Daily Value*
Total Fat 4.5g	**7%**
Saturated Fat 0g	**0%**
Trans Fat 0g	
Cholesterol 15mg	**5%**
Sodium 240mg	**10%**
Total Carbohydrate 24g	**8%**
Dietary Fiber 4g	**16%**
Sugars 1g	
Protein 11g	

製作方法：

1. 義大利麵煮熟，撈出，瀝乾備用。
2. 秋葵切片 ，蔥薑蒜切碎。
3. 量好減鹽醬油、料酒和醋，倒入小碗備用。
4. 炒鍋燒熱，放油，放入蔥薑蒜，爆香。
5. 蛤蜊和秋葵同時下鍋，翻炒 2 分鐘，加 1 杯水，煮 8 分鐘左右。
6. 倒入煮熟的義大利麵，攪勻，即可出鍋。

小貼士

1. 全麥義大利麵的升血糖指數相對較低，可以嘗試用其取代平時用的白麵條。

甜玉米牛奶 Sweet Corn Milk

（一人份）

材料：

新鮮或冷凍的玉米粒 sweet corn	½ 杯
2%乳脂率的牛奶 milk, 2%MF	1 杯

Nutrition Facts

Serving Size (326g)
Servings Per Container

Amount Per Serving

Calories 190	Calories from Fat 50
	% Daily Value*
Total Fat 5g	**8%**
Saturated Fat 3g	**15%**
Trans Fat 0g	
Cholesterol 20mg	**7%**
Sodium 100mg	**4%**
Total Carbohydrate 28g	**9%**
Dietary Fiber 2g	**8%**
Sugars 15g	
Protein 11g	

製作方法：

1. 將玉米和牛奶倒入杯中，用微波爐加熱 3 分鐘左右即可。

小貼士

1. 盡量選用低脂奶製品， 比如 1%、2%的牛奶或者低脂優酪乳。

2. 如果您傾向於飲用豆奶來代替牛奶， 請選用加鈣和維生素 D 的豆奶來保證鈣質和維生素 D 的攝取。

微波蘋果和梨 Microwaved Apples and Pears

（一人份）

材料：

蘋果，中等大小 apple　　半個

梨，中等大小 pear　　半個

Nutrition Facts

Serving Size (152g)

Servings Per Container

Amount Per Serving

Calories 80	Calories from Fat 0
	% Daily Value*
Total Fat 0g	**0%**
Saturated Fat 0g	**0%**
Trans Fat --g	
Cholesterol 0mg	**0%**
Sodium 0mg	**0%**
Total Carbohydrate 22g	**7%**
Dietary Fiber 4g	**16%**
Sugars 15g	
Protein 0g	

製作方法：

1. 將蘋果和梨洗淨，不去皮，切塊，擺在適用於微波爐的盤子中。

2. 將盤子放入微波爐，加熱 2 分鐘左右即可（也可用蒸鍋）。

小貼士

1. 相對於新鮮蔬果來說， 在超市購買的蔬菜汁或果汁可能含糖量較高而膳食纖維較低，所以盡量食用新鮮蔬果，控制每日果汁飲用量在半杯以下。

2. 選擇水作為您的飲料首選。果汁或碳酸飲料可能會讓您在不經意中攝入過多卡路里。

香蕉草莓奶昔 Banana and Strawberry Milkshake

（一人份）

材料：

香蕉，中等大小 banana　　半個

草莓，中等大小 strawberries　6 個（大約 ½ 杯）

牛奶　milk, 1%　　半杯

Nutrition Facts

Serving Size (253g)

Servings Per Container

Amount Per Serving

Calories 130	Calories from Fat 15
	% Daily Value*
Total Fat 1.5g	**2%**
Saturated Fat 1g	**5%**
Trans Fat 0g	
Cholesterol 5mg	**2%**
Sodium 55mg	**2%**
Total Carbohydrate 25g	**8%**
Dietary Fiber 3g	**12%**
Sugars 17g	
Protein 5g	

製作方法：

1. 將所有材料倒入攪拌器，攪拌 10 秒鐘即可。

小貼士

1. 嘗試加入多種莓類，比如藍莓、樹莓等，可以使口感更豐富。

2. 為了降低食物成本， 您可以在新鮮蔬果成熟的季節購買， 冷凍儲存以供日後使用。

3. 除了新鮮蔬果之外， 您也可以選擇罐裝或者冷凍蔬果。 如果您選擇罐裝食品，盡量選擇清水或果汁浸泡的，避免用糖漿浸泡的水果。

蘋果奶昔 Apple Milkshake

（兩人份）

材料：

蘋果 apple	2 個（中等大的）
牛奶 milk, 2%	1 杯

Nutrition Facts

Serving Size (267g)
Servings Per Container

Amount Per Serving	
Calories 140	Calories from Fat 25
	% Daily Value*
Total Fat 3g	**5%**
Saturated Fat 1.5g	**8%**
Trans Fat 0g	
Cholesterol 10mg	**3%**
Sodium 55mg	**2%**
Total Carbohydrate 25g	**8%**
Dietary Fiber 3g	**12%**
Sugars 21g	
Protein 5g	

製作方法：

1. 蘋果洗淨，不去皮，切塊。
2. 將蘋果和牛奶倒入攪拌機，攪拌 30 秒鐘即可。

小貼士

1. 蘋果皮中含有豐富的膳食纖維和其他有益健康的植生素，製作奶昔的時候可以保留果皮。

香蕉葡萄果昔 Banana and Grape Smoothie

（兩人份）

材料：

低脂原味優酪乳 low fat plain yogourt　¾ 杯（175 毫升）

香蕉，中等大小 banana　半根

無籽葡萄 seedless grapes　10 粒

水 water　半杯

Nutrition Facts

Serving Size (206g)

Servings Per Container

Amount Per Serving

Calories 90	Calories from Fat 0
	% Daily Value*
Total Fat 0g	**0%**
Saturated Fat 0g	**0%**
Trans Fat 0g	
Cholesterol 0mg	**0%**
Sodium 70mg	**3%**
Total Carbohydrate 18g	**6%**
Dietary Fiber 1g	**4%**
Sugars 15g	
Protein 5g	

製作方法：

1. 將水果、優酪乳和水倒入攪拌器，攪拌 10 秒鐘即可。

小貼士

1. 奶昔可以幫助您增加水果攝入。 嘗試用不同口味的優酪乳和冷凍水果製作不同口味的奶昔。

紅棗蓮子銀耳湯 Sweet Soup with White Fungi and Lotus Seeds

（四人份）

材料：

銀耳/雪耳 white fungi	8 克（泡發後大約 1 杯）
蓮子 lotus seeds	¼ 杯
紅棗 dates	8 個
冰糖 crystal sugar	20 克（約 1 湯匙）
白砂糖 granulated sugar	1 茶匙
水 water	6 杯

Nutrition Facts

Serving Size (25g)
Servings Per Container

Amount Per Serving

Calories 80	Calories from Fat 0
	% Daily Value*
Total Fat 0g	**0%**
Saturated Fat 0g	**0%**
Trans Fat 0g	
Cholesterol 0mg	**0%**
Sodium 0mg	**0%**
Total Carbohydrate 19g	**6%**
Dietary Fiber 3g	**12%**
Sugars 15g	
Protein 1g	

製作方法：

1. 將銀耳洗淨，撕成小碎片，加 5 杯水浸泡一夜（8 小時）。
2. 蓮子去心，洗淨，加 1 杯水，浸泡一夜。
3. 紅棗洗淨，無需浸泡。
4. 將泡好的銀耳和蓮子放入電飯煲中，連同浸泡的水一起。
5. 煮 50 分鐘之後，加入紅棗和糖，再煮 10 分鐘，調到保溫檔，保溫 30 分鐘，即可。

小貼士

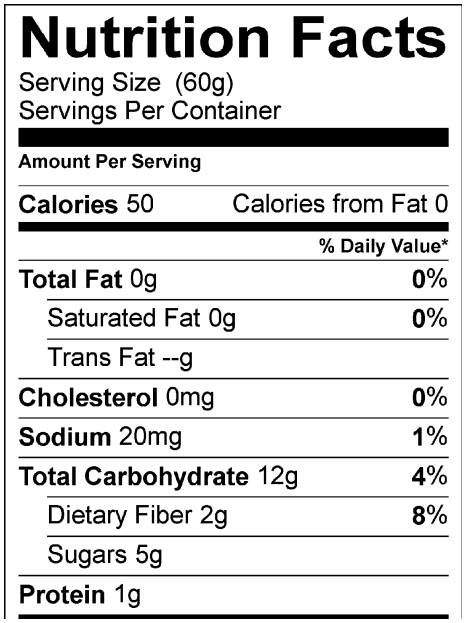
1. 可以用其他甜味劑代替糖，減低對血糖的影響。
2. 注意一日三餐有規律地飲食，再加上中間的零食，這樣可以幫助控制血糖水平，延長飽腹感時間， 從而降低您想吃甜食的慾望。

烤甜薯 Baked Sweet Potatoes

（四人份）

材料：

甜薯 sweet potato	4 個小的（每個 60 克左右）



製作方法：

1. 烤箱預熱到 220℃/425℉（約需 20 分鐘）。
2. 紅薯放在烤盤上，放入烤箱，烤 40 分鐘左右即可。

附錄

測量單位轉換

體積單位轉換

茶匙/湯匙 (spoons)		杯 (cups)	
慣用測量	公制測量	慣用測量	公制測量
¼ 茶匙 (tsp / teaspoon)	1.25 毫升(ml)	¼ 杯 (4 湯匙/2 盎司)	60 毫升
½ 茶匙	2.5 毫升	1/3 杯	80 毫升
1 茶匙	5 毫升	½ 杯	125 毫升
3 茶匙 =1 湯匙 (tbsp / tablespoon)	15 毫升	1 杯	250 毫升

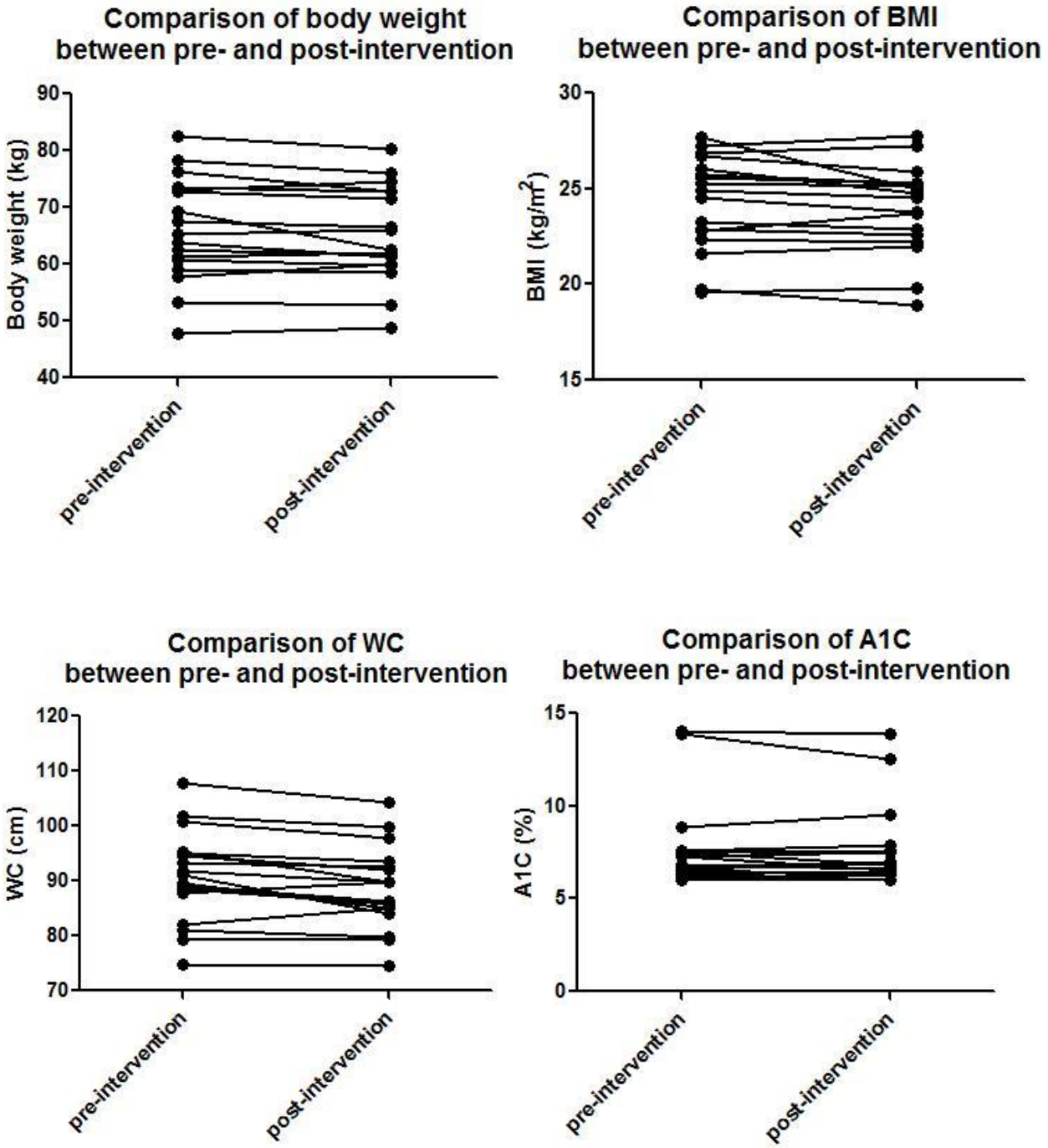
重量單位轉換

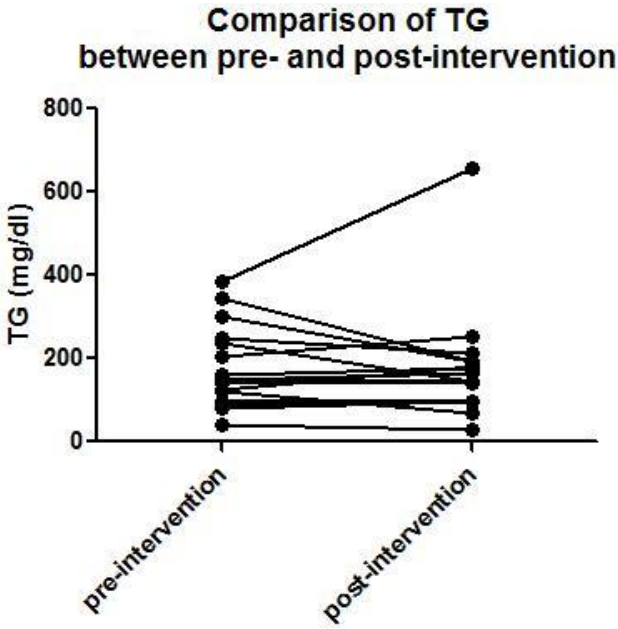
慣用測量	公制測量
1 盎司 (ounce/oz)	28 克(grams/g)
4 盎司	115 克
1 磅（16 盎司）	450 克

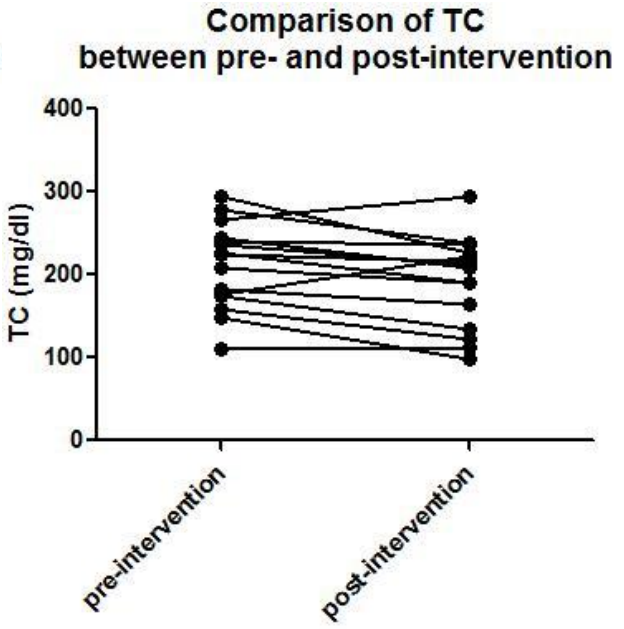
Appendix N

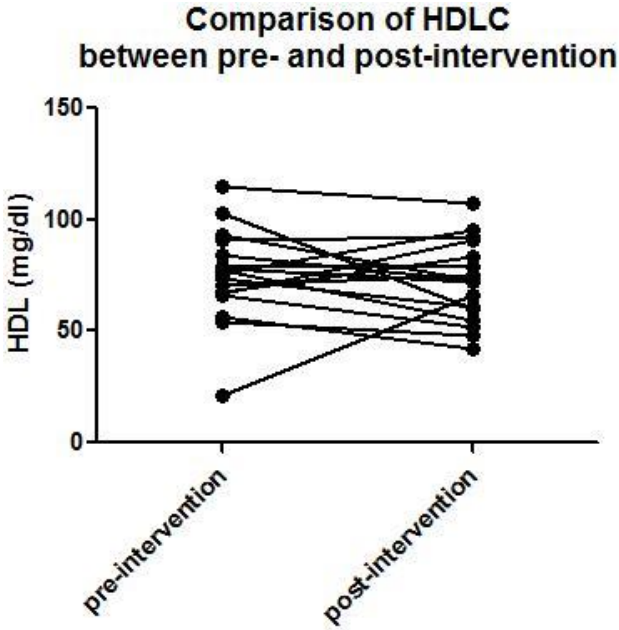
Acculturation score and subscores (n=14)			
Acculturation and subcategories	**Mean ± SD**	**Minimum**	**Maximum**
Acculturation	1.91 ± 0.42	1.38	2.62
Language proficiency	2.00 ± 0.88	1.00	3.67
Language preference	2.07 ± 0.83	1.00	3.00
Food preference	1.80 ± 0.70	1.00	3.10
Ethnicity of friends before adulthood	1.18 ± 0.32	1.00	2.00
Music preference	2.07 ± 1.00	1.00	3.00
Movie preference	2.29 ± 1.14	1.00	4.00
Pride in traditional culture	2.00 ± 1.11	1.00	4.00
Participation in traditional holidays	2.71 ± 1.14	1.00	4.00
Scores were calculated based on the Suinn-Lew Asian Self-identity Acculturation Scale. Language proficiency score was calculated as the mean of speaking, reading and writing proficiency scores. Food preference score was calculated as 90% of food preference at home and 10% of food preference in restaurants. Ethnicity of friends before adulthood score was calculated as the mean of scores for ethnicities of friends before age 6 and between age 6 and 18.			

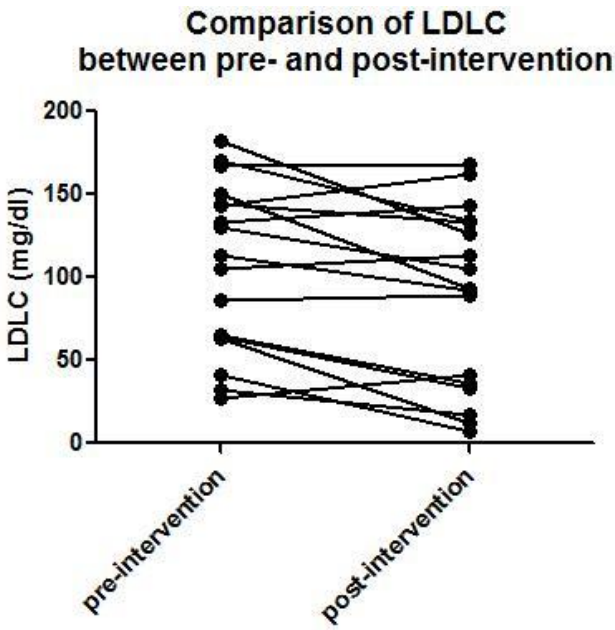
Appendix O

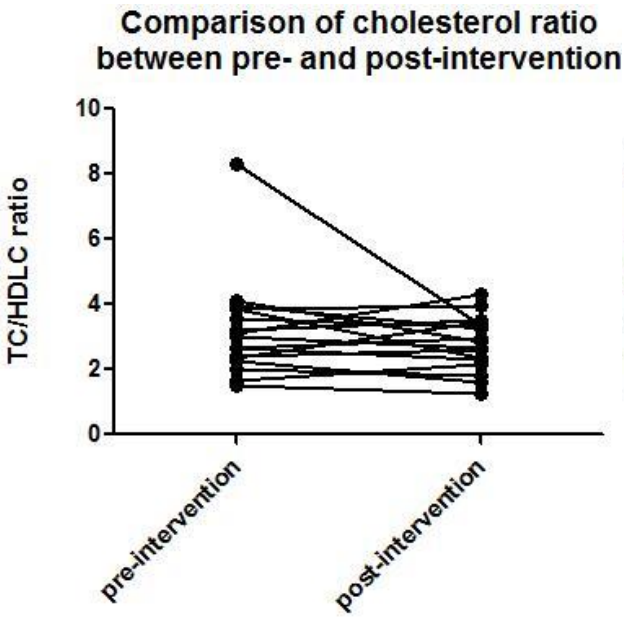

Comparison of body weight
between pre- and post-intervention
Body weight (kg)
90
80
70
60
50
40
pre-intervention
post-intervention
Comparison of BMI
between pre- and post-intervention
BMI (kg/m2)
30
25
20
15
pre-intervention
post-intervention
Comparison of WC
between pre- and post-intervention
WC (cm)
120
110
100
90
80
70
pre-intervention
post-intervention
Comparison of A1C
between pre- and post-intervention
A1C (%)
15
10
5
0
pre-intervention
post-intervention

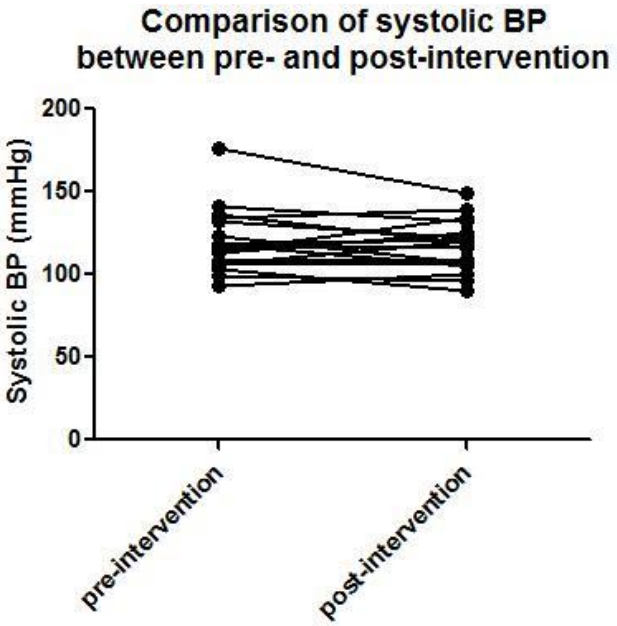

Comparison of TG
between pre- and post-intervention
TG (mg/dl)
800
600
400
200
0
pre-intervention
post-intervention

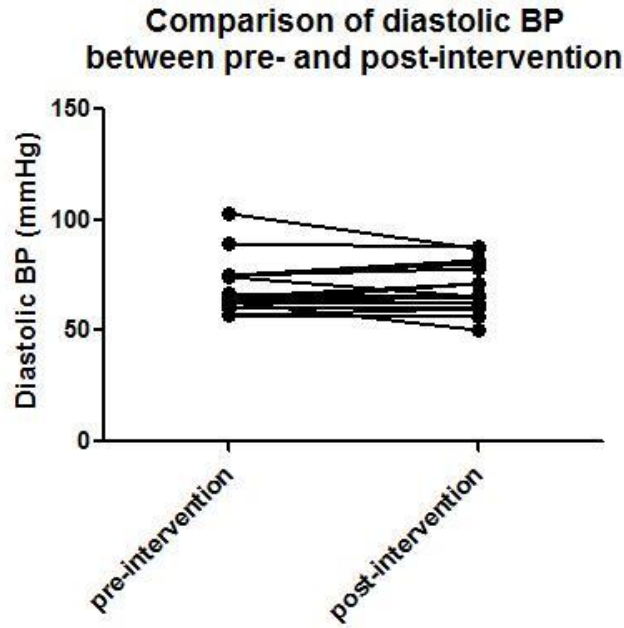

Comparison of TC
between pre- and post-intervention
TC (mg/dl)
400
300
200
100
0
pre-intervention
post-intervention


Comparison of HDLC
between pre- and post-intervention
HDL (mg/dl)
150
100
50
0
pre-intervention
post-intervention

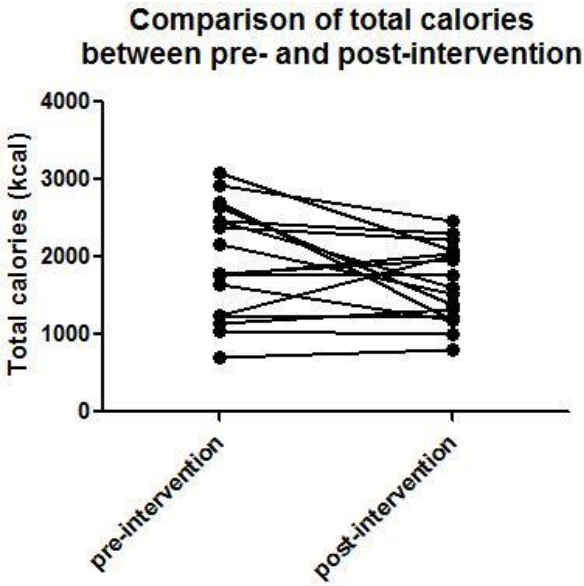

Comparison of LDLC
between pre- and post-intervention
LDLC (mg/dl)
200
150
100
50
0
pre-intervention
post-intervention

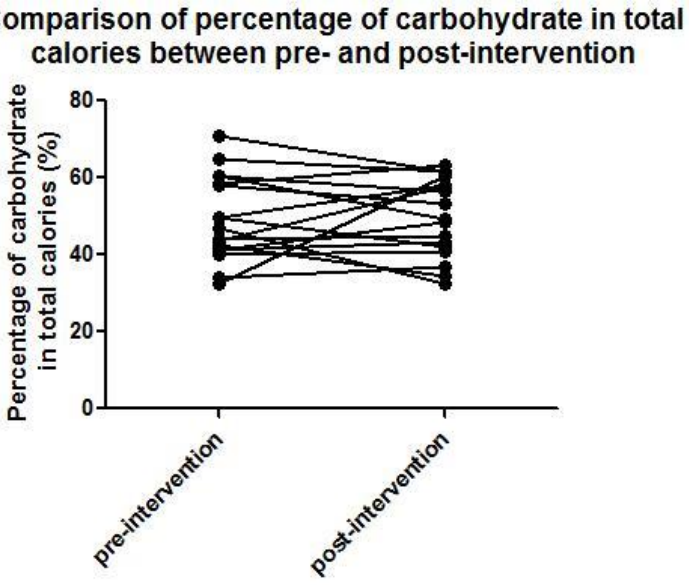

Comparison of cholesterol ratio
between pre- and post-intervention
TC/HDLC ratio
10
8
6
4
2
0
pre-intervention
post-intervention

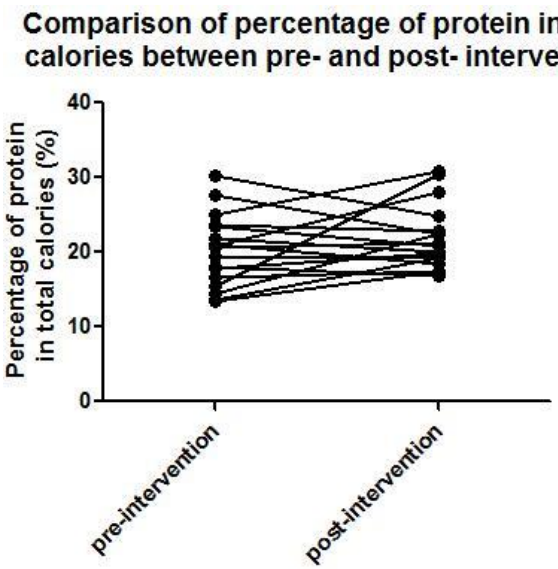

Comparison of systolic BP
between pre- and post-intervention
Systolic BP (mmHg)
200
150
100
50
0
pre-intervention
post-intervention

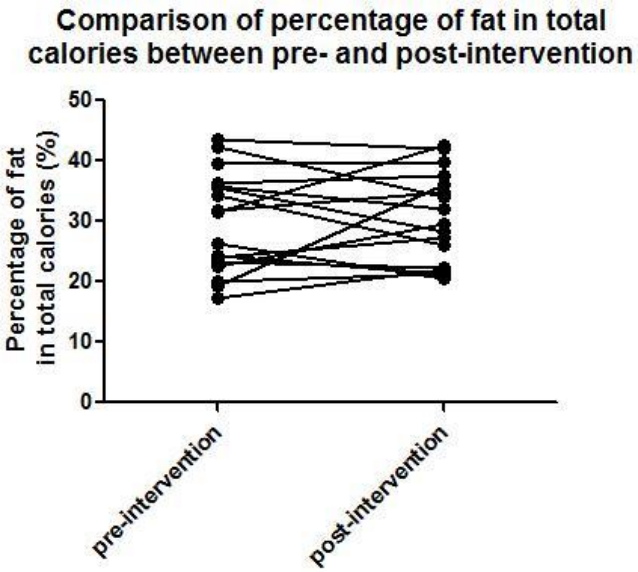

Comparison of diastolic BP
between pre- and post-intervention
Diastolic BP (mmHg)
150
100
50
0
pre-intervention
post-intervention

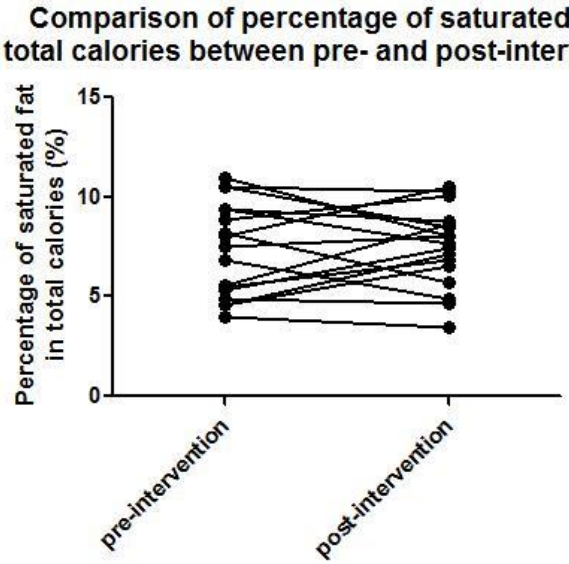
Appendix P

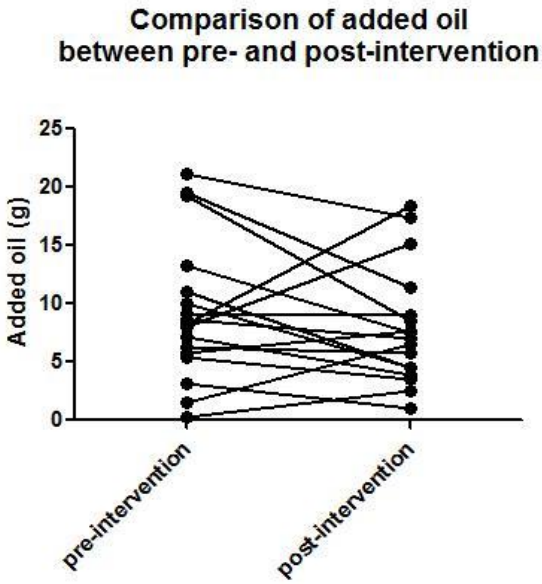

Comparison of total calories between pre- and post-intervention
Total calories (kcal)
4000
3000
2000
1000
0
pre-intervention
post-intervention

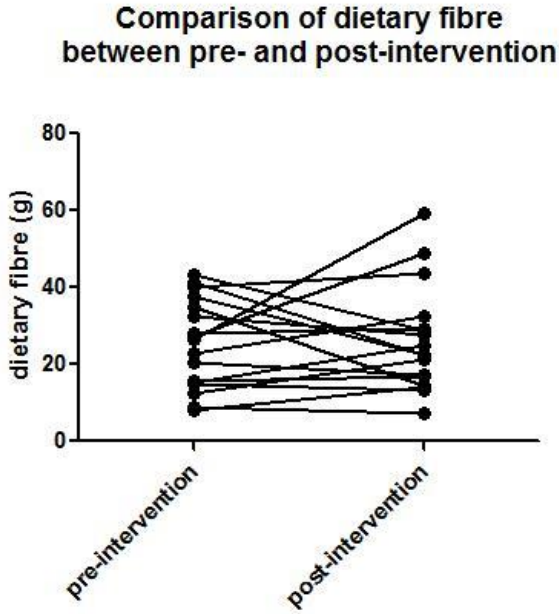

Comparison of percentage of carbohydrate in total calories between pre- and post-intervention
Percentage of carbohydrate in total calories (%)
80
60
40
20
0
pre-intervention
post-intervention

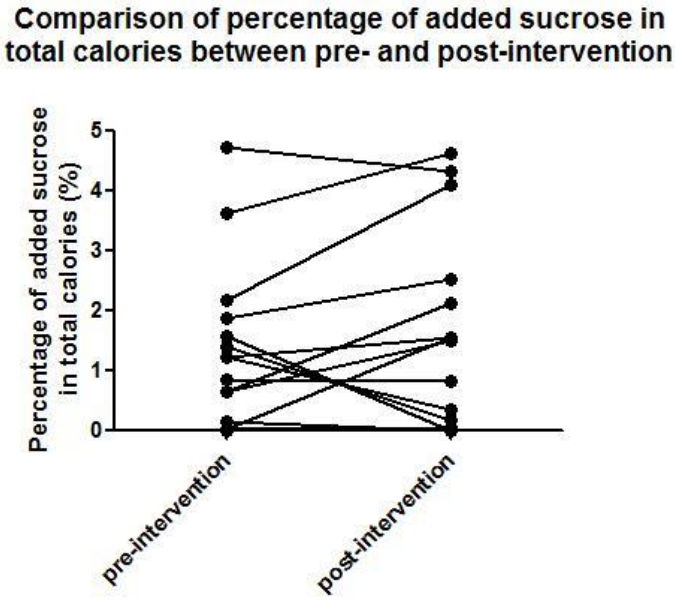

Comparison of percentage of protein in total calories between pre- and post- intervention
Percentage of protein in total calories (%)
40
30
20
10
0
pre-intervention
post-intervention

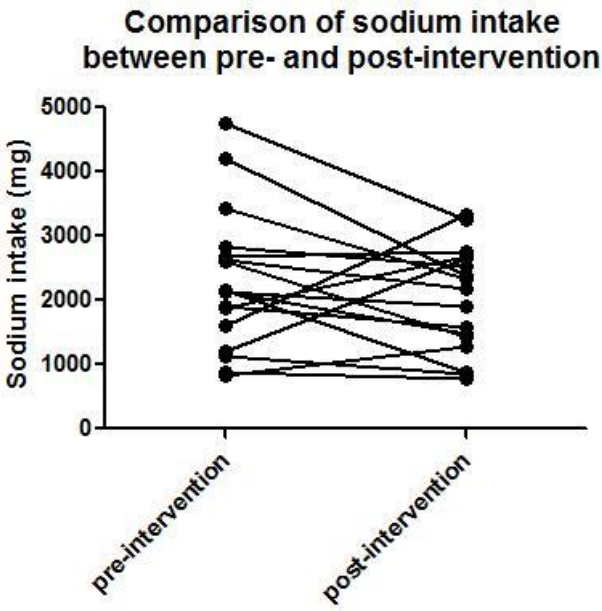

Comparison of percentage of fat in total calories between pre- and post-intervention
Percentage of fat in total calories (%)
50
40
30
20
10
0
pre-intervention
post-intervention

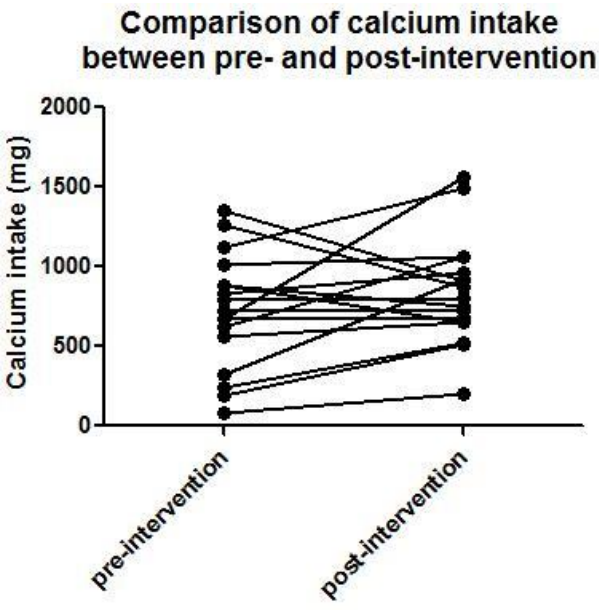

Comparison of percentage of saturated fat in total calories between pre- and post-intervention
Percentage of saturated fat in total calories (%)
15
10
5
0
pre-intervention
post-intervention

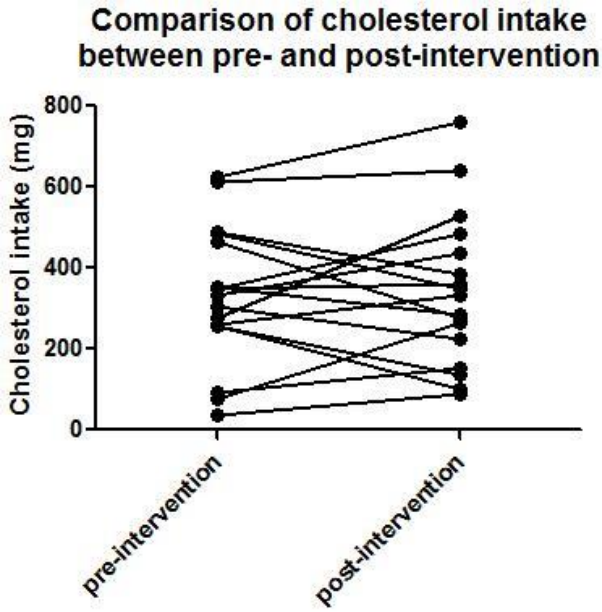

Comparison of added oil between pre- and post-intervention
Added oil (g)
25
20
15
10
5
0
pre-intervention
post-intervention


Comparison of dietary fibre between pre- and post-intervention
dietary fibre (g)
80
60
40
20
0
pre-intervention
post-intervention

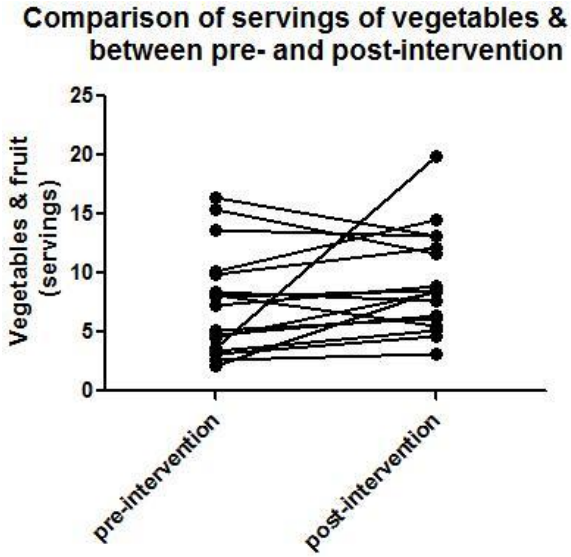

Comparison of percentage of added sucrose in total calories between pre- and post-intervention
Percentage of added sucrose in total calories (%)
5
4
3
2
1
0
pre-intervention
post-intervention

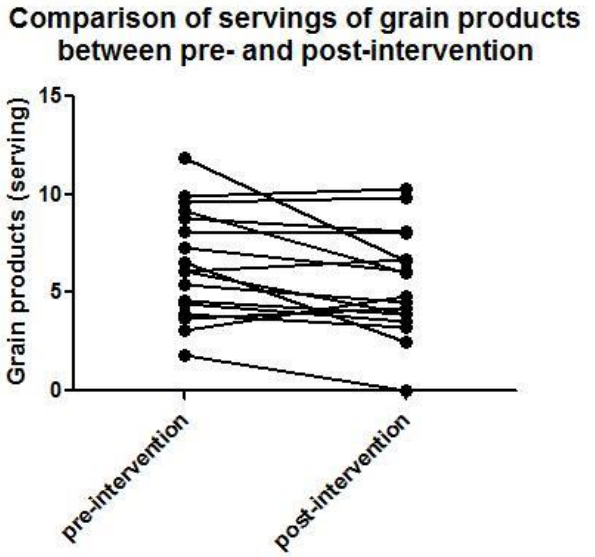

Comparison of sodium intake between pre- and post-intervention
Sodium intake (mg)
5000
4000
3000
2000
1000
0
pre-intervention
post-intervention

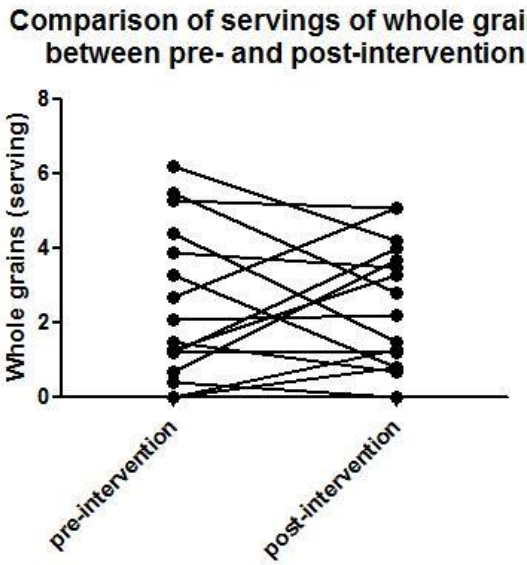

Comparison of calcium intake between pre- and post-intervention
Calcium intake (mg)
2000
1500
1000
500
0
pre-intervention
post-intervention

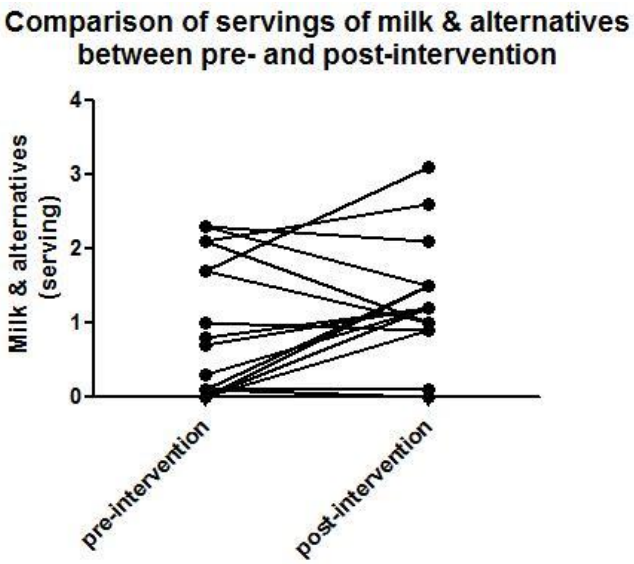

Comparison of cholesterol intake between pre- and post-intervention
Cholesterol intake (mg)
800
600
400
200
0
pre-intervention
post-intervention

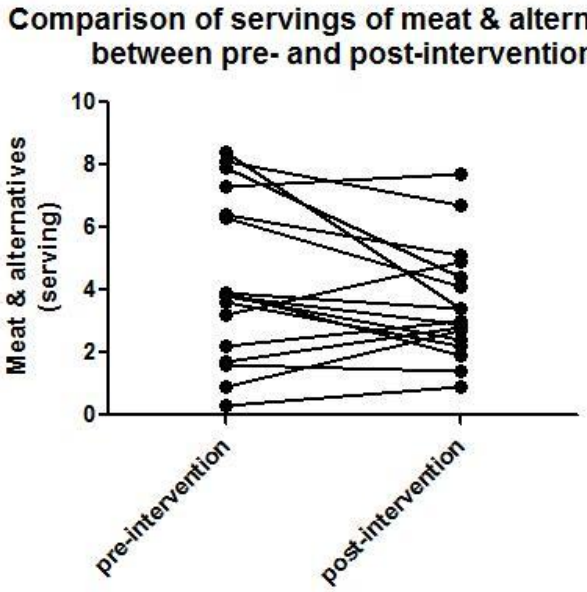
Appendix Q


Comparison of servings of vegetables & fruit between pre- and post-intervention
Vegetables & fruit (servings)
25
20
15
10
5
0
pre-intervention
post-intervention

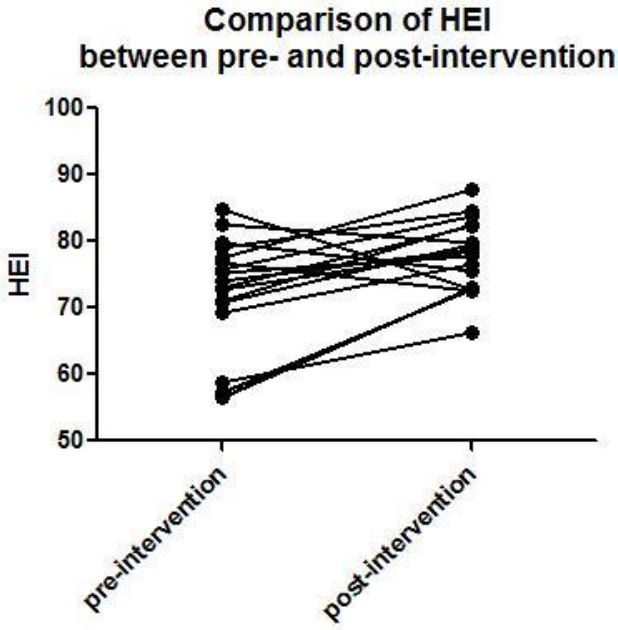

Comparison of servings of grain products between pre- and post-intervention
Grain products (serving)
15
10
5
0
pre-intervention
post-intervention

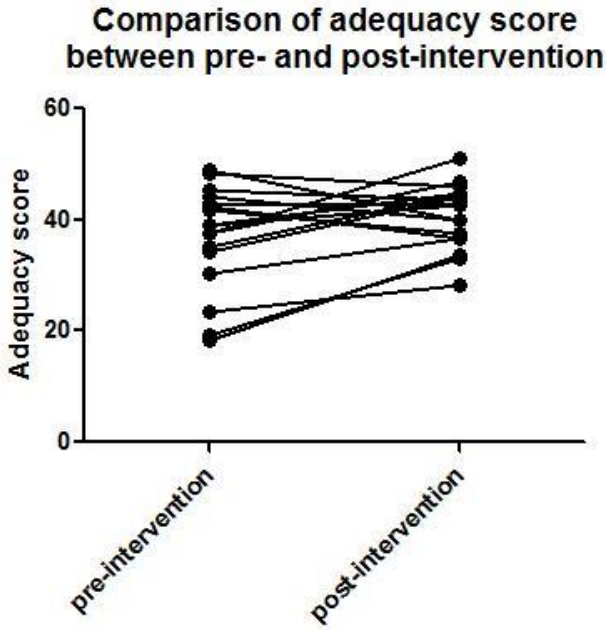

Comparison of servings of whole grains between pre- and post-intervention
Whole grains (serving)
8
6
4
2
0
pre-intervention
post-intervention

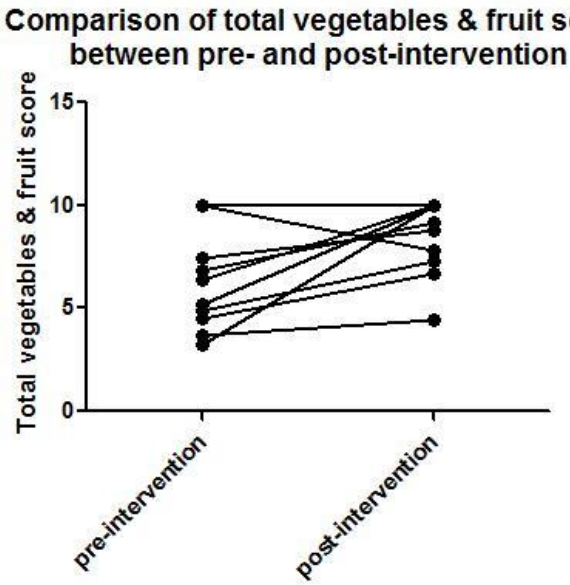

Comparison of servings of milk & alternatives between pre- and post-intervention
Milk & alternatives (serving)
4
3
2
1
0
pre-intervention
post-intervention

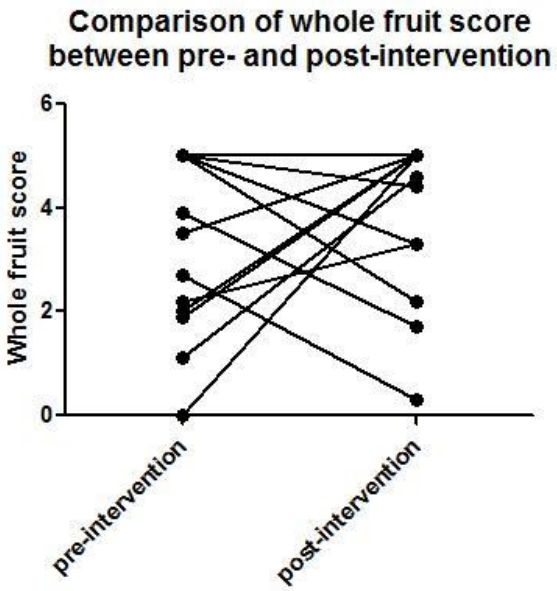

Comparison of servings of meat & alternatives between pre- and post-intervention
Meat & alternatives (serving)
10
8
6
4
2
0
pre-intervention
post-intervention

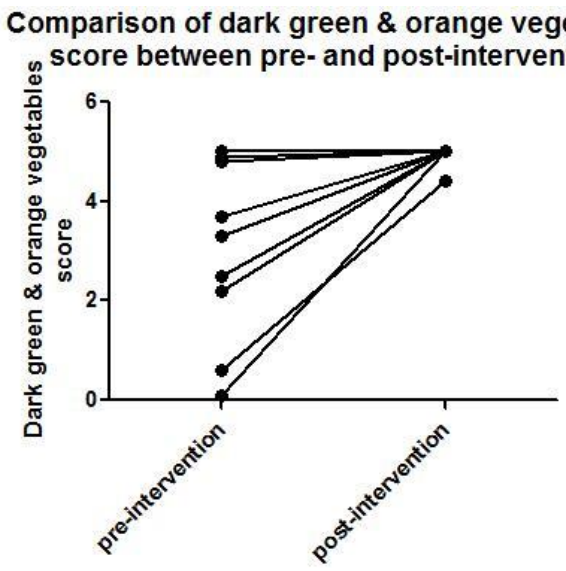
Appendix R

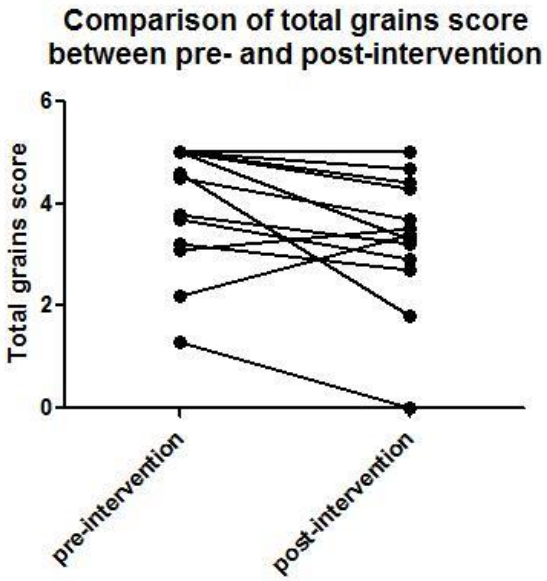

Comparison of HEI
between pre- and post-intervention
HEI
100
90
80
70
60
50
pre-intervention
post-intervention

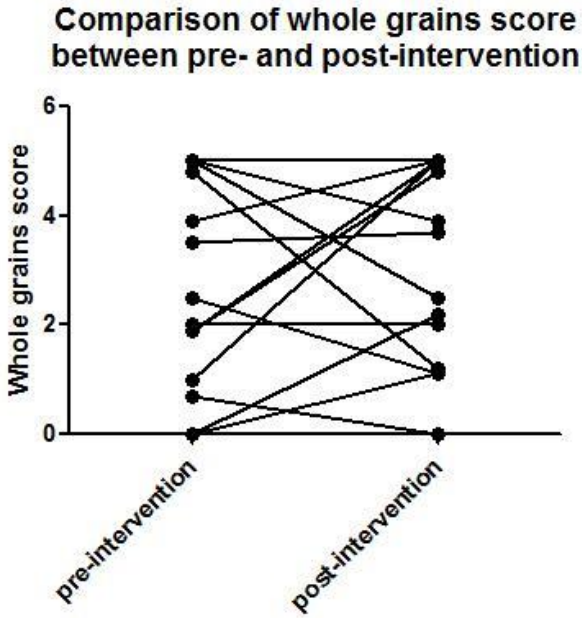

Comparison of adequacy score
between pre- and post-intervention
Adequacy score
60
40
20
0
pre-intervention
post-intervention

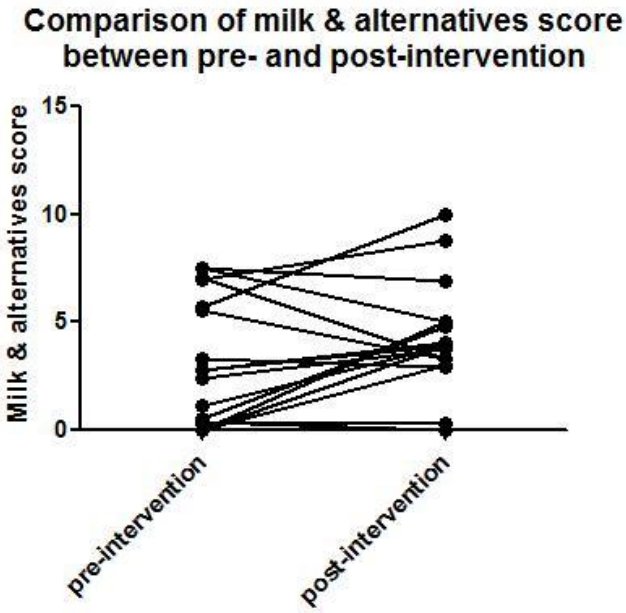

Comparison of total vegetables & fruit score
between pre- and post-intervention
Total vegetables & fruit score
15
10
5
0
pre-intervention
post-intervention

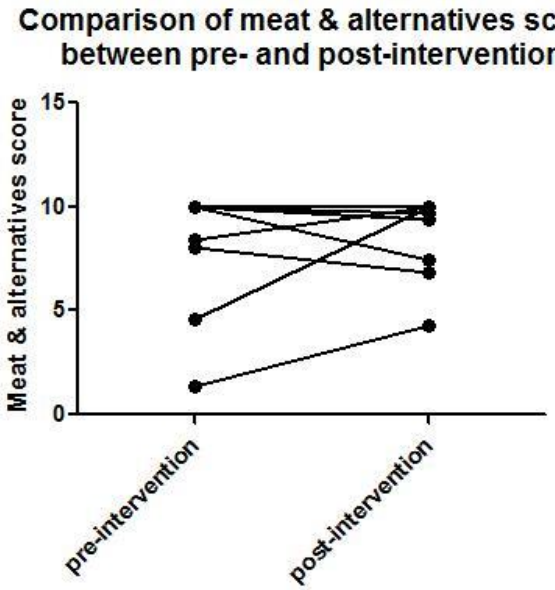

Comparison of whole fruit score
between pre- and post-intervention
Whole fruit score
6
4
2
0
pre-intervention
post-intervention

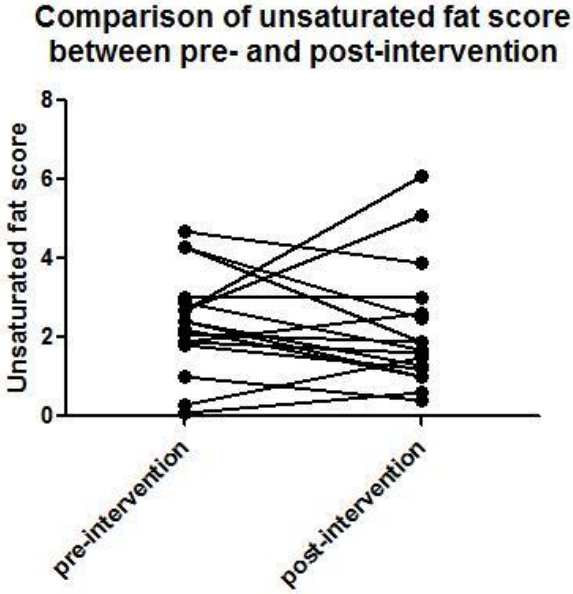

Comparison of dark green & orange vegetables score between pre- and post-intervention
Dark green & orange vegetables score
6
4
2
0
pre-intervention
post-intervention

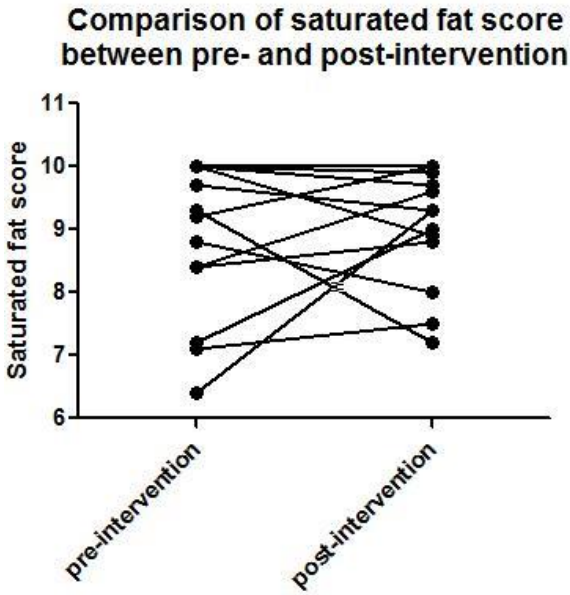

Comparison of total grains score between pre- and post-intervention
Total grains score
6
4
2
0
pre-intervention
post-intervention

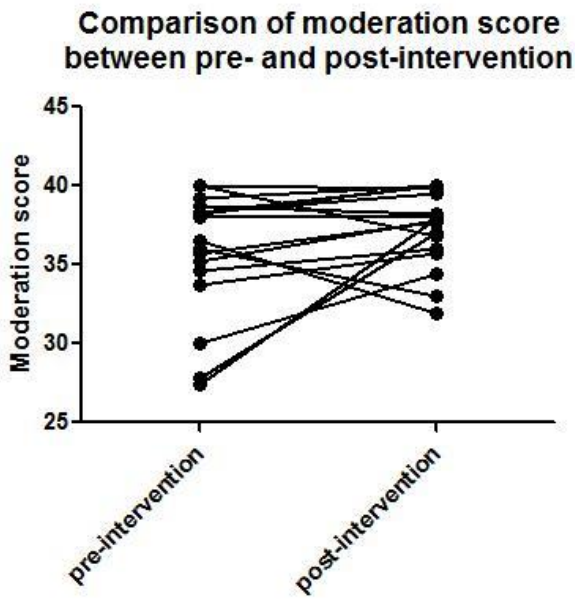

Comparison of whole grains score between pre- and post-intervention
Whole grains score
6
4
2
0
pre-intervention
post-intervention

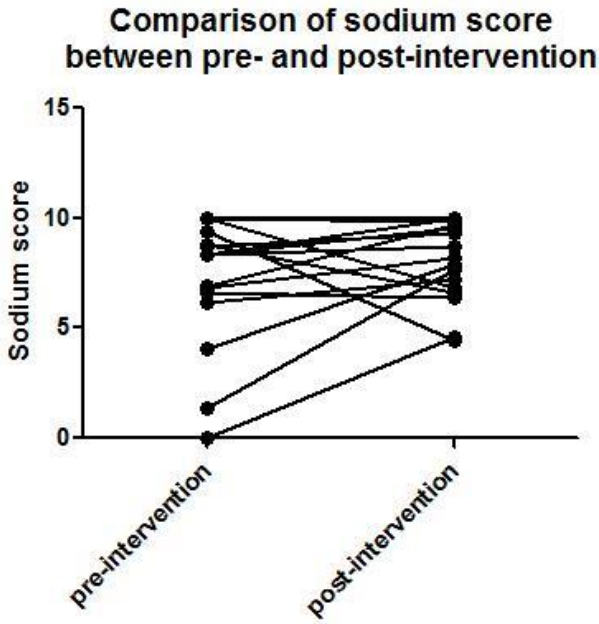

Comparison of milk & alternatives score between pre- and post-intervention
Milk & alternatives score
15
10
5
0
pre-intervention
post-intervention

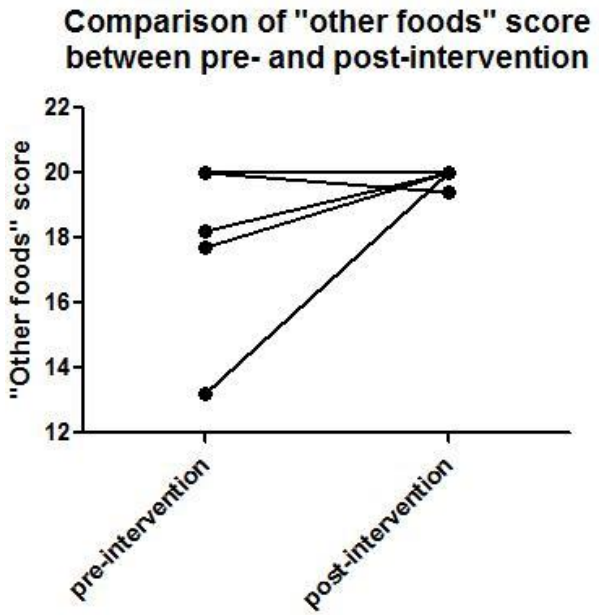

Comparison of meat & alternatives score between pre- and post-intervention
Meat & alternatives score
15
10
5
0
pre-intervention
post-intervention

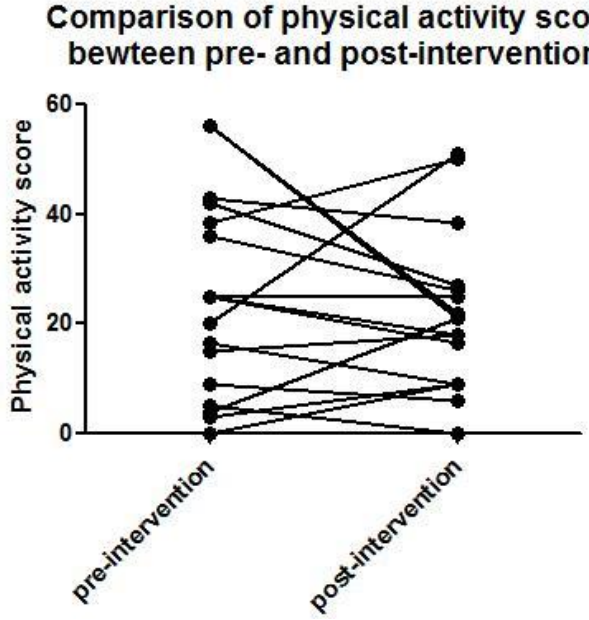

Comparison of unsaturated fat score between pre- and post-intervention
Unsaturated fat score
8
6
4
2
0
pre-intervention
post-intervention

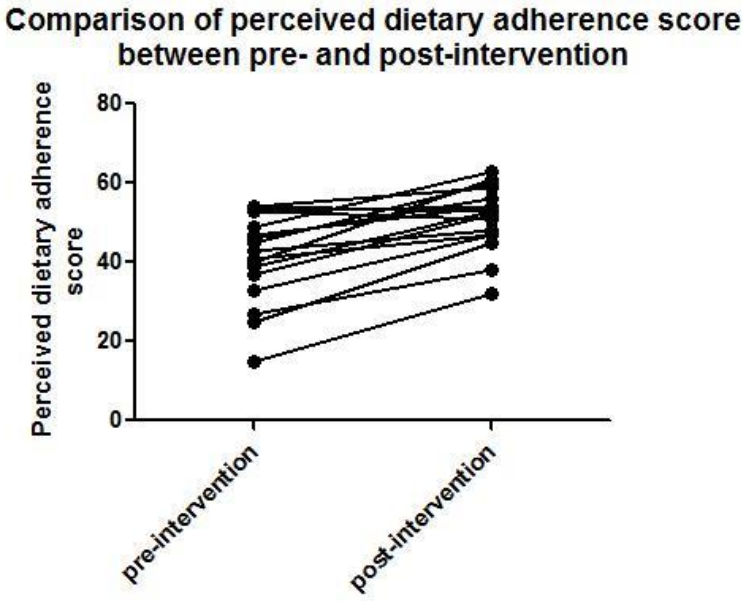

Comparison of saturated fat score between pre- and post-intervention
Saturated fat score
11
10
9
8
7
6
pre-intervention
post-intervention

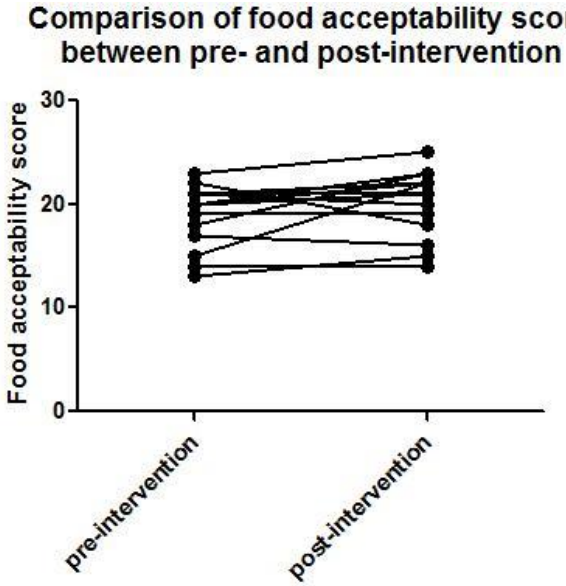

Comparison of moderation score between pre- and post-intervention
Moderation score
45
40
35
30
25
pre-intervention
post-intervention

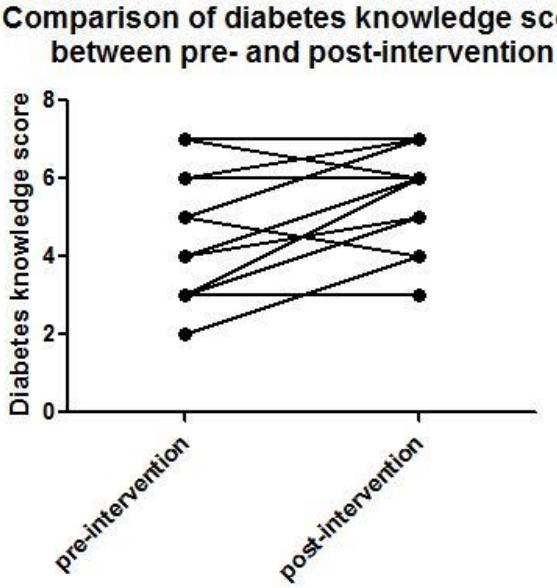

Comparison of sodium score
between pre- and post-intervention
Sodium score
15
10
5
0
pre-intervention
post-intervention


Comparison of "other foods" score
between pre- and post-intervention
"Other foods" score
22
20
18
16
14
12
pre-intervention
post-intervention


Comparison of physical activity score
bewteen pre- and post-intervention
Physical activity score
60
40
20
0
pre-intervention
post-intervention


Comparison of perceived dietary adherence score between pre- and post-intervention
Perceived dietary adherence score
80
60
40
20
0
pre-intervention
post-intervention


Comparison of food acceptability score between pre- and post-intervention
Food acceptability score
30
20
10
0
pre-intervention
post-intervention


Comparison of diabetes knowledge score between pre- and post-intervention
Diabetes knowledge score
8
6
4
2
0
pre-intervention
post-intervention