Dietary Patterns among Overweight/Obese Hispanic Women at High Risk for Type 2 Diabetes

by

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ABSTRACT

Background: Hispanic women are at high risk for Type 2 Diabetes (T2D), in part due to their high prevalence of obesity, which may influence the development of insulin resistance and disease onset. Unhealthy eating contributes to T2D risk. Dietary patterns are the combination of total foods and beverages among individual's over time, but there is limited information regarding its role on T2D risk factors among Hispanic women. Objective: To identify a posteriori dietary patterns and their associations with diabetes risk factors (age, BMI, abdominal obesity, elevated fasting blood glucose, and hemoglobin A1c) among overweight/obese Hispanic women. Design: Cross-sectional dietary data were collected among 191 women with or at risk for T2D using the Southwestern Food Frequency Questionnaire capturing the prior three months of intake. Dietary patterns were derived using exploratory factor analysis. Regression scores were used to explore associations between dietary patterns and diabetes risk factors. Results: The patterns derived were: 1) "sugar and fat-laden", with high loads of sweets, drinks, pastries, and fats; 2) "plant foods and fish", with high loads of vegetables, fruits, fish, and beans; 3) "soups and starchy dishes", with high loads of soups, starchy foods, and mixed dishes; 4) "meats and snacks", with high loads of red meat, salty snacks, and condiments; 5) "beans and grains", with high loads of beans and seeds, whole-wheat and refined grain foods, fish, and alcohol; and 6) "eggs and dairy", with high loads of eggs, dairy, and fats. The "sugar and fat-laden" and "meats and snacks" patterns were negatively associated with age ($r= -0.230$, $p= 0.001$ and $r= -0.298$, $p<0.001$, respectively). Scores for "plant foods and fish" were associated with fasting blood glucose ($r= 0.152$, $p= 0.037$). There were no other statistically significant relationships between the dietary patterns and risk

factors for T2D. Conclusions: A variety of patterns with healthy and unhealthy traits among Hispanic women were observed. Being younger may play an important role in adhering to a dietary pattern rich in sugary and high-fat foods and highlights the importance of assessing dietary patterns among young women to early identify dietary traits detrimental for their health.

DEDICATION

This doctoral dissertation is dedicated to my family who has been always supportive and has always provided the ground for me to grow as a person and as a professional. To the best and most loving parents in the world, Roman and Gloria, thanks for always giving me your love and for making me laugh so much. To my sister Lorena, you have always been a model of honesty and maturity for me and for our family. Thanks for being always there for me. To my brother, for always being with me even when you are not on earth anymore. To the little kids of the family, Larissa, Román Elías, and Iker, your love always gave me the strength to continue. To Stevens, you make me want to be a better person. Thanks for your words of encouragement and support.

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TABLE OF CONTENTS

Page

CHAPTER Page

CHAPTER Page

LIST OF TABLES

LIST OF ABBREVIATIONS

2hPG: Two hours post oral plasma glucose

24HR: Twenty four hour dietary recall

AD: anno Domini (in the year of the Lord)

ADA: American Diabetes Association

AHEI: Alternate Healthy Eating Index

AIDS: Acquired immunodeficiency syndrome

AMD: Acceptable macronutrient distribution

ARIC: Atherosclerosis Risk in Communities

ATP III: Adult Treatment Panel III

BC: Before Christ

BMI: Body mass index

BPRHS: Boston Puerto Rican Health Study

CHD: Coronary heart disease

CI: Confidence interval

CRP: C reactive protein

Cm: Centimeters

CoA: Coenzyme A

CVD: Cardiovascular disease

DASH: Dietary Approaches to Stop Hypertension

DPP: Diabetes prevention program

DPS: Diabetes prevention study

EASD: European Association for the Study of Diabetes

E.g.: Example given

EGP: Endogenous glucose production

FBG: Fasting blood glucose

FID: Food items

FFQ: Food frequency questionnaire

FPG: Fasting plasma glucose

G: gram

G/d: Gram per day

GIP: Glucose-dependent insulinotropic peptide

GLP-1: Glucagon-like peptide 1

HbA1c: Hemoglobin A1c

HC: High carbohydrate

HCHS/SOL: Hispanic Community Health Study/Study of Latinos

HDL-C: High density lipoprotein-cholesterol

HEI: Healthy Eating Index

HIS: Indian Health Services

HIV: Human immunodeficiency virus

HOMA-IR: Homeostatic Model Assessment for Insulin Resistance

ICD: International Classification of Diseases

IFG: Impaired fasting glucose

IGT: Impaired glucose tolerance

IL-6: Interleucine-6

IOM: Institute of Medicine

Kcal: Kilocalories

Kg: Kilogram

Kg/m^2: Kilograms per square meter

LC: Low carbohydrate

LDL-C: Low density lipoprotein-cholesterol

MedD: Mediterranean Diet

Mg: Milligrams

Min: Minute

Mg/dL: Milligrams/deciliter

MmHg: Millimeter of mercury

Mmol/L: Millimoles per litre

Mmol/mol: Millimoles per mol

MNT: Medical nutrition therapy

MODY: Maturity-onset diabetes of the young

MUFA: Monounsaturated fatty acid

NCEP: National Cholesterol Education Program

NFG: Normal fasting glucose

NGT: Normal glucose tolerance

NHANES: National Health and Nutrition Examination Survey

NHIS: National Health Interview Survey

NS: Non-significant

OGTT: Oral glucose tolerance test

OR: Odds ratio

PAR: Population-attributable risk

Pmol: Picomoles

PUFA: polyunsaturated fatty acid

RR: Relative risk

SD: Standard Deviation

SE: Standard error

SFA: Saturated fatty acid

SWFFQ: Southwestern Food Frequency Questionnaire

T2D: Type 2 diabetes

U.S.: Unites States

UK: United Kingdom

USDA: U.S. Department of Agriculture

VCAM-1: Vascular cell adhesion protein-1

VGMHC: Virginia Garcia Memorial Health Center

WHO: World Health Organization

CHAPTER 1

INTRODUCTION

1.1 Diabetes

Type 2 diabetes mellitus (T2D) accounts roughly for 90-95% of all the types of diabetes.[1] T2D is a serious chronic disease characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both. Sustained and chronic hyperglycemia of T2D is associated with damage to, and failure of different organs, particularly the eyes, kidneys, nerves, heart, and blood vessels.[2] Prevalence of T2D has risen to epidemic levels in the last decades affecting more than 29 million people in the U.S. and 420 million worldwide with a projected worldwide prevalence of 642 million by 2040.[3]

In the U.S., 29.1 million people or 9.3% of the population have diabetes and it is the 6th disease leading cause of death. However, it is estimated that 27.8% of people with diabetes remain undiagnosed. Estimates from 2009-2012 based on fasting glucose and hemoglobin A1c (HbA1c) indicated 37% of U.S. adults aged 20-64 years and 51% of adults aged 65 and older had prediabetes,[3] which is the term used for individual with impaired fasting glucose and/or impaired glucose tolerance.[1]

It has been reported that T2D imposes a considerable economic burden on individuals with the condition. The estimated lifetime direct medical costs of treating T2D is $124,700 in men and $130,800 in women with age 25-44 years at diagnosis.[4] T2D is not only expensive but also affects the quality of life of individuals affected. The presence of diabetes nearly doubles the likelihood of depressive disorders; on the other hand, the presence of a depressive disorder increases the likelihood of developing diabetes by 37%. Studies indicated that depression, both clinical and subclinical symptoms, is considered a

reliable predictor for poor adherence to medical regimens among those with T2D, and severity of depression has been shown to be associated with poorer quality of life.[5]

Epidemiological studies have shown that obesity and weight gain are the most important risk factors for T2D, which may influence the development of insulin resistance and disease onset.[6] T2D is derived from a complex interaction of heritable genetic risk factors (family history), gut metagenome, and lifestyle factors such as sedentary lifestyle, physical inactivity, smoking, and alcohol consumption.[6] Diet is also considered an important independent risk factor for diabetes.[7] For instance, diets low in fiber and rich in simple carbohydrates, deficiency of nutrients such as vitamin D and vitamin K,[8] [9,10] and specific dietary fatty acids have been associated with increased risk of T2D.[11] The aspect of diet and T2D is discussed in more detail in a further section.

1.1.1 Hispanics and Type 2 Diabetes

Health disparities have been reported among Latinos. Health disparities are defined as differences in health, and are considered avoidable, unfair and unjust.[12] Factors contributing to disparities and poor diabetes quality of care and health outcomes among socially disadvantaged and patients from minority groups are lack of access to health system, poor health literacy and numeracy, language barriers, financial disadvantage, lack of trust, and perceived discrimination by health care providers.[13] Adults with diabetes with no insurance receive fewer if any recommended processes of care, have worse glycemic control, and develop more diabetes complications. Particularly among Latinos with T2D, uninsured individuals have higher rates of microvascular complications than those who are insured.[14]

Hispanic/Latinos show higher prevalence of T2D and at a younger age compared to non-Hispanic whites.[3] According to 2009-2012 National Health and Nutrition Examination Survey (NHANES), 2010-2012 National Health Interview Survey (NHIS), 2012 Indian Health Services and 2012 U.S. resident population estimates, a high percentage of Hispanics have been diagnosed with diabetes (12.8%), just after American Indians/Alaska Natives (15.9%) and Non-Hispanic blacks (13.2%).[3] (Mexican-Americans often represent Hispanic group in a majority. The prevalence of T2D has been noted to be different by Hispanic/Latino background, which perhaps fail to distinguish the heterogeneity in diabetes prevalence across subgroups within the Hispanic population.[15] Estimated prevalence of self-reported diabetes among across subgroups of Hispanics including Puerto Rican, Mexican, Mexican-American, Cuban, Dominican, Central/South American and other Hispanics subgroups, have shown that Puerto Rican (11%), Mexican-Americans (10.2%), and non-Hispanic blacks (10.2%) have the highest prevalence of self-reported T2D of all groups, as opposed Central/South Americans (4%) with the lowest self-reported prevalence.[15]

1.1.1.1 Type 2 Diabetes and Cardiovascular Disease

T2D is a risk factor for cardiovascular disease (CVD).[16] CVD encompasses coronary heart, cerebrovascular, peripheral arterial, rheumatic heart, and congenital heart diseases, as well as deep vein thrombosis and pulmonary embolism.[17] Besides T2D, other important risk factors for CVD include an unhealthy diet, physical inactivity, tobacco use and excessive alcohol consumption. The effects of these behaviors can manifest in individuals as high blood pressure, increased blood glucose, impairment in blood lipids,

and overweight and obesity.[17] According to the World Health Organization (WHO), CVD is the number one cause of death globally.[17] However, based on 2009-2013 NHIS and 2009-2012 NHANES data, overall Hispanic all-cause mortality rate was 24% lower than for non-Hispanic whites, and Hispanics overall had lower rates than whites for most leading causes of death. This is consistent with previous reports where the phenomenon is called "Hispanic Paradox"[18] to describe Hispanics' projected longer life expectancy, and lower overall mortality, despite multiple potential barriers to health including lack of medical insurance and worse environmental conditions in the places they live, work, and age.[19] Although the "Hispanic Paradox" has been reported, in comparison rates are substantially higher among Hispanics for diabetes (>51%), essential hypertension and hypertensive renal disease (>8%), and two out of five deaths (>41%) among Hispanics were the result of cancer and CVD.[20] Furthermore, it has been reported that overall, U.S.-born Hispanics show a higher prevalence of risk factors and worse health outcomes than foreign-born Hispanics. For instance, U.S. born Hispanics had a greater prevalence of cancer, heart disease, smoking, hypertension, and obesity than foreign-born Hispanics (93%, 89%, 72%, 40%, and 30%, respectively).[20]

CVD is one the leading causes of mortality among Hispanics/Latinos[21] with a high burden of CVD risk factors among Mexican-Americans, who comprised the largest and most studied Hispanic/Latino group in the U.S.[21] The prevalence of cardiovascular risk factors differs by Hispanic background and it has been observed to differ by degree of acculturation.[22] According to baseline data from 2008-2011 from the Hispanic Community Health Study/Study of Latinos (HCHS/SOL) which included Cuban, Dominican, Mexican, Puerto Rican, Central American and South American

Hispanic/Latino backgrounds,[23] there is a marked variability in CVD risk factor prevalence within the Hispanic/Latino population, with those with Puerto Rican background undergoing remarkably high rates of individual CVD risk factors and overall risk factor burden compared with the other groups. However, Mexicans also showed a high prevalence of cardiovascular risk factors as well including hypertension (19.5% vs. 21.4%), hypercholesterolemia (36.2% vs. 53.9%), obesity (41.5% vs. 36.8%), T2D (18.5% vs. 19.3%), and smoking (10% vs. 23.1%) for women and men, respectively.[23] Across all ethnic backgrounds, hypertension and diabetes were strongly associated with prevalent stroke in men and women, and hypercholesterolemia and obesity were significantly associated with prevalent stroke only among women.[23]

1.1.1.2 Type 2 Diabetes Among Women

The risk of T2D has been reported to differ by sex and it has been suggested that endogenous sex hormones may play a role in T2D onset.[24] For instance, in some studies, hyperandrogenic conditions (e.g., polycystic ovarian syndrome) have been strongly associated with glucose intolerance and insulin resistance in women.[25,26] Other studies have reported associations of hypoandrogenism with adiposity and insulin resistance in men.[27] Also, sex-dependent relationships have been reported for the risk of T2D and estradiol, which is a form of the primary female sex hormone estrogen. Although there have been reports suggesting a positive association between estradiol and insulin resistance in women,[28] these findings have been inconsistent.[29] Furthermore, T2D is considered a more powerful risk factor for coronary heart disease (CHD) mortality in women than in men, with women with T2D having risk for CHD mortality 3.5-fold, but

only 2-fold in men (p=0.008 for sex difference).[24] A systematic review and meta-analysis evaluating the association of plasma levels of testosterone, estradiol, and sex-hormone-binding globulin with risk of T2D found that men with higher testosterone levels had 42% lower risk of T2D; while there was indication that testosterone increased risk of T2D in women. Higher levels of sex-hormone binding globulin were protective in women with 80% lower risk, but only 50% lower risk in men. Also, estradiol levels were higher in men and postmenopausal women with T2D compared with controls without T2D.[30]

1.2 Metabolic Syndrome

Metabolic Syndrome is characterized by a group of metabolic risk factors and is strongly associated with T2D or the risk of this disease.[31,32] According to the National Cholesterol Education Program (NCEP) Adult Treatment Panel III (ATP III), Metabolic Syndrome diagnostic criteria include at least three of the following conditions: elevated triglycerides (≥150 mg/dL), low High Density Lipoprotein-Cholesterol (HDL-C) (<40 mg/dL in men, <50 mg/dL in women), hypertension (high systolic ≥130 mmHg or high diastolic blood pressure ≥85 mmHg), high fasting glucose (≥100 mg/dL), and abdominal obesity (≥102 cm in men, ≥88 cm in women).[33]

The overall prevalence of Metabolic Syndrome in the U.S. population increased from 25.3% in 1988-1994 to 34.2% in 2007-2012 according to NHANES data.[34] Findings from this study indicated that compared to non-Hispanic white men, non-Hispanic black men were less likely to have Metabolic Syndrome (OR, 0.77, 95%CI, 0.66-0.89); but non-Hispanic black women were more likely than non-Hispanic white women to have Metabolic Syndrome (OR, 1.20, 95%CI, 1.02-1.40). Low education level (OR, 0.77,

95%CI, 0.66-0.89) and older age (OR, 0.77, 95%CI, 0.66-0.89) were independently associated with increased likelihood of having Metabolic Syndrome.[34] The Metabolic Syndrome also affects younger individuals. There has been reported increase in the prevalence of risk factors and Metabolic Syndrome children[35] and adolescents.[36] Based on the findings of a systematic review, for whole populations, the estimated overall prevalence of Metabolic Syndrome in children ranged from 1-3% using the ATP III, and for populations of overweight/obese children, the prevalence range from 10-36%.[35] In youth, it has been reported that one in 10 adolescents has Metabolic Syndrome with an estimated prevalence 10.1%, and 73.2% of the participants had at least one risk factor for Metabolic Syndrome.[36] These findings have important health public implications due to the established cardiovascular disease risk factors related to Metabolic Syndrome affecting younger populations.[36]

1.2.1 Hispanics and Metabolic Syndrome

According to the National Health and Nutrition Examination Survey (NHANES), the prevalence of Metabolic Syndrome is consistently higher in racial/ethnic minority groups, such as Hispanic/Latinos compared to non-Hispanic whites.[37] Prevalence of Metabolic Syndrome increases with age and in a sex-specific manner. For instance, when stratified by race/ethnicity and age group, Metabolic Syndrome prevalence increased from 10% among those aged 18-29 years including all racial/ethnic groups to almost 70% among those aged 70 or older between 2007-2012.[37] Sex differences in the prevalence of Metabolic Syndrome may result in different cardiovascular risk for men and women.[38] Hispanics/Latinos are at high risk for cardiometabolic disease, with higher levels of

insulin resistance,[39] and higher rates of conversion to T2D than non-Hispanic whites.[40] Particularly, the prevalence of diagnosed diabetes by age and sex in Mexican-Americans is approximately twice (12%) as in non-Hispanic whites (6.3%).[41] Mexican-American men and women are more likely to have elevated fasting glucose, and Mexican-American women are more likely to have abdominal obesity, elevated triglycerides and reduced HDL-C than their non-Hispanic whites counterparts.[34]

1.2.2 Strategies to Decrease Metabolic Syndrome

The Metabolic Syndrome and prediabetes are strongly associated with obesity.[42] Although the mechanisms of obesity predisposition to Metabolic Syndrome and prediabetes are not completely understood, insulin resistance and systemic inflammation are considered common factors in their development. Insulin resistance is thought to be a mediator of all metabolic risk factors of Metabolic Syndrome.[43] [44] In the context of increased adipose tissue, prior work suggests that adipose tissue releases excess free fatty acids and a variety of adipokines, [44] which appear to underlie a proinflammatory state.[43] The increased adipose tissue-derived free fatty acids induce insulin resistance at a muscular level, which causes an elevation of plasma glucose.[43] Increased plasma free fatty acids over time may affect beta-cell function mediated by lipotoxicity,[45] increased hepatic glucose production, higher glucose concentration, hyperglycemia,[46] and hypertriglyceridemia in plasma that results in lower HDL-C concentrations.[47]

Reduction of abdominal obesity has been reported to improve glucose tolerance in subjects at risk for Metabolic Syndrome.[48] Also, energy restriction is known as an effective strategy to promote weight loss and to improve Metabolic Syndrome status.[49]

Further reported benefits from energy restriction have been improved immunity and prolonged lifespan.[50] A restriction of 500 kcal/day among subjects with Metabolic Syndrome following either a diet with whole grains or refined grains showed an improved body composition regardless of the type of grains consumed. However, those consuming whole grains showed greater decreases in C-reactive protein (inflammation biomarker) and waist circumference.[49] Additionally, whole grain consumption was significantly associated with greater intakes of fiber and magnesium, which have been associated with protection against Metabolic Syndrome.[49] Calorie restriction has been also associated with reduction of plasma triglycerides and Low Density Lipoprotein-Cholesterol (LDL-C), but concerns arise due to calorie-restricted diets have shown to reduce HDL-C as well, which may impact the risk among individuals with already low HDL-C concentrations.[51] Since calorie restricted diets required long-term adherence, these have reported to be more difficult to follow when compared with diets based on food groups and dietary patterns, such as diets focusing on Mediterranean-style foods or carbohydrate restriction (restricting food groups high in carbohydrates).[52]

1.2.2.1 Diet as Lifestyle Factor for Metabolic Syndrome and Type 2 Diabetes

A poor diet contributes to poor health and is a well-established modifiable risk factor for the development of non-communicable diseases such as T2D and CVD.[53] Intake and combination of foods that induce minimal postprandial glucose and insulin response is thought to prevent or delay T2D onset,[54] and healthy diets have been repeatedly associated with decreased risk of all-cause mortality, T2D and CVD.[55] However, the study of diet and T2D has been focused on individual nutrients (e.g.,

carbohydrates, dietary fiber)[56,57] or food items consumed (e.g., sugar, sweetened drinks, whole grains, fruits and vegetables)[56,58] rather than focusing on the diet as a whole.[59]

Nutrients are not consumed in isolation, and it is the synergy of nutrients within the context of a healthy diet that is frequently associated with a reduced risk of disease such as CVD.[60] Mixed meals contain several nutrients that may interact with each other, for this reason is difficult to separate the specific effects of nutrients or foods on health outcomes (e.g., blood pressure) or disease risk.[61] For instance, diets high in fiber are usually also high in vitamin C, folate, carotenoids, potassium and magnesium; making difficult to ascertain that the associations observed between fiber and disease risk are not a consequence of folate or carotenoid intake.[61] Therefore, interactions between nutrients may confound results from studies that looked at the effects of individual foods or nutrients. In this scenario, the study of healthy dietary patterns has been proposed as a better approach to examining the components of dietary patterns with disease risk and health outcomes.[61] Dietary pattern, often referred as "eating pattern", is defined as the combination of foods and beverages that constitute an individual's complete dietary intake over time, and may describe a way of eating including proportions, variety of combinations of different foods and beverages, and also the frequency with which they are habitually consumed.[62] Examples of dietary patterns include the U.S. Department of Agriculture (USDA) Food Patterns and the Dietary Approaches to Stop Hypertension (DASH) eating plan.[62] Particularly, it has been suggested that shifting from a Western (e.g., rich in processed meats, high fat dairy products and refined grains) to a healthier dietary pattern (e.g., rich in vegetables, fruit, fiber, whole grains, fish and poultry) may reduce the risk of T2D.[63,64] The influence of the overall diet on health outcomes (e.g.,

CDV, diabetes, cancer) instead of single foods and nutrients can be studied with dietary patterns analysis.[65] For instance, a systematic review and meta-analysis including 15 cohort studies indicated that healthy dietary patterns might be associated with the risk of T2D.[66]

Hispanic women's diet may impact their risk of weight gain, obesity, Metabolic Syndrome, and T2D onset.[67] Traditional Mexican foods are considered healthy, however, higher acculturation among adults of Mexican descent living in the U.S. has been associated with lower intake of these foods, adhering more to a typical U.S. or Western diet, usually low in fruits and vegetables and high in refined grains and added sugar.[68] It has been reported that when compared to Mexicans, Mexican-Americans consume more saturated fat, sugar, desserts, snacks high in sodium, pizza, and French fries, and have higher intakes of low-fiber bread, high-fat milk, corn tortillas, and Mexican fast food.[69] Additionally, Mexican-Americans are prone to consume insufficient amounts of fiber and to be deficient in key nutrients such as iron[70] and vitamin D.[71]

Exploratory factor analysis has emerged as a useful technique to derive dietary patterns. Exploratory factor analysis is a variable reduction technique that captures the primary sources of variation in a set of variables. When assessing dietary patterns, these variables (foods consumed) and the identification of major sources of dietary variation, make possible describing the main dietary patterns in a given study population.[72] Assessing diet and dietary patterns among specifics ethnic/racial groups can help to understand the associations between the diet as whole, and coexisting risk factors for T2D. This would allow creating targeted strategies to improve their diet and decrease risk factors for metabolic diseases.

There is still a gap in the literature regarding dietary quality and dietary patterns among specific ethnic groups, including Mexican-Americans. Aside from having less favorable risk factor profiles,[23] there may be important traits in the diet of Mexican-Americans that can further impact T2D risk such as higher intakes of fatty acids that have an influence on insulin response (e.g., saturated fatty acid [SFA] such as palmitic acid), or they might include dietary components that are protective against cardiometabolic diseases (e.g., foods characteristic of the Mediterranean diet).

In view of the overwhelming prevalence of Metabolic Syndrome and T2D among Hispanics, the study of distinct dietary patterns and their association with diabetes is crucial. This would help to provide informed advice on which elements of the diet should be modified with the goal of controlling and preventing T2D onset. To the best of our knowledge, there are no published studies regarding dietary patterns and associations with risk factors for T2D among Hispanic women with predominant Mexican background.

1.4 Purpose of research

The goal of this dissertation is to explore the association between dietary patterns and metabolic risk factors among overweight/obese Hispanic women with or at risk for T2D. The specific aims are:

(1) to identify *a posteriori*-derived dietary patterns among overweight/obese Hispanic women enrolled in a behavioral intervention for weight loss and diabetes risk reduction using exploratory factor analysis, and

(2) to explore associations of the derived dietary patterns with risk factors including BMI, abdominal obesity, hyperglycemia, and higher HbA1c. The working hypothesis is that dietary patterns with greater loads of unhealthy foods will be associated with greater diabetes risk.

CHAPTER 2

LITERATURE REVIEW

In this chapter, Metabolic Syndrome, T2D, research of different dietary approaches to prevent and control T2D, the different methodologies to evaluate diet, and purpose of research of the current study are included.

2.1 Metabolic Syndrome

Metabolic Syndrome consists of five cardiometabolic risk factors including abdominal obesity (≥ 102 cm in males, ≥ 88 cm in females), elevated triglycerides (≥ 150 mg/dL or ≥ 1.7 mmol/L) or drug treatment for elevated triglycerides, reduced HDL-C (< 40 mg/dL or < 1.0 mmol/L in males, < 50 mg/dL or < 1.3 mmol/L in females), elevated blood pressure (systolic ≥ 130 mmHg and/or diastolic ≥ 85 mmHg), and elevated fasting glucose (≥ 100 mg/dL or ≥ 5.5 mmol/L).[42] The diagnosis of the Metabolic Syndrome is considered when at least 3 out of the 5 risk factors are present.[32]

Metabolic Syndrome has been consistently associated with T2D and CVD.[73-75] A cross-sectional study with a sample composed of patients with T2D (n=201) reported that the prevalence of the Metabolic Syndrome among them was higher than 50%, and the prevalence of Metabolic Syndrome components was 8%, 15.4%, 25.8%, 27.4%, 17.4%, and 6%, for the presence of none, 1, 2, 3, 4, and 5 risk factors, respectively, fasting blood glucose (FBG) being the component most frequently reported.[31] The presence of the Metabolic Syndrome components among individuals with T2D needs monitoring, as the presence of such components are associated with an increase in the number of micro and macrovascular complications, yielding to higher rates of morbidity and mortality.[31]

A cohort study composed by members of the Framingham Offspring Study followed for 8 years men and women (aged 22-81 years) with a baseline between 1989-1993, aimed to investigate the relation between the number of Metabolic Syndrome risk factors and relative risk for incident CVD and T2D. The findings in men showed the age-adjusted relative risk (RR) due to Metabolic Syndrome was increased for CVD (RR=2.88; 95% CI 1.99-4.16), total CHD (RR=2.54; 95% CI 1.62-3.98), and myocardial infarction /CHD death (RR=2.58; 95% CI 11.46-4.57).[32] The age-adjusted population-attributable risk (PAR) was 33% for CVD and close to 30% for CHD, which points to the proportion of vascular events that could be attributed to the presence of Metabolic Syndrome at the baseline evaluation. At follow up, the age-adjusted RR for T2D was noticeably increased in men (RR=6.92; 95% CI 4.47-10.81), and the age-adjusted PAR was 62%.[32] At follow up in women, the age-adjusted RR for CVD (RR=2.25; 95% CI 1.31-3.88), total CHD (RR=1.54; 95% CI 0.68-3.53), and for myocardial infarction/CHD death (RR=2.50; 95% CI) were moderately increased.[32]

The overall prevalence of Metabolic Syndrome in the U.S. population increased from 25.3% (1988-1994) to 34.2% (2007-2012), and by 2012, more than a third of all U.S. adults met the criteria for Metabolic Syndrome.[34] Aguilar et al. (2015) evaluated the Metabolic Syndrome trends among adults (aged $\geq$ 20 years) using 2003-2012 NHANES data and reported a prevalence of 33% (95% CI, 32.5%-33.5%) with significantly higher prevalence in women compared with men (35.6% vs. 30.3%, respectively, $p<0.001$).[76]

Mexican-Americans represent a minority group at high risk for T2D and CVD with a high number of subjects with Metabolic Syndrome that later develop T2D.[40] Stratified results by race/ethnicity in the period of 2003-2012 NHANES data showed the

highest prevalence of Metabolic Syndrome among Hispanics (35.4; 95% CI, 34.2-36.6%), followed by non-Hispanic whites (33.4%; 95% CI, 32.6%-34.2%), and blacks (32.7%; 95% CI, 31.5%-33.9%).[76]

Components of Metabolic Syndrome are associated with increased risk of CVD and T2D regardless of sex.[32] However Mexican-Americans show increased prevalence of Metabolic Syndrome components when compared to non-Hispanic whites. According to the National Health and Nutrition Examination Survey (NHANES) from 2007-2012,[34] compared to non-Hispanic whites, Mexican-American men had higher prevalence of fasting hyperglycemia (32.3% vs. 30.0%). Compared to non-Hispanic white women, Mexican-American women had higher prevalence of elevated waist circumference (66.8%, SE=1.58 vs. 58.8%, SE=1.29), reduced HDL-C (51.6%, SE=1.95 vs. 46.2%, SE=1.38), and elevated fasting glucose (32.3%, SE=1.58 vs. 30.0%, SE=1.04).[34] However, non-Hispanic white men and women had higher prevalence and were more likely to have high blood pressure when compared to their Mexican-American counterparts.[34]

In summary, Metabolic Syndrome components are associated with an increased T2D and CVD risk. Although these components affect a high percentage of both women and men regardless of race/ethnicity, Mexican American men and women are more likely to have fasting hyperglycemia that their non-Hispanic white counterparts. However, Mexican American women show a less favorable cardiometabolic profile because in addition to fasting hyperglycemia risk, they are more likely to have elevated waist circumference, elevated triglycerides, and reduced HDL-C than their non-Hispanic white counterparts.

2.2 Prediabetes

Prediabetes is defined as an intermediate state of plasma glucose levels ranging between normoglycemia and diabetes.[77] Prediabetes or increased risk of diabetes mellitus is the term used to refer to early stages of abnormal glucose homeostasis including impaired fasting glucose (IFG), and/or impaired glucose tolerance (IGT), and/or high HbA1c.[2] Prediabetes or IFG is defined based on fasting plasma glucose (FPG) concentration of 100-125 mg/dL, and/or impaired glucose tolerance (IGT) based on a 2-hour postprandial glucose concentration of 140-199 mg/dL during an oral glucose tolerance test (OGTT), and/or HbA1c of 5.7%-6.4% (39-47 mmol/mol).[78] IGT reflects inadequate postprandial insulin secretion and is considered the earliest irregularity in glucose homeostasis related to the progression to T2D.[79] The OGTT detects IGT and is considered the "gold standard" test to detect diabetes mellitus. IFG denotes augmented hepatic glucose production, which results in fasting hyperglycemia and can be assessed by FPG.[80] HbA1c represents the 2-3 month-mean plasma glucose concentrations and has been shown to be elevated during states of intermediate hyperglycemia.[79,80] Prediabetes is associated with obesity, particularly abdominal or visceral obesity, and dyslipidemia,[78] and although prediabetes denotes impairment in glucose metabolism, it should not be handled as an isolated clinical condition, but rather as a risk factor for CVD and T2D.[78]

2.2.1 Glucose Regulation

The normal physiology of plasma glucose concentrations depends on the rate of glucose entering to the circulation, which is termed "glucose appearance", balanced by the rate of glucose cleared or removed from the circulation, called "glucose

disappearance".[81] Glucose regulation requires the interplay of many hormones (gut and pancreatic), which cause effect on multiple target tissues including muscle, brain, liver, and adipocyte.[82] Circulating glucose is provided from three sources: intestinal absorption during the fed state, glycogenolysis, and gluconeogenesis. The rate of gastric emptying is the main factor determining how fast glucose appears in the circulation during the fed state.[82] Other sources of glucose are derived from hepatic processes: glycogenolysis, which is the breakdown of glycogen (storage form of glucose), and gluconeogenesis (formation of glucose from lactate and amino acids during fasting state) facilitated by glucagon.[81] Hormones regulating glucose are: insulin and amylin, derived from beta-cells of the pancreas; glucagon from the alpha-cells of the pancreas; glucagon-like peptide 1 (GLP-1) and glucose-dependent insulinotropic peptide (GIP) from the L-cells of the intestine; and epinephrine, cortisol, and growth hormone.[83] Glucoregulatory hormones maintain circulating glucose concentrations in a narrow range. During the fasting state, glucose is cleared from the circulation at a constant rate, and endogenous production of glucose occurs to keep pace along with glucose disappearance. Although glucose-6-phosphatase, the enzyme necessary to release glucose into the circulation, is present in both the liver and the kidneys, the liver is the sole source of endogenous glucose production because renal gluconeogenesis occurs only during periods of extreme starvation.[82]

Glucagon is a major regulator of glucose appearance, and insulin is the key regulatory hormone for glucose disappearance. Blood glucose slowly decreases during the next hours after reaching a post-meal peak, and blood glucose returns to fasting levels.[81] During the immediate post-feeding state, insulin acts to remove glucose into

adipose tissue and skeletal muscle. Simultaneously, endogenous glucose production is suppressed by (1) insulin action, delivered via the portal vein on the liver, and (2) the paracrine effect (direct communication) in the pancreas between the alpha- and beta-cells, resulting in glucagon suppression.[81] Amylin complements the effects of insulin on circulating glucose concentrations by suppressing postprandial glucagon secretion, which decreases glucagon-stimulated hepatic glucose output after food ingestion. Additionally, amylin slows the rate of gastric emptying and the rate at which nutrients are delivered from the stomach to the small intestine for absorption.[84] GIP stimulates insulin secretion and regulates fat metabolism, but does not inhibit glucagon secretion or gastric emptying, and its levels are either normal or slightly elevated in people with T2D. GLP-1 is more physiologically relevant in humans; it stimulates glucose dependent insulin secretion but is significantly reduced in the postprandial state in people with T2D or IFG.[85]

2.2.1.1 Pathophysiology of Prediabetes

There is heterogeneity in most glucose intolerance disorders, including diabetes mellitus syndromes. In individuals with prediabetes (IFG and/or IGT), glucose concentrations start to increase when glucose appearance exceeds glucose disappearance and continues to increase until the two rates become equal again.[86] During fasting state, glucose appearance is the result of the rate of glucose released from the liver with perhaps a minor contribution by the kidney. However, it has been observed that most individuals with IFG also have IGT or frank diabetes, but some have normal glucose tolerance (NGT), and some individuals with normal fasting glucose (NFG) have IGT.[86]

2.2.2 Burden of Prediabetes

Prediabetes estimates from 2009-2012 based on fasting glucose and HbA1c test from the 2009-2012 NHANES survey indicated that 37% of U.S. adults aged 20-64 years and 51% of adults aged 65 and older had prediabetes.[3] Based on this data, it was estimated that by 2012, 86 million Americans 20 years or older were affected by prediabetes. The percentage of U.S. adults with prediabetes based on IFG or HbA1c and after adjustment for age between 2009-2012 was similar for non-Hispanic white (35%), Hispanics (38%), and non-Hispanic blacks (39%).[3] Individuals with prediabetes have a 1.5-fold increased risk of CVD compared to people with normal glucose concentrations, and individuals with T2D diagnosis have between 2- to 4-fold increased risk for CVD.[40]

Results from a population-based analysis with participants from the Atherosclerosis Risk in Communities (ARIC) study and a subpopulation from NHANES III aimed to assess the test performance of HbA1c against single and repeated glucose measurements for diagnosis of prevalent diabetes and prediction of incident diabetes. Fasting glucose and HbA1c both strongly predicted subsequent risk of diagnosed diabetes.[87 88]

Cross-sectional studies including Hispanic/Latinos have observed a higher prevalence of IFG among men, and a higher prevalence of IGT among women.[89-91] A cross-sectional study aimed to compare the ability of FPG, two hours post oral plasma glucose (2hPG) (obtained during an OGTT), and HbA1c to detect U.S. Hispanic/Latino individuals with prediabetes using baseline data from 15,507 adults free of diabetes mellitus, enrolled in the Hispanic Community Health Study/Study of Latinos, and including women and men with Central American, Cuban, Dominican, Mexican, Puerto

Rican and South American backgrounds.[92] Results showed that 36.3% Hispanic/Latinos from all the heritage groups met at least one criterion for prediabetes based on the American Diabetes Association (ADA) diagnostic criteria. Using 2hPG-OGTT as the gold standard, the combination of FPG + HbA1c was more sensitive 62% [95% CI, 59.2-65.1], but less specific 70.1% [95% CI, 68.7-71.4] to detect prediabetes when compared with sensitivity and specificity of isolated HbA1c 45.6% [95% CI, 42.5-48.7] and 80.7% [95% CI, 79.5-81.8], or FPG 40.1% [95% CI, 37.3-43.0] and 82.8% [95% CI, 81.6-84], respectively.[92] Therefore, screening for prediabetes or IFG using more than one test (e.g., FPG + HbA1c vs. either test alone) would increase the chances of identifying individuals at higher risk for prediabetes.[92]

In summary, prediabetes represents the prior stage to diabetes onset. Its early detection is an opportunity to prevent its onset through lifestyle changes to improve glucose homeostasis in both fasting and postprandial state. Prediabetes affects a high percentage of Hispanics, thus, is necessary to continue screening in primary level.

2.3 Diabetes

Diabetes is a group of metabolic diseases depicted by hyperglycemia as a result of defects in insulin secretion and action, or both.[78] Symptoms of hyperglycemia can include polyuria, weight loss, sometimes presence of polyphagia, polydipsia, and impaired vision. Hyperglycemia can also affect growth, and susceptibility to certain infections. Lack of adequate control of diabetes can lead to acute, life threatening consequences like hyperglycemia accompanied by ketoacidosis and non-ketonic hyperosmolar syndrome.[2]

Complications of diabetes at long-term include retinopathy and potential loss of vision, nephropathy leading to renal failure, peripheral neuropathy and risk of foot ulcers, amputations, and autonomic neuropathy which can cause sexual dysfunction, and gastrointestinal, genitourinary, and cardiovascular symptoms.[2]

Different types of diabetes include: type 1 diabetes, T2D, gestational diabetes, and specific types of diabetes due to other causes. For instance, monogenic diabetes syndromes (e.g., neonatal diabetes and maturity-onset diabetes of the young [MODY]), diseases of the exocrine pancreas (e.g., cystic fibrosis), and drug-induced diabetes (e.g., treatment for HIV/AIDS or after organ transplantation).[1] Type 1 diabetes, previously called insulin-dependent diabetes or juvenile-onset diabetes, accounts for 5-10% of subjects affected by diabetes. Type 1 diabetes is the result of a cellular mediated autoimmune destruction of beta-cells of the pancreas; however, some forms of type 1 diabetes have unknown etiologies. T2D accounts for 90-95% of the cases of diabetes, and was previously referred as non-insulin dependent diabetes, or adult-onset diabetes.[1] Individuals with T2D have insulin resistance and usually have do not have absolute insulin deficiency. Therefore, they usually do not require insulin treatment to survive.[1]

T2D and obesity rates have risen to epidemic levels in the last decades. In the U.S., 29.1 million people or 9.3% of the population have diabetes. However, 27.8% of people with diabetes remain undiagnosed. It has been established that weight gain and overweight can predict the onset of T2D. The number of people affected by diabetes is expected to reach 552 million worldwide, with associated increases in complications and health costs.[93]

2.3.1 Pathophysiology of Diabetes

The pathophysiology of diabetes involves several processes ranging from autoimmune destruction of beta-cells followed by insulin deficiency to abnormalities that result in resistance to insulin action.[81] During early stages of T2D, beta-cell action becomes abnormal, which is reflected by the loss of immediate insulin response after meal ingestion. Subsequently, there is peripheral insulin resistance that develops along with progressive beta-cell failure and decreased availability of insulin, amylin, and GLP-1, all of which contribute to hyperglycemia.[94] In people with diabetes, the delayed or absent secretion of insulin exacerbates postprandial hyperglycemia,[94] and an accelerated gastric emptying generates a poorly timed meal-derived glucose to the circulation.

Insulin resistance involving both muscle and the liver are characteristic aspects of glucose intolerance in patients with T2D. During the basal state, the liver is a major site of insulin resistance. This is reflected by an excessive production of glucose even when there is presence of both fasting hyperglycemia and fasting hyperinsulinemia.[95] In this scenario, the accelerated rate of hepatic glucose turning is the primary causal factor of the elevated FPG concentration in individuals with T2D. In absolute terms, muscle glucose uptake is increased in the postabsorptive state, but the efficiency of glucose clearance is decreased. After glucose intake or infusion (e.g., in the insulin stimulated state), both reduced muscle glucose uptake and impaired suppression of hepatic glucose production contribute to the insulin resistance. After glucose infusion or intake, the defects in insulin-mediated glucose uptake by muscle and the suppression of hepatic glucose production contribute to the same extent to the malfunction of glucose homeostasis in T2D individuals. Yet, under frank hyperinsulinemic conditions with normal glycemia,

hepatic glucose production is mostly suppressed, and impaired muscle glucose uptake is mainly responsible for the insulin resistance.[94,95]

In the presence of obesity, and in more than 80% of individuals with T2D, there is an expanded fat cell mass where the adipocytes are resistant to the antilipolytic impact of insulin.[96] The majority of obese individuals with T2D have visceral adipocity[97] and visceral fat cells have a high lipolytic rate, which is refractory to insulin action.[95] Furthermore, in both diabetes and obesity, there is an elevation in the mean daylong plasma free fatty acid concentration, which along with increased triglyceride/fatty acid acyl CoA concentration in muscle, liver, and beta cell, result in the onset of muscle/hepatic insulin resistance and impaired insulin secretion.[98] In addition, multiple known causes lead to hyperglycemia in patients with T2D including decreased insulin secretion, decreased incretin effect, increased lipolysis, increased glucose reabsorption, decreased glucose uptake, neurotransmitter dysfunction, increased hepatic glucose production, and increased glucagon secretion.[95]

2.4 Lifestyle Management of Diabetes

Lifestyle changes and medical nutrition therapy are considered keystones for preventing and treating T2D. However, there is no consensus of what dietary approach is most adequate to control hyperglycemia and to achieve and maintain weight loss.[99]

2.4.1 Weight Control

Along with nutrition, individuals with diabetes should achieve and maintain healthy weight. Evidence from two large randomized double-blinded, prospective clinical

trials have provided insights on the degree of weight loss that should be achieved and if the risk reduction could be sustained over time.[78] The Diabetes Prevention Program (DPP) and the Diabetes Prevention Study (DPS)[100] have provided supporting evidence on the importance of implementing healthy behavior changes to promote weight loss and reduce diabetes risk in people with IGT. Both, the DPP and DPS reported a 58% relative risk reduction with the lifestyle intervention over a period of 3 years in the progression from IGT to T2D.[101,102]

In the DPP, subjects in the lifestyle intervention group a mean of 7 kg after 1 year, and approximately 35% of them achieved the target ≥ 7% body weight loss during the following 3 years. The average weight loss was over 3 years was 5.6 kg which represented a 6% decrease from the baseline weight of 94.1 kg compared with 0.1 kg in the control group.[101] Weight loss in the DPP observational phase was the dominant predictor of reduced diabetes incidence (hazard ratio per 5 kg weight loss 0.42 [95% CI 0.35-0.51]; $p<0.0001$). Additionally, after adjustments for changes in diet and physical activity, 1 kg (1%) of body weight loss was associated with a 16% relative risk reduction in diabetes risk, which is very important clinically.[103] Similar results were observed in the DPS at 1-year follow up, where individuals enrolled in the intensive lifestyle intervention lost 4.5 kg (5.1%) body weight compared to 1.0 (1.1%) in the control arm. Compared to the control group, the intervention arm showed improvements in glycemic control (HbA1c decrease of 0.1% vs. +1.0%), and lipid (triglycerides -0.2 mmol/L vs. 0.0 mmol/L; HDL-C 0.05 mmol/L vs. 0.02 mmol/L). Additionally, weight loss after 3 years was 3.5% (4%) and 0.9% (1%) in the intensive and control groups, respectively.[6,100]

In summary, both DPP and DPS have demonstrated benefits in sustained lifestyle changes and reduction in the progression to diabetes after the 3-year intensive lifestyle intervention finished.

2.4.2 Diabetes Nutrition Therapy

Nutrition therapy for diabetes has been prescribed since antiquity. The most ancient evidence of dietary treatment for diabetes was registered in the Ebers Papyrus (1550 BC), where a diet high in carbohydrates including wheat, grains, grapes, and honey was prescribed.[104] The diet for diabetes went from "sun-dried membranes from young roosters or drinks made of a combination of dry corn, wild pomegranate's flower, copper, oak-gall, honey of roses and cold water" recommended by Galen (AD 128-200), to a diet rich in lupin (a type of legume), fenugreek (green leaves), and zedoary (white turmeric root) which was thought to reduce the excretion of sugar in the urine, recommended by the Persian physician Avicenna (AD 980-1037).[93] More types of diets were recommended between this period of time and until 1799 when John Rollo recommended to his patients a 1500-calorie diet high in fat and protein consisting of blood pudding and rancid meat along with medication to reduce appetite. John Rollo was the first to associate calorie reduction and diabetes symptoms.[105] The low-calorie diet known as the 'starvation diet' was continually used before and after the discovery of insulin. With the use of insulin, prescribed diets became richer in carbohydrates, and at sometimes doctors recommended "free diets" with no carbohydrate restriction.[106] In 1935, Harold Himsworth identified two types of diabetes, the "insulin-sensitive" patients who lacked the capacity to produce insulin and where liable to develop ketoacidosis, and "insulin-

insensitive" patients who were not able to respond fully to their own insulin. This allowed the use of new treatments for diabetes.[107] The ADA advised in the 1940s, restricting carbohydrate amount in the diet to 40% of the total calorie intake to improve glycemic control. After a few decades, in the 1970s, the ADA allowed the use of tailored diets, revising these recommendations in the 1980s to include small amounts of sucrose and other simple sugars in the diet. The ADA started in 2002 and continued to issue evidence-based recommendations every year. Although similar guidelines have been created from other diabetes organizations such as the European Association for the Study of Diabetes (EASD) and the Diabetes UK, all dietary guidelines coincide on recommending weight-loss and increased physical activity, as large-scale studies such as the DPP have shown that a healthy lifestyle improve insulin resistance and glycemic control.[108]

Nutrition therapy plays an integral role in diabetes management on three levels: in primary prevention, through interventions aimed at delaying or containing the diabetes onset; in secondary level, medical nutrition therapy (MNT) is used to try and prevent complications; and in tertiary level, to control complications derived from diabetes.[93] However, many individuals with diabetes struggle to determine what to eat and to adhere to a prescribed diet.[109] The ADA, in their published guidelines, "Standards of Medical Care 2018" emphasized that nutritional assessment; weight history and analysis of dietary pattern analysis should be made in individuals with newly diagnosed diabetes.[110]

There is no universal eating pattern for individuals with diabetes. Each person with diabetes should receive education, self-management tools, and a specific treatment including an individualized eating-plan provided by the healthcare team.[109,111] A trained registered dietitian, who is knowledgeable and skilled to provide specific nutrition for

nutrition-related diseases should facilitate MNT for individuals with diabetes. MNT provided by a dietitian has been associated with decreases of HbA1c of 0.3-1% in people with type 1 diabetes,[112] and decreases of 0.5-2% in people with T2D.[113] The healthcare team should have knowledge about nutrition principles for people affected by diabetes and be supportive in the implementation of the diet.[78]

2.4.2.1 Nutrition Recommendations

The ADA recommends focusing on healthy eating patterns with the inclusion of nutrient-rich foods rather than individual nutrients and consuming adequate portion sizes with the aims of improving overall health.[78]

2.4.2.1.1 Energy Balance

Modest weight loss may provide clinical improvement (improved glycemia, blood pressure, and/or lipids) in some individuals, particularly in those in the early stages of diabetes.[114] A study tested a caloric-restricted diet in men and women with T2D to determine how the diet affected beta-cell function and glucose metabolism. The diet consisted of a pureed diet (<900 kcal/day) for 12 weeks, and assessments were made at baseline, and after 6 and 12-weeks of the diet. Results showed that fasting glucose decreased significantly after the first 6 week of caloric restriction with no further decrease during the additional 6 weeks (week 6-12) (9.8 ± 1.3, 5.9 ± 0.2, and 6.2 ± 0.3 mmol/L at baseline and after 6 and 12 week of caloric restriction, respectively; $p = 0.01$) due to decrease in endogenous glucose production. In addition, changes included an improvement in beta-cell function assessed by the disposition index (189 ± 51, 436 ± 68,

and 449 ± 67 10^{-14} dL · kg^{-1} · min^{-2} · $pmol^{-1}$ at baseline and after 6 and 12 weeks of caloric restriction, respectively; p = 0.01).[115] Other studies showed similar results. For instance, results of a study showed that caloric restriction alone had a significant effect on glucose metabolism,[116] similar to the effect after a Roux-en-Y gastric bypass. Other two studies reported comparable[117] or equivalent[118] effects on glucose metabolism after caloric restriction compared with bariatric surgery. Taken together, this evidence supports that caloric restriction should be considered in the management of T2D. Thus, energy intake should be reduced to promote weight loss while maintaining a healthy dietary pattern in overweight or obese adults with T2D.[109]

2.4.2.1.2 Macronutrient Distribution

The optimal macronutrient intake to support reduction of excess body weight and glycemic control has not been established yet. Some studies suggest that macronutrient distribution may be important for energy restriction and energy balance, with the aim of improving glucose control[119] and lipid profile.[120]

Carbohydrate intake is a major contributor to glycemic control because its immediate effect on postprandial glucose concentrations.[121] In addition, high- protein diets with reduction of carbohydrates content lowers postprandial blood glucose and improves overall glucose control in people with T2D.[122] However, more studies are necessary to establish the total magnitude of response to a high-protein/controlled in carbohydrate diet, potential adverse effects (e.g., renal function), and long-term acceptability and adherence of the diet.

There is not an ideal of percentage of calories from the macronutrients - carbohydrate, protein, and lipids, for all people with diabetes. It has been observed that on average, people with diabetes eat near 45% of their total calorie intake from carbohydrate, approximately 36-40% from fat, and the remaining ~16-18% from protein.[123,124] However, macronutrient distribution for T2D patients should be based on individualized assessment of their eating patterns, preferences, and metabolic target.

2.4.2.1.3 Carbohydrates

The evidence for an ideal amount of carbohydrate intake in people with diabetes is inconclusive. Large-scale observational studies have reported conflicting results with positive and negative associations of total carbohydrate consumption with diabetes risk.[125-128] Four important factors of carbohydrates reported to be relevant to diabetes include simple sugars in beverages, fiber, whole grains, and glycemic index. However, due to the inconsistent findings regarding the effects of low glycemic index diets on glycemic control and T2D,[99,129] this topic is not discussed here.

The quality and quantity of carbohydrates found in foods influence postprandial glucose levels. Quality of carbohydrates intake may be of more importance in determining the capacity to increase glucose levels, which would be determined largely on its influence on gastrointestinal transit and the velocity of nutrient absorption, and the risk of diabetes in the long-term.[130] Simple carbohydrates or "simple sugars" occur in natural foods (e.g., fruits, vegetables, and milk), and processed foods (e.g., bread, table sugar, candy, syrups, and sweetened drinks),[131] while complex carbohydrates, often called "starchy carbohydrates", are found mainly in unprocessed or unrefined foods (e.g.,

whole grains, vegetables). Simple sugars are the fastest source of energy due to their simple chemical structure contains either one or two monosaccharide molecules.[131] Commercial drinks containing simple sugars, such as artificially sweetened beverages and natural commercial fruit juices (usually sugar-enriched), are consumed in significant amounts worldwide.[132] Multiple observational studies have reported that their consumption is associated with an increased risk of diabetes.[58,133-136] The mechanisms by which sugar-containing drinks promote insulin resistance includes weight gain due to high energy content, lack of satiating response because these drinks usually do not contain fiber, higher postprandial blood glucose, and insulin response impairment.[137]

A randomized controlled trial assessed long-term effects of changes in dietary carbohydrate/fat ratio and simple vs. complex carbohydrates on body weight and blood lipids among moderately obese adults (n=398) for 6 moths.[138] The seasonal control group received no intervention, and the three experimental groups received either a control diet group (dietary intervention typical of average national intake); or an *ad libitum* low-fat high simple carbohydrate group; or a low-fat high complex carbohydrate group.[138] Compared to baseline, results of body weight loss in the low-fat high complex carbohydrates and the low-fat high simple carbohydrates groups was 1.8 kg ($p < 0.001$), and 0.9 kg ($p < 0.05$).[138] The seasonal control and control diet groups showed gain weight (0.1, and 0.08 kg, NS). However, changes in blood lipids did not differ across the diet groups. These results suggest that decrease of fat intake can lead to a modest reduction in body weight and body fat, but that moderate increases in simple and complex carbohydrates did not indicate significant changes in body weight changes.[138]

Regarding quantity of carbohydrates, some published studies have reported that relative to higher carbohydrate intake levels, diets with lower intake of carbohydrate (21 g/day and up to 40% of total calorie intake) improved markers of glycemic control and insulin sensitivity.[52,139] A randomized controlled trial study compared the effects of 52-week very low-carbohydrate (14% of total energy from carbohydrate or <50 g/day), high-unsaturated fat, low-saturated fat diet (LC) vs. a high-carbohydrate, low-fat diet (HC) on glycemic control and CVD risk factors among obese adults with T2D.[140] Outcomes of interest were HbA1c, fasting blood glucose, glycemic variability assessed with 48-hours continuous glucose monitoring, diabetes medication, weight, blood pressure, and lipid profiles (baseline, 24 and 52 week). Both groups showed similar results in reductions of weight, blood pressure, HbA1c, fasting glucose, and LDL-C (p-diet effect ≥ 0.10).[140] However, compared with the HC diet, the LC group reached greater mean reductions in the diabetes medication score, glycemic variability determined by measuring the continuous overall net glycemic action, triglycerides, and greater mean increases in HDL-C (p=0.002). Although both diets showed reductions in fasting blood glucose, HbA1c, and weight reduction, the LC diet yielded a larger improvement in glucose stability, lipid profile, the need of medication; which suggests that a LC diet may be more effective for T2D control.[140] However, multiple meta-analyses of randomized control trials evaluating the effects of LC in T2D indicate that LC diets improve glycemic control in people with T2D,[99,141] while others meta-analysis have not found difference between HC and LC diets.[142-144]

While evidence supporting either HC or LC diets for glycemic control is emerging, the amount of carbohydrate ingested and insulin available are potentially the

most important factors affecting glycemic response in the postprandial state. Thus, this should be considered when developing a dietary strategy. For instance, an alternative strategy to carbohydrate counting is using the modified plate method, which incorporates measuring cups to measure portions.[145]

2.4.2.1.3.1 Dietary Fiber and Whole Grains

Dietary fiber is the indigestible component of complex carbohydrates. Dietary fiber intake is associated with reduced all-cause mortality among people with diabetes.[146] Multiple observational studies suggest that diets rich in fiber and fiber-rich wholegrain foods, which are defined as foods containing the whole grain seed (kernel), bran, germ, and endosperm,[62] are independently associated with risk reduction for obesity and diabetes.[8,126,147] Possible confounding is possible because high intake of whole grains and fiber are potential markers of healthier behaviors.[148] Regardless, soluble viscous fiber plays an important role in postprandial glycemia, insulin response and satiety, due to its effect of slowing gastric emptying and total intestinal nutrient absorption.[149]

A systematic review did not find enough evidence to support the effect of fiber on significantly improved glycemic control among subjects with diabetes.[150] However, evidence from interventions have shown modest lowering of pre-prandial glucose and HbA1c (-0.2% to -0.3%) when subjects have an intake of 50 g/day of fiber.[151] Furthermore, multiple prospective studies have reported that insoluble fiber, but not soluble fiber, associates inversely to incidence of diabetes.[8,56,152] Possible reason for this is that insoluble fiber is closely associated with wholegrain foods (e.g., cereals, legumes, nuts), in which their germ and skin also contain multiple bioactive phytochemicals with

potential benefits.[153] Results of randomized clinical trials comparing the effects of wholegrain and refined grain cereals on glycemic responses in healthy individuals, insulin sensitivity in obese individuals, or glucose control in people with diabetes support the beneficial effect of wholegrain foods in insulin resistance conditions.[154,155] Although the mechanisms are unclear, it has been suggested that gastric inhibitory polypeptide, anti-inflammatory effects, and also changes in the gut microbiota are potential factors that increase insulin sensitivity.[156-159]

Fiber provides multiple health benefits (e.g., intestinal health, satiety). In primary prevention of diabetes, individuals at high risk for T2D are encouraged to achieve the USDA recommendation for the general public to ingest 14 g/fiber per 1000 kcal (or 25 g/day for women and 38 g/day for men) and foods containing whole grains, which should be one-half of total grain intakes.[109,160] In secondary prevention, individuals with diabetes are encouraged to follow the same fiber intake recommendations because evidence to recommend a higher fiber intake is still lacking.[160]

2.4.2.1.4 Protein

Evidence is inconclusive to recommend a percentage or ideal amount of protein for improving glycemic control. Some intervention studies have evaluated the effect of higher protein intake (28-40% of total calories) compared to regular intake (15-19%) on diabetes outcomes. One study showed a significant decrease in HbA1c with the higher-protein diet,[122] while other studies showed no effect.[120,161] On the other hand, kidney function in people at later stages of diabetes must be considered as well, where a low-protein diet with less protein from animal sources may be encouraged. In individuals with

T2D, protein does not show a significant effect on blood glucose level, but appears to increase insulin response. In this scenario, intake of protein should not be advised to treat or prevent hypoglycemia.[109]

2.4.2.1.5 Total Fat

Goals for fat intake should be individualized among patients with diabetes due to inconclusive evidence of the effects dietary fat intake. Dietary fat has been proposed to be more important than quantity. Limited research exists in individuals with diabetes. The Institute of Medicine (IOM) established an acceptable macronutrient distribution (AMD) range for total fat of 20-35% of total calories, which was estimated on the basis of evidence of risk for CHD or obesity and complications at low and high intakes of fat. However, these recommendations are not specific for diabetes.[162]

Regarding quality of fat, monounsaturated fatty acid (MUFA) may benefit glycemic control and CVD risk factors.[163] Evidence from preclinical studies indicate that increased intake of MUFA, such as oleate, would provide physiological benefits. For instance, while chronic exposure of pancreatic islets to increased levels of fatty acids induce less insulin secretion,[164] SFA such as palmitate appear to cause higher rates of beta-cell death, while oleate provides neutral or protective effect.[165] Additionally, even chronic elevated circulating fatty acids leads to insulin resistance, this effect seems to be more greater with SFA than with MUFA.[166] Thus, while evidence from in vitro and animal studies on the effects of parameters of glucose metabolism supports the substitution of SFA for MUFA among subjects with diabetes,[167] findings of experimental studies in humans are still inconclusive.

A study compared the effects one year a high MUFA or high-carbohydrate diet on body weight and glycemic control outcomes among men and women with T2D.[163] Results showed that changes were similar for weight loss over 1 year, with comparable improvement of body fat, diastolic blood pressure, waist circumference, HDL-C, HbA1c, fasting glucose and insulin in both groups.[163] This indicates that high-MUFA diets are potential alternatives to low-fat or high-carbohydrate diets to achieve beneficial effects on diabetes management. Also, evidence regarding relationship between the amount of dietary saturated fat and glycemic control and CVD risk among people with diabetes is limited. A study with a short duration of 3 weeks compared glycemic control outcomes among individuals with T2D. A comparison of a low-SFA (8% total calories) vs. a high-SFA diet (17% total calories) showed no significant differences in glycemic control and the majority of CVD measures.[168] Additionally, there is limited evidence about the optimal amount of dietary cholesterol and *trans* fat in people with diabetes. Only one large prospective cohort study in women with T2D found a 37% increase in CVD for every 200 mg of cholesterol/1000 kcal consumed.[169]

Due to the lack of robust evidence in this area, people with diabetes should adhere to the guidelines for the general population. The Dietary Guidelines for Americans 2015[62] recommends to consume less than 10% of calories from SFA to reduce CVD risk. Foods high in SFA include full-fat dairy products, butter, bacon and marbled meats, and tropical oils such as coconut and palm, and should be replaced with foods rich in MUFA and PUFA such as vegetable oils including canola, corn, safflower, soy, and sunflower; vegetable oils spreads, whole nuts, nut butters, and avocado.[62]

2.4.2.1.6 Alcohol

It has been reported that moderate alcohol intake may help reduce cardiovascular risk and mortality, regardless the type of alcohol consumed.[170] However, excessive intake of alcohol (≥ 3 drinks/day) consumed on a regular basis may increase hyperglycemia.[170] One alcoholic drink is defined as 5 oz. of wine, 12 oz. of beer, 1.5 oz. of distilled spirits, where each contains 15 g of alcohol.[62] In summary, people with diabetes choosing to drink alcohol should adhere to the recommendations for the adult general population of one drink/day or less for women and 2 drinks/day or less for men or less, and consuming alcoholic drinks accompanied by food to reduce the risk of hypoglycemia in those people taking insulin.[62]

2.4.2.1.7 Sodium

A review of intervention studies reported that decreasing sodium intakes reduces blood pressure in people with diabetes.[171] Other study showed that people following a DASH diet with a sodium intake of 2300 mg improved blood pressure and cardiovascular risk measures.[172] However, other studies in people with type 1 diabetes and T2D measuring urine sodium excretion showed an increased mortality associated with the lowest sodium intakes, hence showing evidence to be cautious about recommending a universal restriction of 1500 mg of sodium in this population.[173,174] In the lack of robust evidence for people with diabetes, recommendation in people with diabetes is to reduce sodium intake to less than 2300 mg/day, and in people with diabetes and hypertension, additional reduction of sodium should be individualized.[62]

2.5 Dietary Patterns and Health Outcomes

Dietary pattern, often referred as "eating pattern", is defined as the combination of foods and beverages that constitute an individual's complete dietary intake over time, and may describe a way of eating including proportions, variety of combinations of different foods and beverages, and also the frequency with which they are habitually consumed.[62] Nutrients are not consumed individually, and it is considered that the interaction of such nutrients in the context of a healthy dietary pattern. Healthy dietary patterns are considered those characterized by higher consumption of vegetables, fruits, whole grains, low-fat dairy, and seafood, and lower consumption of red and processed meat, and lower intakes of refined grains, and sugar-sweetened foods and beverages relative to less healthy patterns,[62] and are frequently associated with decreased risk of CVD, cancer, and all-cause mortality.[55,175] Furthermore, results from multiple studies indicates that healthy[176,177] dietary patterns including the vegan/vegetarian,[178] and Mediterarrean Diet (MedD),[179] were associated with reduced inflammation evaluated through biomarkers such as interleucine-6 (IL-6), C reactive protein (CRP), fibrinogen, and vascular cell adhesion protein-1 (VCAM-1).[177] In this scenario, it is of interest to investigate not only specific nutrients but also the effectiveness of dietary patterns on health outcomes.

2.5.1 Dietary Approaches to Stop Hypertension

The DASH eating pattern is a diet that emphasizes vegetables, fruits, low-fat dairy products, whole grains, poultry, fish, that includes only small amounts of red meat, sweets, and sugar-sweetened drinks, and that contains low amounts of SFA and cholesterol.[180] The DASH pattern was originally created to prevent hypertension.

However, now it is recommended as an ideal and healthy dietary pattern for all adults.[181] A systematic review and meta-analysis[181] on randomized controlled trials examining the effect of the DASH diet on glycemic control through FBG, serum fasting insulin, and Homeostatic Model Assessment for Insulin Resistance (HOMA-IR) showed a significantly decrease in fasting insulin (mean difference -0.15; 95% CI, -0.22 to -0.08; $p<0.001$). After subgroup analysis based on the study period indicated that the DASH diet could significantly reduce fasting insulin levels if prescribed for more than 16 weeks (mean difference -0.16; 95% CI, -0.23 to -0.08; $p<0.001$). However, the results of the meta-analysis did not show a beneficial effect of the DASH diet on FBG (mean difference -0.26; 95% CI, -0.56 to 0.05, $p=0.1$), and HOMA-IR (mean difference -0.26; 95% CI, -0.56 to 0.05, $p=0.1$).[181] Therefore, the DASH dietary pattern may lead to an improvement in insulin sensitivity, and play an important role in longer-term interventions.

2.5.2 Vegetarian Diets

Vegetarian diets can include vegan diets, which exclude all flesh foods and animal-derived products; and vegetarian diets, which exclude all flesh foods but may include egg (ovo), and/or dairy (lacto) products. The vegetarian eating pattern is characterized by low intake of saturated fat and cholesterol, and high intake of fruits, vegetables, whole grains, nuts, soy products, fiber, and phytochemicals or biologically active compounds in plants (e.g., carotenoids).[109] A systematic review and meta-analysis assessing the effects of vegetarian diets on glycemic control in T2D evaluated six controlled-studies. Results showed that when compared with the comparator diets in each

study (either a conventional diabetic, or ADA, or conventional low-fat diet), intake of vegetarian diets was associated with a significant reduction in HbA1c [-0.39 %; 95% CI: -0-62 to -0.15, p=0.001], but non significant reduction in fasting blood glucose concentration (-0.36 mmol/L; 95% CI: -1.04 to 0.32, p=0.301).[182] Other studies have shown inconsistent results in the improvement of glycemic control or CVD factors except when the intervention also included energy restriction and the presence of weight loss.[178,183]

2.5.3 Mediterranean Diets

The MedD represents a pattern with traditional recipes representing heritage and tradition of the Mediterranean region. Some basic elements of the MedD are extra virgin olive oil, garlic, onion, fish, green vegetables, nuts and fruits,[184] and the adherence to the MedD can be assessed with the different existing published scores.[185] The evidence from epidemiologic studies and clinical trials about the effectiveness of the MedD decreasing risk of chronic diseases and mortality is abundant.[186,187] Adherence to the MedD is associated with reduced risk of both total and cardiovascular mortality in diabetic subjects, independently of the severity of the disease.[186]

Benefits associated to the MedD include weight loss and lipid profile improvement,[188-190] prevention and control of T2D,[184,191-193] decreased incidence of Metabolic Syndrome,[194] prevention of inflammation and oxidative stress, reduced hypertension,[195,196] improved kidney function,[197] and protection of cognitive function.[198] The benefits also include reducing risk of developing other non-communicable diseases such as Parkinson's and Alzheimer's diseases, and breast cancer,[199] reduced preterm

delivery in overweight and obese pregnant women,[200] and an inverse association between MedD and risk of developing binge eating disorders.[201]

Unhealthful dietary patterns have been identified in different studies. Three unhealthful eating patterns were reported in a study: (1) meat and soda, which was high in fatty meats, low-fat meat, mixed proteins, high-fat poultry, and eggs; (2) sweets, which was high refined grains, high-fat sweets, low-fat desserts, high-fat desserts, high-fat dry cheese, and low-fat dairy product; and (3) alcohol and snacks, characterized by high beer, wine, liquor, shellfish, and salty and fatty snacks eating patterns.[202] A systematic review and meta-analysis[203] on the association of healthful and unhealthful eating patterns with breast cancer risk and pooled studies identified the following eating patterns: (1) prudent/healthy, which tended to have high loadings of foods such as fruit, vegetables, poultry, fish, low-fat dairy, and whole grains; (2) western/unhealthy eating pattern, with high loadings of foods such as red and/or processed meats, refined grains, potatoes, sweets, and high-fat dairy; and (3) drinker dietary pattern, characterized by high loadings of wines, beers, and spirits.[203]

2.5.4 Mexican Diets

Mexican immigrants are the largest growing minority group in the U.S., and compared to non-Hispanic white women, Mexican descendants are placed at higher risk of overweight and obesity,[204,205] and associated risk for chronic diseases including T2D.[25] The traditional Mexican diet is characterized by high intakes of vegetables, fruits, and legumes.[69] A crossover feeding trial evaluated the metabolic responses to a eucaloric traditional Mexican vs. a typical U.S. diet among first- and second-generation healthy

women of Mexican descent for 24 days.[206] The traditional Mexican diet included corn tortillas, beans, traditional soups "pozole", tamales, citrus fruits, vegetables with the inclusion of "nopales", and jicama), animal fats, whole milk, and "aguas frescas" (mix of water, fruits, flowers, and sugar), while the U.S. diet included refined carbohydrates, fat-free or low-fat milk, processed foods, processed meat, vegetable oils, and sugar-sweetened beverages. When compared to the typical U.S. diet, the traditional Mexican diet significantly reduced insulin by 14%, HOMA-IR by 15%, and insulin growth factor-1 by 4%. There was no significant intervention effect on serum concentrations of glucose and inflammation biomarkers (adiponectin, CRP or IL-6) between the diets. However, results showed that when compared to a U.S. diet, a traditional Mexican diet improves insulin sensitivity among healthy Mexican descent women with no changes in weight. These findings support the reported benefits of following a traditional Mexican diet high in fruits, vegetables, beans, soups, corn tortillas, whole milk, and Mexican cheeses to reduce insulin resistance.[206]

Dietary patterns among Mexicans living in the U.S. have not been thoroughly studied. The literature reports that acculturation –the process by which immigrants adopt the host-country lifestyle, is suggested as a main modifying factor on the associations between diet and metabolic disease risk.[207] Among individuals of Mexican descent, higher acculturation has been associated with lower consumption of their traditional healthy Mexican foods, which include plentiful fruit, vegetables, legumes, and whole grains.[69,208]

It has been reported that Hispanic women who are more acculturated have diets lower in vegetables, fruits, grains, and beans, and some important nutrients such as

protein, calcium, folate, vitamins A and C, compared to less acculturated women.[209] Also, it has been reported that more acculturated Hispanic women consume more fat compared to women with less acculturation.[209] A study evaluating associations of dietary patterns and macronutrient composition in overweight and obese Hispanic and non-Hispanic white women showed that Hispanic women consume more energy, a greater proportion of energy from fat and vegetable protein, less alcohol and less energy from animal protein compared to non-Hispanic white women.[210] Other study evaluating associations of diet quality indices including the Alternate Mediterranean index, Healthy Eating Index (HEI)-2010, and DASH score among the Women's Health Initiative cohort reported that Hispanic women have better diet quality than their blacks and whites counterparts.[211] However, another study reported that dietary quality average (mean±SD) among women assessed with the Alternate Healthy Eating Index (AHEI) was the highest among Asians (40.6±11.6), followed by whites (38.6±11.0), blacks (34.7±11.1), and Hispanics (34.5±10.2) with the lowest diet quality.[212]

2.5.5 Dietary Pattern Analysis Methods

Different statistical methods have been used to derive dietary patterns; this can be *a priori* or *a posteriori* approach. Index analysis is an "investigator-driven" *a priori* approach that creates patterns based on *a priori* decisions, while cluster analysis and factor analysis are categorized as "data-driven" approaches that derive *a posteriori* patterns.[213] The cluster analysis method involves clustering individuals into relatively homogeneous subgroups (clusters) based on similarities in diet composition,[59] while factor analysis identifies common underlying patterns of food consumption by

aggregating food groups on the basis of the degree of correlation with one another.[214] As has been noted previously,[213] reported variation in findings when compared the different methods to derive dietary patterns and their association with colorectal cancer risk. The authors reported each method answer a different question. Cluster analysis and factor analysis question what accounts for the variation in intakes and how well those variances relate to risk, while index analysis questions if variation from a predefined diet relates to risk.[213]

Exploratory factor analysis and confirmatory factor analysis are two types of factor analysis techniques. Exploratory factor analysis is used to identify complex relationships among items and group items that are part of integrated concepts and there are no *a priori* assumptions regarding the relationships among factors.[215] Exploratory factor analysis is a variable reduction technique that captures the primary sources of variation in a set of variables. When assessing dietary patterns, these variables (foods consumed) and the identification of major sources of dietary variation, make possible describing the main dietary patterns in a given study population.[72] On the other hand, confirmatory factor analysis is a more complex approach testing the hypothesis that the items are associated with particular factors.[216]

Principal component analysis is another statistical technique that is often used as a synonym of exploratory factor analysis because the steps to run them are the same (extraction, interpretation, rotation, and selection of number of factors or components). Both are powerful statistical techniques, and due to both are variable reduction techniques, sometimes mistaken as the same statistical method.[215] Despite all their similarities, there are important differences between both methods. The main differences

are that in principal component analysis, the principal components retained account for a maximal amount of variance of the observed variables, minimizes the sum of the squared perpendicular distance to the component axis, and components are no interpretable due to the lack of underlying constructs.[217] In exploratory factor analysis, derived factors account for common variance in the data, the amount of variance explained is equal to the trace of the matrix, and observed variables represent a linear combination of the underlying factors. Furthermore, exploratory factor analysis takes into account the random error inherent to measurements (unique factors), whereas principal component analysis fails to do so.[217]

2.5.5.1 A posteriori Dietary Pattern Studies

Multiple studies have identified a "prudent" or "healthy" pattern characterized by high loads of vegetables, fruits, legumes, whole grains, fish, and poultry. [175,177,218,219] A multiethnic studies reported that at increasing age, women were less likely to eat according to a "meat" pattern, and more likely to adopt a "vegetable" pattern. [220]

Results of a study developed in the southwestern of the U.S. including Hispanic and non-Hispanic white women (25-79 years) reported the presence of five meaningful dietary patterns: (1) "western", (2) "Native Hispanic", (3) "prudent", (4) "Mediterranean", and (5) "dieter" eating patterns. Results indicated that Hispanic women reported a higher calorie intake, and a greater proportion of energy from fat and vegetable protein, less alcohol, and less energy from animal protein compared with non-Hispanic white women. [210]

Studies among Puerto Rican and Dominican individuals have reported different patterns: (1) “fruit and vegetables”, with high loadings of fresh fruits, non-starchy vegetables, and fish; (2) “pizza and sweets”, with high loadings of pizza, cakes, donuts and candy; (3) “fried foods”, with high loadings of French fries and fried chicken; (4) “Caribbean starch”, with high loadings of rice, beans and starchy vegetables (e.g., yucca and plantains); and (5) “meats”, characterized by high loadings of eggs, processed meats, and cultural meats (e.g., goat). [218] Other study among Puerto Ricans reported three meaningful dietary patterns: (1) “meat and French fries”, (2) a “traditional”, (3) and a “sweets” eating patterns, where a “meat and French fries” pattern was associated with higher blood pressure and waist circumference, a “traditional” pattern was associated with lower HDL-cholesterol and a higher likelihood of Metabolic Syndrome, and a “sweets” pattern was associated with lower HDL-concentrations and higher waist circumference.[221]

Among Mexican-Americans, four dietary patterns were reported using and using 2001-2002 NHANES data: (1) “poultry and alcohol”, (2) “milk and baked products”, and (3) “traditional Mexican diet”, and (4) “meat” patterns. [222] Results of this study did not find significant associations between the unhealthy dietary patterns identified (“poultry and alcohol”, “milk and baked products”, “traditional Mexican diet”, and “meat”) and BMI or obesity.[222]

Among Mexicans, a study including 5240 men and women showed three dietary patterns: (1) the “prudent”, characterized by high intakes of vegetable juices, potatoes, fresh fruits, fresh vegetables, and legumes; (2) the “western”, which had high loadings of pastries, refined cereals, corn tortillas, and soft drinks, and negative loads of whole

cereals, seafood, and whole-milk dairy products; and (3) the "high protein/fat", characterized by high intakes of red meat, processed meat, margarine, and eggs.[223] Results indicated that a "Western" pattern with high loads tortillas, tacos, and sugary beverages was associated with higher risk of Metabolic Syndrome.[223] Other study involving 15,890 Mexican adults participating in the National Health Survey 2006 in Mexico identified three major dietary patterns: (1) the "refined foods and sweets", with the highest contribution of energy coming from alcohol, soft drinks, white bread, fast foods, sweets, and snacks; (2) the "traditional", with high loads of maize and maize foods; (3) and the "diverse" pattern", with high loads of full-fat dairy, rice, pasta, meat, poultry, eggs, saturated fat, fruits, and vegetables.[224]

2.5.6 Dietary patterns: Strengths and Limitations

Dietary patterns derived *a posteriori* have the advantage that they are independent of definitions of what is a healthy pattern, and they are multidimensional in nature. Furthermore, unlike the traditional analytical approach used in nutritional epidemiology, dietary pattern analysis takes into consideration the entire diet rather than individual nutrients or foods.[59] The dietary pattern approach cannot be specific about particular nutrients responsible for observed differences in disease risk, due to the multiple potential differences in nutrients between dietary patterns, and therefore, it may not be very useful and informative about biological relationships between components of the diet and disease risk.[59]

The type of dietary assessment used to collect the dietary data is an important aspect to be considered. Interest will be mostly centered on the usual dietary patterns, and in the scenario of dietary data collected with 24-hour dietary recall or diet records, day-to-day variation would behave like random measurement error.[214] There are general problems of measurement error associated with self-reported dietary data, which would be transferred to the derived dietary patterns, and might be even more emphasized because correlations in measurement error might disfigure the definition of the patterns. An example of this scenario would be if subjects in a study systematically underestimate their consumption of unhealthy foods.[214]

Dietary patterns are likely to change based on socioeconomic status, sex, ethnic group, and culture. Therefore, it would be necessary to reproduce the results in different populations. However, this would not mean the results of the pattern analysis are not valid, due to these differences may be genuine result of different sociocultural background.[225] Additionally, food availability and food preferences change, therefore, the meaning of dietary patterns is subject to change over time. Finally, evidence is reinforced when the result from different perspectives of research (e.g., biomarkers of nutrient consumption, nutrients, foods, food groups, and dietary patterns) show consistent results. Therefore, it is not expected that dietary patterns replace the nutrient or food analysis; instead, it is expected to function as a complementary approach to the existing traditional methods.

2.6 Dietary Assessment

Diet is identified as a leading lifestyle risk factor for a wide range of chronic diseases. Dietary findings have been used successfully to predict cardiovascular disease risk.[226] There are different methods to assess nutrient exposure including subjective and objective methods; they are discussed briefly discussed in the next subsections.

2.6.1 Subjective Methods

Subjective dietary assessment methods or "traditional methods" to assess an individual's intake those collected are self-reported and it can be collected also with help of an interviewer. These methods include the twenty-four hour dietary recall (24HR), dietary record, dietary history, and food frequency questionnaire.[227]

2.6.1.1 Twenty-Four Hour Dietary Recall

The twenty-four hour dietary recall (24HR) is an open-ended questionnaire that collects information about food consumed over a period of 24 hours.[228] The 24HR is completed during an in-depth interview manner, and typically requires 20-30 min to complete a single day recall. Information about amounts of each food consumed is estimated in reference to a common size container (e.g., cups, glasses), standard measuring cups and spoons, three-dimensional foods models, or two-dimensional aids (e.g., photographs). Information about preparation methods and ingredients of mixed dishes is collected, and sometimes the brand of commercial products may be required. Strength of this method is a relative burden imposed on the responders when compared

with other dietary assessment methods (e.g., diet history). However, an important limitation is that all the information is subject to recall bias and to the skills of the interviewer.

2.6.1.2 Dietary Record

The dietary record is an open-ended self-administered questionnaire that captures information of food intake at the time food is consumed, thus minimizes recall bias.[229] In addition, no interviewer is required. A limitation of the dietary record is that it focuses on short-term intake; hence, multiple days are required to assess usual intake. Also, respondents should be trained before participating in the dietary record, and literacy and high motivation are required. This may impose a burden to the respondents who has to collect the data accurately through the day. Other limitation is the process to analyze the collected dietary data (e.g., review data, entry, coding, analysis) tend to be time-consuming, arduous, and expensive to carry out.[227]

2.6.1.3 Diet History

The diet history provides subjective measures using open- and closed-ended questionnaires administered by an interviewer. The diet history method was developed to assess long-term dietary intake. This method combines a 24HR, a 3-day food diary, and a checklist of foods habitually consumed. It requires highly trained and skilled interviewer to collect the dietary information during a comprehensive interview (~ 90 minutes to complete).[230] Hence, this method is seldom used in epidemiological studies.

2.6.1.4 Food Frequency Questionnaire

The food frequency questionnaire (FFQ) is a subjective measure that uses a predefined, self- or interviewer-led format that assesses the usual intake over a relatively long period of time (e.g., 3 or 6 months, or 1 year).[231] A strength of this method is that assess usual dietary intake in a simply, cost-effective and timesaving manner, which makes this method adequate for epidemiological studies. Limitations include that is specific to groups of study and research questions (e.g., food frequency questionnaires should be adapted for target population considering their usual foods consumed), uses closed-ended questionnaire with the potential of leaving food items out, portion sizes are estimated whit the potential of under- or over reporting, potential of recall bias, and requires accurate methods and databases to evaluate the specific questionnaire.[232]

2.6.1.5 Diet Quality Indices

Diet quality is a concept that involves the assessment of both quality and variety of the entire diet. Diet quality can be measured by using scoring food patterns relative to how close they adhere to national dietary guidelines and how diverse the variety of healthy choices is within core food groups.[60] Diet quality scores have been used to describe dietary patterns among free-living populations, with the aim of determining the associated risk of some health outcomes, particularly T2D. Prospective cohort studies in the U.S. have shown that diets with high quality, or with high diet quality score, are considerably associated with a lower incidence of T2D.[233]

Scoring systems and indices have been developed for assessing the quality of dietary patterns based on *a priori* defined of amounts of specific food groups

recommended by current dietary guidelines.[233] Some of the most used score and indices are the HEI-2010, AHEI, Alternate Mediterranean index, and different versions of DASH score.

The HEI is an algorithm that measures diet quality in alignment to the Dietary Guidelines for Americans, which along with the food guide pyramid, represent the cornerstone of federal nutrition policy in the U.S. government.[234] The USDA and the U.S. Department of Health and Human Services update the Dietary Guidelines for Americans every 5 years; therefore, the HEI has been updated to reflect the current Dietary Guidelines for Americans.

The first HEI (1995) was developed based on a 10-component system of five food groups, for nutrients, and a measure of variety in food intake. The components included: grains, vegetables, fruits, milk, meat, total fat, saturated fat, cholesterol, sodium, and variety. Each component has a score between 0 and 10 points, with an overall scoring ranging from 0 to 100.[235] The second version, HEI-2005 includes 12 components: total fruit, whole fruit, total vegetables, dark green and orange vegetables and legumes, total grains, and whole grains, 5 points each; and milk, meat and beans, oils, saturated fat, sodium, 10 points each; and empty calories from solid fats, alcoholic beverages, and added sugars, 20 points. The overall scoring range from 0 to 100.[236]

The HEI-2010 is the most recent version and is integrated by 12 components scored from 0-5, 10 or 20, which is determined by the food or nutrient category with a maximum total score of 100. Adequacy components correspond to food groups or nutrients that are encouraged as part of a healthful diet. Food groups in the adequacy component are: total fruit, whole fruit, total vegetables, greens and beans, whole grains,

dairy, total protein foods, seafood and plant proteins, and fatty acids (polyunsaturated fatty acid-PUFA + monounsaturated fatty acid-MUFA ratio), where each score up to 5 points with the exception of fatty acids (10 points). Moderation components correspond to food groups or nutrients that should be limited. Food groups included in the moderation component are: refined grains, and sodium, 10 points each; and empty calories from solid fats, alcoholic beverages, and added sugars, 20 points.[237] For adequacy components, the maximum score is assigned to intakes equal to or higher than the level of recommended intake. In contrast, for moderation components the maximum score corresponds to intakes at or beneath the level of recommended intake; therefore, a higher score reflects lower intake. The scoring standards were created on a density basis, to focus on diet quality instead of quantity, where each individual component was assessed as amount per intake of 1000 kcal (4184 kJ), percentage of total energy intake, or a ratio.[234] The total HEI-2010 corresponds to the sum of all the components,[238] and the cut-off points for total HEI are: >80 indicates good diet, 51-80 indicates need for improvement; <51 indicates poor diet.[234]

The AHEI was developed by McCullough in 2002[239] in an attempt to improve the HEI at predicting chronic disease risk. The AHEI is composed by the intake of nine components from the original HEI. In contrast to the HEI-2010 that uses a nutrient density approach, the AHEI uses an absolute intake approach in which the total amount of food and nutrients consumed is considered for scoring.[239] The AHEI-2010 is a more recent version of this index.[55]

The DASH score has several versions varying slightly in terms of items included, cut-off values, scoring strategy, classification of items and their assignment to food

groups. However, they all reflect a common dietary pattern in agreement with dietary guidelines rich in vegetables, fruit, whole grains, legumes, nuts, fish, and low in highly processed meat and sweets.[240] The DASH score established by Fung et al. (2008) is the most often used version which includes eight components: high intake of fruits, vegetables, whole grains, low-fat dairy products, nuts and legumes, and also low intake of red and processed meats, sodium, and sweetened beverages.[241]

The Alternate Mediterranean index score was adapted by Fung et al. (2005) from the scale developed by Trichopoulou et al. (2003) to use with a food frequency questionnaire developed in the U.S.[242] The Alternate Mediterranean index was developed to reflect higher consumptions of plant foods, including plant proteins, monounsaturated fat, and fish, and lower consumption of animal products and saturated fat.[243] The original score was composed of 9 items: vegetables, legumes, fruit and nuts, dairy, cereals, meat and meat products, fish, alcohol, and the ratio of MUFA/Saturated fat. Intakes above the median received 1 point, all other intakes received 0 points. The modifications of this original scale to derive the Alternate Mediterranean index included separating fruits and nuts into two different groups, excluding potatoes from the vegetable group, eliminating the dairy group, including only whole-grain products, including only red and processed meat in the meat group, and assigning alcohol intake between 5-15 g/d one point. Possible scores of the Alternate Mediterranean index ranged from 0-9.[242] The DASH score, along with the HEI, AHEI, and more recently the Alternate Mediterranean index represent indices of major public health importance in the U.S. due to their association with decreased risk for multiple diseases. The use of dietary quality indexes considers multidimensional aspects of food and non-nutrient components (e.g., biologically active

dietary constituents), instead of reducing dietary consumption to individual nutrients, which is considered strength of the method.[55] However, a limitation of using dietary quality indices is the potential sources of heterogeneity due to differences in how the dietary quality indices are defined and scored.[55]

2.6.2 Objective Methods

Accurate assessment of dietary exposure is cornerstone in investigating associations between diet and disease. In the last two decades, research in nutritional epidemiology has resulted in a considerable amount of information about associations between diet, nutrients and chronic diseases. Most dietary assessment methods available rely on self-report with the potential of systematic bias affected by multiple factors (e.g., gender, age, and social desirability).[244] Contrary, objective measurements are accurate and easy to replicate; therefore, they tend to be used in conjunction with subjective measures based on the research question.

2.6.2.1 Biomarkers

Biological markers, termed "biomarker", refers to a broad subcategory of medical signs (objective indications of medical state observed from outside the patient), which can be measured accurately and reproducibly.[245] The term biomarker has different meanings, but most biomarkers are used as surrogate endpoints in clinical research and are used to predict future events (e.g., CVD risk); contrariwise, biomarkers of exposure are used to estimate past exposure for instance, to chemical substances (e.g., pesticides).[244]

2.6.2.1.1 Biomarkers of Fatty Acid Intake

In nutrition, biomarkers are used for accurate assessment of dietary exposure with the aim of investigating associations between diet and disease, therefore, biomarkers can be used as surrogates to measure the intake of certain nutrients or dietary components of interest in nutrition research.[246] For instance, assessment of dietary fat quality is of interest given that fatty acid intake has been associated with the risk of Metabolic Syndrome,[247] and T2D.[248,249] To study dietary fat quality, data are usually derived from subjective measures (e.g., food frequency questionnaires); however, fatty acids of erythrocyte membranes are considered an objective measure of long-term (past 6 months) fatty acid intake[250] and endogenous metabolism.[248,251] Fatty acid chains are elongated by elongase and double bonds are inserted by desaturase to generate more unsaturated and long-chain PUFAs.[252] A high desaturase activity may lead to an increased bioavailability of arachidonic acid with dominant synthesis of arachidonic-derived proinflammatory eicosanoids, possibly leading to vascular damage, especially in populations eating a western diet.[252] It is difficult to obtain direct measures of desaturase activities;[253] for this reason, desaturase indices are used as surrogate measures endogenous fatty acid metabolism.[254,255]

2.6.2.1.2 Biomarkers of Fruit and Vegetable Intake

Besides blood, other biological specimens (e.g., urine, tissues) can be used to reflect accurate and consistent biomarkers of food consumption. For instance, recovery biomarkers (e.g., doubly labeled water, 24-hour urinary nitrogen) are considered accurate in estimating dietary intakes because they reflect a direct relationship between absolute

intake and concentration in tissues.[256] Other biomarkers are those termed concentration biomarkers, which correlate with intake, but factors such as metabolism or characteristics inherent to individuals (e.g., smoking) affect their concentrations; therefore, they cannot be used as measures of absolute intake. An example of this type of biomarker is circulating carotenoids. Carotenoids are diverse fat-soluble pigments in substantial quantities in fruits and vegetables. Since they cannot be synthetized by humans,[257] and since fruit and vegetables carotenoids accounts for around 90% of dietary carotenoid intake, carotenoids in circulation are considered as reliable biomarkers of carotenoid consumption. In addition, circulating carotenoid concentrations as biomarkers of fruits and vegetables intake are mostly validated against self-reported intake of fruits and vegetables using questionnaires. Some examples of these are alfa-carotene, beta-carotene, beta-cryptoxanthin, zeaxanthin, lutein, and lycopene.[258]

2.6.2.2 Objective Methods: Strengths and Limitations

An important advantage of using biomarkers to measure nutrient intake is avoidance of social desirability and recall bias; thus, they may yield to more accurate measures than dietary intake assessments provide.[232] On the other hand, some limitations include that biomarkers may be affected by diseases, inter-individual variations in metabolism, and other physiological factors (e.g., homeostasis reactions). Furthermore, biomarkers are frequently restricted to estimating intake of particular compounds and not entire foods,[244] making difficult obtaining the absolute dietary intake by individuals.[259] Therefore, biomarkers results do not provide dietary information to modify individual's

dietary behaviors. In this case, direct dietary assessment may provide more detailed information than the information provided by biomarkers.[260]

2.7 Conclusion

In conclusion, the Metabolic Syndrome, prediabetes and diabetes affect a high percentage of Hispanic women. Multiple factors play a role in diabetes onset; however, diet is an important modifiable contributing risk factor to delay and/or prevent T2D onset and its complications. Nutrition therapy is one of the most important components of diabetes management; however, differences in diabetes control and management within ethnic groups might be attributed to different socioeconomic status, access to health care, acculturation, lifestyle and dietary patterns.

T2D treatment should be aimed at achieving individualized targets for glycemic control, blood pressure, and lipid concentrations. Individualized nutrition therapy should address nutrition needs taking into consideration personal preferences, health literacy and numeracy, access to high-quality foods, state of willingness and ability to change behavior, and personal barriers to change behaviors. This should occur by using messages about food choices without judgmental emphasis, and by providing all individuals with diabetes with real-life tools for developing healthy eating patterns like the DASH,[261] vegan or vegetarian patterns,[262] and MedD,[263] rather than focusing on macronutrients, micronutrients, or isolated foods.[78]

The evidence suggests that several dietary strategies may lead to improvements in diabetes risk factors; hence, there is no one an ideal conclusive dietary pattern that is expected to benefit or be followed by all individuals with diabetes, because a healthy

dietary pattern may vary across different populations and ethnic groups. Research of diet and dietary patterns among high-risk populations such as women of Mexican descent are still needed to detect opportunities for improvement in their dietary behaviors. Studying dietary patterns may provide additional insights to those yielded by analysis of diet quality based on pre-established guidelines by allowing capturing a larger variety of dietary patterns among populations. Both strategies, the nutrient and dietary patterns approaches are complimentary and useful to better understand women's diet characteristics and its protective and detrimental effects on health.

The reviewed literature showed that most of the published studies among Hispanics include multiple backgrounds, which can limit dietary assessment because diet recall instruments are usually designed and validated for specific subpopulations (tailored). Therefore, it is possible that some studies assessing dietary patterns among Hispanic women with multiple backgrounds do not capture all the dietary traits within an ethnic group. Thus, using adequate methodologies to study the diet as a whole rather than the nutrient intake approach may provide insights of the accumulative effects of foods and interactions between their compounds on diabetes risk factors.

CHAPTER 3

METHODOLOGY

3.1 Study Design

"De Por Vida" is the parent study for the current analysis. "De Por Vida" is a behavioral intervention testing a weight-loss lifestyle and diabetes risk reduction for overweight/obese Hispanic women with T2D, prediabetes or at risk for T2D diagnosis using a pragmatic randomized controlled trial study design. "De Por Vida" was delivered at Virginia Garcia Memorial Health Center (VGMHC), a Federal Qualified Health Center in Hillsboro, Oregon, where the majority of Hispanic patients have low-income (65% of patients live in poverty) and have low-education attainment. For purposes of this dissertation, a cross-sectional data analysis was conducted using data from all participants enrolled in the trial and collected at baseline prior to randomization. A description of the "De Por Vida" intervention is not included in this dissertation because the follow-up data of the "De Por Vida" trial was not used for the current analysis.

3.2 Recruitment

Participants were recruited via posters exhibited in clinic exam rooms, by direct physician referral, and through examination of the Electronic Medical Records of patients seen at the clinic within the last 18 months. Potential participants were those receiving their primary medical care at the VGMHC and who met eligibility criteria based on existing medical record information.

Eligible participants had to: (1) be Spanish-speaking and Hispanic; (2) be female; (3) be ≥ 18 years; (4) have BMI ≥ 27 kg/m^2; (5) be diagnosed with T2D or pre-diabetes per International Classification of Diseases (ICD)-9 codes and/or inclusion of the diagnoses on patients' problem lists, or considered to be at risk for developing T2D due to Metabolic Syndrome, high blood pressure, family history of diabetes, or history of gestational diabetes; and (6) have had a clinic appointment in the last 18 months. Participants were excluded if they: (1) were treated for cancer in the past two years (with the exclusion of non-melanoma skin cancers); (2) had a psychiatric hospitalization in the past 2 years; (3) had conditions that require limitation of physical activity or that would be contraindicated for the DASH dietary patterns; (4) were on weight-loss medication currently or within the past 6 months; (5) were currently or recently (<12 months) pregnant or breastfeeding; (6) were planning pregnancy in the next 18 months; and (7) were participating in other studies.

3.3 Participants

A total of 200 participants were enrolled in the trial, one was excluded from the present analysis because she did not complete the food frequency questionnaire at baseline. Out of the remaining 199 participants with diet data, 8 participants were excluded because their reported energy intake was ± 2 SD away from the sample mean, and thus diet data was deemed implausible. Therefore, a final sample of 191 participants was used for the current analysis.

All study materials and procedures were approved by the Kaiser Permanente Center for Health Research and Arizona State University Institutional Review Boards (Appendices A and B). All participants interested in enrolling for the study and confirmed eligibility provided written informed consent in their language of preference (English or Spanish; Appendices C and D, respectively) prior to data collection.

3.4 Data Collection

Following confirmation of eligibility and after written informed consent was obtained; participants were contacted via telephone to complete an interviewer-led survey that included sociodemographic questions (age, gender), and the Southwestern Food Frequency Questionnaire (SWFFQ, described below). After the telephone assessment, participants were scheduled for a visit at the VGMHC, following a 12-hour overnight fast for collection of FBG, HbA1c, height and weight as described below.

3.5 Measurements

3.5.1 Anthropometric Measurements

Waist circumference was measured at the midpoint between the lower rib and the iliac crest. The measure was recorded to the nearest 0.5 cm using a linen non-stretch tape measure with a tension device to provide a constant tension during measurement. Weight was measured using a standard protocol with participants wearing light indoor clothes and without shoes and recorded to the nearest 0.1 kg using a calibrated digital scale.

Height was measured without shoes and was recorded to the nearest 0.1 cm using a calibrated wall-mounted stadiometer. Weight and height were used to calculate BMI= weight/height^2 (kg/m^2).

3.5.2 Biochemical Assessments

FBG and HbA1c were measured from capillary blood via finger stick using point of care devices to facilitate data collection by VGMHC staff. Fasting blood glucose was measured with a OneTouch Ultra glucometer (LifeScan Inc, Milpitas, CA). HbA1c was measured using an A1cNow+ device (Bayer HealthCare LLC, Sunnyvale, CA). Although the American Diabetes Association (ADA) does not recommend the use of point of care devices for diagnostic purposes,[78] HbA1c assessment was conducted with one of this devices in the context of a pragmatic clinical trial because the use of capillary blood with these devices to detect unrecognized diabetes in clinical settings has been strongly correlated with standard laboratory tests (R^2=0.712, $p<0.001$).[264]

3.5.3 Dietary Assessment

Baseline dietary data were collected using the Southwestern Food Frequency Questionnaire (SWFFQ)[265] (Appendix E) by trained bilingual interviewers from Arizona State University and Kaiser Permanente Center for Health Research. The SWFFQ[265] is a semi-quantitative (frequency and portion size) bicultural, bilingual (English/Spanish) food frequency questionnaire, adapted from the Arizona Food Frequency Questionnaire.[266] The SWFFQ consists of 158 food items including culturally appropriate elements of the diet for the southwestern Hispanic population in the U.S., predominantly

from the north part of Mexico. Relevant and characteristic foods items include "nopalitos" (cactus leaves), corn flour tortillas, refried beans, "machaca" (dried beef), and chorizo. This instrument also allows adding foods not included in the questionnaire, as well as recording the use of supplements. The SWFFQ has shown a reproducibility of 0.832 and a validity coefficient of 0.700 and has been reported to be effectively used for its target population.[265]

Data were collected to reflect the prior three months of intake. The dietary data for the present study is derived from an intervention study, and the dietary data collection where planned to occur within the periods of assessment. SWFFQ data were analyzed by the Arizona Diet, Behavior and Quality of Life Assessment Laboratory at the University of Arizona, based on the USDA Nutrient Data Bank databases of food composition.[267] The output provided information of 87 nutrients, in addition to 25 computed variables such as percentage of calories from macronutrients.[265] The analysis of the SWFFQs derived a total of 867 potential food items (FIDs). Per SWFFQ analysis, the FIDs were originally aggregated into 23 food groups as follows: (1) milk, (2) cheese, (3) meat, (4) mixed dishes, (5) soups, sauces and gravies, (6) eggs, (7) beans, nut, and seeds, (8) breads, cereals, and crackers, (9) cakes, cookies, and pastries, (10) salty snacks, (11) fruits, (12) fruit juice, (13) starchy side dishes, (14) vegetables, (15) vegetable juice, (16) condiments, (17) fats, (18) sweets, candy, and syrup, (19) non-alcohol and non-fruit beverages, (20) alcohol, (21) fish, (22) poultry, and (23) soy products. The standard SWFFQ analysis includes diet soft drinks in the "beverages" food group. Because diet soft drinks do not contribute energy, they were removed from the "beverages" food group and considered as a separate "diet soft drinks" food group, yielding to a total of 24 food

groups. Food groups that included similar items were further collapsed, following the approach from previous published studies,[72,268] as follows: (1) "fruits" and "fruit juice" were collapsed into the "total fruit" group, (2) "vegetables" and "vegetable juice" groups were collapsed into the "total vegetables" group, (3) "soy products", and "beans, nuts and seeds" groups were collapsed into a group called "beans", and (4) "cheese" and "milk" groups were collapsed into the "dairy" group.

All food group variables were non-normally distributed and were transformed using either square root, natural logarithm, or inverse functions, as needed. After transformations, skewness and kurtosis improved substantially. The "diet soft drinks" group was excluded from the analysis due to low reporting and because it was not possible to normalize the variable after transformations. In addition, individual's daily frequencies of consumption of all the collapsed 19 food groups were divided by the total calories/day consumed to adjust for energy. A total of 19 adjusted food group variables were yielded (Table 1).

3.6 Sample Size

The sample size estimation was conducted based on the primary outcome for the "De Por Vida" study (e.g.., body weight). In the "De Por Vida" pilot study 30 participants completed 6-month follow-up data collection procedures.[269] Using a quasi-experimental design, participants experienced weight changes from 91.6±13.3 kg at baseline to 84.1±11.9 kg at the 6-month follow-up. Based on a power of .80 and alpha of .05, and a 66% retention observed in the "De Por Vida" pilot study, the sample size was estimated

at 200 women (100 each arm) and a total of 200 participants were enrolled in the study; this estimated sample was used as a convenience sample for the analysis proposed herein.

3.7 Dietary Pattern Analysis

For the present analysis of dietary patterns, the exploratory factor analysis technique was used to identify the number of latent constructs and the underlying factor structure of a set of variables. Latent construct, also referred as a factor, underlying construct, or unobserved variable; can be measured indirectly by identifying its influence to responses on the observed or measured variables. Exploratory factor analysis establishes the hypothesis of an underlying construct, a variable that is not measured directly and estimates factors that influence responses on observed variables, called factor scores.[270] This technique allows describing and identifying the number of latent constructs, called factors, which are influenced by unique factors (estimated error due to unreliability in measurement). Factor loadings are parameter estimates that help to interpret factors. Loadings are the correlation between observed variables and factors. Eigenvalues indicate the amount of variance explained by each factor. Though factor scores can be computed, in common practice summary scores for factors are calculated with a mean or sum of measured variables that load on a factor.[215]

To run exploratory factor analysis, the following factors were considered: 1) factor extraction method, 2) number of factors to retain, 3) rotation, and 4) sample size. SPSS principal axis factor was used since the data were significantly non-normal.[271] Scree plot and eigenvalues informed the decision on the number of factors to retain, and rotations to clarify and simplify data structure. Varimax (orthogonal) and oblique rotations were used.

If the factors were truly uncorrelated, orthogonal and oblique rotation will produce nearly identical results.[271] After rotation, item-loading tables were reviewed to look for the cleanest factor structure (item loadings ≥ 0.30), no or few crossloadings, and no factors with fewer than three items were the best fit to the data. Decisions of number of factors were based on how the items loaded and which had the most interpretable factors. To determine whether the sample size was sufficient, the subject to item ratio was examined. This was determined by how many items each participant answered or was measured on, not how many were kept after analysis. It has been reported that most of the studies analyzed (63%), researchers performed analysis with subject to item ratios of 10:1 or less, which is a still prevalent rule of thumb that many researchers follow when determining *a priori* sample size.[271] However, a high proportion of reported studies using factor analysis were based on subject to item ratios of only 2:1 or less.[271]

After the above-mentioned steps, the solution was interpreted; summary scores were calculated (by using the mean or sum of variables for variables that load and are highly correlated with the factor). Regression factor scores used a least square regression procedure to predict factor score(s). Regression factor scores predict the location of each individual on the factor component. This method differs from the non-refined sum method (sum scores) due to the weighed sum non-refined procedure reflects the extent to which the factor or component estimated is expressed by each individual case; the method does not use an underlying model to predict an "ideal" factor score. Factor scores representing each placement of each individual on the factors identified in exploratory factor analysis were created as described elsewhere [272] to look for associations of dietary patterns with age, BMI, waist circumference, HbA1c, and FBG.

3.8 Statistical Analyses

Data were tested for normality with both visual and the Kolmogorov-Smirnov normality tests. Outliers (n=8) were identified based on energy intake levels and removed if they fell in the lowest and upper 2.5 percentile of the distribution (Z.975 score) yielding a final sample of n=191 participants for all the analyses. After removal of outliers, the majority of variables remained non-normally distributed. Descriptive results from participants and their nutrient intake are reported from non-normal and untransformed data and include the median and interquartile range in addition to mean ± standard deviations (mean ± SD). Nutrient intake of carbohydrate, protein, fat, saturated fat, and alcohol were expressed as percentage of total energy/day.

Dietary patterns were derived from the 19 transformed food groups using exploratory factor analysis. The Kaiser-Meyer-Olkin measure of sampling adequacy was 0.731, above the recommended value of 0.60; and Barlett's test of sphericity was significant (chi-square [190] = 771.325 p <0.0001). The principal axis factoring method with Kaiser normalization was used to extract the factors given that even after transformations, food groups were non-normal, this was followed by orthogonal and oblique rotations. To decide the factor rotation, coefficients of factors in the factor correlation matrix (Appendix F) created by promax (oblique) were examined. It has been proposed that correlations among factors that are 0.32 and above indicate there is 10% or more overlap in variances among factors, which would warrant oblique rotation.[273] The observed correlations between factors in the matrix (Appendix F) surpassed 0.32; therefore, oblique rotation methods (e.g., oblimin and promax) were used to enhance interpretability of the resultant factors and to allow them to correlate. A scree test

suggested six meaningful factors (eigenvalues of ≥ 1.0) explaining 56% of total variance, which were retained for rotation. Iterative rotations showed that promax provided a simple structure. In interpreting the rotated factor patterns, an item was considered to contribute to the pattern (load on a given factor) if the factor loading was ≥ 0.30 for that factor and was < 0.30 for the other. Factors with at least three-item loadings ≥ 0.30 with no or few crossloadings were the criteria to retain the factors.

Regression factor scores of each eating pattern were used to test their associations (Pearson correlation coefficients, *r*) with risk factors including: age, BMI, waist circumference, FBG, and HbA1c. Statistical significance was set at the $p < 0.05$ level. All the statistical analyses were performed with SPSS software (version 21; IBM Corporation).

Table 1. Food groupings assessed with the southwestern food frequency questionnaire

Food group	Food items
Dairy	Milk (whole, 2%, 1%, and skim), evaporated milk, cream (half and half, sour, semi-sweet), yogurt, cheese (cheddar, Swiss, spreads, fresh, and cottage)
Read meat	Beef, pork, hamburgers, dried shredded beef ("machaca"), chorizo, beef steaks ("carne asada"), sausage, ham, liver, hot dogs, bacon
Mixed dishes	Spaghetti or pasta, pizza, dishes with chicken, Chinese dishes, Mexican dishes, crispy taco ("flautas"), tacos w/beef and cheese, soft taco, tamales with and without meat, quesadilla, menudo, pozole, chile relleno, enchiladas, chili, sushi, mole, chimichangas, tostadas, burritos, macaroni and cheese, beef stew, meat with chile (e.g., "birria").
Soups	Cazuela soup, meatball soup ("caldo de albóndigas"), soup w/cheese and chile ("caldo de queso"), noodle soup, tortilla soup, vegetable soup, vegetable beef ("cocido"), salsa, taco sauce, barbeque sauce, gravies
Eggs	Eggs
Beans	Lentils, beans, refried beans, chickpeas, sunflower seeds, flaxseed, shelled nuts (peanuts, walnuts, almonds, pistachios), peanut butter, almond butter, tofu, soy milk, soy-meat substitutes, soy-based protein powder
Grains	White bread, biscuits, muffins, whole wheat muffins, bagels, rolls, waffles, pancakes, cornbread, oat bran, cooked cereal, cold cereals (e.g., corn flakes), 100% wheat bran cereals (e.g., all bran), sugary cereals (e.g., frosted flakes), granola and breakfast bars, crackers, Mexican bread, corn tortillas, flour tortillas
Pastries	Cookies, cake, doughnuts, molasses turnover ("coyotas") pastries, sweet bread ("pan dulce"), pumpkin pie
Salty snacks	Pork rinds ("chicharrón"), popcorn, potato chips, corn chips, tortilla chips
Fruits	Bananas, peaches, nectarines, cantaloupe, watermelon, mangoes, grapefruit, oranges, pineapple, strawberries, cherries, blueberries, raspberries, pomegranate, apples, pears, guava, grapes, plums, dried fruit (prunes, raisins, figs), natural fruit juice (grape, cranberry, orange, grapefruit)
Starchy dishes	French fries, mashed potatoes, baked or cooked potato, white rice, Spanish rice, noodles
Vegetables	Green beans, squash, broccoli, cauliflower, carrots, spinach, turnip greens, coleslaw, cabbage, sweet potato, onion, garlic, celery, radish, cucumber, jicama, cactus leaf ("nopales"), cilantro, artichoke, peppers, chile peppers, tomatoes, corn, peas, mixed vegetables with carrots, mushrooms, olives, avocado, guacamole, asparagus, kale, zucchini, lettuce, tomato juice, other vegetable juice (not carrot or tomato)
Condiments	Artificial sweetener, fat-free salad dressing, non-fat mayonnaise, mustard, horseradish, non-dairy creamer
Fats	Butter, lard, margarine (regular and low-calorie), mayonnaise (regular and low-calorie), salad dressing (regular and low-calorie), vegetable oil (olive and canola)
Sweets	Sugar, candy, chocolate candy, milkshake, pudding, custard, flan, jelly, syrup, honey, sherbet (jello), sherbet or sorbet, ice cream, popsicles
Fish	Shellfish, canned fish (tuna or salmon), canned tuna (oil or water), fried fish, baked or broiled fish
Poultry	Fried chicken, chicken or turkey (with or without skin), ground turkey, buffalo wings
Drinks	Coffee, specialty coffees (latte, mocha, cappuccino), lemonade, Jamaica, tea (herbal, black, green caffeinated or decaffeinated) sweetened fruit juice, rice drink ("Horchata"), tang, juice drinks, regular soft drinks
Alcohol	Beer, wine, liquor

CHAPTER 4

RESULTS

4.1 Descriptive Characteristics of Participants

Age range of this sample of women was 18 to 73 years (Table 2). BMI categories showed that 86% of participants had obesity. Waist circumference mean was above 88 cm among most of participants (99.5%). Fasting blood glucose was high among 86% of participants with a concentration range of 80 mg/dL to 278 mg/dL, and HbA1c was high among 73% of participants with a range of 4.7% to 11.8%.

4.2 Macronutrient Intake

Participants reported a mean energy intake of 1603 ± 748 kcal per day with a macronutrient distribution of 54% of total energy provided by carbohydrates, 18% by protein, and 31% by fat (Table 3). Reported total sugar and carbohydrate intake values were 82 ± 52 g/d and 213 ± 100 g/d, respectively. Mean fiber intake was 16 ± 4.3 g/1000 kcal and reported mean intake of SFA and alcohol contributed with 9.4 ± 2.4 % and 0.3 ± 0.4 % of total energy intake, respectively (Table 4).

Table 2. Anthropometric, diabetes risk factors, and risk categories among overweight/obese Hispanic women participating in De Por Vida[1]

Characteristics	n	%	Mean ± SD[2]	Median	IQR
Age, years	191	100	44.0 ± 10.0	43.0	14.0
BMI, kg/m^2	191	100	36.4 ± 6.4	35.0	8.7
BMI categories					
Overweight (25.0-29.9 kg/m^2)	26	14	28.6 ± 0.9	28.6	1.4
Obesity class I (30.0-34.9 kg/m^2)	70	37	32.7 ± 1.5	32.6	2.6
Obesity class II (35.0-39.9 kg/m^2)	47	25	37.4 ± 1.6	37.7	2.8
Obesity class III (≥ 40 kg/m^2)	48	25	45.3 ± 5.1	44.4	4.9
Waist circumference (≥ 88 cm)	190	99	115.4 ± 13.4	113.4	18.0
Fasting blood glucose, mg/dL	188	98	135.0 ± 45.4	117.5	41.0
Fasting blood glucose categories based on diabetes diagnosis criteria					
Normoglycemia (< 100 mg/dL)	26	14	94.0 ± 4.4	96.0	6.0
Prediabetes or impaired fasting glucose (≥ 100 - <126 mg/dL)	88	46	112.0 ± 7.0	112.0	11.0
Diabetes mellitus (≥ 126 mg/dL)	74	39	177.0 ± 47.0	156.0	79.0
Hemoglobin A1c, %	188	98	6.5 ± 1.4	5.9	1.5
Hemoglobin A1c categories based on diabetes diagnosis criteria					
Normal (< 5.7%)	50	26	5.4 ± 0.2	5.5	0.3
Prediabetes (5.7 - <6.5%)	82	43	5.9 ± 0.2	5.9	0.3
Diabetes mellitus (≥ 6.5%)	56	29	8.4 ± 1.4	8.1	1.9

[1]Non-normal and untransformed values. [2]Values shown as mean ± standard deviation (SD). IQR, interquartile range.

Table 3. Energy and macronutrient intake among 191 overweight/obese Hispanic women participating in De Por Vida[1]

Nutrients	Mean ± SD[2]	Median	IQR
Total energy, kcal	1603.0 ± 748.0	1423.0	964.0
Carbohydrates, % energy	54.0 ± 8.0	53.0	12.0
Carbohydrates, g	213.0 ± 100.0	191.0	111.0
Total sugars, g	82.0 ± 52.0	70.0	54.0
Fiber, g	24.0 ± 11.0	21.0	13.0
Protein, % energy	18.0 ± 3.0	18.0	4.0
Total fat, % energy	31.0 ± 5.4	31.0	8.0
Alcohol, % energy	0.3 ± 0.4	0.1	0.0

[1]Non-normal and untransformed values. [2]Values shown as mean ± SD. IQR, interquartile range.

4.3 Dietary Patterns

Factor analysis identified six distinct dietary patterns (Table 4). The first pattern named "sugar and fat-laden" had high loadings of foods high in sugar, such as candy and ice cream, and fat-rich foods, such as butter and margarine. This pattern explained 20.3% of total variance in the intake of food servings/day reported by Hispanic women. The second pattern named "plant foods and fish" had high loadings of vegetables, fruit, fish and beans. This pattern explained 8.9% of total variance in the intake of food servings/day reported. The third pattern named "soups and starchy dishes" had high loadings of soups and gravies, starchy side dishes, and mixed dishes. This pattern explained 8.3% of total variance in the intake of food servings/day reported. The fourth named "meats and snacks" had high loadings of red meat, caloric condiments, and salty snacks (e.g., pork rinds, popcorn). This pattern explained 6.4% of total variance in the

intake of food servings/day reported. The fifth pattern named “beans and grains” had high loadings of legumes, seeds, nuts, and whole-wheat and refined-grain products (bread, cereals, crackers and tortillas), fish, and alcohol. This pattern explained 6.3% of total variance in the intake of food servings/day reported. The sixth and last pattern named “eggs and dairy” had high loadings of eggs, high-fat dairy products, and fats and oils. This pattern explained 5.4% of total variance in the intake of food servings/day reported by participants (Table 4). Although poultry was highly reported during dietary data collection, this food item did not load on any of the meaningful dietary patterns observed in this study.

4.4 Associations of Dietary Patterns with Risk Factors

Cross-sectional associations between dietary pattern factor scores and diabetes risk factors are shown in Table 6. Scores for the “sugar and fat-laden” and “meats and snacks” patterns were negatively associated with age (r= -0.230, p= 0.001 and r= -0.298, p<0.001), respectively. Scores for “plant foods and fish” pattern were associated with fasting blood glucose (r= 0.152, p= 0.037). No significant associations were found between the “soups and starchy dishes”, “beans and grains”, and “eggs and dairy” patterns with age, BMI, waist circumference, FBG and HbA1c. A weak association approaching significance was observed between the “Plant foods & fish” pattern and HbA1c (r=0.128, p=0.080) (Table 5).

Table 4. Factor loadings from exploratory factor analysis of food frequency questionnaires among overweight/obese Hispanic women participating in De Por Vida

Food group[1]	Servings/day		Factors[2,3]					
			Sugar & fat -laden	Plant foods & fish	Soups & starchy dishes	Meats & snacks	Beans & grains	Eggs & dairy
	Mean	SD	1	2	3	4	5	6
Sweets	0.43	0.53	**0.96**	0.01	-0.06	-0.21	0.01	-0.07
Drinks	1.50	1.20	**0.51**	0.14	-0.04	-0.14	-0.08	0.09
Pastries	0.42	0.46	**0.47**	-0.20	0.06	0.08	0.19	0.14
Fats	0.21	0.29	**0.37**	-0.04	-0.06	0.14	-0.12	**0.33**
Dairy	1.60	1.40	0.21	0.18	-0.03	0.01	0.22	**0.34**
Salty snacks	0.10	0.14	0.19	-0.02	0.12	**0.61**	-0.09	-0.17
Beans	0.82	0.76	0.12	**0.32**	-0.07	0.16	**0.47**	-0.13
Mixed dishes	0.92	0.78	0.12	-0.04	**0.34**	0.20	0.01	0.17
Fish	0.21	0.22	0.7	**0.34**	-0.01	0.21	**0.41**	0.03
Eggs	0.32	0.38	0.6	0.13	0.05	0.03	-0.02	**0.49**
Grains	3.40	2.30	0.6	-0.03	0.05	0.06	**0.45**	0.02
Vegetables	4.50	3.10	0.5	**0.88**	0.14	-0.10	-0.04	0.09
Starchy dishes	0.45	0.43	-0.03	-0.03	**0.63**	-0.17	-0.03	0.16
Fruits	2.80	2.50	-0.05	**0.62**	-0.08	0.17	0.08	0.10
Soups	1.00	0.75	-0.09	0.12	**0.70**	0.02	0.08	-0.14
Poultry	0.17	0.22	-0.10	0.07	-0.01	0.11	0.13	0.15
Red meat	0.43	0.41	-0.10	-0.08	0.02	**0.61**	0.07	0.27
Alcohol	0.20	0.06	-0.16	0.02	0.05	-0.23	**0.39**	0.11
Condiments	0.16	0.29	-0.25	0.17	-0.15	**0.49**	-0.01	0.09
% VARIANCE EXPLAINED			**20.3**	**8.9**	**8.3**	**6.4**	**6.3**	**5.4**

[1]Transformed food group variables. [2]Extraction method, principal axis factoring; rotation method, promax with Kaiser normalization. [3]Factors with three or more factor loadings ≥0.30 were retained.

Table 5. Associations between dietary patterns and diabetes risk factors among overweight/obese Hispanic women participating in De Por Vida[1,2]

Risk factors	Factors					
	Sugar & fat-laden	**Plant foods & fish**	**Soups & starchy dishes**	**Meats & snacks**	**Beans & grains**	**Eggs & dairy**
Age, years	**-0.230****	0.082	-0.114	**-0.298****	0.002	-0.051
BMI, kg/m^2	0.012	-0.042	0.014	-0.042	0.067	-0.055
Waist circumference, cm (n=190)	0.017	-0.044	0.064	0.023	-0.053	0.001
Fasting blood glucose, mg/dL (n=188)	-0.044	**0.152***	0.039	0.031	-0.028	0.075
Hemoglobin A1c, % (n=188)	-0.097	0.128	-0.016	-0.047	-0.026	0.016

[1]Associations assessed with Pearson correlation coefficient (*r*). *p< 0.05. **p<0.01. [2]n=191 unless otherwise indicated.

CHAPTER 5

DISCUSSION

Hispanics have one of the highest prevalence of T2D among all racial/ethnic groups,[274] with Hispanic women having one of the highest T2D incidence.[275] These disparities in diabetes suggest that different lifestyle behaviors, including but not limited to diet quality, may be relevant contributing factors.[275] Hispanic women have a greater risk of obesity and overweight than white women.[210] In addition, Hispanic women eat more energy with greater proportion of energy from fat than white women.[210] The study of distinct dietary patterns and their association with diabetes could provide evidence of dietary traits that should be modified or reinforced among Hispanic women with the aim of controlling and preventing T2D. Because the prevalence of Metabolic Syndrome and T2D among Hispanics is overwhelming, there is a need for characterizing the diet among Hispanic women in order to help provide more specific dietary guidance. Thus, the present study was designed to derive *a posteriori* dietary patterns among Hispanic women in order to identify distinct dietary patterns and their association with diabetes among Hispanic women at high risk for T2D.

5.1 Dietary Patterns

Dietary patterns among Hispanic women in the present study were diverse. Four patterns, the "sugar and fat-laden", "soups and starchy dishes", the "meats and snacks", and "eggs and dairy" patterns were characterized by sweets, fatty foods, meat, foods high in sodium, and foods rich in starch. Specifically, the "sugar and fat-laden" pattern had

high loadings of foods rich in refined carbohydrates (e.g., candy, chocolate candy, syrup, ice cream, sugary and soft drinks), which have been considered to promote insulin resistance.[276] This pattern explained the majority of the variance in food intake, with 20.3%, from all the six meaningful derived dietary patterns. This dietary pattern was the most relevant identified eating pattern among the sample of women in this study. The high loadings observed in the "sugar and fat-laden" pattern indicate that individuals adhering to this pattern include more sugary foods and high in fat products in their diets.

The following eating patterns explained smaller percentages of total variance, but they were also meaningful and together contributed to explain almost 36% of total variance. The "soups and starchy dishes", "meats and snacks", and "eggs and dairy" patterns were characterized by high loadings of red meat, fats, and fried snacks high in sodium, saturated fat, and cholesterol. The "beans and grains" pattern included some foods considered to be healthy, such as legumes, nuts, seeds, soy products, fish, whole grain bread, and 100% wheat bran cereals, but also included processed foods high in refined carbohydrates such as white bread, biscuits, muffins, rolls, flour tortilla, and sugar-laden cereals. Alcohol also loaded as part of the later pattern. The loadings in the "beans and grains" pattern indicates that individuals adhering to this pattern usually include legumes, refined grain foods, whole-wheat products, and alcohol in their diets. Interestingly, in the present study, poultry was highly reported during dietary data collection; however, this food item did not load on any of the meaningful dietary patterns observed in this study. A potential explanation is that poultry reported intake was very homogeneous among all participants.

Four patterns, “soups and starchy dishes”, “meats and snacks”, “eggs and dairy”, and “beans and grains”, were considered to share characteristics with a “Western” eating pattern. Numerous studies [63,64,218,276] have reported that “Western” type eating patterns, usually characterized by high intakes of red meat, processed meat, refined grains, desserts, sweets, French fries, and whole-fat dairy, associate with higher odds of coronary heart disease independently of other lifestyle factors such as smoking and heart disease family history, and also associate with an increased risk of Metabolic Syndrome [223] and T2D.[54,66]

In this study, the “plant foods and fish” eating pattern was characterized by high loadings of vegetable-origin foods, fiber and marine protein, and therefore, was considered to align with a Mediterranean-like dietary pattern,[277] which has been associated with reduced risk of both total and cardiovascular mortality in diabetic subjects.[186] The latter pattern was not labeled as a Mediterranean pattern because information regarding the use of olive oil was not collected in the current study. The strongest loading scores for the “plant foods and fish” pattern were for vegetables and fruits food groups. These food groupings included a great variety of vibrant orange, yellow, red and dark green vegetables, and fruits (fresh, juice, dried), which are high in antioxidants such as carotenoids and vitamin C, and nutrients such as potassium, magnesium, and soluble and insoluble fiber. Increasing evidence point out the role of nutrition in the aging process assessed by telomere length[278] and it has been reported that higher adherence to a “vegetable-rich“ dietary pattern was positively related to longer telomeres in women.[219] In addition, fish is an important source of protein, and omega-3 fatty acids, both of which have been associated with a lower likelihood of Metabolic

Syndrome.[279] Multiple studies [177,218,219,223] have identified a type of "prudent" or "healthy" dietary pattern, mostly characterized by high intakes of vegetables, fruits, legumes, whole grains, fish, and poultry, which has been associated with lower risk of diabetes [175] and coronary heart disease.[280] For instance, results of a study developed in the southwestern of the U.S. including Hispanic and non-Hispanic white women (25-79 years) reported the presence of five meaningful dietary patterns: (1) "western", (2) "Native Hispanic", (3) "prudent", (4) "Mediterranean", and (5) "dieter" eating patterns. The authors reported that Hispanic women reported a higher calorie intake, and a greater proportion of energy from fat and vegetable protein, less alcohol, and less energy from animal protein compared with non-Hispanic white women.[210] These findings are in part similar to the observed in the current study. For instance, some observed patterns aligned with a western pattern, and other pattern would align with the prudent pattern observed in a previous study.[210] However, the previous study[210] included 68 food groups, while in the present study the analysis was limited to 19 food groups. This could limit the variety and specificity of the dietary patterns found in the current study.

Additional studies including Mexicans have reported a diversity of eating patterns with healthier and less healthy traits. Findings from a study including 5240 Mexican men and women showed three dietary patterns: (1) the "prudent", characterized by high intakes of vegetable juices, potatoes, fresh fruits, fresh vegetables, and legumes; (2) the "western", which had high loadings of pastries, refined cereals, corn tortillas, and soft drinks, and negative loads of whole cereals, seafood, and whole-milk dairy products; and (3) the "high protein/fat", characterized by high intakes of red meat, processed meat, margarine, and eggs.[223] Also, a study involving 15,890 Mexican adults who participated

in the National Health Survey 2006 in Mexico[224] identified three major dietary patterns: (1) the "refined foods and sweets", with the highest contribution of energy coming from alcohol, soft drinks, white bread, fast foods, sweets, and snacks; (2) the "traditional", which was characterized by low dietary diversity due to maize and maize foods accounted roughly for 47% of the total energy intake; and the "diverse" pattern, whit the highest contribution from full-fat dairy, rice, pasta, meat, poultry, eggs, saturated fat, fruits, and vegetables.[224] The findings of the present study are in agreement with the "western" and "refined foods and sweets" of the aforementioned studies,[223,224] where sweets and soft drinks were main components of their observed dietary patterns. Soft drinks have been reported to be main contributors to total energy intake in the Mexican population[224,281] regardless of living in the city or rural areas.[224] Mexico is considered one of the biggest per-capita consumers of soft drinks. As previously published, sweet beverages contribute with 19.2% and 17.8% of the total daily energy among adults between 20-59 years and 60 year and older, respectively, being caloric soda (or soft drinks), caloric coffee/tea, and "agua fresca" the three top sources of energy intake.[281] Since Mexico soft drinks intake per capita ranks second to the U.S., it is not surprising that Mexican immigrants in the U.S. continue to follow this dietary behavior. Regardless, it is alarming to observe that soft drinks are an important component of the sugar and fat-laden among women at with multiple risk factors for T2D in the present study.

In a study among Mexican-Americans and using 2001-2002 NHANES, four dietary patterns were reported: (1) "poultry and alcohol", (2) "milk and baked products", and (3) "traditional Mexican diet", and (4) "meat" patterns.[222] The similarities in the dietary patterns of the later[222] and other discussed studies[223 224] with the present study, such as

some of the characteristics of the "sugar and fat-laden" pattern, which resembles a "Western" pattern, and the "plant foods and fish", which aligns with the "healthful" or "prudent" and also share characteristics with a "Mediterranean" pattern. Poultry loaded in one of the patterns described in the previous study among Mexican-Americans.[222] This is contrary to the observed in the current study, given that poultry did not load in any of the identified patterns. The observed in our study is supported by previous reports indicating that Mexican Americans consume more red meat such as beef and processed pork products (e.g., ham, sausage, hot dogs) than poultry.[282]

Studies among Hispanics have shown a mix of dietary patterns. For instance, the Bronx A1c study, which included Puerto Rican and Dominican individuals identified five dietary patterns: (1) "fruit and vegetables", with high loadings of fresh fruits, non-starchy vegetables, and fish; (2) "pizza and sweets", with high loadings of pizza, cakes, donuts and candy; (3) "fried foods", with high loadings of French fries and fried chicken; (4) "Caribbean starch", with high loadings of rice, beans and starchy vegetables (e.g., yucca and plantains); and (5) "meats", characterized by high loadings of eggs, processed meats, and cultural meats (e.g., goat).[218] Interestingly, a different study involving also Puerto Ricans, the Boston Puerto Rican Health Study (BPRHS), only found three meaningful dietary patterns: (1) "meat and French fries", (2) a "traditional", (3) and a "sweets" eating patterns.[221] Puerto Rican and Mexican traditional foods can be different. For instance, a traditional Puerto Rican diet usually include fried foods, corn oil, rice, and legumes; while a traditional Mexican pattern usually include tortillas, tacos, sweet drinks, and legumes.[283] Although it has been a common practice to study Hispanic/Latino population as a whole, it has been suggested there are important differences within Hispanic/Latino

backgrounds. For instance, substantial particularities in diet and food preferences have been noted, which were suggested to interact with other factors that influence health behaviors including eating patterns.[284] This is potentially reflected in the variety of dietary patterns observed among Puerto Ricans, Mexicans, and Mexican Americans. In addition, discrepancies may be due to the questionnaires used to assess dietary intake, which potentially add heterogeneity to the number of food groups and items in each food group, leading to a variety of results.

Results from the current study showed more diverse dietary patterns than those reported in other studies. This diversity is potentially explained by the different degree of acculturation among women included in this study. Also, it is also possible that even within Mexican Americans there are differences in diet behaviors depending on some factors reported to affect dietary behavior such as environment, access to health care, food insecurity, socioeconomic status, nutritional beliefs,[285] lack of knowledge, and sociocultural norms.[286]

5.2 Associations of Dietary Patterns with Risk Factors

In this study, the higher number of eating patterns high in meat, foods rich in sugar, high-fat foods, and high in sodium food items among Hispanic women is of a high concern because they are at increased high risk or have a formal T2D diagnosis, and one would expect these women to be adhering to a healthy eating pattern. Multiple studies have reported associations between unhealthy dietary patterns and metabolic risk factors.[177,222,287] Considering that less healthy dietary patterns are characterized by high intakes of sugar, fat, saturated fat, sodium, refined grains and highly processed meat

foods, all of which have been repeatedly associated with T2D risk, it was expected to find significant associations between the dietary patterns with unhealthier traits, as well as finding potentially negative associations between dietary patterns with healthier traits and T2D risk factors. In the present study, the "sugar and fat-laden" and the "meats and snacks" dietary patterns were negatively associated with age. In addition, the "plant foods and fish" pattern was associated with fasting blood glucose. Also, a weak association approximate to significance was observed between the "plant foods & fish" pattern and HbA1c.

Interestingly, neither of the eating patterns with characteristics detrimental for health showed significant associations nor approached significant associations with BMI, waist circumference, and HbA1c. Failure to find significant associations between the "meats and snacks", "sugar and fat-laden", "soups and starchy dishes", "beans and grains", and "egg and dairy" dietary patterns with other diabetes risk factors including BMI, HbA1c, and waist circumference in the present study may be explained by multiple factors. First, the study may be underpowered to detect differences in risk factors across the identified dietary patterns because all participants were at risk for or had T2D, and no healthy individuals were included. Second, the sample was homogeneous in sociodemographic characteristics, since all the participants were primarily low-income, first generation immigrants, with low literacy. Third, lack of more significant associations of the former five eating patterns with risk factors may be related to the methodology used to collect dietary information, which has the potential of under and over reporting nutrient intake. For instance, rates of underreporting dietary intakes among Mexican and Mexican American women has been reported to range from 12% to 81.3%.[288] Also, overweight

and obese weight statuses were reported to be correlates to underreporting dietary intakes. The predominant obesity status and the relatively low-calorie intake level among participants in this study supports this limitation. Fourth, it may be suggested there are other protective factors that potentially attenuate these associations. For instance, first generation Mexican immigrants are believed to adhere more to their culture than second-generation Mexicans, whose diet may be influenced by the American culture.[69] It also has been documented that after one generation in the U.S., the influence of the traditional Mexican diet is lost.[69] Measures of acculturation were not included in the present study; thus, it is not possible to assess how acculturation affected associations of dietary patterns with diabetes risk factors in the current study.

Interestingly, in the present study, fasting blood glucose was only associated with the "plant foods and fish", which was considered a dietary pattern with healthy traits given that its highest score loadings were for food groups such as vegetables, fruits, legumes, and fish. If significant, this association was expected to be negative. The reasons for this association are not clear but a potential explanation is that women with high fasting blood glucose may be attempting to adhere more to a pattern rich in fiber and good quality protein. Furthermore, the possibility that participants may have over reported intake of vegetables and fruits cannot be ruled out. Over reporting of vegetables and fruits is well documented in the literature, particularly among individuals with a diagnosis of or at risk for diabetes, or who have received nutritional counseling in the past may be subject to social desirability bias reporting higher intakes of foods perceived as healthful.[289] Also, it could be speculated that high amounts of fruit, especially fruit juice, could have an impact on glucose control. It has been previously reported that while increased intake of

whole fruit is associated with lower diabetes risk, an increase in fruit juice is associated with greater risk.[135] Also, it is possible that other factors such as lack of physical activity and/or overweight/obese status moderate this relationship. Measures of physical activity were not included in the analysis for the present study, but since the effects of diet and exercise combined are associated with a decrease in the incidence of T2D among those with impaired glucose,[290] it could be speculated that glucose response to a dietary pattern rich in fruit may be affected by sedentary behavior. Furthermore, obesity and the concomitant insulin resistance usually present among subjects with abdominal adiposity as reported previously by multiple studies,[291] [292,293] has the potential to affect glucose response to a dietary pattern with healthy rich in healthy foods. Also, a weak association approximate to significance was observed between the "plant foods & fish" pattern and HbA1c. This result, as well as the significant association of the later pattern with fasting blood glucose was contrary to the expected, due to the pattern showed high loads of vegetables, fruits, and fish; all of them are characteristic of healthy diets.

Studies exploring associations of dietary patterns with risk factors have shown mixed results. Findings of a study including a multiethnic sample of 514 women (Caucasian, Chinese, Japanese, native Hawaiian and other) suggested that at increasing age, women were less likely to eat according to a "meat" pattern, and more likely to adopt a "vegetable" pattern.[220] This finding aligns with the observed in the present study. An inverse association between age and the "meats and snacks" pattern suggest that younger women would adhere more to this pattern. In addition, a negative association between the "sugar and fat-laden" pattern with age was observed. These negative associations of two eating patterns high in sugar, meat, and snacks high in sodium with age suggest that

younger women may adhere more to these eating patterns. This association is potentially explained by the resemblance between dietary behaviors of adolescents and young adults, which has been reported to include high amounts of mixed foods containing meat (e.g. cheeseburgers, pizza), sweet beverages, and snacks rich in sodium.[294] Thus, it is possible that younger women may still be adhering to a pattern characteristic of adolescents in transition to adulthood.[294] Also, it could be possible that older women in this study may be aware of their health conditions such as excess of weight, and T2D, which would motivate them to include meat less frequently.

Results from the Boston Puerto Rican Health Study, suggested that a "meat and French fries" pattern was associated with higher blood pressure and waist circumference, a "traditional" pattern was associated with lower HDL-cholesterol and a higher likelihood of Metabolic Syndrome, and a "sweets" pattern was associated with lower HDL-cholesterolconcentrations and higher waist circumference.[221] However, after exclusion of subjects with diabetes, the sweets pattern was no longer associated with Metabolic Syndrome.[221] Further reports derived from the Boston Puerto Rican Health Study (n=1117) assessing associations of the three dietary patterns ("meat and French fries", "traditional", and "sweets") with a composite measure of physiological dysregulation termed "allostatic load" showed that participants in the highest quintile of the "meat and French fries" pattern was significantly associated with higher allostatic load score than participants in the lowest quintile of the pattern.[287] A study among Mexican men and women (n=5240) showed that a "Western" pattern with high intakes of calories from tortillas, tacos, and sugary beverages was associated with higher risk of Metabolic Syndrome.[223] In contrast, results of a study among Mexican-Americans using 2001-2002

NHANES data did not find significant associations between the unhealthy dietary patterns identified ("poultry and alcohol", "milk and baked products", "traditional Mexican diet", and "meat") and BMI or obesity.[222] In the present study, the "sugar and fat-laden" and the "meats and snacks" dietary patterns were negatively associated with age, and the "plant foods and fish" was associated with fasting blood glucose. These mixed results of associations with metabolic risk factors among Puerto Ricans, Mexican Americans, and Mexicans are in agreement with the previously reported marked variation in eating patterns and risk factors by Hispanic background.

5.3 Strengths and Limitations

It is important to note the strengths and limitations of this study. The homogeneity of the sample, composed primarily by low-income overweight/obese Mexican-women, reflects fairly closely the makeup of the Hispanic population attending the community clinic where the study took place. Also, the use of trained interviewers minimized error reporting and missing data, and the use of a previously validated food frequency questionnaire among the Hispanic population increased the likelihood of capturing measures closer to the participant's diets. The type of analysis used to the derived dietary patterns make no *a priori* assumptions and it is independent of definitions of what is a healthy pattern, which allows finding as many meaningful patterns as possible.

The limitations of this study include the cross-sectional nature of the analysis, which does not allow arguing causation. Another limitation is the homogeneity of the sample, that although was also considered strength, it could also limit external validity because the sample cannot be considered representative of the Mexican-American adult

population as a whole, or of the U.S. population. Furthermore, the sample may be underpowered to detect significant associations between risk factors and dietary patterns due to all participants were at increased risk T2D.

A limitation of using a food frequency questionnaire to collect dietary data is the measurement error associated with self-reported dietary data, which would be transferred to the derived dietary patterns. This might be even more emphasized because correlations in measurement error might disfigure the definition of the patterns, and this can lead to making associations between diets and risk factors weaker and/or non-significant. An example of this scenario would be if participants in a study systematically underestimate their consumption of unhealthy foods.[214] For instance, sometimes participants may think of some snack food as "not counting as foods", but even when the sum of all these foods throughout the day would contribute significantly to the total daily energy and nutrient intake.[295] The SWFFQ was created to capture the diet of the southwestern part of the U.S., and foods included are characteristic of the north part of Mexico (e.g., dried beef or "machaca"); thus, some important food items for participants from the south part of Mexico may have not been properly captured. FFQs developed and validated for a specific population may leave out some important food items that are culturally-appropriate for other culturally-diverse populations.[296]

The SWFFQ did not record how food was cooked. Therefore, it is possible that for instance, the intake of fish reported was fried fish instead of using healthier cooking procedures such as baked or steamed fish. One tool to assess diet that capture more information is a computerized interviewer-administered diet history questionnaire. The question order differs from the FFQ in that participants are first asked whether they ate

food such as fish., a response of yes for the food leads to the participants choosing in which preparation they ate fish (e.g., baked, fried, grilled), then frequency of consumption, and finally three different portion sizes.[210] This type of questionnaire may potentially provide more insights of food preparation, and more accurate way to describe diet preferences and dietary patterns among populations. Last, there is potential for limited reproducibility of this study; due to exploratory factor analysis relying on multiple subjective decisions. For instance, researchers need to make decisions on the number of meaningful eating patterns to retain assisted with the scree plot and eigenvalues or variance explained by each eating pattern. Also, there are multiple rotations that can be used to make the solution more interpretable. Another subjective decision is the cutoff point chosen to retain item loadings, which can vary based on the sample size; that is, in studies with larger sample sizes the cutoff could be less conservative and allow to use a lower cutoff point (e.g., ≥ 0.20) as opposed to studies with smaller sample sizes, which usually chose a more conservative cutoff point (e.g., ≥ 0.30). For all these reasons, the possibility cannot be ruled out that a different team could find different results using the same dietary data.

5.4 Future Research

The current study was conducted to assess dietary patterns among Hispanic women and their associations with diabetes risk factors. There is a need for more studies including healthy and at-risk Hispanic women with larger samples to determine how dietary patterns differ among women with and without risk for T2D. Further studies

should also include more information regarding acculturation, physical activity, and previous knowledge about diet for T2D to control for potential confounders. This would help understanding dietary choices and potential factors affecting these choices.

CHAPTER 6

CONCLUSION

Research about diet among Hispanic women at high risk for T2D is a growing need, as T2D continue to be the 6th leading cause of mortality in the U.S. Study of potential protective traits of Hispanics' dietary patterns are important to understand what healthy key components of their diets should be reinforced and which ones should be changed to decrease their diabetes risk.

The present study was designed to evaluate dietary patterns among overweight/obese Hispanic women with or at high risk for T2D. Participants of this study were Hispanic, predominantly of Mexican descent, and previous studies have shown mixed results of dietary patterns among this set of the population living in the U.S. The primary aim of this study was to derive dietary patterns using an *a posteriori* approach. To our knowledge, this is the first study assessing dietary patterns among Hispanic women, with predominant Mexican background, and with multiple diabetes risk factors. Additionally, associations of dietary patterns with diabetes risk factors including BMI, waist circumference, fasting blood glucose, and HbA1c were assessed.

The findings of this study showed the presence of a variety of dietary patterns in a homogeneous sample of overweight/obese Hispanic women. Although food items considered as healthful loaded in multiple patterns, the predominance of dietary patterns characterized by foods rich in sugar, rich in fat, and high in sodium is alarming given these women are at increased risk or have a formal T2D diagnosis. The implications for this is that women at risk adhering to less healthier dietary patterns may be increasing their likelihood for T2D and/or T2D complications. This finding would justify increasing

awareness and adherence to healthier dietary patterns as a path to decrease the metabolic risk among these women. Significant negative associations of two eating patterns high in sugar, meat, and snacks high in sodium with age suggest that younger women may adhere more to these eating patterns. This highlights the importance of assessing dietary patterns among younger adults to identify dietary traits detrimental for their health in the long run. Furthermore, an association between fasting blood glucose with an eating pattern rich in legumes and refined grain and whole-wheat foods may suggest that women with abnormal glucose are potentially attempting to adhere to an eating pattern with healthier traits. Lack of associations of BMI, waist circumference, and HbA1c with the eating patterns rich in meat, sugary foods, foods rich in fat, and snacks high in sodium may be related to sample size, study design, and the inclusion of only women at increased risk for T2D.

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APPENDIX A

INSTITUTIONAL REVIEW BOARD APPROVAL FOR KAISER PERMANENTE CENTER FOR HEALTH RESEARCH

KAISER PERMANENTE®

NOTIFICATION OF INITIAL APPROVAL (contingencies met)

December 20, 2013

To: Nangel Lindberg

CC:

Sabina Smith

Re: Study ID: Pro00004521

Study Title: Culturally Competent Behavioral Intervention for Diabetes Risk Reduction
1R01DK099277-01A1

As you know, the study referenced above was reviewed and given contingent approval by the Kaiser Permanente Northwest Institutional Review Board (KPNW IRB) on 12/18/2013. The contingencies have been satisfied. Therefore, this study now has final approval. The approval expires on **12/18/2014**.

Study materials reviewed included the following:

- Protocol
- Consent form, including Privacy Rule authorization
- Data collection table

The IRB noted that surveys, questionnaires, and recruitment materials have not yet been developed. All study materials must be submitted through a study modification and receive IRB approval prior to use with study participants.

A final consent form is now available in the eIRB system for your use with participants. Please send a copy to the appropriate organization or individual (e.g., study sponsor, coordinating center).

NOTE: Only KPNW IRB approved consent forms are to be used with study participants. If you have any revisions or edits to the consent form, it must be sent to the Research Subjects Protection Office (RSPO) via a study modification through the eIRB for processing. Use of an unapproved consent form or use of a previous version of a consent form constitutes a protocol violation and must be reported to the IRB as a reportable event through the eIRB system.

The IRB also approved a Privacy Rule authorization. Use this URL/link to find instructions for your compliance with Privacy Rule provisions relating to research participant authorization:

http://www.kpchr.org/rspopublic/public/common/getdocbyname.aspx?filename=PRIVACY RULE INSTRUCTION SHEET.pdf

The IRB waived the Privacy Rule authorization requirement for the purposes of, and only for the purposes of, recruitment. This waiver was granted to allow the research team to access protected health information prior to obtaining written authorization.

Please contact Gary Ansell (503-335-6735) in the CHR Compliance Office within the next two weeks to schedule a data review for your project. This review determines if any compliance documents or Risk Assessment and Mitigation Process calls are needed prior to disclosing data/samples. Please note that no data transfer may occur for this project until all compliance documents are on file with the CHR Compliance Office.

The KPNW IRB agreed to accept review authority and continued oversight for this study from the Virginia Garcia Memorial Health Center (VGMHC) and agrees that VGMHC may rely on this review and oversight pending establishment of an IRB Authorization Agreement between VGMHC and Kaiser Foundation Research Institute (KFRI) on behalf of the KPNW IRB. The Research Subjects Protection Office (RSPO) will manage this process, and you will be notified when it has been completed. Please note that the KPNW IRB will not act as the IRB of record until a fully executed IRB Authorization Agreement is in place.

If your study or study-related documents require modification, you must seek IRB approval for these changes before they are implemented. If, during the course of your study, you need to make a modification in order to protect the rights, safety, or welfare of a participant prior to obtaining IRB approval, you are required to notify the IRB within five business (5) days of this action. In addition, you must promptly notify the IRB of any unanticipated problems associated with this study.

Federal regulations require that all studies be reviewed at least annually. It is your responsibility to ensure that you reapply for approval at least one month prior to the study approval expiration date.

Please use this notification of approval should the funding agency require documentation of IRB approval. Our Federalwide Assurance number is FWA 00002344 – IRB 00000405.

Sandy Heintz

Sandy Heintz, CIP
Administrator
Research Subjects Protection Office
3800 N Interstate Avenue
Portland, OR 97227
(503) 335-6357

APPENDIX B

INSTITUTIONAL REVIEW BOARD APPROVAL FOR ARIZONA STATE UNIVERSITY

APPROVAL: EXPEDITED REVIEW

Sonia Vega-Lopez
SNHP - Nutrition
602/827-2268
Sonia.Vega.Lopez@asu.edu

Dear Sonia Vega-Lopez:

On 1/1/2014 the ASU IRB reviewed the following protocol:

Type of Review:	Initial Study
Title:	Diabetes De Por Vida: Culturally Competent Behavioral Intervention for Diabetes Risk Reduction
Investigator:	Sonia Vega-Lopez
IRB ID:	STUDY00000404
Category of review:	(2)(a) Blood samples from healthy, non-pregnant adults, (4) Noninvasive procedures, (7)(b) Social science methods, (7)(a) Behavioral research
Funding:	Name: NIH: National Institutes of Health;
Grant Title:	
Grant ID:	
Documents Reviewed:	• HRP-503b-Vega-Lopez-Kaiser, Category: IRB Protocol; • NIH Project Narrative, Category: IRB Protocol; • IRB letter-Kaiser.pdf, Category: Off-site authorizations (school permission, other IRB approvals, Tribal permission etc); • NIH De Por Vida - R01 Submission, Category: Sponsor Attachment;

The IRB approved the protocol from 1/1/2014 to 12/31/2014 inclusive. Three weeks before 12/31/2014 you are to submit a completed "FORM: Continuing Review (HRP-212)" and required attachments to request continuing approval or closure.

If continuing review approval is not granted before the expiration date of 12/31/2014 approval of this protocol expires on that date. When consent is appropriate, you must use final, watermarked versions available under the "Documents" tab in ERA-IRB.

In conducting this protocol you are required to follow the requirements listed in the INVESTIGATOR MANUAL (HRP-103).

Sincerely,

IRB Administrator

cc:

APPENDIX C

CONSENT FORM IN ENGLISH

Kaiser Permanente Center For Health Research
Consent Form

Study Title: Culturally Competent Behavioral Intervention for Diabetes Risk Reduction (DE POR VIDA)

Principal Investigator: Nangel Lindberg, PhD 503-528-3961

Sponsor: National Institute of Diabetes and Digestive and Kidney Diseases

KAISER PERMANENTE CENTER FOR HEALTH RESEARCH
CULTURALLY COMPETENT BEHAVIORAL INTERVENTION FOR DIABETES RISK REDUCTION (DE POR VIDA)
Consent to participate in a weight loss study

Purpose of the DE POR VIDA study
The Virginia Garcia Memorial Health Center (VGMHC) and Kaiser Permanente Northwest Center for Health Research (CHR)are working together to do the DE POR VIDA research study to see if we can help Hispanic women who are diabetic or at high risk for diabetes (high blood sugar) to lose weight. The program will compare two different ways to lose weight by eating a healthier diet and being more active. The study will take place at the VGMHC's Hillsboro and Cornelius clinics. The DE POR VIDA study is funded by the National Institute of Diabetes and Digestive and Kidney Disorders (NIDDK), which is part of the National Institutes of Health.

Why is the study being done?
Being very overweight (obese) and having diabetes or being at risk for diabetes are serious health problems, especially in the Hispanic community. Being very overweight puts people at greater risk of developing diabetes and many other serious diseases, including heart disease and stroke. Losing weight, eating healthy foods, and being active can reduce the risk of developing diabetes for people that are at risk, and can improve the general health of people with diabetes.

The DE POR VIDA study will compare two different ways of helping diabetic women and women who are at high risk for diabetes to lose weight. Women who join the study will be assigned to one of two groups. One group will attend classes that will offer information and advice about how to eat more fruits and vegetables, reduce fat in their foods, and will encourage them to be more physically active. The other group will receive brochures and booklets about how to lose weight by eating healthy foods and being more physically active. Women in both groups will receive some things to help with weight loss: a bathroom scale, measuring cups and spoons, and an instrument that measures the number of steps taken while walking (pedometer). If you want to be part of the study, you must be willing to be assigned to either group.

If you would like us to give you the study results when the study is finished, please mark the box at the end of this form. It may be a year or longer before we know the results of the study.

How long will I be in the study?
Women will be in the study about 18 months (one and a half years).

What will happen in the study?
Women who join the study will be randomly assigned, like by a coin toss, to be in one of the two groups. This means that you cannot choose which group you will be assigned to.

If you agree to be in the study, we will ask you to come to your clinic three times, 6, 12, and 18-months after the study begins, to measure your weight, and waist circumference, and ask you questions about your satisfaction with the program, your quality of life, and your health. During this clinic visit we will also ask you to do a fasting blood sample (by finger stick) to measure your blood sugar that day (fasting glucose), your blood sugar control (HbA1c) and your blood fats (lipids). Each of these clinic visits will last about 45 minutes. We will also ask you to have a telephone conversation with a study staff member who will ask you about the food you eat and your physical activity. This phone call will also take about 45 minutes. After you complete all three parts of the clinic visit (the measurements we will take and the questions we will ask you in the clinic, the blood tests, and the questions by telephone), we will give you a gift certificate to thank you for your time. The value of the gift cards will be $25 for the 6-month visit, $30 for the 12-month visit, and $35 for the 18-month visit.

What happens if I am assigned to the group classes?
If you are in the group classes, you will be asked to attend a 12-month weight-loss program. You will be placed in a group of women that will meet every week for six months, and then will meet every month for another six months. This program has helped other people lose 10 lbs or more.

The group classes will last about an hour and a half and will meet at a Virginia Garcia clinic. During these meetings we will teach you about how to change the way you eat and encourage you to increase your physical activity to help you lose weight. We expect there will be about 15 people at each class.

What happens if I am assigned to the group that receives printed materials?
If you are assigned to this group, you will be given several written materials created by the National Institutes of Health to help people improve the way they eat, improve their physical activity, and help control their weight. You will also receive the same things as the other group: a bathroom scale, measuring cup and spoons, and a pedometer.

What are the risks of the study?
This study does not involve any major health risks, but you must have your doctor's approval to join our program. Changes in the way you eat could produce mild stomach upset, such as bloating and gas. As you increase your physical activity, you may feel some soreness and aches. As people with diabetes change their diets and begin to exercise more, there is a small chance that they may experience low blood sugar (called hypoglycemia). Low blood sugar can make you feel sweaty, hungry, or worried.

If you don't eat something and your sugar gets really low, you can feel weak, have trouble seeing, or feel confused. If you join the study, we will ask you to do things to keep your sugar from getting low, such as not skipping meals and monitoring your blood sugar. We will also ask you to carry some sugary foods or sugar tablets with you at all times, and to continue visiting your doctor as directed. If you do get low sugars, we will contact your doctor and your doctor may decide to change your medications.

While we will take steps to ensure confidentiality of your information, it is possible that some of your information may be seen by someone outside of the study. To keep your identity private, we will use a number instead of your name on all the questionnaires and forms that are filled out.

Women who are pregnant or breastfeeding cannot be in this study. If you become pregnant during the study, you must tell a study staff member immediately. You will stop participating in the study. This is because women who are pregnant or breast feeding should follow their doctor's instructions about how to eat which may be different than what the study recommends.

Are there benefits for taking part in the study?
The potential benefits for taking part in the study include:

- you might lose weight
- you might maintain your weight loss
- you might improve your diet
- you might change your nutrition and exercise habits
- you might have a lower risk for diseases, such as diabetes, heart disease, and cancer

We cannot promise that any of these benefits will result from taking part in this study.

Are there any financial costs or compensation?
There is no charge for being in the study. You will not be paid for taking part in this study. You will receive a gift card every time you complete a 6-month clinic visit (completing weight and waist measurements, questionnaires, telephone interviews, and have a blood test). The value of the gift cards will be $25 for the 6-month visit, $30 for the 12-month visit, and $35 for the 18-month visit.

New findings
We will tell you about any new information that might affect your decision to stay in the study.

What if I am injured during the study?
If you have an injury that Virginia Garcia Memorial Health Center (VGMHC) doctors determine is due to this study, VGMHC will provide care for that injury.

If you are on Medicare, and you are injured by being in this study, the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK), which sponsors this study,

must tell Medicare about any payments made to you, or any payments made for treatment of the injury. Your name, birth date, social security number, and the fact that you had been part of this study would be sent to Medicare.

Do I have to be in this study?
You do not have to join this research study. If you join, you may quit at any time.

If you decide not to be in this study, it will not affect your regular medical care or health benefits or your relationship with Virginia Garcia Memorial Health Center.

What other choices do I have if I don't take part in this study?
If you want to lose weight, you could join a weight loss program in the community.

Who can answer my questions?
If you have any questions about the study, you may contact the study investigator:

Nangel Lindberg, Ph.D.
503-528-3961 (direct line)
503-528-3982 (voice mail)
866 4040792 (toll free for voice mail)

If you have any questions about your rights as a research study participant, , or about research-related injuries, or to contact the Institutional Review Board (IRB), call Caroline Miner, the Director of Research Compliance, at 503-335-6725.

The IRB is a committee of scientific, nonscientific, and community members who review research to protect the rights and welfare of participants.

Confidentiality and your personal health information
Kaiser Permanente and the Virginia Garcia Memorial Health Center are committed to protecting your personal health information. State and federal laws also protect your privacy. Your privacy is very important to us.

In order to do this study, researchers will collect data about you and your health including your height, weight, waist circumference, your eating and exercise habits, and other health information, including your blood sugar.

We will protect your confidentiality by using a study number on all forms instead of your name. We will keep all study forms and paper records in a secured, locked place. We will use passwords to protect electronic study information. Only authorized research personnel will have access to study records. We will never use your name, and we will not identify you in published reports or presentations about this study.

Only researchers involved in this study will look at your personal health information. In certain circumstances we may need to review your VGMHC medical record and/or

contact your doctor to assure that you are eligible to take part in the study, or for other medical reasons such as reported low blood sugar.

Your contact information will be sent from VGMHC to CHR. CHR will give this information to a De Por Vida staff member at the CHR or Arizona State University School of Nutrition and Health Promotion who will need it to conduct telephone interviews with you. This interview will be about the food you eat and the physical activity you do. The information about what you eat will be sent from CHR to the University of Arizona Diet Behavior and Quality of Life Assessment Lab and the Arizona State University School of Nutrition and Health Promotion where it will be analyzed. The results of the blood tests that will be performed at VGMHC will be placed in your medical record at VGMHC, and the blood test results will also be sent for analysis to Arizona State University School of Nutrition and Health Promotion.

Only the number assigned to you at the beginning of the study will be used on these forms and data. Your name and other information will not be used outside of CHR and Arizona State University School of Nutrition and Health Promotion. Kaiser Permanente has agreements with other organizations to protect your health information. However, if this information is given to an organization not covered by these policies and laws, Kaiser Permanente can no longer guarantee the privacy and confidentiality of your information.

By signing this consent form, you agree to participate in the study and you agree to let us use and share your personal health information as outlined in this document. If you do not agree to do this, you cannot be in the study. This agreement about using and sharing your data will end at the end of the study.

You can withdraw this consent at any time by sending a written notice to:

Nangel Lindberg, Ph.D.
Kaiser Permanente Northwest
Center for Health Research
3800 N. Interstate Avenue
Portland, OR 97227

After we receive your written withdrawal request, only data that has already been looked at or shared will continue to be used, unless we need to monitor your data for safety reasons.

CONSENT TO BE A RESEARCH SUBJECT

I have read this consent form carefully and understand the purpose, procedures, benefits and risks of the DE POR VIDA study. I have had a chance to ask questions and have had them answered so that I understand. I also understand that I may ask other questions in the future and that they will be answered clearly. I understand that my taking part in this study is voluntary, and I may withdraw at any time.

I voluntarily consent to participate in this research.

I have received a copy of this consent form.

_____	_____
Subject's signature	Person Obtaining Consent
Date_____	Date_____

☐ Please send me the results of the study when it is complete

APPENDIX D

CONSENT FORM IN SPANISH

Centro de Investigaciones de la Salud de Káiser Permanente
Forma de Consentimiento

Título del Estudio: Intervención Conductual Culturalmente Competente para Reducir el Riesgo de Diabetes (DE POR VIDA)

Investigador Principal: Nangel Lindberg, PhD 503-528-3961

Patrocinador: Instituto Nacional de Diabetes y Enfermedades Digestivas y del Riñón

CENTRO DE INVESTIGACIONES DE LA SALUD DE KÁISER PERMANENTE
INTERVENCIÓN CONDUCTUAL CULTURALMENTE COMPETENTE PARA REDUCIR EL RIESGO DE DIABETES (DE POR VIDA)
Consentimiento para participar en un estudio de reducción de peso

Propósito del estudio DE POR VIDA
El Centro de Salud en Memoria de Virginia García (VGMHC) y el Centro de Investigaciones de la Salud de Káiser Permanente del Noroeste (CHR) están trabajando juntos para hacer el estudio de investigación DE POR VIDA, que trata de ayudar a mujeres hispanas que tienen diabetes o que están en riesgo de tener diabetes (altos niveles de azúcar en la sangre) a que bajen de peso. Este programa va a comparar dos diferentes maneras para bajar de peso manteniendo una dieta saludable y llevando una vida más activa. El estudio se va a hacer en las clínicas de VGMHC de Hillsboro y Cornelius. El estudio DE POR VIDA está patrocinado por el Instituto Nacional de Diabetes y Enfermedades Digestivas y del Riñón (NIDDK), que forma parte de los Institutos Nacionales de Salud.

¿Por qué se está realizando el estudio?
Los altos grados de sobrepeso (obesidad) y la diabetes –ya sea tenerla o estar en riesgo de tenerla-- son serios problemas de salud, especialmente en la comunidad hispana. El tener un alto grado de sobrepeso hace que las personas tengan mayor riesgo de desarrollar diabetes y muchas otras enfermedades serias, incluyendo la enfermedad del corazón y la embolia. Bajar de peso, comer una dieta saludable, y mantenerse activo pueden ayudar a reducir el riesgo de diabetes en las personas que están en riesgo de diabetes, y puede también ayudar a que las personas que tienen diabetes mejoren su estado general de salud.

El estudio DE POR VIDA va a comparar dos diferentes maneras de ayudar a bajar de peso a mujeres diabéticas y a mujeres que están en riesgo de tener diabetes. Las mujeres que se inscriban al estudio van a ser asignadas a uno de dos grupos. Uno de los grupos va a asistir a clases que ofrecerán información y consejos sobre cómo comer más frutas y verduras, reducir la grasa en los alimentos, y tener una vida más activa. El otro grupo recibirá folletos y libritos sobre cómo bajar de peso comiendo alimentos saludables y llevando una vida más activa. Las participantes en los dos grupos van a recibir algunas cosas para ayudarlas a bajar de peso: una báscula de baño, tazas y cucharas de medir, y un instrumento que mide cuántos pasos caminas durante el día (cuentapasos o podómetro). Si quieres ser parte de este estudio, debes estar dispuesta a aceptar que te asignen a cualquiera de los dos grupos.

Si al final del estudio te gustaría recibir los resultados de la investigación, por favor marca la casilla al final de este formulario. Los resultados probablemente no estarán disponibles hasta dentro de un año, o posiblemente más.

¿Cuánto tiempo voy a estar en el estudio?
Las participantes van a estar en el estudio aproximadamente 18 meses (un año y medio).

¿Qué va a pasar en el estudio?
Las mujeres que se inscriban al estudio van a ser asignadas al azar, como cuando se echa un volado, para estar en uno de los dos grupos. Esto quiere decir que no puedes escoger en qué grupo vas a quedar.

Si estás de acuerdo en estar en el estudio, te vamos a pedir que vengas a la clínica cada seis meses para medir tu peso y tu cintura, y hacerte algunas preguntas sobre tu satisfacción con el programa, tu calidad de vida, y tu salud. Durante esta visita a la clínica te pediremos también que te hagan una prueba de sangre (con un piquete en el dedo) en ayunas para saber cuál es tu nivel de azúcar en la sangre (glucosa en ayunas), tu control de azúcar en sangre (HbA1C) y tu colesterol en la sangre (lípidos). Cada una de estas visitas va a durar unos 45 minutos. También vamos a pedirte que hables por teléfono con una compañera de nuestro equipo de investigación. En esta llamada, que durará unos 45 minutos, nuestra compañera te hará varias preguntas sobre la comida que acostumbras comer y el ejercicio o la actividad física que haces. Después de la visita a la clínica, cuando hayas completado las tres partes de la visita (es decir, las preguntas que te haremos en la clínica, los exámenes de sangre, y las preguntas que haremos por teléfono), te daremos un certificado de regalo (gift card) para agradecer que nos hayas dado tu tiempo. El valor de los certificados de regalo será de $25 para la visita de 6 meses, $30 para la visita de los 12 meses, y $35 para la visita de los 18 meses.

¿Qué pasa si me asignan a las clases en grupo?
Si estás en el grupo de clases, te pediremos que asistas a un grupo para bajar de peso siguiendo un programa que durará 12 meses. Durante los primeros seis meses, el grupo de mujeres se reunirá una vez por semana, y durante los últimos seis meses el grupo se reunirá una vez al mes. Este programa ha ayudado a otras personas a bajar 10 libras o más.

Las clases durarán aproximadamente hora y media y van a realizarse en una clínica de Virginia García. Durante estas reuniones te enseñaremos cómo cambiar tu manera de alimentarte y te animaremos a que aumentes tu actividad física para ayudarte a bajar de peso. Cada grupo será de aproximadamente 15 personas.

¿Qué pasa si me asignan al grupo que recibe materiales impresos?
Si quedas en este grupo, vas a recibir varios materiales escritos que han sido creados por los Institutos Nacionales de la Salud para ayudar a las personas a mejorar sus hábitos de comida y su nivel de actividad física, y ayudarlas a controlar su peso. También recibirás las mismas cosas va a recibir el otro grupo: una báscula de baño, tazas y cucharas de medir, y un cuentapasos o podómetro.

¿Cuáles son los riesgos de participar en el estudio?
Este estudio no conlleva riesgos importantes para la salud, pero debes tener la aprobación de tu médico para poder inscribirte al programa. Cuando empiezas a cambiar tu dieta puedes tener pequeños problemas digestivos, como gas y pesadez en el estómago, y cuando empiezas a hacer ejercicio puedes sentir algunos dolores musculares. Cuando las personas con diabetes cambian su dieta y empiezan a hacer más ejercicio hay la posibilidad de que se les baje el azúcar (hipoglicemia). Cuando tienes un bajón de azúcar puedes sentirte sudorosa o preocupada, o puedes tener

hambre. Si no comes algo y tu azúcar se baja demasiado, puedes sentirte débil, tener dificultad para ver bien, o sentirte confundida. Si participas en el estudio, te pediremos que hagas algunas cosas para que no se te baje el azúcar, como por ejemplo no saltarte comidas y medir tu azúcar en sangre. También vamos a pedirte que siempre tengas a la mano alimentos azucarados o tabletas de glucosa, y que sigas visitando a tu médico regularmente. Si llegas a tener baja el azúcar, vamos a ponernos en contacto con tu médico, y tu médico puede decidir cambiar tus medicamentos.

Aunque tomaremos precauciones para asegurar la confidencialidad de tu información, es posible que alguien fuera del estudio vea información tuya. Para mantener secreta tu identidad, vamos a utilizar un número en lugar de tu nombre en todos los cuestionarios y los formularios que haya en el estudio.

No pueden participar en el estudio mujeres embarazadas o que estén amamantando. Si llegas a embarazarte durante el estudio, debes avisar inmediatamente a un miembro del equipo de estudio. Si estás embarazada tendrás que dejar de participar en el estudio porque las mujeres que están embarazadas o amamantando deben seguir las indicaciones de su médico sobre la dieta que deben seguir, y estas indicaciones pueden ser diferentes de lo que el estudio recomienda.

¿Tiene algún beneficio participar en el estudio?
Los posibles beneficios por participar en el estudio incluyen:

- puedes bajar de peso
- puedes mantenerte en un peso más bajo
- puedes mejorar tu alimentación
- puedes cambiar tus hábitos de dieta y ejercicio
- puede bajar tu riesgo de enfermedades como diabetes, enfermedad del corazón, y cáncer

No podemos prometerte que vayas a tener ninguno de estos beneficios.

¿Hay algún costo o compensación económica?
No hay ningún cargo por participar en el estudio. No vas a recibir ningún pago por participar en este estudio. Vas a recibir una tarjeta de regalo cada vez que completes una visita de seguimiento cada 6 meses en la clínica (en la que mediremos tu peso y tu cintura, llenarás cuestionarios, tendrás una entrevista por teléfono, y te haremos une prueba de sangre). El valor de las tarjetas de regalo serán de $25 para la visita de los 6 meses, $30 para la visita de los 12 meses, y $35 para la visita de los 18 meses.

Nueva información
Si llegara a haber alguna nueva información que pueda afectar tu decisión de seguir participando en el estudio, te avisaremos inmediatamente.

¿Qué va a pasar si me lastimo durante el estudio?

Si tienes alguna lesión o lastimadura que los doctores del Centro de Salud en Memoria de Virginia García (VGMHC) determinen que fue causada por este estudio. VGMHC te dará la atención que necesites para esta lesión.

Si tienes Medicare y te lastimas al participar durante este estudio, el Instituto Nacional de Diabetes y Enfermedades Digestivas y del Riñón (NIDDK), que patrocina este estudio, debe informar a Medicare sobre cualquier pago que se te haya hecho a ti, o sobre cualquier pago que se haya hecho para atender tu lesión. Medicare recibiría tu nombre, fecha de nacimiento, número de seguro social, y se le informaría sobre tu participación en este estudio.

¿Tengo que estar en el estudio?
No tienes que participar en este estudio de investigación. Si participas en el estudio, puedes dejar de participar en el momento que quieras.

Si decides que no quieres estar en este estudio, tu decisión no va a afectar ni tu relación con el Centro de Salud en Memoria de Virginia García, ni el cuidado médico ni los beneficios médicos que recibes allí.

¿Qué otras opciones tengo si no quiero participar en este estudio?
Si quieres bajar de peso, puedes inscribirte a un programa de reducción de peso en la comunidad.

¿Quién puede contestar mis preguntas?
Para cualquier pregunta que tengas sobre el estudio, puedes dirigirte a la investigadora del proyecto.

Nangel Lindberg, Ph.D.
503-528-3961 (línea directa)
503-528-3982 (correo de voz)
866-404-0792 (llamada gratis al correo de voz)

Si tienes alguna pregunta sobre tus derechos como participante en un estudio de investigación, o acerca de lesiones relacionadas con la participación en un estudio, o para ponerte en contacto con el Comité de Revisión Institucional (Institutional Review Board, IRB), puedes llamar a Caroline Miner, Directora de Cumplimiento de la Ley en las Investigaciones, al teléfono 503-335-6725.

El Comité de Revisión Institucional es un comité en el que participan miembros de la comunidad, algunos de los cuales son científicos y otros que no son científicos. Este comité se encarga de vigilar las investigaciones para proteger los derechos y el bienestar de los participantes.

Confidencialidad y tu información personal de salud
Káiser Permanente y el Centro de Salud en Memoria de Virginia García tienen el compromiso de proteger tu información personal de salud. Las leyes estatales y

federales también protegen tu privacidad. Tu privacidad es muy importante para nosotros.
Para poder hacer este estudio, los investigadores van a recopilar información sobre ti y sobre tu salud, incluyendo tu estatura, tu peso, la medida de tu cintura, tus hábitos de alimentación y ejercicio, y otros datos sobre tu salud, incluyendo tu nivel de azúcar en la sangre.

Vamos a proteger tu confidencialidad poniendo un número, en lugar de tu nombre, en todos los formularios del estudio. Vamos a mantener todos los formularios y los documentos del estudio en lugar seguro, cerrado bajo llave. Vamos a usar contraseñas para proteger la información electrónica del estudio. Solamente personal autorizado del equipo de investigación tendrá acceso a los documentos del estudio. Nunca vamos a usar tu nombre ni te vamos a identificar en informes o presentaciones que se hagan o que se publiquen sobre este estudio.

Solamente los investigadores de este estudio tendrán acceso a tu información personal de salud. Es posible que en ciertas circunstancias tengamos que revisar tu expediente médico de VGMHC y/o ponernos en contacto con tu médico para confirmar que cumples los requisitos para participar en el estudio, o por razones médicas, como por ejemplo que haya estado demasiado baja tu azúcar en sangre.

Tus datos como nombre y número de teléfono van a ser enviados de VGMHC a CHR. CHR va a proporcionar esta información a un miembro del estudio De Por Vida de CHR o de la Escuela de Nutrición y Promoción de la Salud de la Universidad del Estado de Arizona (Arizona State University) quien va a necesitar tu información para poder llamarte por teléfono y hacerte unas entrevistas. En estas entrevistas te preguntaremos sobre la comida que acostumbras comer y la actividad física que haces. La información sobre lo que acostumbras comer será enviada de CHR al Laboratorio de Evaluación de Conducta Alimentaria y Calidad de Vida de la Universidad de Arizona para que sea analizada. Los resultados de las pruebas de sangre que se te harán en VGMHC van a ser incluidos en tu expediente médico en VGMHC, y también los vamos a enviar a la Escuela de Nutrición y Promoción de la Salud de la Universidad del Estado de Arizona (Arizona State University) para que allí los analicen.

Para identificar tu información solamente vamos a usar el número que se te asigne al principio del estudio. Tu nombre y tus datos personales no van a ser usados fuera de CHR o de la Escuela de Nutrición y Promoción de la Salud de la Universidad del Estado de Arizona (Arizona State University) . Káiser Permanente tiene convenios con otras organizaciones para proteger tu información de salud. Pero si esta información es proporcionada a organizaciones que no se rigen por esas leyes y regulaciones, Káiser Permanente no puede garantizar la privacidad y confidencialidad de tu información.

Al firmar esta forma de consentimiento indicas que estás de acuerdo en participar en el estudio, y que estás de acuerdo en permitirnos usar y compartir tu información personal de salud tal como se describe en este documento. Si no estás de acuerdo con esto, no puedes estar en el estudio. Este acuerdo sobre permitirnos usar y compartir tu información va a terminar cuando se termine el estudio.

Si ya no quieres dar tu permiso, en cualquier momento puedes retirarlo escribiendo a:

Nangel Lindberg, Ph.D.
Kaiser Permanente Northwest
Center for Health Research
3800 N. Interstate Avenue
Portland, OR 97227

Cuando hayamos recibido tu solicitud para retirar tu permiso, solo seguiremos utilizando la información que ya hayamos estudiado o compartido, a menos que necesitemos vigilar tu información para tu seguridad.

CONSENTIMIENTO PARA SER SUJETO DE INVESTIGACION

He leído con cuidado esta forma de consentimiento y entiendo el propósito, los procedimientos, los beneficios y los riesgos del estudio DE POR VIDA. He tenido la oportunidad de hacer preguntas y me las han contestado para que yo pueda entender. También entiendo que puedo hacer más preguntas en el futuro, y que me van a contestar a estas preguntas claramente. Entiendo que mi participación en este estudio es voluntaria, y que puedo salirme del estudio en cualquier momento.

Yo doy voluntariamente mi permiso para participar en este estudio.

He recibido una copia de esta forma de consentimiento.

_____	_____
Firma del Sujeto	Persona que Obtiene el Consentimiento
Fecha_____	Fecha_____

☐ Favor de enviarme los resultados del estudio cuando se haya terminado.

APPENDIX E

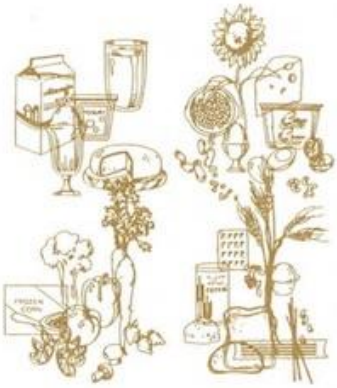
SOUTHWESTERN FOOD FREQUENCY QUESTIONNAIRE

THE UNIVERSITY OF ARIZONA.

The University of Arizona Diet, Behavior, and Quality of Life Assessment Lab

CUESTIONARIO SOBRE PRATICAS DE ALIMENTACION DE LA POBLACION

Southwestern Food Frequency Questionnaire©



INSTRUCCIONES
- USE SOLAMENTE LAPIZ #2.
- NO UTILICE PLUMA DE TINTA.
- NO HAGA NINGUNA MARCA EXTRA.
- COMPLETE LOS CÍRCULOS TOTALMENTE.

INSTRUCTIONS
- USE #2 PENCIL.
- DO NOT USE INK PEN.
- MAKE NO STRAY MARKS.
- FILL IN THE CIRCLES COMPLETELY.

EJEMPLOS
EXAMPLES

MARCA CORRECTA
CORRECT MARK

MARCAS INCORRECTAS
INCORRECT MARKS

POR FAVOR COMPLETE LOS BLOQUES SIGUIENTES. PLEASE FILL OUT THE BOXES BELOW.

LA FECHA DE HOY
TODAY'S DATE
MES MO. | DÍA DAY | AÑO YEAR

EDAD
AGE

GÉNERO
MASCULINO (M) MALE
FEMENINO (F) FEMALE
SEX

ESTATURA
HEIGHT
Pies Ft. | Pulgadas Inches

PESO ACTUAL EN LIBRAS
CURRENT WEIGHT
Libras Lbs.

PESO HACE UN AÑO EN LIBRAS
WEIGHT 1 YR. AGO
Libras Lbs.

PESO A LOS 18 AÑOS
WEIGHT AT AGE 18
Libras Lbs.

ID NUMBER

FOR OFFICE USE

STUDY

Este cuestionario debe reflejar el consumo de alimentos en los últimos _____ meses.

This questionnaire should reflect back on the past _____ months of food intake.

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INSTRUCTIONS

No doble, rompa, engrape, perfore o separe las páginas.
Please do not fold, cut, staple, punch, or separate pages.

Este cuestionario se refiere a sus habitos alimenticios USALES.
The questionnaire asks you about your USUAL eating habits.

Rellene el círculo que describa el TAMAÑO DE PORCION que usted consume generalmente para cada uno de los alimentos de la lista, comparándolo con el de otras personas de su misma edad y sexo. Usted puede seleccionar Pequeño (P), Mediano (M), o Grande (G).
Fill in the circle that describes your AVERAGE SERVING SIZE for each food listed as compared to other people your same age and gender. You may choose Small (S), Medium (M), or Large (L).

Rellene el círculo que mejor describa su CONSUMO PROMEDIO. Si usted comió ese alimento en raras ocasiones o nunca, llene el círculo que dice RARA VEZ O NUNCA. Si selecciona RARA VEZ O NUNCA, no es necesario indicar tamaño de porción.
Fill in the circle that describes your AVERAGE USE. If you rarely or never ate the food, fill in the circle under Rarely/Never. However, if you select RARELY/NEVER, no serving size is necessary.

EJEMPLOS Examples

EN PROMEDIO, ¿QUE TAN SEGUIDO COME LOS SIGUIENTES ALIMENTOS?
On the average, how often do you eat the following foods?

	PORCION Portion Size			USO PROMEDIO Average Use						
GUISADOS Y SOPAS Side, Mixed Dishes, and Soups	P S	M M	G L	3 O MAS VECES AL DIA 3 or more times a day	1 O 2 VECES AL DIA 1 or 2 times a day	4 A 6 VECES POR SEMANA 4 to 6 times a week	2 A 3 VECES POR SEMANA 2 to 3 times a week	UNA VEZ POR SEMANA 1 time a week	2 A 3 VECES AL MES 2 to 3 times a month	MENOS DE UNA VEZ AL MES Less than 1 time a month	RARA VEZ O NUNCA Rarely or never
FRIJOLES REFRITOS. Refried Beans	○	●	○	○	○	○	●	○	○	○	○
FRIJOLES DE LA OLLA, CHARROS, BAYOS, NEGROS, PINTOS, ALUBIAS. Baked / Cooked Beans, "Charro-Style" Beans, Black, Pinto, and Kidney Beans	○	○	○	○	○	○	○	○	○	○	●

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EN PROMEDIO, ¿QUE TAN SEGUIDO COME LOS SIGUIENTES ALIMENTOS?
On the average, how often do you eat the following foods?

GUISADOS Y SOPAS Side, Mixed Dishes, and Soups	PORCION Portion Size			USO PROMEDIO Average Use							
	P S	M M	G L	3 O MAS VECES AL DIA 3 or more times a day	1 O 2 VECES AL DIA 1 or 2 times a day	4 A 6 VECES POR SEMANA 4 to 6 times a week	2 A 3 VECES POR SEMANA 2 to 3 times a week	UNA VEZ POR SEMANA 1 time a week	2 A 3 VECES AL MES 2 to 3 times a month	MENOS DE UNA VEZ AL MES Less than 1 time a month	RARA VEZ O NUNCA Rarely or never
FRIJOLES REFRITOS. Refried Beans	O	O	O	O	O	O	O	O	O	O	O
FRIJOLES DE LA OLLA, CHARROS BAYOS, NEGROS, PINTOS, ALUBIAS. Baked / Cooked Beans, "Charro-Style" Beans, Black, Pinto, and Kidney Beans	O	O	O	O	O	O	O	O	O	O	O
ARROZ BLANCO. Plain Rice	O	O	O	O	O	O	O	O	O	O	O
ARROZ A LA MEXICANA. Mexican Rice	O	O	O	O	O	O	O	O	O	O	O
SOPAS DE PASTA / FIDEO (SIN QUESO Y SIN CARNE). Noodle Soup, Pastas without Cheese or Meat	O	O	O	O	O	O	O	O	O	O	O
LENTEJAS, GARBANZOS, HABAS (COCIDAS, EN SOPAS, ETC.). Lentils, Garbanzo Beans (Cooked, in Soups, etc.)	O	O	O	O	O	O	O	O	O	O	O
PAPAS FRITAS, PAPITAS, O PAPAS A LA FRANCESA. French Fries and Fried Potatoes	O	O	O	O	O	O	O	O	O	O	O
PAPAS HERVIDAS, AL HORNO, PURE DE PAPA, OTRAS PAPAS. Other Potatoes, including Boiled, Baked, Mashed	O	O	O	O	O	O	O	O	O	O	O
MOLE ROJO O VERDE, CON POLLO, PUERCO, CABRA U OVEJA. Red or Green Mole, with Chicken, Pork, Goat, or Lamb	O	O	O	O	O	O	O	O	O	O	O
CALABACITAS CON QUESO. Zucchini with Cheese	O	O	O	O	O	O	O	O	O	O	O
CHILES RELLENOS CON QUESO O PICADILLO. Chiles Rellenos with Cheese or Meat	O	O	O	O	O	O	O	O	O	O	O
TAMALES DE CARNE. Meat Tamales	O	O	O	O	O	O	O	O	O	O	O
TAMALES DE ELOTE. Corn Tamales	O	O	O	O	O	O	O	O	O	O	O
QUESADILLAS DE HARINA O DE MAIZ. Flour or Corn Quesadillas	O	O	O	O	O	O	O	O	O	O	O
CHIMICHANGAS	O	O	O	O	O	O	O	O	O	O	O

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EN PROMEDIO, ¿QUE TAN SEGUIDO COME LOS SIGUIENTES ALIMENTOS?
On the average, how often do you eat the following foods?

(CONTINUACION) *(continued)*	PORCION Portion Size			USO PROMEDIO Average Use							
GUISADOS Y SOPAS **Side, Mixed Dishes, and Soups**	P S	M M	G L	3 O MAS VECES AL DIA 3 or more times a day	1 O 2 VECES AL DIA 1 or 2 times a day	4 A 6 VECES POR SEMANA 4 to 6 times a week	2 A 3 VECES POR SEMANA 2 to 3 times a week	UNA VEZ POR SEMANA 1 time a week	2 A 3 VECES AL MES 2 to 3 times a month	MENOS DE UNA VEZ AL MES Less than 1 time a month	RARA VEZ O NUNCA Rarely or never
TACOS SUAVES. Soft Tacos	○	○	○	○	○	○	○	○	○	○	○
TOSTADAS	○	○	○	○	○	○	○	○	○	○	○
BURRITOS	○	○	○	○	○	○	○	○	○	○	○
ENCHILADAS, CHILAQUILES, PASTEL AZTECA	○	○	○	○	○	○	○	○	○	○	○
FLAUTAS / TACOS DORADOS. Crispy Tacos (Fried)	○	○	○	○	○	○	○	○	○	○	○
SALSA MEXICANA, SALSA PARA TACOS, OTRAS SALSAS. Mexican Sauce, Taco Sauce, Other	○	○	○	○	○	○	○	○	○	○	○
POZOLE, MENUDO, GALLINA PINTA	○	○	○	○	○	○	○	○	○	○	○
CAZUELA, SOPA DE ALBONDIGAS. Cazuela Soup, Meatball Soup	○	○	○	○	○	○	○	○	○	○	○
SOPA DE TORTILLA. Tortilla Soup	○	○	○	○	○	○	○	○	○	○	○
CALDO DE QUESO. Cheese Soup	○	○	○	○	○	○	○	○	○	○	○
SOPA DE VERDURAS, SOPA DE VERDURAS CON CARNE, COCIDO, MINESTRONE, Y SOPA DE TOMATE. Vegetable Soup, Vegetable Beef, Cocido, Minestrone, and Tomato Soup	○	○	○	○	○	○	○	○	○	○	○
OTRAS SOPAS. Other Soups	○	○	○	○	○	○	○	○	○	○	○
ESPAGUETI, LASAGNA, OTRAS PASTAS CON PURE O SALSA DE TOMATE. Spaghetti, Lasagna, Other Pasta with Tomato Sauce	○	○	○	○	○	○	○	○	○	○	○
PIZZA	○	○	○	○	○	○	○	○	○	○	○
PLATILLOS QUE CONTENGAN QUESO COMO MACARRONES CON QUESO. Mixed Dishes with Cheese, like Macaroni and Cheese	○	○	○	○	○	○	○	○	○	○	○

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EN PROMEDIO, ¿QUE TAN SEGUIDO COME LOS SIGUIENTES ALIMENTOS?
On the average, how often do you eat the following foods?

CARNES Y HUEVOS Meats and Eggs	PORCION Portion Size			USO PROMEDIO Average Use							
	P S	M M	G L	3 O MAS VECES AL DIA 3 or more times a day	1 O 2 VECES AL DIA 1 or 2 times a day	4 A 6 VECES POR SEMANA 4 to 6 times a week	2 A 3 VECES POR SEMANA 2 to 3 times a week	UNA VEZ POR SEMANA 1 time a week	2 A 3 VECES AL MES 2 to 3 times a month	MENOS DE UNA VEZ AL MES Less than 1 time a month	RARA VEZ O NUNCA Rarely or never
HUEVOS. Eggs	○	○	○	○	○ D	○	○	○ S	○	○	○
TOCINO. Bacon	○	○	○	○	○ D	○	○	○ S	○	○	○
CHORIZO. Mexican Sausage	○	○	○	○	○ D	○	○	○ S	○	○	○
SALCHICHON. Sausage	○	○	○	○	○ D	○	○	○ S	○	○	○
SALCHICHAS. Hot dogs	○	○	○	○	○ D	○	○	○ S	○	○	○
HAMBURGUESAS, HAMBURGUESAS CON QUESO, PASTEL DE CARNE, MILANESA DE TERNERA, PICADILLO. Hamburgers, Cheeseburgers, Meat Loaf, Veal Dishes	○	○	○	○	○ D	○	○	○ S	○	○	○
JAMON, MORTADELA, BOLOGNA Y SPAM. Ham, Lunch Meats, and Spam	○	○	○	○	○ D	○	○	○ S	○	○	○
BISTEC DE RES, ASADO AL HORNO, CARNE ASADA. Beef-Steaks, Roasts, Carne Asada	○	○	○	○	○ D	○	○	○ S	○	○	○
GUISADOS DE CARNE CON ZANAHORIA Y OTRAS VERDURAS. Beef Stew or Pot Pie with Carrots and Other Vegetables	○	○	○	○	○ D	○	○	○ S	○	○	○
CARNE CON CHILE (ESTILO SONORA), CHILE CON CARNE DE RES, DE PUERCO, O DE TERNERA, BIRRIA. Beef with Chile ("Sonoran-style"), Pork or Veal with Chile, Birria.	○	○	○	○	○ D	○	○	○ S	○	○	○
MACHACA. Dried Beef	○	○	○	○	○ D	○	○	○ S	○	○	○
HIGADO DE RES, POLLO, TERNERA. Liver: Beef, Chicken, Veal	○	○	○	○	○ D	○	○	○ S	○	○	○
PUERCO: INCLUYENDO CARNITAS CHULETAS, AL HORNO, MILANESAS. Pork, including Carnitas Chops, Roasts, Fried	○	○	○	○	○ D	○	○	○ S	○	○	○

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EN PROMEDIO, ¿QUE TAN SEGUIDO COME LOS SIGUIENTES ALIMENTOS?
On the average, how often do you eat the following foods?

	PORCION Portion Size			USO PROMEDIO Average Use							
AVES, PESCADOS, Y MARISCOS **Poultry and Fish**	P S	M M	G L	3 O MAS VECES AL DIA 3 or more times a day	1 O 2 VECES AL DIA 1 or 2 times a day	4 A 6 VECES POR SEMANA 4 to 6 times a week	2 A 3 VECES POR SEMANA 2 to 3 times a week	UNA VEZ POR SEMANA 1 time a week	2 A 3 VECES AL MES 2 to 3 times a month	MENOS DE UNA VEZ AL MES Less than 1 time a month	RARA VEZ O NUNCA Rarely or never
POLLO EMPANIZADO O FRITO. Breaded or Fried Chicken	O	O	O	O	O	O	O	O	O	O	O
POLLO O PAVO AL HORNO, COCIDO O A LA PARRILLA. Chicken or Turkey: Baked, Stewed, or Broiled	O	O	O	O	O	O	O	O	O	O	O
PESCADO FRITO, EMPANIZADO O SANDWICH DE FILETE DE PESCADO. Breaded or Fried Fish or Fish Sandwich	O	O	O	O	O	O	O	O	O	O	O
ATUN, ENSALADA DE ATUN, ATUN AL HORNO O GUISADO. Tuna Fish, Tuna Salad, Tuna Casserole	O	O	O	O	O	O	O	O	O	O	O
MARISCOS: CAMARONES, LANGOSTA, JAIBA, OSTIONES, ETC. Shell Fish: Shrimp, Lobster, Crab, Oysters, etc.	O	O	O	O	O	O	O	O	O	O	O
CEVICHE, ESCABECHE DE PESCADO. Ceviche, Pickled Herring	O	O	O	O	O	O	O	O	O	O	O
OTRO TIPO DE PESCADOS: ASADOS, A LAS BRASAS, ETC. Other Fish: Broiled, Baked, etc.	O	O	O	O	O	O	O	O	O	O	O
DERIVADOS DE LA LECHE **Dairy Products**											
QUESOS COMO CHEDDAR Y SWISS. Cheeses such as Cheddar and Swiss	O	O	O	O	O	O	O	O	O	O	O
QUESO FRESCO Y PANELA. Farmers/Fresh Cheese	O	O	O	O	O	O	O	O	O	O	O
OTROS QUESOS Y QUESOS PARA UNTAR. Other Cheeses and cheese spreads	O	O	O	O	O	O	O	O	O	O	O
QUESO CUAJADA O REQUESON. Cottage Cheese	O	O	O	O	O	O	O	O	O	O	O
YOGURT	O	O	O	O	O	O	O	O	O	O	O
CREMA / ACIDA. Creams (Sour, Semi-Sweet, Sweet)	O	O	O	O	O	O	O	O	O	O	O

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EN PROMEDIO, ¿QUE TAN SEGUIDO COME LOS SIGUIENTES ALIMENTOS?
On the average, how often do you eat the following foods?

	PORCION Portion Size			USO PROMEDIO Average Use							
CEREALES **Cereals**	P S	M M	G L	3 O MAS VECES AL DIA 3 or more times a day	1 O 2 VECES AL DIA 1 or 2 times a day	4 A 6 VECES POR SEMANA 4 to 6 times a week	2 A 3 VECES POR SEMANA 2 to 3 times a week	UNA VEZ POR SEMANA 1 time a week	2 A 3 VECES AL MES 2 to 3 times a month	MENOS DE UNA VEZ AL MES Less than 1 time a month	RARA VEZ O NUNCA Rarely or never
AVENA O CEREALES COCIDOS COMO ATOLE, CHAMPURRADO. Oatmeal/Other Cooked Cereals	O	O	O	O	O	O	O	O	O	O	O
¿CEREALES DE DESAYUNO INSTANEOS? Eat Cold Cereals?	O	O	O	O	O	O	O	O	O	O	O
¿CUALES SON LOS CEREALES QUE COME CON MAS FRECUENCIA? Which cereals do you usually eat?											
1. _____	O	O	O	O	O	O	O	O	O	O	O
2. _____	O	O	O	O	O	O	O	O	O	O	O
¿LE AÑADE LECHE A LOS CEREALES QUE COME? Do you add milk to cereal?	O	O	O	O	O	O	O	O	O	O	O
¿LE AÑADE AZUCAR A LOS CEREALES QUE COME? Do you add sugar to cereal?	O	O	O	O	O	O	O	O	O	O	O
VERDURAS **Vegetables**											
CALABACITAS. Zucchini	O	O	O	O	O	O	O	O	O	O	O
CALABAZA COCIDA, AL HORNO. Winter Squash, Baked Squash	O	O	O	O	O	O	O	O	O	O	O
ELOTES. Corn	O	O	O	O	O	O	O	O	O	O	O
ZANAHORIAS. Carrots	O	O	O	O	O	O	O	O	O	O	O
CAMOTES. Sweet Potatos, Yams	O	O	O	O	O	O	O	O	O	O	O
EJOTES. String Beans	O	O	O	O	O	O	O	O	O	O	O
CHICHAROS. Peas	O	O	O	O	O	O	O	O	O	O	O
ESPARRAGO. Asparagus	O	O	O	O	O	O	O	O	O	O	O
COLIFLOR O COLES DE BRUSELAS. Cauliflower or Brussels Sprouts	O	O	O	O	O	O	O	O	O	O	O
SETAS. Mushrooms	O	O	O	O	O	O	O	O	O	O	O
ESPINACAS COCIDAS. Cooked Spinach	O	O	O	O	O	O	O	O	O	O	O

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EN PROMEDIO, ¿QUE TAN SEGUIDO COME LOS SIGUIENTES ALIMENTOS?
On the average, how often do you eat the following foods?

(CONTINUACION)
(continued)

VERDURAS Vegetables	PORCION Portion Size			USO PROMEDIO Average Use							
	P S	M M	G L	3 O MAS VECES AL DIA 3 or more times a day	1 O 2 VECES AL DIA 1 or 2 times a day	4 A 6 VECES POR SEMANA 4 to 6 times a week	2 A 3 VECES POR SEMANA 2 to 3 times a week	UNA VEZ POR SEMANA 1 time a week	2 A 3 VECES AL MES 2 to 3 times a month	MENOS DE UNA VEZ AL MES Less than 1 time a month	RARA VEZ O NUNCA Rarely or never
ACELGAS, VERDOLAGAS, QUELITES. Mustard Greens, Turnip Greens, Collards	○	○	○	○	○	○	○	○	○	○	○
VEGETALES MIXTOS QUE CONTENGAN ZANAHORIAS. Mixed vegetables containing Carrots, canned or frozen	○	○	○	○	○	○	○	○	○	○	○
CHILES VERDES, JALAPEÑOS, POBLANOS, SERRANOS, EN RAJAS, CHILE PIMIENTO / MORRON. Chiles: Jalapeño, Serrano, etc., including Bell Peppers	○	○	○	○	○	○	○	○	○	○	○
AGUACATE, GUACAMOLE. Avocado, Guacamole	○	○	○	○	○	○	○	○	○	○	○
NOPALES. Cactus Leaves	○	○	○	○	○	○	○	○	○	○	○
REPOLLO O COL, COL AGRIA Y ENSALADA DE COL. Cabbage, Sauerkraut and Cole Slaw	○	○	○	○	○	○	○	○	○	○	○
BROCOLI. Broccoli	○	○	○	○	○	○	○	○	○	○	○
ESPINACAS CRUDAS, BERROS. Raw Spinach, Watercress	○	○	○	○	○	○	○	○	○	○	○
LECHUGA. Lettuce	○	○	○	○	○	○	○	○	○	○	○
TOMATE CRUDO. Raw Tomato	○	○	○	○	○	○	○	○	○	○	○
JICAMA. Jicama	○	○	○	○	○	○	○	○	○	○	○
PEPINO. Cucumber	○	○	○	○	○	○	○	○	○	○	○
CEBOLLA. Onion	○	○	○	○	○	○	○	○	○	○	○
AJO. Garlic	○	○	○	○	○	○	○	○	○	○	○
CILANTRO. Cilantro	○	○	○	○	○	○	○	○	○	○	○

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EN PROMEDIO, ¿QUE TAN SEGUIDO COME LOS SIGUIENTES ALIMENTOS?
On the average, how often do you eat the following foods?

FRUTAS Fruits	PORCION Portion Size			USO PROMEDIO Average Use							
	P S	M M	G L	3 O MAS VECES AL DIA 3 or more times a day	1 O 2 VECES AL DIA 1 or 2 times a day	4 A 6 VECES POR SEMANA 4 to 6 times a week	2 A 3 VECES POR SEMANA 2 to 3 times a week	UNA VEZ POR SEMANA 1 time a week	2 A 3 VECES AL MES 2 to 3 times a month	MENOS DE UNA VEZ AL MES Less than 1 time a month	RARA VEZ O NUNCA Rarely or never
NARANJAS, MANDARINAS. Oranges, Tangerines	○	○	○	○	○	○	○	○	○	○	○
LIMONES Y JUGO DE LIMON. Lemon/Limes and Lime Juice	○	○	○	○	○	○	○	○	○	○	○
PLATANOS. Bananas	○	○	○	○	○	○	○	○	○	○	○
PIÑA. Pineapple	○	○	○	○	○	○	○	○	○	○	○
MANZANAS, PERAS, GUAYABAS. Apples, Pears, Guavas	○	○	○	○	○	○	○	○	○	○	○
MANGOS. Mangoes	○	○	○	○	○	○	○	○	○	○	○
DURAZNOS, CHABACANOS, ALBARICOQUES, Y NECTARINAS. Peaches, Apricots, and Nectarines	○	○	○	○	○	○	○	○	○	○	○
SANDIA. Watermelon	○	○	○	○	○	○	○	○	○	○	○
MELÓN. Cantaloupe and other melons	○	○	○	○	○	○	○	○	○	○	○
FRESAS. Strawberries	○	○	○	○	○	○	○	○	○	○	○
OTRAS MORAS (Frambuesas, zarzamoras). Other berries (blueberries/raspberries)	○	○	○	○	○	○	○	○	○	○	○
UVAS. Grapes	○	○	○	○	○	○	○	○	○	○	○
CEREZAS. Cherries	○	○	○	○	○	○	○	○	○	○	○
PASAS, CIRUELAS PASAS, HIGOS. Raisins, Prunes, Figs	○	○	○	○	○	○	○	○	○	○	○
CIRUELAS FRESCAS. Fresh Plums	○	○	○	○	○	○	○	○	○	○	○
TORONJAS. Grapefruit	○	○	○	○	○	○	○	○	○	○	○

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EN LAS SIGUIENTES SECCIONES AGRUPAMOS ALIMENTOS QUE PUEDEN CONSUMIRSE EN GRANDES CANTIDADES. POR ESA RAZON LA FRECUENCIA DE CONSUMO VA AHORA DESDE 6 O MAS VECES AL DIA HASTA RARA VEZ O NUNCA. EN EL CASO DE LAS TORTILLAS QUEREMOS QUE NOS DIGA APROXIMADAMENTE CUANTAS COME REGULARMENTE Y DE QUE TAMAÑO EN EL CASO DE LAS TORTILLAS DE HARINA. POR EJEMPLO, 2 TORTILLAS DE HARINA MEDIANITAS (APROXIMADAMENTE 10 PULGADAS DE DIAMETRO).

In the following sections, we have grouped food items that can be eaten in large quantities. For that reason, the frequency of consumption now goes from 6 or more times a day to rarely or never. In regards to tortillas, we want you to specify approximately how many you usually eat and the size in the case of flour tortillas. For example, 2 medium size flour tortillas (about 10 inches in diameter).

EN PROMEDIO, ¿QUE TAN SEGUIDO Y CUANTAS TORTILLAS COME?
On the average, how often and how many tortillas do you eat?

	TAMAÑO Size			USO PROMEDIO Average Use								
TORTILLAS	6"	10"	12"	6 O MAS VECES AL DIA 6 or more times a day	3 O 5 VECES AL DIA 3 or 5 times a day	2 VECES AL DIA 2 times a day	UNA VEZ AL DIA 1 time a day	5 O 6 VECES POR SEMANA 5 or 6 times a week	2 A 4 VECES POR SEMANA 2 to 4 times a week	UNA VEZ POR SEMANA 1 time a week	1 A 3 VECES AL MES 1 to 3 times a month	RARA VEZ O NUNCA Rarely or never
TORTILLAS DE HARINA (EXCLUYENDO LAS QUE USA EN GUISADOS). Flour Tortillas (excluding use in mixed and side dishes).	○	○	○	○	○	○	Ⓓ	○	○	Ⓢ	○	○
TORTILLAS DE MAIZ (EXCLUYENDO LAS QUE USA EN GUISADOS). Corn Tortillas (excluding use in mixed and side dishes)	○	○	○	○	○	○	Ⓓ	○	○	Ⓢ	○	○

EN PROMEDIO, ¿QUE TAN SEGUIDO COME LOS SIGUIENTES ALIMENTOS?
On the average, how often do you eat the following foods?

	PORCION Portion Size			USO PROMEDIO Average Use								
PANES Breads	P S	M M	G L	6 O MAS VECES AL DIA 6 or more times a day	3 O 5 VECES AL DIA 3 or 5 times a day	2 VECES AL DIA 2 times a day	UNA VEZ AL DIA 1 time a day	5 O 6 VECES POR SEMANA 5 or 6 times a week	2 A 4 VECES POR SEMANA 2 to 4 times a week	UNA VEZ POR SEMANA 1 time a week	1 A 3 VECES AL MES 1 to 3 times a month	RARA VEZ O NUNCA Rarely or never
PAN BLANCO, BIROTE/ BOLILLO, GALLETAS SALADAS, ETC., INCLUYENDO EN SANDWICHES. White Bread, Rolls, Crackers, Mexican Bread (including sandwich bread)	○	○	○	○	○	○	Ⓓ	○	○	Ⓢ	○	○
PAN O PANECILLOS DE TRIGO ENTERO INTEGRAL. Whole Wheat Bread / Rolls	○	○	○	○	○	○	Ⓓ	○	○	Ⓢ	○	○

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EN PROMEDIO, ¿QUE TAN SEGUIDO COME LOS SIGUIENTES ALIMENTOS?
On the average, how often do you eat the following foods?

(CONTINUACION) *(continued)*	PORCION Portion Size			USO PROMEDIO Average Use								
PANES **Breads**	P S	M M	G L	6 O MAS VECES AL DIA 6 or more times a day	3 O 5 VECES AL DIA 3 or 5 times a day	2 VECES AL DIA 2 times a day	UNA VEZ AL DIA 1 time a day	5 O 6 VECES POR SEMANA 5 or 6 times a week	2 A 4 VECES POR SEMANA 2 to 4 times a week	UNA VEZ POR SEMANA 1 time a week	1 A 3 VECES AL MES 1 to 3 times a month	RARA VEZ O NUNCA Rarely or never
PAN DE MAIZ / ELOTE. Corn Bread	O	O	O	O	O	O	D	O	O	S	O	O
PANECITOS / BIZCOCHOS DE SALVADO, O INTEGRALES. Bran or whole wheat muffin	O	O	O	O	O	O	D	O	O	S	O	O
PANCAKES Y WAFFLES. Pancakes and Waffles	O	O	O	O	O	O	D	O	O	S	O	O
PAN DULCE. Sweet Bread	O	O	O	O	O	O	D	O	O	S	O	O
POSTRES **Sweets**												
NIEVE DE LECHE O HELADO. Ice Cream	O	O	O	O	O	O	D	O	O	S	O	O
NIEVE DE AGUA, PALETAS. Sherbet, Popsicles	O	O	O	O	O	O	D	O	O	S	O	O
NATILLA O FLAN, BUDIN. Custard or Pudding	O	O	O	O	O	O	D	O	O	S	O	O
ARROZ CON LECHE Y PASAS. Rice Pudding with Raisins	O	O	O	O	O	O	D	O	O	S	O	O
DONAS. Doughnuts	O	O	O	O	O	O	D	O	O	S	O	O
GALLETAS. Cookies	O	O	O	O	O	O	D	O	O	S	O	O
PASTEL. Cake	O	O	O	O	O	O	D	O	O	S	O	O
PASTEL, O DULCE DE CALABAZA, CAMOTE DE DULCE. Pumpkin Pie, Sweet Potato Pie	O	O	O	O	O	O	D	O	O	S	O	O
BUÑUELOS, SOPAPILLAS, PASTELILLOS. Pastries	O	O	O	O	O	O	D	O	O	S	O	O
EMPANADAS, COYOTAS. Turnovers, Coyotas	O	O	O	O	O	O	D	O	O	S	O	O

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EN PROMEDIO, ¿QUE TAN SEGUIDO COME LOS SIGUIENTES ALIMENTOS?
On the average, how often do you eat the following foods?

(CONTINUACION) *(continued)*	PORCION Portion Size			USO PROMEDIO Average Use								
POSTRES **Sweets**	P S	M M	G L	6 O MAS VECES AL DIA 6 or more times a day	3 O 5 VECES AL DIA 3 or 5 times a day	2 VECES AL DIA 2 times a day	UNA VEZ AL DIA 1 time a day	5 O 6 VECES POR SEMANA 5 or 6 times a week	2 A 4 VECES POR SEMANA 2 to 4 times a week	UNA VEZ POR SEMANA 1 time a week	1 A 3 VECES AL MES 1 to 3 times a month	RARA VEZ O NUNCA Rarely or never
CHOCOLATES. Chocolate Candy	○	○	○	○	○	○	○	○	○	○	○	○
OTROS DULCES, JALEA, MERMELADA, MIEL, PANOCHA. Other Candy, Jelly, Honey, Molasses	○	○	○	○	○	○	○	○	○	○	○	○
BOTANAS **Salty Snacks and Spreads**												
PALOMITAS DE MAIZ O ESQUITE. Popcorn	○	○	○	○	○	○	○	○	○	○	○	○
PAPITAS FRITAS DE BOLSA, CUALQUIER TIPO DE "CHIPS". Chips, all types	○	○	○	○	○	○	○	○	○	○	○	○
CHICHARRONES DE PUERCO. Pork Rinds	○	○	○	○	○	○	○	○	○	○	○	○
NUECES, INCLUYENDO CACAHUATES. Shelled Nuts, including Peanuts	○	○	○	○	○	○	○	○	○	○	○	○
MANTEQUILLA DE CACAHUATE. Peanut Butter	○	○	○	○	○	○	○	○	○	○	○	○
ACEITUNAS. Olives	○	○	○	○	○	○	○	○	○	○	○	○
ADEREZOS PARA ENSALADA. Salad Dressing	○	○	○	○	○	○	○	○	○	○	○	○
MAYONESA. Mayonnaise	○	○	○	○	○	○	○	○	○	○	○	○
SALSA DE TOMATE Y SALSA DE BARBACOA. Tomato Ketchup and BBQ Sauce	○	○	○	○	○	○	○	○	○	○	○	○
MANTEQUILLA/ MARGARINA Butter/Margarine	○	○	○	○	○	○	○	○	○	○	○	○

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0423

EN PROMEDIO, ¿QUE TAN SEGUIDO COME LOS SIGUIENTES ALIMENTOS?
On the average, how often do you eat the following foods?

(CONTINUACION) *(continued)*	PORCION Portion Size			USO PROMEDIO Average Use								
BOTANAS **Salty Snacks and Spreads**	P S	M M	G L	6 O MAS VECES AL DIA 6 or more times a day	3 O 5 VECES AL DIA 3 or 5 times a day	2 VECES AL DIA 2 times a day	UNA VEZ AL DIA 1 time a day	5 O 6 VECES POR SEMANA 5 or 6 times a week	2 A 4 VECES POR SEMANA 2 to 4 times a week	UNA VEZ POR SEMANA 1 time a week	1 A 3 VECES AL MES 1 to 3 times a month	RARA VEZ O NUNCA Rarely or never
MOSTAZA, RABANO PICANTE. Mustard, Horseradish	O	O	O	O	O	O	O	O	O	O	O	O
JUGO Y/O GRASA DE CARNE CON HARINA (Gravy). Gravies made with Meat Drippings or White Sauce	O	O	O	O	O	O	O	O	O	O	O	O
BEBIDAS **Beverages**												
AGUA. Water	O	O	O	O	O	O	O	O	O	O	O	O
JUGO DE NARANJA O TORONJA. Orange or Grapefruit Juice	O	O	O	O	O	O	O	O	O	O	O	O
LIMONADA. Lemonade/Limeade	O	O	O	O	O	O	O	O	O	O	O	O
HORCHATA. Rice-Based	O	O	O	O	O	O	O	O	O	O	O	O
JAMAICA. Tea of Hibiscus Flowers	O	O	O	O	O	O	O	O	O	O	O	O
JUGO DE UVA. Grape Juice	O	O	O	O	O	O	O	O	O	O	O	O
JUGO DE TOMATE. Tomato Juice	O	O	O	O	O	O	O	O	O	O	O	O
TANG, JUGOS EN POLVO INSTANTANEOS. Tang, Start Breakfast Drinks, Juice Drinks	O	O	O	O	O	O	O	O	O	O	O	O
REFRESCOS / SODAS NO DIETETICAS. Regular Soft Drinks	O	O	O	O	O	O	O	O	O	O	O	O
REFRESCOS / SODAS DIETETICAS. Diet Soft Drinks	O	O	O	O	O	O	O	O	O	O	O	O
CERVEZA. Beer	O	O	O	O	O	O	O	O	O	O	O	O
LICOR. Liquor / Alcohol	O	O	O	O	O	O	O	O	O	O	O	O
VINO. Wine	O	O	O	O	O	O	O	O	O	O	O	O
CAFE REGULAR. Regular Coffee	O	O	O	O	O	O	O	O	O	O	O	O
CAFE DESCAFEINADO. Decaffeinated Coffee	O	O	O	O	O	O	O	O	O	O	O	O

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EN PROMEDIO, ¿QUE TAN SEGUIDO COME LOS SIGUIENTES ALIMENTOS?
On the average, how often do you eat the following foods?

(CONTINUACION) *(continued)*	PORCION Portion Size			USO PROMEDIO Average Use								
BEBIDAS **Beverages**	P S	M M	G L	6 O MAS VECES AL DIA 6 or more times a day	3 O 5 VECES AL DIA 3 or 5 times a day	2 VECES AL DIA 2 times a day	UNA VEZ AL DIA 1 time a day	5 O 6 VECES POR SEMANA 5 or 6 times a week	2 A 4 VECES POR SEMANA 2 to 4 times a week	UNA VEZ POR SEMANA 1 time a week	1 A 3 VECES AL MES 1 to 3 times a month	RARA VEZ O NUNCA Rarely or never
TE DE HIERBAS. Herbal Tea	O	O	O	O	O	O	O	O	O	O	O	O
TE CON CAFEINA (NEGRO / VERDE) HELADO O CALIENTE. Tea, Hot or Iced	O	O	O	O	O	O	O	O	O	O	O	O
A SU CAFE O TE, ¿LE AÑADE: To your coffee or tea, do you add:												
CREMA EN POLVO PARA CAFE? Non-Dairy Creamer?	O	O	O	O	O	O	O	O	O	O	O	O
LECHE? Milk?	O	O	O	O	O	O	O	O	O	O	O	O
O CREMA? or Real Cream?	O	O	O	O	O	O	O	O	O	O	O	O
¿A SU CAFE O TE, LE AÑADE: To your coffee or tea, do you add:												
AZUCAR? Sugar	O	O	O	O	O	O	O	O	O	O	O	O
O ENDULZANTE ARTIFICIAL (AZUCAR DE DIETA, AZUCAR ARTIFICIAL)? Diet Sugar or Artificial Sweetener?	O	O	O	O	O	O	O	O	O	O	O	O
LECHE ENTERA Y BEBIDAS CON LECHE ENTERA (SIN INCLUIR EN CEREALES). Whole Milk and Beverages with Whole Milk (excluding milk in cereals)	O	O	O	O	O	O	O	O	O	O	O	O
LECHE DESCREMADA, LECHE AL 1% O LECHE EN POLVO RECONSTITUIDA (SIN INCLUIR EN CEREALES). Skim Milk, 1% Milk or Buttermilk, Reconstituted Milk (excluding milk in cereals)	O	O	O	O	O	O	O	O	O	O	O	O

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EN PROMEDIO, ¿QUE TAN SEGUIDO COME LOS SIGUIENTES ALIMENTOS?
On the average, how often do you eat the following foods?

(CONTINUACION) *(continued)*	PORCION Portion Size			USO PROMEDIO Average Use							
BEBIDAS **Beverages**	P S	M M	G L	6 O MAS VECES AL DIA 6 or more times a day	3 O 5 VECES AL DIA 3 or 5 times a day	2 VECES AL DIA 2 times a day	UNA VEZ AL DIA 1 time a day	5 O 6 VECES POR SEMANA 5 or 6 times a week	2 A 4 VECES POR SEMANA 2 to 4 times a week	UNA VEZ POR SEMANA 1 time a week	1 A 3 VECES AL MES 1 to 3 times a month	RARA VEZ O NUNCA Rarely or never
LECHE AL 2% Y BEBIDAS CON LECHE AL 2% (SIN INCLUIR EN CEREALES). 2% Milk and Beverages with 2% Milk (excluding milk in cereals)	○	○	○	○	○	○	ⓓ	○	○	ⓢ	○	○
LECHE CONDENSADA. Condensed Milk	○	○	○	○	○	○	ⓓ	○	○	ⓢ	○	○
LECHE EVAPORADA. Evaporated Milk	○	○	○	○	○	○	ⓓ	○	○	ⓢ	○	○

ALIMENTOS ADICIONALES.
Additional Foods

1. **¿HAY ALGUN OTRO ALIMENTO QUE COME AL MENOS UNA VEZ AL MES Y QUE NO ESTE EN EL CUESTIONARIO?**
   Are there any foods not listed on the questionnaire that you eat at least once a month?

   EN PROMEDIO, ¿QUE TAN SEGUIDO COME LOS SIGUIENTES ALIMENTOS?
   Please list any additional foods and how often on average you eat each food?

	PORCION Portion Size			USO PROMEDIO Average Use							
	P S	M M	G L	6 O MAS VECES AL DIA 6 or more times a day	3 O 5 VECES AL DIA 3 or 5 times a day	2 VECES AL DIA 2 times a day	UNA VEZ AL DIA 1 time a day	5 O 6 VECES POR SEMANA 5 or 6 times a week	2 A 4 VECES POR SEMANA 2 to 4 times a week	UNA VEZ POR SEMANA 1 time a week	1 A 3 VECES AL MES 1 to 3 times a month
A.	○	○	○	○	ⓓ	○	○	ⓢ	○	○	○
B.	○	○	○	○	ⓓ	○	○	ⓢ	○	○	○
C.	○	○	○	○	ⓓ	○	○	ⓢ	○	○	○
D.	○	○	○	○	ⓓ	○	○	ⓢ	○	○	○
E.	○	○	○	○	ⓓ	○	○	ⓢ	○	○	○
F.	○	○	○	○	ⓓ	○	○	ⓢ	○	○	○

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POR FAVOR, CONTESTE LAS SIGUIENTES PREGUNTAS SEGUN A SUS HABITOS ALIMENTARIOS DURANTE EL PERIODO DE TIEMPO QUE LE PIDIERON CONSIDERAR.

2. ¿QUE TAN SEGUIDO SE COME EL PELLEJO DEL POLLO?
   - ○ SEGUIDO O SIEMPRE
   - ○ ALGUNAS VECES
   - ○ RARA VEZ O NUNCA

3. ¿QUE TAN SEGUIDO SE COME LA GRASA DE LA CARNE?
   - ○ SEGUIDO O SIEMPRE
   - ○ ALGUNAS VECES
   - ○ RARA VEZ O NUNCA

4. POR LO GENERAL, CUANDO COMIÓ HAMBURGUESA U OTRA CARNE MOLIDA, ¿QUE TIPO COMIÓ?
   - ○ NO COMIÓ HAMBURGUESA U OTRA CARNE MOLIDA
   - ○ REGULAR
   - ○ MAGRO (80-89% MAGRO)
   - ○ EXTRA MAGRO (90% O MÁS)
   - ○ NO SE

5. POR LO GENERAL, CUANDO COMIÓ LAS CONSERVAS DE ATÚN, ¿QUE TIPO COMIÓ?
   - ○ NO COMIÓ CONSERVAS DE ATÚN
   - ○ ENVASADO EN AGUA
   - ○ ENVASADO EN ACEITE
   - ○ NO SE

6. POR LO GENERAL, CUANDO SE COMIÓ FRUTA, FUE…
   - ○ NO COMIÓ FRUTA
   - ○ FRESCO, CONGELADO
   - ○ CONSERVADO EN JUGOS NATURALES
   - ○ CONSERVADO EN JARABE LIGERO
   - ○ CONSERVADO EN JARABE PESADO

7. POR LO GENERAL, CUANDO USÓ ADEREZOS PARA ENSALADA, ¿QUE TIPO USÓ?
   - ○ NO USÓ ADEREZOS PARA ENSALADA
   - ○ REGULAR
   - ○ BAJO EN GRASA O REDUCIDO EN CALORÍAS
   - ○ SIN GRASA

Please answer the following questions according to your eating habits during the period of time you were asked to consider

2. How often do you eat the skin on chicken?
   - ○ Frequently or Always
   - ○ Sometimes
   - ○ Rarely or Never

3. How often do you eat the fat on meat?
   - ○ Frequently or Always
   - ○ Sometimes
   - ○ Rarely or Never

4. When you ate hamburger or other ground meat, what type did you usually eat?
   - ○ Did not eat hamburger or other ground meat
   - ○ Regular
   - ○ Lean (80-89%)
   - ○ Extra lean (90% or greater lean)
   - ○ Don't know

5. When you ate canned tuna, what type did you usually eat?
   - ○ Did not eat canned tuna
   - ○ Water-packed
   - ○ Oil-packed
   - ○ Don't know

6. When you ate fruit, was it usually…
   - ○ Did not eat fruit
   - ○ Fresh, frozen
   - ○ Canned in natural juices
   - ○ Canned in light syrup
   - ○ Canned in heavy syrup

7. When you used salad dressing, what type did you usually use?
   - ○ Did not use salad dressing
   - ○ Regular
   - ○ Low Fat or Reduced Calorie
   - ○ Fat-Free

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8. **POR LO GENERAL, CUANDO USÓ MAYONESA, ¿QUE TIPO USÓ?**
- ○ NO USÓ MAYONESA
- ○ REGULAR
- ○ BAJO EN GRASA O REDUCIDO EN CALORÍAS
- ○ SIN GRASA

9. **POR LO GENERAL, CUANDO COMIÓ PALOMITAS DE MAÍZ O ESQUITE, ¿COMO FUE PREPARADO?**
- ○ NO COMIÓ PALOMITAS DE MAIZ O ESQUITE
- ○ HECHO EN ACEITE O COMPRADO DEL ALMACEN
- ○ MICROONDA REGULAR
- ○ MICROONDA LIGERO
- ○ HECHO EN AIRE

10. **POR LO GENERAL, ¿QUE TIPO DE GRASA USA?**
- ○ NINGUNA
- ○ MARGARINA PARA UNTAR
- ○ MARGARINA DE BARRA
- ○ MANTEQUILLA
- ○ MITAD MANTEQUILLA, MITAD MARGARINA
- ○ MANTECA O GRASA DE TOCINO
- ○ ACEITE VEGETAL

11. **POR LO GENERAL, ¿CON QUE TIPO DE GRASA O ACEITE COCINA?**
- ○ NO SE O "YO NO COCINO"
- ○ MARGARINA PARA UNTAR
- ○ MARGARINA EN BARRA
- ○ MANTEQUILLA
- ○ ACEITE
- ○ MANTECA, MANTECA DE GRASA O TOCINO
- ○ PAM O "NO USO ACEITE"

12. **¿LLEVA ALGUNA DIETA ESPECIAL?**
- ○ NO
- ○ SI, DIETA PARA BAJAR PESO
- ○ SI, DIETA POR PROBLEMA DE SALUD
- ○ SI, DIETA VEGETARIANA
- ○ SI, DIETA BAJA EN SAL
- ○ SI, DIETA BAJA EN COLESTEROL
- ○ SI, DIETA PARA SUBIR DE PESO

8. **When you used mayonnaise, what type did you usually use?**
- ○ Did not use mayonnaise
- ○ Regular
- ○ Low Fat or Reduced Calorie
- ○ Fat-Free

9. **When you ate popcorn, how was it usually prepared?**
- ○ Did not eat popcorn
- ○ Popped in oil or pre-popped
- ○ Regular microwave
- ○ Light microwave
- ○ Air-popped

10. **What kind of fat do you usually use?**
- ○ Don't add fat
- ○ Soft Margarine
- ○ Stick Margarine
- ○ Butter
- ○ Half Butter, Half Margarine
- ○ Lard, Fatback, Bacon fat
- ○ Vegetable Oil

11. **What kind of fat or oil do you usually cook with?**
- ○ Don't know or don't cook
- ○ Soft Margarine
- ○ Stick Margarine
- ○ Butter
- ○ Oil
- ○ Lard, Fatback or Bacon Fat
- ○ Pam or "no oil"

12. **Are you currently on a special diet?**
- ○ No
- ○ Yes, Weight Loss
- ○ Yes, for Medical Condition
- ○ Yes, Vegetarian
- ○ Yes, Low Salt
- ○ Yes, Low Cholesterol
- ○ Yes, Weight Gain

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VITAMINAS Y SUPLEMENTOS MINERALES
Vitamins and Mineral Supplements

1. RELLENE EL CÍRCULO AL LADO DE CUALQUIER MULTI-VITAMINA O SUPLEMENTO INDIVIDUAL USTED CONSUMÓ. Fill in the circle next to any multiple vitamins or individual supplements consumed.
2. ESCRIBA LA MARCA USADO GENERALMENTE PARA CADA MULTI-VITAMINA. Write in the brand name used most often for each multiple vitamin.
3. RELLENE LOS CÍRCULOS PARA NUMERO DE VECES CADA SEMANA, PARA CADA MULTI-VITAMINA. Fill in the circles for number of times per week for each multiple vitamin.
4. RELLENE LOS CÍRCULOS POR DOSIS (POR CADA PASTILLA), UNIDADES DE SU DOSIS Y CUANTAS VECES POR CADA SEMANA, POR CADA SUPLEMENTO. Fill in the circles for dosage (per pill), dosage units, and the number of times per week for each individual supplement.

MULTI-VITAMINA *Multiple Vitamin*

○ MULTI-VITAMINAS CON MINERALES.
Multi-Vitamins with Minerals

PASTILLAS POR SEMANA / # of Pills Per Week

MARCA / Brand Name _____

○ FORMULA TERAPEUTICA O STRESS.
Therapeutic or Stress Formula

PASTILLAS POR SEMANA / # of Pills Per Week

MARCA / Brand Name _____

○ MULTI-VITAMINAS SIN MINERALES.
Multi-Vitamins without Minerals

PASTILLAS POR SEMANA / # of Pills Per Week

MARCA / Brand Name _____

○ COMPLEJO B.
B-Complex

PASTILLAS POR SEMANA / # of Pills Per Week

MARCA / Brand Name _____

SUPLEMENTOS INDIVIDUALES *Individual Supplements*

○ VITAMINA A. Vitamin A

CANTIDAD / Amount

DOSAGE UNITS: ○ IU ○ g ○ mg ○ mcg (µg) ○ ng ○ RAE ○ mg_TE ○ mcg_DFE ○ ml ○ Other (specify): _____

VECES POR SEMANA / Times Per Week

○ VITAMINA B_6. Vitamin B_6

CANTIDAD / Amount

DOSAGE UNITS: ○ IU ○ g ○ mg ○ mcg (µg) ○ ng ○ RAE ○ mg_TE ○ mcg_DFE ○ ml ○ Other (specify): _____

VECES POR SEMANA / Times Per Week

○ VITAMINA C. Vitamin C

CANTIDAD / Amount

DOSAGE UNITS: ○ IU ○ g ○ mg ○ mcg (µg) ○ ng ○ RAE ○ mg_TE ○ mcg_DFE ○ ml ○ Other (specify): _____

VECES POR SEMANA / Times Per Week

○ VITAMINA D. Vitamin D

CANTIDAD / Amount

DOSAGE UNITS: ○ IU ○ g ○ mg ○ mcg (µg) ○ ng ○ RAE ○ mg_TE ○ mcg_DFE ○ ml ○ Other (specify): _____

VECES POR SEMANA / Times Per Week

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SUPLEMENTOS INDIVIDUALES
Individual Supplements

○ VITAMINA E. Vitamin E

CANTIDAD Amount	DOSAGE UNITS	VECES POR SEMANA Times Per Week
0 0 0 0 0 0 1 1 1 1 1 1 2 2 2 2 2 2 3 3 3 3 3 3 4 4 4 4 4 4 5 5 5 5 5 5 6 6 6 6 6 6 7 7 7 7 7 7 8 8 8 8 8 8 9 9 9 9 9 9	○ IU ○ g ○ mg ○ mcg (µg) ○ ng ○ RAE ○ mg, TE ○ mcg_DFE ○ ml ○ Other (specify): _____	0 0 1 1 2 2 3 3 4 4 5 5 6 6 7 7 8 8 9 9

○ VITAMINA K. Vitamin K

CANTIDAD Amount	DOSAGE UNITS	VECES POR SEMANA Times Per Week
0 0 0 0 0 0 1 1 1 1 1 1 2 2 2 2 2 2 3 3 3 3 3 3 4 4 4 4 4 4 5 5 5 5 5 5 6 6 6 6 6 6 7 7 7 7 7 7 8 8 8 8 8 8 9 9 9 9 9 9	○ IU ○ g ○ mg ○ mcg (µg) ○ ng ○ RAE ○ mg, TE ○ mcg_DFE ○ ml ○ Other (specify): _____	0 0 1 1 2 2 3 3 4 4 5 5 6 6 7 7 8 8 9 9

○ CALCIO (INCLUYENDO ANTI-ACIDOS CON CALCIO).
Calcium (including antacids with calcium)
MARCA. Brand: _____

CANTIDAD Amount	DOSAGE UNITS	VECES POR SEMANA Times Per Week
0 0 0 0 0 0 1 1 1 1 1 1 2 2 2 2 2 2 3 3 3 3 3 3 4 4 4 4 4 4 5 5 5 5 5 5 6 6 6 6 6 6 7 7 7 7 7 7 8 8 8 8 8 8 9 9 9 9 9 9	○ IU ○ g ○ mg ○ mcg (µg) ○ ng ○ RAE ○ mg, TE ○ mcg_DFE ○ ml ○ Other (specify): _____	0 0 1 1 2 2 3 3 4 4 5 5 6 6 7 7 8 8 9 9

○ HIERRO. Iron

CANTIDAD Amount	DOSAGE UNITS	VECES POR SEMANA Times Per Week
0 0 0 0 0 0 1 1 1 1 1 1 2 2 2 2 2 2 3 3 3 3 3 3 4 4 4 4 4 4 5 5 5 5 5 5 6 6 6 6 6 6 7 7 7 7 7 7 8 8 8 8 8 8 9 9 9 9 9 9	○ IU ○ g ○ mg ○ mcg (µg) ○ ng ○ RAE ○ mg, TE ○ mcg_DFE ○ ml ○ Other (specify): _____	0 0 1 1 2 2 3 3 4 4 5 5 6 6 7 7 8 8 9 9

○ MAGNESIO. Magnesium

CANTIDAD Amount	DOSAGE UNITS	VECES POR SEMANA Times Per Week
0 0 0 0 0 0 1 1 1 1 1 1 2 2 2 2 2 2 3 3 3 3 3 3 4 4 4 4 4 4 5 5 5 5 5 5 6 6 6 6 6 6 7 7 7 7 7 7 8 8 8 8 8 8 9 9 9 9 9 9	○ IU ○ g ○ mg ○ mcg (µg) ○ ng ○ RAE ○ mg, TE ○ mcg_DFE ○ ml ○ Other (specify): _____	0 0 1 1 2 2 3 3 4 4 5 5 6 6 7 7 8 8 9 9

○ SELENIO. Selenium

CANTIDAD Amount	DOSAGE UNITS	VECES POR SEMANA Times Per Week
0 0 0 0 0 0 1 1 1 1 1 1 2 2 2 2 2 2 3 3 3 3 3 3 4 4 4 4 4 4 5 5 5 5 5 5 6 6 6 6 6 6 7 7 7 7 7 7 8 8 8 8 8 8 9 9 9 9 9 9	○ IU ○ g ○ mg ○ mcg (µg) ○ ng ○ RAE ○ mg, TE ○ mcg_DFE ○ ml ○ Other (specify): _____	0 0 1 1 2 2 3 3 4 4 5 5 6 6 7 7 8 8 9 9

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SUPLEMENTOS INDIVIDUALES
Individual Supplements

○ ZINC

CANTIDAD Amount	DOSAGE UNITS	VECES POR SEMANA Times Per Week
	○ IU ○ g ○ mg ○ mcg (µg) ○ ng ○ RAE ○ mg, TE ○ mcg_DFE ○ ml ○ Other (specify):	

○ FIBRA. Fiber

CANTIDAD Amount	DOSAGE UNITS	VECES POR SEMANA Times Per Week
	○ IU ○ g ○ mg ○ mcg (µg) ○ ng ○ RAE ○ mg, TE ○ mcg_DFE ○ ml ○ Other (specify):	

○ ACEITE DE PESCADO. Fish Oil

CANTIDAD Amount	DOSAGE UNITS	VECES POR SEMANA Times Per Week
	○ IU ○ g ○ mg ○ mcg (µg) ○ ng ○ RAE ○ mg, TE ○ mcg_DFE ○ ml ○ Other (specify):	

○ OTRO: Other: _____

CANTIDAD Amount	DOSAGE UNITS	VECES POR SEMANA Times Per Week
	○ IU ○ g ○ mg ○ mcg (µg) ○ ng ○ RAE ○ mg, TE ○ mcg_DFE ○ ml ○ Other (specify):	

○ OTRO: Other: _____

CANTIDAD Amount	DOSAGE UNITS	VECES POR SEMANA Times Per Week
	○ IU ○ g ○ mg ○ mcg (µg) ○ ng ○ RAE ○ mg, TE ○ mcg_DFE ○ ml ○ Other (specify):	

GRACIAS POR COMPLETAR ESTE CUESTIONARIO. POR FAVOR TOME UN MOMENTO PARA COMPLETAR CUALQUIER PREGUNTA QUE DEJÓ EN BLANCO.

THANK YOU FOR COMPLETING THIS QUESTIONNAIRE. PLEASE TAKE A MOMENT TO FINISH ANY QUESTIONS YOU MAY HAVE SKIPPED.

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APPENDIX F

ADDITIONAL RESULTS

Factor correlation matrix with promax rotation[1]

Factor	**1**	**2**	**3**	**4**	**5**	**6**
1	1.000	0.163	0.435	0.669	0.184	0.336
2	0.163	1.000	0.194	0.193	0.095	0.039
3	0.435	0.194	1.000	0.571	-0.028	0.350
4	0.669	0.193	0.571	1.000	0.145	0.302
5	0.184	0.095	-0.028	0.145	1.000	0.084
6	0.336	0.039	0.350	0.302	0.084	1.000

[1]Extraction method was principal axis factoring.

APPENDIX G

DATA SHEETS

Data Sheets

ID	Participants' characteristics						
	Age (years)	**Weight (kg)**	**Height (cm)**	**BMI (kg/m^2)**	**Waist circumference (cm)**	**Fasting blood glucose (mg/dL)**	**HbA1c (%)**
10001	60	156.80	62.00	28.68	101.50	109	5.80
10002	45	187.00	62.25	33.92	113.47	125	5.80
10010	58	165.80	59.50	32.92	109.10	121	6.30
10016	47	237.80	62.50	42.80	131.45	112	5.90
10019	33	137.80	59.00	27.83	86.67	105	5.10
10021	52	152.20	59.00	30.74	106.05	182	10.20
10027	41	230.40	67.50	35.55	131.05	271	8.90
10032	33	235.60	64.00	40.44	131.43	91	5.40
10034	42	157.00	60.25	30.40	104.40	111	6.10
10035	39	164.80	57.50	35.04	111.15	107	5.90
10041	38	203.40	59.00	41.08	118.75	130	6.10
10042	44	148.00	59.00	29.89	96.65	117	5.70
10045	38	170.20	61.00	32.16	108.00	174	10.90
10046	54	184.40	62.25	33.45	107.75	240	9.90
10054	31	237.20	64.00	40.71	128.90	150	6.00
10058	56	195.80	58.00	40.92	124.50	136	5.90
10059	29	178.40	64.50	30.15	106.05	121	5.20
10060	34	156.80	60.40	30.22	98.75	123	5.90
10064	50	235.60	62.00	43.09	125.50	151	7.40

BMI, body mass index; HbA1c, hemoglobin A1c.

Data Sheets

ID	Participants' characteristics						
	Age (years)	**Weight (kg)**	**Height (cm)**	**BMI (kg/m^2)**	**Waist circumference (cm)**	**Fasting blood glucose (mg/dL)**	**HbA1c (%)**
10068	42	259.00	60.00	50.58	142.00	171	7.20
10078	41	215.80	61.00	40.77	130.50	90	5.60
10079	53	247.80	62.00	45.32	130.20	99	6.20
10080	32	193.20	62.00	35.33	112.75	123	7.20
10084	42	248.00	61.25	46.47	127.25	163	8.70
10086	38	157.80	57.90	33.09	99.70	111	5.30
10087	49	169.00	62.00	30.91	116.20	115	5.90
10091	44	167.60	60.25	32.46	105.70	95	5.70
10096	53	180.60	59.50	35.86	111.15	136	6.60
10098	28	161.40	57.80	33.96	99.70	108	5.00
10101	53	294.20	58.00	61.48	159.75	145	8.70
10102	51	211.20	65.50	34.61	115.17	97	5.80
10103	56	143.40	59.50	28.48	100.65	197	7.60
10106	43	145.60	61.00	27.51	94.75	92	5.50
10109	50	187.20	62.20	34.02	115.25	90	6.50
10121	46	180.60	59.00	36.47	117.25	117	6.20
10124	32	157.60	59.50	31.30	106.25	146	7.20
10142	49	262.20	60.75	49.95	135.90	204	9.60
10143	70	164.00	59.00	33.12	109.25	159	8.10

BMI, body mass index; HbA1c, hemoglobin A1c.

Data Sheets

ID	Participants' characteristics						
	Age (years)	**Weight (kg)**	**Height (cm)**	**BMI (kg/m^2)**	**Waist circumference (cm)**	**Fasting blood glucose (mg/dL)**	**HbA1c (%)**
10145	58	176.40	59.25	35.32	101.60	108	5.70
10150	48	178.60	56.50	39.33	113.25	153	7.80
10152	48	195.20	63.00	34.57	122.25	126	6.00
10153	58	150.00	58.75	30.55	100.25	137	7.00
10161	44	200.00	62.00	36.58	111.95	109	--
10162	48	165.40	64.00	28.39	107.10	101	6.00
10165	56	169.20	61.20	31.76	110.75	140	7.10
10169	41	148.00	59.50	29.39	105.40	109	5.80
10170	38	223.80	60.50	42.98	136.90	125	5.30
10202	23	171.40	61.00	32.38	107.35	99	5.20
10205	33	253.20	63.25	44.49	130.87	111	5.50
10206	29	198.00	59.75	38.99	122.55	99	5.50
10207	45	155.60	59.50	30.90	98.25	131	5.90
10213	43	194.00	60.00	37.88	124.75	92	5.50
10216	55	183.80	63.00	32.56	115.25	104	6.10
10237	38	249.60	62.00	45.65	136.75	104	4.70
10239	33	190.00	58.00	39.71	121.30	109	5.70
10246	37	188.20	59.60	37.25	113.50	251	8.30
10247	32	144.40	61.25	27.06	96.57	96	5.30

BMI, body mass index; HbA1c, hemoglobin A1c.

Data Sheets

ID	Participants' characteristics						
	Age (years)	**Weight (kg)**	**Height (cm)**	**BMI (kg/m^2)**	**Waist circumference (cm)**	**Fasting blood glucose (mg/dL)**	**HbA1c (%)**
10248	35	182.80	63.00	32.38	107.93	101	6.10
10250	52	132.80	57.20	28.53	93.85	112	6.00
10256	27	150.80	63.00	26.71	104.05	--	--
10259	50	258.20	62.50	46.47	133.30	194	8.10
10261	44	187.40	62.50	33.73	109.25	133	5.70
10263	31	232.00	62.70	41.49	130.75	117	5.70
10272	55	196.60	60.00	38.39	117.25	144	6.30
10275	36	191.20	65.00	31.81	112.25	118	5.30
10282	47	163.20	62.75	29.14	102.45	97	5.40
10284	36	162.40	60.20	31.50	101.35	223	8.50
10287	71	155.40	56.00	34.84	110.67	154	7.80
10295	50	182.60	61.00	34.50	113.25	107	5.30
10300	39	204.00	64.00	35.01	108.60	234	8.00
10301	44	233.20	64.75	39.10	123.85	125	5.60
10305	30	187.60	59.00	37.89	126.90	112	5.50
10329	65	162.60	55.75	36.78	113.70	106	5.90
10341	42	205.60	65.35	33.84	113.10	175	6.50
10495	52	142.80	59.25	28.60	98.80	112	5.70
10542	43	257.60	60.50	49.48	125.20	142	6.30

BMI, body mass index; HbA1c, hemoglobin A1c.

Data Sheets

ID	Participants' characteristics						
	Age (years)	**Weight (kg)**	**Height (cm)**	**BMI (kg/m^2)**	**Waist circumference (cm)**	**Fasting blood glucose (mg/dL)**	**HbA1c (%)**
10543	45	177.40	64.50	29.98	111.75	105	5.40
10608	60	208.60	59.00	42.13	135.00	239	9.00
10616	42	176.00	58.00	36.78	115.50	122	5.70
10618	38	185.60	62.00	33.94	121.25	101	6.10
10621	36	272.60	66.50	43.33	133.83	134	5.70
10633	50	276.40	59.75	54.43	151.75	146	8.30
10637	36	219.60	58.50	45.11	118.25	141	6.40
10643	45	178.00	63.00	31.53	110.00	97	5.70
10648	47	184.20	60.50	35.38	111.25	224	10.00
10649	60	248.20	60.00	48.47	133.25	156	6.80
10651	57	142.00	56.75	31.00	100.25	124	6.30
10654	45	171.80	58.90	34.81	112.50	142	6.00
10657	37	306.40	63.25	53.84	157.83	134	6.20
10667	44	198.40	59.50	39.40	123.75	124	6.30
10678	55	148.20	57.25	31.79	98.00	265	11.40
10680	49	233.80	60.00	45.66	131.75	246	9.00
10695	42	148.00	55.00	34.39	115.75	106	5.60
10699	48	192.80	61.69	35.61	119.50	169	9.20
10703	46	210.20	59.90	41.18	116.43	172	8.30

BMI, body mass index; HbA1c, hemoglobin A1c.

Data Sheets

ID	Participants' characteristics						
	Age (years)	**Weight (kg)**	**Height (cm)**	**BMI (kg/m^2)**	**Waist circumference (cm)**	**Fasting blood glucose (mg/dL)**	**HbA1c (%)**
10708	73	156.40	55.00	36.35	114.00	238	11.80
10711	31	188.40	59.00	38.05	122.83	249	8.10
10726	53	132.80	58.00	27.75	96.75	252	11.80
10729	33	216.00	65.00	35.94	115.33	139	6.70
10731	41	161.80	59.00	32.68	107.00	120	6.20
10735	59	145.80	58.50	29.95	104.25	192	8.80
10737	59	198.00	60.00	38.67	119.75	152	7.30
10752	46	168.00	60.00	32.81	104.25	92	5.90
10758	51	181.80	60.00	35.50	115.25	107	6.30
10769	61	152.40	60.00	29.76	98.50	176	7.70
10788	40	193.00	62.00	35.30	106.75	278	10.80
10793	61	147.00	58.50	30.20	102.25	118	6.80
10795	65	152.40	58.00	31.85	100.75	120	7.10
10796	38	191.60	68.00	29.13	108.25	177	7.80
10798	43	143.80	59.45	28.60	95.00	100	5.60
10799	38	203.20	61.00	38.39	123.75	209	9.90
10800	51	184.40	61.00	34.84	117.00	--	--
10801	38	161.40	58.00	33.73	110.75	162	8.00
10804	49	150.20	61.00	28.38	99.25	236	10.20

BMI, body mass index; HbA1c, hemoglobin A1c.

Data Sheets

ID	Participants' characteristics						
	Age (years)	**Weight (kg)**	**Height (cm)**	**BMI (kg/m^2)**	**Waist circumference (cm)**	**Fasting blood glucose (mg/dL)**	**HbA1c (%)**
10809	51	153.00	58.50	31.43	101.67	103	5.70
10810	43	245.20	62.00	44.84	141.83	111	5.50
10822	45	199.00	59.50	39.52	126.25	266	11.10
10848	56	197.60	63.00	35.00	121.17	271	8.20
10851	48	165.20	57.00	35.75	101.25	113	5.80
10903	43	195.80	64.00	33.61	107.75	120	5.80
10904	39	246.80	63.00	43.71	131.83	119	6.00
10906	43	171.60	61.00	32.42	111.75	116	5.90
10907	37	174.00	59.50	34.55	106.25	152	7.50
10915	48	211.60	62.00	38.70	117.25	112	5.50
10917	42	227.40	59.00	45.92	122.33	103	5.70
10923	31	164.00	61.50	30.48	99.25	116	5.00
10940	37	322.00	60.00	62.88	165.25	104	5.60
10943	44	197.40	60.00	38.55	110.50	127	6.00
10946	48	202.40	62.00	37.02	116.25	108	5.80
10952	40	150.80	62.90	26.80	99.35	110	5.30
10954	40	193.00	59.50	38.32	116.75	112	5.90
10959	34	188.00	63.00	33.30	118.75	101	5.60
10963	31	160.20	56.00	35.91	108.50	98	5.60

BMI, body mass index; HbA1c, hemoglobin A1c.

Data Sheets

ID	Participants' characteristics						
	Age (years)	**Weight (kg)**	**Height (cm)**	**BMI (kg/m^2)**	**Waist circumference (cm)**	**Fasting blood glucose (mg/dL)**	**HbA1c (%)**
10977	51	218.40	61.00	41.26	126.75	--	5.90
10982	49	137.20	57.50	29.17	96.75	105	5.80
10984	36	249.80	62.50	44.96	131.50	100	5.60
10985	54	202.20	61.00	38.20	123.75	124	6.40
10986	57	232.20	61.50	43.16	130.25	107	6.10
10987	36	168.00	59.50	33.36	105.75	101	6.20
10989	36	221.20	62.00	40.45	113.75	112	5.90
10995	38	162.40	62.50	29.23	105.25	99	5.70
11002	41	157.80	62.00	28.86	109.25	109	5.60
11008	48	180.60	57.00	39.08	109.00	136	6.70
11009	31	192.60	62.00	35.22	122.83	112	5.70
11011	40	155.60	61.00	29.40	97.25	94	5.70
11014	45	239.60	62.00	43.82	133.83	240	8.00
11015	55	156.20	60.50	30.00	105.50	102	5.90
11019	34	151.40	62.00	27.69	103.50	92	4.90
11025	47	177.00	60.00	34.56	109.00	112	5.70
11029	32	155.20	59.00	31.34	103.75	117	5.90
11031	30	206.00	61.50	38.29	124.75	114	5.40
11039	32	181.20	63.00	32.09	110.00	126	7.30

BMI, body mass index; HbA1c, hemoglobin A1c.

Data Sheets

ID	Participants' characteristics						
	Age (years)	Weight (kg)	Height (cm)	BMI (kg/m^2)	Waist circumference (cm)	Fasting blood glucose (mg/dL)	HbA1c (%)
11042	39	175.40	60.75	33.41	113.25	135	6.10
11046	51	164.20	60.00	32.06	108.25	98	5.60
11103	32	203.60	60.00	39.76	117.75	132	5.80
11117	35	151.00	61.00	28.53	96.75	94	5.10
11120	56	159.80	61.00	30.19	101.50	99	5.50
11121	52	162.40	59.50	32.25	110.25	145	6.20
11124	59	215.60	61.00	40.73	121.00	112	6.10
11127	31	160.80	59.00	32.47	94.83	113	5.80
90001	35	188.80	56.50	41.58	115.00	100	5.40
90002	43	230.40	60.00	44.99	111.10	107	5.40
90003	31	216.80	59.25	43.41	129.15	129	6.30
90004	53	186.60	59.00	37.68	121.30	132	5.90
90005	19	188.80	62.25	34.25	114.73	102	5.30
90007	61	172.00	61.00	32.50	113.65	115	5.80
90008	43	295.60	60.70	56.40	156.85	121	6.00
90011	43	158.40	58.00	33.10	106.25	143	6.30
90013	41	158.80	60.00	31.01	111.25	113	5.40
90015	59	201.40	60.25	39.00	116.95	106	5.50
90017	37	190.00	62.00	34.75	117.75	98	5.80

BMI, body mass index; HbA1c, hemoglobin A1c.

Data Sheets

ID	Participants' characteristics						
	Age (years)	Weight (kg)	Height (cm)	BMI (kg/m^2)	Waist circumference (cm)	Fasting blood glucose (mg/dL)	HbA1c (%)
90018	34	179.00	57.75	37.73	117.25	120	5.70
90019	31	229.40	61.50	42.64	131.15	126	5.60
90020	47	210.00	61.00	39.67	103.20	80	5.50
90021	19	232.60	63.25	40.87	120.75	88	5.40
90022	18	182.80	61.00	34.54	111.25	96	4.80
90023	42	205.40	62.00	37.56	119.00	164	6.40
90024	53	213.00	58.00	44.51	129.00	115	6.10
90025	38	246.40	61.00	46.55	138.33	114	5.50
90027	54	180.60	61.00	34.12	120.67	104	5.70
90028	39	171.00	62.50	30.77	101.75	275	9.20
90032	40	185.80	63.00	32.91	108.75	165	8.10
90033	48	248.00	62.25	44.99	130.25	120	5.80
90035	39	207.00	59.50	41.10	141.75	91	5.20
90037	47	260.80	63.00	46.19	135.33	215	8.00
90038	42	174.20	60.00	34.02	105.75	129	5.80
90040	38	190.00	59.00	38.37	120.25	116	5.60
90041	29	243.20	62.00	44.48	125.50	105	5.60
90042	52	204.20	60.00	39.88	122.25	150	8.30
90044	48	182.00	65.00	30.28	--	113	5.60

BMI, body mass index; HbA1c, hemoglobin A1c.

Data Sheets

ID	Dietary nutrient intake							
	Energy (kcal)	**CHO (%kcal)**	**CHO (g)**	**Total sugars (g)**	**Fiber (g)**	**Protein (g)**	**Total fat (%kcal)**	**Alcohol (%kcal)**
10001	2027	53	271	82	33	95	30	.29
10002	1103	56	153	16	22	45	30	.05
10010	1189	61	182	82	23	47	27	.43
10016	1110	54	149	59	24	50	32	.13
10019	903	64	144	53	15	37	22	.06
10021	2143	45	241	100	25	99	39	.07
10027	1870	47	219	49	22	93	34	.44
10032	1388	44	151	50	15	61	38	1.84
10034	1483	40	147	39	13	68	42	.60
10035	1367	52	179	76	18	60	33	.00
10041	2373	46	274	113	31	151	30	.00
10042	3220	44	355	95	38	180	34	.03
10045	575	46	66	26	7	33	32	.42
10046	2737	64	440	187	48	107	23	.07
10054	3860	51	495	214	50	153	35	.09
10058	929	48	112	40	12	48	34	.06
10059	695	38	66	20	7	39	39	.35
10060	1027	55	141	52	20	38	34	.14
10064	1449	51	183	74	24	73	32	.17
10065	1607	49	198	63	23	77	33	.66

CHO, carbohydrates; kcal, kilocalories; %kcal, percentage of total kilocalories; g, grams.

Data Sheets

ID	Dietary nutrient intake							
	Energy (kcal)	CHO (%kcal)	CHO (g)	Total sugars (g)	Fiber (g)	Protein (g)	Total fat (%kcal)	Alcohol (%kcal)
10068	1247	54	170	49	26	55	31	.00
10078	976	62	152	54	17	36	26	.00
10079	1617	53	214	68	24	71	32	.03
10080	3268	64	526	207	57	119	23	.28
10084	1354	66	225	96	24	54	21	.00
10086	2845	54	383	163	35	101	35	.09
10087	1274	51	163	62	18	50	35	.00
10091	3237	52	420	220	32	150	31	.13
10096	1398	41	143	60	17	99	32	.00
10098	3398	47	396	192	34	154	36	.27
10101	960	61	147	78	14	40	25	.00
10102	2426	57	346	114	31	91	30	.00
10103	3834	49	468	134	54	172	36	.00
10106	1558	44	171	70	22	72	40	1.10
10109	528	51	68	17	8	24	30	2.19
10121	972	43	105	36	17	57	37	.00
10124	2364	58	341	122	38	100	28	.15
10142	1166	58	169	80	21	52	27	.12
10143	553	63	87	28	13	22	26	.00
10145	2864	60	429	158	62	123	26	.03

CHO, carbohydrates; kcal, kilocalories; %kcal, percentage of total kilocalories; g, grams.

Data Sheets

ID	Dietary nutrient intake							
	Energy (kcal)	**CHO (%kcal)**	**CHO (g)**	**Total sugars (g)**	**Fiber (g)**	**Protein (g)**	**Total fat (%kcal)**	**Alcohol (%kcal)**
10150	3732	41	383	127	47	233	34	.47
10152	1520	56	212	150	14	69	29	.09
10153	1492	60	224	99	28	63	27	.00
10161	1224	54	167	60	17	57	28	.99
10162	2582	52	335	108	47	125	31	.00
10165	1028	48	124	53	10	43	36	.58
10169	1013	49	124	43	15	51	33	.00
10170	1053	42	112	36	12	48	39	1.60
10202	929	41	95	31	9	42	42	.56
10205	1506	48	179	70	17	68	36	.40
10206	1613	48	194	76	18	76	35	.00
10207	1449	39	142	38	16	83	38	.42
10213	2178	50	270	85	27	103	32	.28
10216	1236	52	161	55	28	59	31	.48
10237	1527	68	258	90	36	53	22	.00
10239	1522	60	227	99	37	57	30	.08
10246	1629	44	178	56	19	68	40	1.02
10247	2464	50	307	98	38	104	36	.69
10248	642	54	87	26	12	28	31	.00
10250	1467	56	207	100	27	74	27	.09

CHO, carbohydrates; kcal, kilocalories; %kcal, percentage of total kilocalories; g, grams.

Data Sheets

ID	Dietary nutrient intake							
	Energy (kcal)	**CHO (%kcal)**	**CHO (g)**	**Total sugars (g)**	**Fiber (g)**	**Protein (g)**	**Total fat (%kcal)**	**Alcohol (%kcal)**
10256	1362	54	185	61	22	58	30	.18
10259	2546	41	258	86	26	126	40	.34
10261	1315	45	147	55	16	60	39	.00
10263	1778	52	233	90	16	76	31	.42
10272	3555	53	474	252	55	161	32	.04
10275	1670	49	204	104	18	82	33	.15
10282	2865	67	482	256	49	107	23	.00
10284	1616	49	198	65	25	78	34	.09
10287	1308	56	183	49	23	60	26	2.16
10295	1042	73	189	89	21	34	18	.00
10300	883	51	112	50	16	45	31	.03
10301	981	50	122	54	16	48	33	.62
10305	3917	46	453	169	36	185	36	.21
10329	717	69	123	59	17	25	22	.18
10341	2064	45	232	55	28	101	36	.29
10495	1325	49	163	80	15	56	36	.06
10542	1021	55	140	34	14	43	29	.75
10543	1437	54	195	72	25	63	30	.49
10608	2111	49	258	94	31	97	34	.06
10616	538	39	53	12	8	33	37	1.43

CHO, carbohydrates; kcal, kilocalories; %kcal, percentage of total kilocalories; g, grams.

Data Sheets

ID	Dietary nutrient intake							
	Energy (kcal)	**CHO (%kcal)**	**CHO (g)**	**Total sugars (g)**	**Fiber (g)**	**Protein (g)**	**Total fat (%kcal)**	**Alcohol (%kcal)**
10618	2102	39	205	72	22	129	37	.72
10621	1807	41	183	67	20	92	40	.66
10633	1213	63	192	65	27	43	26	.05
10637	1234	66	202	105	15	39	25	.26
10643	1898	44	208	89	19	112	34	.00
10648	903	64	145	54	18	34	25	.16
10649	1028	57	147	45	11	41	28	.23
10651	1006	58	146	49	21	34	32	.41
10654	1236	48	149	53	14	51	37	.53
10657	1250	59	183	100	15	52	27	.11
10667	1308	51	167	54	23	60	33	.46
10678	667	50	83	31	16	33	35	.36
10680	855	59	126	60	16	38	27	.07
10695	635	59	93	34	10	25	28	.09
10699	1237	53	165	66	18	60	30	.63
10703	1459	66	239	118	21	46	25	.10
10708	1188	68	201	83	21	38	23	.00
10711	767	46	88	33	13	53	28	.00
10726	1600	71	284	176	17	47	20	.20
10729	1378	52	179	64	19	69	30	.00

CHO, carbohydrates; kcal, kilocalories; %kcal, percentage of total kilocalories; g, grams.

Data Sheets

ID	Dietary nutrient intake							
	Energy (kcal)	**CHO (%kcal)**	**CHO (g)**	**Total sugars (g)**	**Fiber (g)**	**Protein (g)**	**Total fat (%kcal)**	**Alcohol (%kcal)**
10731	2318	47	270	91	37	103	38	.10
10735	1209	56	170	30	24	60	26	.11
10737	661	70	115	37	18	22	21	.00
10752	1029	48	124	44	11	40	37	.34
10758	720	53	95	24	10	29	33	.00
10769	1441	66	237	124	16	58	20	.50
10788	2141	52	279	126	38	105	32	.11
10793	903	60	135	21	18	35	27	.00
10795	791	61	120	41	11	27	29	.17
10796	1616	49	198	73	27	75	33	2.58
10798	1536	55	210	80	32	62	32	.00
10799	2216	63	349	217	48	94	25	.00
10800	2074	66	340	210	29	80	24	.12
10801	1542	48	186	73	24	72	36	.09
10804	1394	47	165	57	24	69	34	.88
10809	1400	56	197	101	17	71	26	.05
10810	3301	50	413	164	43	175	31	.07
10822	1878	45	213	71	28	102	35	.07
10848	892	68	152	30	19	30	21	.03
10851	923	66	152	18	19	34	22	.00

CHO, carbohydrates; kcal, kilocalories; %kcal, percentage of total kilocalories; g, grams.

Data Sheets

ID	Dietary nutrient intake							
	Energy (kcal)	CHO (%kcal)	CHO (g)	Total sugars (g)	Fiber (g)	Protein (g)	Total fat (%kcal)	Alcohol (%kcal)
10903	1056	66	174	44	30	38	24	.09
10904	1706	60	257	107	28	66	27	.08
10906	1395	66	230	62	32	50	23	.26
10907	2995	64	477	262	49	107	26	.08
10915	1056	56	148	79	15	51	28	.05
10917	961	51	122	39	11	41	34	.00
10923	2020	58	295	102	34	88	27	.00
10940	1348	56	188	59	18	45	33	.16
10943	1166	38	110	25	16	86	33	.00
10946	693	65	112	16	17	25	24	.00
10952	2258	54	302	93	45	103	29	2.72
10954	2371	42	248	95	18	111	40	.38
10959	863	48	103	26	15	41	35	.16
10963	1875	58	270	103	28	77	28	.03
10977	2540	47	299	103	38	113	37	.00
10982	1007	59	150	47	15	45	25	.00
10984	650	64	104	36	16	25	24	.00
10985	1839	56	257	111	34	81	29	.13
10986	2665	46	304	118	24	121	38	.03
10987	1127	59	166	27	21	45	27	.00

CHO, carbohydrates; kcal, kilocalories; %kcal, percentage of total kilocalories; g, grams.

Data Sheets

ID	Dietary nutrient intake							
	Energy (kcal)	**CHO (%kcal)**	**CHO (g)**	**Total sugars (g)**	**Fiber (g)**	**Protein (g)**	**Total fat (%kcal)**	**Alcohol (%kcal)**
10989	764	58	111	45	16	36	28	.00
10995	1528	44	170	68	24	72	38	.92
11002	1316	60	199	70	17	58	24	.06
11008	1100	59	163	43	17	41	28	.05
11009	1911	58	278	69	43	85	27	.07
11011	1609	55	220	70	23	66	31	.09
11014	1605	44	177	60	17	91	35	.00
11015	1780	46	206	50	29	88	36	.03
11019	1110	45	124	40	10	48	39	.01
11025	759	63	120	19	16	31	22	.07
11029	1760	56	246	107	30	80	29	.08
11031	1579	43	170	54	19	77	39	.00
11039	1920	53	254	53	28	76	33	.00
11042	1181	51	150	19	26	53	34	.00
11046	1095	57	155	36	19	48	28	.00
11103	2050	72	369	237	23	53	20	.38
11117	2123	48	253	93	29	103	34	.48
11120	840	58	121	56	14	34	29	1.04
11121	1404	46	162	58	17	71	35	.10
11124	1295	69	223	141	29	38	25	.00

CHO, carbohydrates; kcal, kilocalories; %kcal, percentage of total kilocalories; g, grams.

Data Sheets

ID	Dietary nutrient intake							
	Energy (kcal)	**CHO (%kcal)**	**CHO (g)**	**Total sugars (g)**	**Fiber (g)**	**Protein (g)**	**Total fat (%kcal)**	**Alcohol (%kcal)**
11127	1297	41	133	49	13	69	37	1.51
90001	1740	62	270	129	32	71	25	.01
90002	1723	68	293	173	25	51	23	.00
90003	1433	55	198	82	32	67	29	.43
90004	2302	48	277	135	20	110	34	.02
90005	1436	44	159	56	13	70	37	.10
90007	2039	51	258	111	27	109	29	.56
90008	2182	46	249	88	22	93	38	.28
90011	1485	51	191	77	25	74	32	.00
90013	1880	50	234	94	19	82	34	.13
90015	1445	74	268	131	29	44	18	.00
90017	1414	46	162	45	22	65	37	.10
90018	2346	62	362	176	42	94	26	.02
90019	2651	46	306	126	20	110	38	.51
90020	1517	43	162	63	16	75	39	.29
90021	633	66	104	40	14	24	23	.00
90022	1509	55	209	126	15	83	25	.04
90023	1710	58	246	104	30	80	26	.55
90024	525	51	67	21	6	27	31	.11
90025	1433	59	210	53	34	72	26	.04

CHO, carbohydrates; kcal, kilocalories; %kcal, percentage of total kilocalories; g, grams.

Data Sheets

ID	Dietary nutrient intake							
	Energy (kcal)	**CHO (%kcal)**	**CHO (g)**	**Total sugars (g)**	**Fiber (g)**	**Protein (g)**	**Total fat (%kcal)**	**Alcohol (%kcal)**
90027	694	73	127	73	13	19	22	.00
90028	1479	50	185	83	20	60	37	.02
90032	2236	54	303	88	34	88	33	.00
90033	1454	55	201	42	23	54	32	.00
90035	2033	53	270	42	31	92	30	.00
90037	3474	47	407	159	42	178	33	.51
90038	1526	50	192	89	14	83	29	.00
90040	1022	64	164	33	19	39	24	.08
90041	2296	46	263	100	35	124	36	.09
90042	1346	58	194	30	23	60	26	.00
90044	4145	61	635	277	83	142	29	.00

Data Sheets

ID	Food group servings consumed per day				
	Dairy	Read meat	Mixed dishes	Soups & gravies	Eggs
10001	2.504718	.259871	1.682052	1.823452	.146428
10002	.214301	.127913	.997338	.865386	.362768
10010	.987234	.245545	.490586	.133870	.000000
10016	1.123024	.141200	.496994	1.661861	.084624
10019	2.497422	.176941	.159558	.179268	.042752
10021	3.775460	.354212	1.277464	.677812	.727611
10027	.558510	1.421435	1.612987	1.573500	.360692
10032	1.758346	.093547	1.776589	.818181	.042719
10034	1.820864	.645758	1.899647	.433225	.072723
10035	1.701893	.244976	.744789	.139907	.144050
10041	1.166114	.395444	2.671032	.699187	.359842
10042	.862290	1.558500	3.625812	3.041352	.363051
10045	1.557549	.438214	.406826	.077922	.072950
10046	5.545946	.534567	.470342	3.078981	.128015
10054	3.769470	1.611314	2.434627	2.680533	.532355
10058	1.547874	.212825	.481307	.388747	.181148
10059	.927746	.593851	.517757	.434247	.357294
10060	.029538	.198279	.893689	1.672507	.042686
10064	.995420	.605493	.961606	.973428	.072459
10065	.752468	.577618	1.070112	.819904	.183224
10068	.567101	.155181	.158434	.559471	.361258
10078	.362574	.223465	.525370	1.039769	.084161
10079	.322084	.763692	.885476	2.043933	.364089
10080	1.303952	.607971	1.584175	2.245719	.000000
10084	.351192	.032557	.190610	4.123455	.000000
10086	4.486109	.381751	1.354064	.879796	.364749

Data Sheets

ID	Food group servings consumed per day				
	Dairy	**Read meat**	**Mixed dishes**	**Soups & gravies**	**Eggs**
10087	.081652	.424516	.521341	.480931	.545095
10091	5.190167	.797237	1.190835	.238135	1.518472
10096	.165823	.290386	1.643260	.278279	.760821
10098	8.392239	.596230	2.488089	1.038436	1.499447
10101	1.783005	.016973	.423404	.383891	.072459
10102	2.195685	.272411	3.001361	.156558	.218887
10103	2.266550	1.319854	2.290701	2.985896	2.310208
10106	.979840	.029739	1.175830	.148194	.721949
10109	.021173	.178269	.377537	.834848	.181148
10121	.443977	.345901	.667081	.416007	.362390
10124	1.300712	.744373	1.217860	2.102230	.533063
10142	1.580374	.671197	.249662	.493474	.362673
10143	.795555	.000000	.083333	1.157614	.181148
10145	4.271627	.391535	.835606	1.690842	.000000
10150	4.121875	2.280416	2.226931	.865025	.181148
10152	1.932613	.098022	.116787	2.480486	.033850
10153	.998545	.316461	.385281	2.240846	.760821
10161	1.161654	.260610	.508070	.932135	.144616
10162	.999110	.754297	.982767	2.300669	1.523228
10165	1.318663	.552473	.992656	.818181	.000000
10169	.912590	.268290	.620818	.213015	.144277
10170	.469992	.416516	1.370986	.740128	.050149
10202	.532964	.679348	.933879	1.790851	.142238
10205	2.172913	.272107	1.839239	1.576387	.000000
10206	1.697270	1.114693	.869844	.525558	.000000
10207	.892907	.588907	1.750535	.511983	.216906

Data Sheets

ID	Food group servings consumed per day				
	Dairy	**Read meat**	**Mixed dishes**	**Soups & gravies**	**Eggs**
10213	2.128327	.552941	2.395751	1.576048	.722516
10216	.143345	.261410	.904329	1.612342	.364655
10237	.624923	.420777	.033333	.241535	.359842
10239	.907235	.056514	.860188	.730685	.366165
10246	.876129	.753407	.744632	1.033218	.359559
10247	1.249101	.643773	1.461808	1.025121	.358144
10248	.100617	.180900	.248027	.194977	.000000
10250	2.024019	.385492	.718072	.194805	.181148
10256	.840159	.265811	.675904	.466202	.211810
10259	1.711964	1.181007	2.708311	1.846028	.545803
10261	.418916	1.435382	.249149	.189739	1.518472
10263	2.872863	.376639	1.247536	.750830	.532355
10272	10.231395	.093806	.942605	1.635421	1.531551
10275	4.027489	.583504	.765403	.434721	.033532
10282	2.846532	.096399	.372389	.568290	.724780
10284	1.926389	.265633	1.370458	1.491861	.359276
10287	1.912496	.055670	.923943	.539397	.369185
10295	.953535	.179876	.220825	.387467	.000000
10300	1.738933	.240720	.348125	.986561	.360125
10301	.599507	.555346	.642464	.897027	.144616
10305	1.479201	2.744030	2.194608	2.788336	.531648
10329	1.151544	.000000	.147576	.142857	.146994
10341	.838231	.562303	2.732775	.563975	.181809
10495	1.558983	.336870	1.487509	.848479	.727611
10542	.498028	.218487	.581173	1.791676	.000000
10543	1.025092	.317797	1.698424	1.082336	.144730

Data Sheets

ID	Food group servings consumed per day				
	Dairy	Read meat	Mixed dishes	Soups & gravies	Eggs
10608	1.208079	1.000710	1.677372	1.093078	.366071
10616	.818345	.496122	.269437	1.499999	.181809
10618	2.460735	.907761	2.510406	1.721636	.359842
10621	1.677208	.384361	2.568957	.528882	.359276
10633	.723892	.149138	.361784	.207751	.000000
10637	.043020	.190011	.973684	.540380	.143824
10643	3.534834	.839045	1.139997	.959183	.723648
10648	.252472	.102297	.349131	.139842	.072459
10649	.151643	.453696	.182481	.836874	.366071
10651	.539408	.068144	.114727	.897205	.085218
10654	1.440923	.233173	.454889	.702378	.361824
10657	1.090995	.272055	.972857	.614871	.083897
10667	.416053	.559615	.535245	1.499999	.072610
10678	.960659	.112271	.281881	.273801	.364655
10680	2.070090	.192705	.178607	.383715	.000000
10695	.133684	.062546	.642240	.878317	.033691
10699	.547930	.298965	1.261128	.581667	.144956
10703	1.108823	.226059	.318278	1.499999	.362107
10708	.792732	.000000	.289602	.997429	.000000
10711	.454070	.736363	.277532	.275386	.042785
10726	.766154	.306346	.677607	.898592	.042268
10729	2.395378	.523323	.635715	1.013374	.083633
10731	.944303	.500811	1.588252	1.046972	.721383
10735	.159331	.590447	.349714	2.368685	.128840
10737	.125953	.000000	.046856	1.277173	.072459
10752	.705383	.126979	1.216750	.336097	.084492

Data Sheets

ID	Food group servings consumed per day				
	Dairy	Read meat	Mixed dishes	Soups & gravies	Eggs
10758	.000000	.052770	.461556	.429323	.363523
10769	3.363009	.069205	.128355	.818181	.072459
10788	.426232	1.049677	1.867818	2.255464	.084095
10793	.107431	.101725	.252017	1.150004	.366354
10795	1.195259	.035815	.425860	.836855	.072459
10796	1.481283	.503967	.498059	.583448	.359842
10798	1.180426	.073950	.225900	.244348	.144503
10799	3.758885	.101093	.161499	.415479	1.511338
10800	2.667272	.229631	.740308	1.083912	.145409
10801	2.608917	.274922	.927143	1.002308	.719685
10804	.349937	.165136	1.329128	1.357888	.362956
10809	2.790700	.015066	1.020428	1.615992	.362296
10810	4.073097	1.087859	2.019199	3.040513	.763001
10822	1.385837	.252922	1.940080	1.299006	.361824
10848	1.115616	.063593	.190505	.194805	.000000
10851	.479288	.098464	.132451	.253570	.362673
10903	.575088	.167973	.389094	1.038961	.000000
10904	1.370710	.393030	.946316	3.207760	.215207
10906	.714667	.029276	.527372	1.320261	.084293
10907	2.689713	.441235	.716797	.277857	.073007
10915	2.617347	.435204	.028974	.228435	.145069
10917	1.258207	.482357	.890616	.498861	.084227
10923	1.131509	.621434	.361668	.213616	.715721
10940	.099009	.261987	.862681	.142857	.083831
10943	.603852	.164343	.422371	.848587	.033744
10946	.000000	.028189	.159404	.033333	.362956

Data Sheets

ID	Food group servings consumed per day				
	Dairy	**Read meat**	**Mixed dishes**	**Soups & gravies**	**Eggs**
10952	.848566	.156047	1.269688	1.389752	.721383
10954	1.446483	.565054	3.556975	.716340	.000000
10959	.342080	.266979	.632672	1.810263	.182941
10963	1.863032	.424471	1.141881	2.361674	.033400
10977	.632377	.495601	4.141911	1.377365	.033929
10982	2.874478	.065417	.184898	1.708934	.000000
10984	.000000	.030856	.031158	1.044360	.000000
10985	.961749	.428402	.418392	1.024100	1.530362
10986	5.916428	.978875	2.483282	.637613	.551465
10987	1.272622	.156242	.098011	.499230	.000000
10989	.184185	.032469	.086315	.410404	.182658
10995	1.102548	1.066059	.143434	.818181	1.511338
11002	.289147	.248954	.425143	1.038961	.000000
11008	.282980	.070083	.297101	.851515	.725347
11009	1.452055	.256129	.769881	.418068	.143144
11011	3.009195	.381779	.553245	.797619	.084095
11014	2.454189	.214230	.922624	1.447112	.033744
11015	3.789914	.026740	.834645	1.601427	.365221
11019	.828529	.413348	.680685	.438804	.768352
11025	1.000000	.085607	.186872	.195077	.000000
11029	3.071003	.286266	.717012	.354172	.357861
11031	2.979414	.484795	.208120	1.638504	.715721
11039	1.326923	.662179	.732718	1.998996	.358144
11042	.978432	.000000	.113886	.162113	.360125
11046	1.499534	.179344	.094795	.834848	.363523
11103	.412603	.486659	.828637	.315374	.143257

Data Sheets

ID	Food group servings consumed per day				
	Dairy	Read meat	Mixed dishes	Soups & gravies	Eggs
11117	2.925971	1.029239	1.024103	1.159472	.358993
11120	1.396871	.164673	.422678	.886889	.016907
11121	1.795444	.317073	1.334438	.304057	.436567
11124	1.881168	.090103	.583333	1.499999	.085284
11127	1.137369	.574653	1.587146	2.405441	.033612
90001	2.251589	.408644	.936643	.343927	.143597
90002	.141714	.136126	.790370	1.788480	.144503
90003	.143862	.328213	1.006473	.329664	.143144
90004	3.671747	1.230740	1.396516	.925479	.364089
90005	1.213806	1.078334	.775679	1.549592	.777270
90007	1.950726	.703899	1.307212	1.047059	.553588
90008	2.325919	1.162412	2.196176	.871918	.722516
90011	1.706497	1.702272	.475911	.524737	.050479
90013	2.160542	.573890	1.235707	1.442498	.721383
90015	.487020	.062617	.000000	.431329	.072459
90017	1.674796	.511076	.847012	1.176476	.359559
90018	2.863809	.227298	.924917	1.280342	.143484
90019	1.599608	1.067480	1.134630	1.596546	1.503014
90020	1.283214	.390610	1.147131	.628609	.362390
90021	.570687	.072620	.507502	.047119	.000000
90022	5.069666	.557481	.343960	.078490	.017286
90023	.542440	.639200	.365711	2.378384	.000000
90024	1.075107	.059381	.358604	.259302	.000000
90025	.494505	.192221	.482792	1.545749	.182375
90027	.452349	.053616	.116667	.000000	.072459
90028	1.845023	.508700	.343691	.285811	.720251

Data Sheets

ID	Food group servings consumed per day				
	Dairy	**Read meat**	**Mixed dishes**	**Soups & gravies**	**Eggs**
90032	3.278437	.376037	.994936	.848642	.720817
90033	.602621	.604664	.777065	2.212169	.544387
90035	1.138932	.000000	1.701234	.711275	.214924
90037	3.734642	1.374226	3.532965	1.549999	.362390
90038	3.425431	.243491	.570511	.453949	.360975
90040	.907159	.055802	.412736	1.129926	.125372
90041	3.063836	.824628	1.318366	1.690865	.357294
90042	.614726	.413100	.960783	.818181	.072459
90044	1.646117	.000000	.860579	1.937767	.362673

Data Sheets

ID	Food group servings consumed per day				
	Beans & seeds	**Bread & cereals**	**Pastries**	**Salty snacks**	**Fruits**
10001	1.272813	5.980166	.155372	.000000	1.867517
10002	.747550	7.472354	.034526	.046593	.445828
10010	.271727	4.100825	.076824	.181733	4.720547
10016	.538426	1.441767	.381067	.104496	3.443654
10019	1.088087	3.561522	.000000	.000000	.710865
10021	.956387	3.963584	.307826	.152218	2.240012
10027	.338902	4.487984	.472545	.050404	1.357632
10032	.383601	1.999999	.634978	.373022	.617826
10034	.390963	2.157642	.518488	.317901	.337478
10035	.588825	3.142904	.124614	.112091	3.984511
10041	1.058052	1.436103	.534587	.091376	3.981519
10042	1.195489	4.999057	1.909205	.094832	1.751906
10045	.280311	1.308076	.132593	.023188	.600864
10046	1.460694	8.466274	.913131	.066667	11.62440
10054	2.360607	3.679354	1.083849	.678554	7.582441
10058	.461276	2.207191	.118314	.000000	1.302668
10059	.141279	1.271075	.140018	.058970	.389868
10060	1.762653	2.030103	.404464	.024825	4.122032
10064	.898673	2.489056	.125908	.284640	3.221812
10065	1.025458	2.912485	.165026	.159617	2.626439
10068	1.897071	1.358234	.000000	.000000	.709085
10078	.033333	4.522232	.000000	.000000	1.897586
10079	.597497	2.497996	.681855	.062160	2.778602
10080	2.657449	8.365645	1.489348	.206117	13.85510
10084	.204589	.727119	.000000	.135797	3.289602

Data Sheets

ID	Food group servings consumed per day				
	Beans & seeds	**Bread & cereals**	**Pastries**	**Salty snacks**	**Fruits**
10086	2.258020	4.669926	1.333180	.356369	3.569419
10087	.599634	1.483988	.513202	.042782	2.283021
10091	1.560347	3.142416	1.986738	.000000	2.694318
10096	.193559	1.673430	.000000	.000000	1.781263
10098	1.364240	4.526633	1.034150	.134548	2.067361
10101	.444681	.724936	.342319	.058586	1.817533
10102	.721139	4.200601	.403653	.000000	3.929139
10103	.378596	5.138736	.333825	.169966	6.177748
10106	1.057526	1.461084	.660886	.112823	3.975823
10109	.054441	1.999999	.058757	.142857	.545758
10121	.929572	1.174929	.000000	.000000	1.618927
10124	.535803	6.976171	.634550	.096101	4.279636
10142	.624198	2.685349	.127022	.066667	3.639454
10143	.489365	2.344135	.000000	.000000	.724183
10145	4.656622	5.199860	.215952	.044283	7.124209
10150	3.460948	5.494726	.541939	.000000	2.626376
10152	.446080	.462738	.370614	.000000	.475557
10153	.269246	2.763544	.087844	.023188	3.360988
10161	.226580	1.763528	.261548	.024536	1.434221
10162	1.019711	4.720704	.370614	.052330	3.743623
10165	.393555	1.112090	.211269	.049689	.291084
10169	.336902	2.840313	.130922	.052763	2.488240
10170	.241780	.313475	.000000	.000000	.919210
10202	.113185	.376002	.107199	.197164	.869484
10205	.642414	2.914432	.406135	.000000	1.148813

Data Sheets

ID	Food group servings consumed per day				
	Beans & seeds	**Bread & cereals**	**Pastries**	**Salty snacks**	**Fruits**
10206	.356465	3.409542	.000000	.132507	3.241346
10207	.346594	2.719477	.561509	.046593	1.148126
10213	1.486486	1.787228	.654396	.157919	2.686114
10216	1.430328	2.321168	.537839	.051897	2.220887
10237	1.535935	8.186938	.184782	.000000	2.792469
10239	1.424414	2.617840	.000000	.032980	7.311164
10246	.375835	2.055467	.490445	.560959	2.464328
10247	1.290614	3.474730	.889018	.199444	2.552032
10248	.525340	1.038140	.227809	.000000	1.184581
10250	.246595	2.365850	.255639	.024305	5.417992
10256	1.504595	2.909849	.426696	.102457	1.347527
10259	.878773	3.044368	1.002290	.199638	1.345143
10261	.088585	1.508664	.261210	.087038	2.357401
10263	.270573	4.797459	.540096	.271624	1.256175
10272	2.095530	4.608026	.804125	.057716	8.508149
10275	.496371	2.193435	.485853	.159218	1.638340
10282	.904403	4.265254	.255879	.000000	11.28577
10284	.982542	3.147265	.062397	.000000	2.236202
10287	.998635	6.076652	.000000	.000000	2.045202
10295	.469299	3.399021	.149861	.000000	4.171096
10300	.523236	1.290642	.000000	.000000	2.441677
10301	.459131	1.388111	.149493	.077897	2.869648
10305	.192291	5.571124	1.626362	.681239	6.477698
10329	.352826	2.054235	.210239	.000000	3.205747
10341	1.642474	2.753296	.316236	.261307	1.131312

Data Sheets

ID	Food group servings consumed per day				
	Beans & seeds	**Bread & cereals**	**Pastries**	**Salty snacks**	**Fruits**
10495	.336349	2.291439	.096951	.000000	2.471488
10542	.274649	2.610457	.196660	.145592	.540258
10543	.885645	1.754258	.034526	.108660	4.202342
10608	2.155778	2.891783	.000000	.000000	1.669628
10616	.343675	1.101351	.086875	.000000	1.109850
10618	.689856	2.665774	1.374780	.231418	3.118487
10621	.384470	.397722	.673011	.000000	1.878573
10633	1.986854	4.249080	.327629	.000000	5.099961
10637	.083333	1.065013	.028857	.023188	3.068571
10643	.410184	2.621684	.552191	.082433	2.535275
10648	.567941	2.425192	.543998	.000000	2.761515
10649	.253344	3.292213	.000000	.024074	1.958936
10651	.395514	2.477615	.096886	.173585	1.609946
10654	.634543	1.222512	.664106	.361594	1.608451
10657	.453147	1.352328	.099367	.090286	1.528410
10667	1.608011	3.099945	.413174	.082750	3.678057
10678	.296883	1.366939	.000000	.000000	1.603017
10680	.449058	.825903	.359296	.000000	2.957750
10695	.458173	2.169987	.034799	.023188	.371937
10699	.458322	.972540	.178503	.044688	3.948223
10703	.731221	4.402831	.596552	.066667	1.899806
10708	.378723	5.006601	.698787	.047961	3.064719
10711	.281167	2.299353	.099498	.056679	1.586895
10726	.188290	2.221891	.414742	.106051	2.697481
10729	1.166439	3.136340	.712452	.119925	1.771318

Data Sheets

ID	Food group servings consumed per day				
	Beans & seeds	**Bread & cereals**	**Pastries**	**Salty snacks**	**Fruits**
10731	1.571950	5.053731	.658675	.811278	4.429703
10735	1.131910	7.597331	.100746	.000000	.244883
10737	.789229	2.484661	.000000	.047263	2.852068
10752	.483602	1.238124	1.041912	.000000	.571447
10758	.090113	1.729603	.318386	.000000	.777114
10769	.297298	2.329709	1.046279	.000000	.325048
10788	.837226	1.926578	.178236	.117068	6.703477
10793	.416833	7.418511	.218016	.000000	.230812
10795	.100642	.534024	.000000	.000000	1.816096
10796	.265475	1.781521	.061877	.098370	2.867948
10798	2.474283	1.976902	.924110	.166862	2.265458
10799	.405695	2.233882	.000000	.000000	13.65263
10800	1.355268	1.920575	.376054	.142857	4.010445
10801	.859511	2.457513	.479466	.024710	2.253354
10804	1.312787	1.999999	.118125	.091757	1.806510
10809	.390262	1.781283	.092126	.000000	1.569220
10810	.899026	6.051322	.705741	.086125	4.793561
10822	.274129	4.496288	.574831	.113260	2.863243
10848	.857116	7.646722	.382540	.000000	.337755
10851	.133518	7.947233	.000000	.000000	.629006
10903	1.158186	7.316818	.060577	.000000	2.831806
10904	.628713	1.679225	.061617	.052309	5.146893
10906	.728047	8.188118	.199224	.095447	2.441761
10907	1.613910	3.712409	.121728	.324579	11.74642
10915	.648771	1.228035	.184148	.000000	2.966683

Data Sheets

ID	Food group servings consumed per day				
	Beans & seeds	**Bread & cereals**	**Pastries**	**Salty snacks**	**Fruits**
10917	.100944	1.253165	.095636	.000000	.943936
10923	1.546036	8.377379	.136492	.215295	4.879776
10940	.355325	7.395242	.998347	.198611	.345480
10943	.566307	4.201340	.502628	.062502	.569232
10946	.440476	7.321564	.050964	.000000	.250257
10952	.791493	4.648799	.160570	.324025	3.715162
10954	.187695	1.449053	1.411966	.052763	.847046
10959	.829506	1.380129	.193511	.113043	.625119
10963	.329675	5.009522	.609541	.160146	2.583030
10977	1.435759	2.129781	.058497	.040877	1.317038
10982	.234282	4.894099	.278627	.042782	.753099
10984	.797510	.849041	.197791	.000000	1.655641
10985	1.075218	4.912246	.611593	.090914	4.749128
10986	.476693	7.870976	1.171096	.242756	.089818
10987	.611730	7.953297	.062397	.118216	1.055014
10989	1.043698	1.227527	.035346	.000000	1.231610
10995	1.121320	3.153198	.287929	.031703	2.327389
11002	.000000	7.414629	1.309551	.076185	.139440
11008	.033333	7.550529	.889157	.000000	.478903
11009	3.182349	7.865968	.300132	.159737	2.385745
11011	.428473	8.135138	1.196998	.115599	.981663
11014	.457072	2.190800	.121339	.000000	.677681
11015	2.237236	5.385363	.000000	.000000	1.874143
11019	.521158	.612646	.267137	.113043	.425557
11025	1.109697	4.202569	.896956	.000000	.817100

Data Sheets

ID	Food group servings consumed per day				
	Beans & seeds	**Bread & cereals**	**Pastries**	**Salty snacks**	**Fruits**
11029	.939332	3.127340	1.610309	.093421	3.226110
11031	.115404	5.483915	.200189	.000000	1.202465
11039	.409317	8.569349	1.287418	.435364	1.178535
11042	1.514317	7.346427	.924252	.000000	.464786
11046	.256483	5.822653	.125351	.126123	1.536172
11103	.995359	4.296127	.256725	.144232	2.326807
11117	1.462396	5.408938	.303438	.220529	4.029848
11120	.500371	1.084990	.327921	.000000	2.303771
11121	.756032	2.377865	.478971	.098945	1.004101
11124	.478445	1.464511	.000000	.000000	12.39834
11127	.224721	.624714	.252092	.376557	.944233
90001	.651045	3.323013	.195293	.122787	5.441626
90002	1.284542	1.188898	.109083	.088389	2.790986
90003	.927083	2.208312	.588803	.024912	5.324701
90004	.550009	1.823605	1.561067	.150177	1.621959
90005	.227168	1.319754	.206162	.071364	.743810
90007	.216597	2.827500	1.823551	.000000	2.724962
90008	.517510	2.664649	.502379	.199372	2.096700
90011	.784361	2.094207	.055278	.161542	8.144279
90013	.054441	1.809957	.087303	.158290	2.546148
90015	.446515	2.485891	.033159	.000000	6.615143
90017	1.487316	4.156080	.755352	.000000	1.149855
90018	1.424531	3.965958	.195233	.133520	5.221583
90019	.471121	3.278871	2.332434	.385271	2.325214
90020	.752781	.819199	.418481	.415141	1.419760

Data Sheets

ID	Food group servings consumed per day				
	Beans & seeds	**Bread & cereals**	**Pastries**	**Salty snacks**	**Fruits**
90021	.411584	1.999999	.000000	.000000	2.597258
90022	.843298	2.137090	.207401	.072316	2.899852
90023	1.707788	3.752737	.069599	.176416	2.237878
90024	.406057	1.316667	.072422	.023188	.200860
90025	.326427	8.387347	.061877	.084965	1.627117
90027	.142857	.549557	.123680	.000000	2.808317
90028	.822834	1.272060	1.915514	.144615	2.249633
90032	.932878	8.477076	.845848	.064242	3.161205
90033	.343558	8.474053	.110960	.671762	.815329
90035	.783447	8.603769	.747360	.113043	1.047676
90037	1.538051	3.307406	.801254	.095759	3.244423
90038	.078579	1.883418	.339973	.024594	1.053078
90040	.211213	8.532065	.035164	.054892	1.217413
90041	1.492720	3.076371	.092449	.321681	9.661994
90042	.363509	8.539971	1.238795	.024305	1.561552
90044	5.817741	2.382022	.355068	.687538	10.41022

Data Sheets

ID	Food group servings consumed per day				
	Starchy sides dishes	Vegetables	Condiments	Fats & oils	Sweets
10001	.919964	4.655049	.146522	.000000	.172419
10002	.359122	1.259574	1.038550	.099665	.000000
10010	.043271	8.256284	.234647	.213509	.326429
10016	.363966	6.149190	.000000	.000000	.271641
10019	.204275	.750832	.000000	.000000	.495067
10021	.424567	4.338588	.067541	.434704	.242109
10027	.413690	6.254868	.550128	.210314	.192635
10032	1.319443	1.808996	.500000	.070742	.539632
10034	.528239	.922480	.136847	.278464	.386544
10035	.452922	3.609623	.000000	.034288	1.510379
10041	.260102	8.161057	.000000	.000000	1.021835
10042	.731415	7.188039	.086786	.432649	.304296
10045	.086672	.540980	.000000	.034288	.099984
10046	.180192	7.734412	1.000000	.066667	.094305
10054	.972401	4.928413	.420093	.423239	1.980176
10058	.016352	3.992197	.000000	.107762	.210570
10059	.185552	.736462	.000000	.034288	.037478
10060	.000000	1.101604	.000000	.034288	.806783
10064	.498914	7.344169	.000000	.073474	.481284
10065	.735365	4.295173	.000000	.100830	.552585
10068	.598346	9.813164	.071429	.073474	.250008
10078	.556618	2.553292	.000000	.000000	.158270
10079	1.186670	7.354189	.632943	.073474	.140229
10080	.071656	6.896482	.000000	.068341	1.529828
10084	.873028	9.466902	.000000	.073474	1.726999

Data Sheets

ID	Food group servings consumed per day				
	Starchy sides dishes	Vegetables	Condiments	Fats & oils	Sweets
10086	.486981	2.963247	.000000	1.233873	3.808426
10087	.403986	3.506456	.000000	.440843	.670598
10091	.746118	4.742703	.000000	1.570112	1.658115
10096	.018748	1.940578	.000000	.000000	.119094
10098	.557792	3.474024	.071665	.064298	1.775307
10101	.150842	2.290921	.000000	.000000	.553858
10102	.255312	4.425225	.037447	.212831	.213749
10103	3.543617	13.08712	.000000	.571134	.133296
10106	.197621	7.691138	.063862	.567641	.641944
10109	.366640	3.443137	.000000	.000000	.000000
10121	.139035	4.490678	.222010	.000000	.000000
10124	.615527	6.954333	.509773	.253435	.382531
10142	.000000	4.113924	.214286	.220421	.366691
10143	.000000	2.549922	.000000	.000000	.336121
10145	.382548	11.76542	.036501	.213509	.190540
10150	.376204	3.996135	.000000	.220421	.000000
10152	.306375	6.076357	.000000	.217740	.124574
10153	.413169	4.785082	.036501	.248573	.411461
10161	.776028	5.053011	.038708	.140775	.200916
10162	2.140520	10.82276	.500000	.212378	.558205
10165	.594437	2.794901	.071429	.073474	.055918
10169	.143360	3.488511	.258674	.107762	.229288
10170	.650938	1.813840	.065682	.065682	.180230
10202	.322102	.722310	.000000	.068576	.197481
10205	.457307	2.667614	.000000	.000000	.210107

Data Sheets

ID	Food group servings consumed per day				
	Starchy sides dishes	Vegetables	Condiments	Fats & oils	Sweets
10206	.308167	3.428399	.428571	.428450	.452777
10207	.143419	2.591314	.399791	.287722	.090702
10213	1.865737	1.845340	.000000	.067301	.000000
10216	.179793	5.156425	.000000	.000000	.398863
10237	.173347	4.618272	.500000	.101589	.196420
10239	.041720	10.70179	.086664	.253435	.498749
10246	.819458	4.297209	.510035	.640566	.183936
10247	.238831	10.04440	.040601	.178504	1.376662
10248	.432541	2.589707	.214286	.000000	.184877
10250	.420091	9.005325	.214286	.220421	.120300
10256	.305405	2.728044	.072222	.034288	.649827
10259	.946763	3.428378	.186694	.433026	.951855
10261	.688963	1.866684	.038708	.033013	.123406
10263	.170517	1.582506	.149985	.587699	.856796
10272	.736933	18.10614	.500000	.220421	.059274
10275	.108778	1.735628	.500000	.291164	.504701
10282	.306405	8.752519	.000000	.000000	.122524
10284	.538498	2.972419	.071429	.136148	.276826
10287	.287145	1.082482	.034459	.000000	.000000
10295	.056625	4.823989	.000000	.000000	.879482
10300	.218647	5.271310	.539497	.220421	.000000
10301	.225645	2.462843	.000000	.000000	.093968
10305	.743442	6.274036	.000000	.832330	.953708
10329	.305869	3.815717	.051042	.033336	.000000
10341	.371181	3.459483	.039024	.144216	.891909

Data Sheets

ID	Food group servings consumed per day				
	Starchy sides dishes	Vegetables	Condiments	Fats & oils	Sweets
10495	.352082	3.746438	.037447	.434704	1.088263
10542	.744208	3.393905	.063304	.140775	.221419
10543	.378375	4.219235	.000000	.033013	.214850
10608	.170717	5.532642	.192888	.440843	.118702
10616	.143346	2.329449	.000000	.067301	.064214
10618	.381537	3.917254	.066091	.101589	.689174
10621	.275931	7.155595	.269513	.673899	.609946
10633	.432957	2.829575	.000000	.144011	.181697
10637	1.246211	4.333086	.000000	.072971	.035112
10643	.104951	4.811791	.000000	.254709	.583087
10648	.059926	3.918119	.000000	.000000	.000000
10649	.613280	2.826063	.000000	.282311	.712438
10651	.489459	6.900531	.000000	.067483	.637093
10654	.492772	4.382786	.000000	.499217	.370420
10657	.451798	3.200631	.039812	.102629	.598274
10667	.172519	3.393087	.038708	.653070	.000000
10678	.034015	8.903716	.000000	.218912	.000000
10680	.098506	5.460070	.000000	.000000	.093218
10695	.197621	1.378809	.039024	.034288	.070728
10699	.151483	2.821643	.672680	.068341	.154670
10703	.627139	4.436285	.000000	.140140	.259190
10708	.232597	2.780403	1.043485	.034737	.215435
10711	.069362	1.499267	.000000	.000000	.066092
10726	.835161	5.411639	.079905	.326138	.502882
10729	.141902	2.930535	.040443	.140775	.361712

Data Sheets

ID	Food group servings consumed per day				
	Starchy sides dishes	Vegetables	Condiments	Fats & oils	Sweets
10731	.356993	6.156465	1.079845	.762890	.303100
10735	.669246	2.938965	.072686	.146250	.085534
10737	.181170	4.564718	1.000000	.000000	.000000
10752	.274844	2.400159	.038393	.287722	.064091
10758	.105361	2.529901	.000000	.000000	.061392
10769	.993605	4.845073	.000000	.000000	.857143
10788	.285915	9.878092	.000000	.477580	.484586
10793	.187556	1.676841	.110535	.000000	.055257
10795	1.337619	2.609597	.500000	.392884	.000000
10796	.074953	6.056790	.039655	.293392	.139458
10798	.070236	7.123843	.000000	.253435	.731373
10799	.160318	14.01781	.000000	1.107761	.159808
10800	.170429	3.459204	.223689	.000000	.033250
10801	.701962	4.964408	.000000	.653070	.062505
10804	.239197	3.827756	1.000000	.034288	.029417
10809	.159205	3.824175	.000000	.073474	.000000
10810	.828780	7.288080	.000000	.220421	.561332
10822	.557003	6.626015	.000000	.218912	.000000
10848	.034064	2.284765	.000000	.034288	.394680
10851	1.558166	1.050230	.214286	.285714	.000000
10903	.082433	4.360519	.000000	.142231	.090977
10904	1.060961	3.563518	.338419	.389084	.415573
10906	.122610	6.245728	.000000	.033013	.063187
10907	.375258	15.74606	1.419416	.220421	1.287871
10915	.000000	2.913991	.222430	.437107	.263090

Data Sheets

ID	Food group servings consumed per day				
	Starchy sides dishes	Vegetables	Condiments	Fats & oils	Sweets
10917	.761578	1.953446	.039024	.068576	.062403
10923	.030664	1.173552	.000000	.000000	.198478
10940	.252712	.217961	.000000	1.740905	2.695196
10943	.143319	3.068350	.000000	.208648	.444873
10946	.018540	1.641942	.000000	.067205	.000000
10952	.587972	12.70079	.504951	.073474	.213519
10954	.324847	1.312333	.000000	1.278400	.386682
10959	.280557	3.045502	.040286	.034288	.000000
10963	.617651	4.222607	.543115	.220421	1.100149
10977	1.222906	10.35548	.000000	.000000	.056629
10982	.364926	2.835393	.000000	.033054	.898533
10984	.767190	1.815542	.000000	.000000	.000000
10985	.245453	5.730309	.037131	.034288	1.792849
10986	.221414	2.472384	.073387	1.597037	2.268801
10987	.430656	2.555510	.000000	.098419	.063116
10989	.613505	6.701873	.000000	.000000	.179303
10995	.175269	2.853652	.424244	.495197	1.347539
11002	.542974	2.556909	.064419	.274108	.454415
11008	.638471	.294994	.000000	.034288	.116605
11009	.221314	2.888125	.420093	.067301	.130102
11011	.319803	2.117161	.000000	.522997	.703165
11014	.801436	1.707374	.066667	.558084	.061100
11015	.429047	5.429540	.000000	.000000	.384309
11019	.508564	2.480631	.000000	.139562	.686080
11025	.614106	.297862	.000000	.000000	.885481

Data Sheets

ID	Food group servings consumed per day				
	Starchy sides dishes	Vegetables	Condiments	Fats & oils	Sweets
11029	.129681	8.900992	.040759	.106807	.536616
11031	.225771	4.403887	.071765	.101589	.170663
11039	.154190	3.660203	.148790	.212227	.065708
11042	.029777	3.452627	.510190	.068576	.027855
11046	.071467	2.854519	1.011552	.101665	.216259
11103	.307489	5.471528	.040601	.462059	1.215571
11117	.689654	2.564083	.067763	.163547	.662528
11120	.125906	2.400979	.000000	.180732	.634525
11121	.447761	2.399500	.492482	.067621	.179083
11124	.083821	4.968897	.000000	.000000	.119290
11127	.203919	1.473703	.169273	.219918	.155210
90001	.309920	6.025349	.000000	.034288	.285432
90002	.434059	4.378080	.000000	.034288	1.731806
90003	.202761	8.081585	.000000	.220421	.000000
90004	.447455	3.781235	.137636	.253546	.950441
90005	.494631	2.853678	.042651	.287759	.212519
90007	.171288	7.124472	.036028	.000000	.331502
90008	.576692	4.171759	.034274	.440843	.828612
90011	.434059	5.432122	.000000	.460982	.563445
90013	1.354969	5.206349	.000000	.067301	.416366
90015	.613280	7.727537	.219996	.071245	.414012
90017	.306703	1.986259	.000000	.070742	.537154
90018	.142990	8.948958	1.403601	.000000	.486701
90019	.897099	1.580717	.000000	.844013	.728791
90020	.629447	2.457619	1.127435	.200524	.680400

Data Sheets

ID	Food group servings consumed per day				
	Starchy sides dishes	**Vegetables**	**Condiments**	**Fats & oils**	**Sweets**
90021	.418835	.558964	.000000	.000000	.000000
90022	.137901	1.456950	.042809	.000000	.373890
90023	.365083	5.787906	.065711	.067301	.176556
90024	.214816	2.185605	.000000	.000000	.000000
90025	.104161	10.21466	.034288	.099280	.259829
90027	.422963	1.528739	.598353	.144493	.071250
90028	.655900	5.055935	1.007818	.034288	1.173976
90032	1.052277	2.433190	.000000	.067301	.659977
90033	.142421	2.733663	.074143	.212378	.224034
90035	1.086130	2.054738	.000000	.132014	.101225
90037	1.517479	7.064801	.081933	.508181	1.250415
90038	.537300	4.131456	.066667	.165486	.210894
90040	.245275	1.143935	.105746	.067301	.086280
90041	.423135	13.55606	.152373	.907242	.343559
90042	.126676	3.627945	.000000	.034288	.060948
90044	1.748378	14.01674	.684651	.067067	.395061

Data Sheets

ID	Food group servings consumed per day			
	Fish	Poultry	Drinks	Alcohol
10001	.079528	.324765	.276190	.000000
10002	.112804	.075021	2.066667	.000000
10010	.254715	.116861	1.000000	.038848
10016	.277161	.039490	.428571	.000000
10019	.000000	.000000	1.066667	.000000
10021	.077083	.197039	.628571	.000000
10027	.147989	.201586	1.285714	.070015
10032	.000000	.032585	2.000000	.000000
10034	.165951	.096025	1.066667	.000000
10035	.581228	.167569	1.495238	.000000
10041	.541005	.537191	6.066667	.000000
10042	.146685	.093878	.923810	.000000
10045	.015502	.054900	1.066667	.000000
10046	.182563	.000000	3.214286	.000000
10054	.136890	.088220	1.780952	.000000
10058	.624541	.028566	1.142857	.000000
10059	.536223	.000000	1.142857	.000000
10060	.000000	.000000	.990476	.000000
10064	.468544	.318270	4.000000	.000000
10065	.272343	.387692	.495238	.084055
10068	.255669	.224276	1.066667	.000000
10078	.255118	.031414	1.000000	.000000
10079	.090156	.340497	1.495238	.000000
10080	.272450	.042703	3.133333	.000000
10084	.244662	.334547	.857143	.000000

Data Sheets

ID	Food group servings consumed per day			
	Fish	Poultry	Drinks	Alcohol
10086	.057128	.171973	2.571429	.000000
10087	.199798	.151735	.276190	.000000
10091	.030710	.360723	5.142857	.037707
10096	.384148	.123238	.780952	.000000
10098	.202722	.000000	1.852381	.000000
10101	.093744	.097828	1.923810	.000000
10102	.000000	.085292	2.000000	.000000
10103	.220834	.324922	2.285714	.000000
10106	.748737	.328614	2.352381	.170723
10109	.041667	.057406	.142857	.109459
10121	.413805	.324374	.990476	.000000
10124	.176435	.218653	1.852381	.000000
10142	.028014	.128936	1.285714	.000000
10143	.203627	.000000	1.428571	.000000
10145	.000000	.031541	.066667	.000000
10150	.000000	.383937	.428571	.000000
10152	.228213	1.353825	4.571429	.000000
10153	.000000	.237657	1.209524	.000000
10161	.311656	.020882	1.133333	.121388
10162	.066292	.000000	1.000000	.000000
10165	.000000	.118684	2.142857	.000000
10169	.470696	.266990	1.285714	.000000
10170	.139087	.082910	.066667	.153088
10202	.179828	.069544	.276190	.039356
10205	.106429	.000000	1.142857	.000000

Data Sheets

ID	Food group servings consumed per day			
	Fish	Poultry	Drinks	Alcohol
10206	.110536	.117669	1.428571	.000000
10207	.000000	.092805	.066667	.000000
10213	.056853	.130534	1.214286	.000000
10216	.204553	.180693	1.352381	.000000
10237	.102947	.000000	2.000000	.000000
10239	.039543	.022896	2.066667	.000000
10246	.351632	.063099	1.200000	.139010
10247	.491344	.163492	3.066667	.150263
10248	.238299	.113544	.495238	.000000
10250	.174355	.305825	.571429	.000000
10256	.224694	.044849	.342857	.000000
10259	.304478	.246975	1.209524	.000000
10261	.055484	.107357	2.285714	.000000
10263	.049782	.199404	.847619	.063782
10272	.231760	.071889	1.857143	.000000
10275	.362857	.179086	1.714286	.000000
10282	.653061	.326071	.000000	.000000
10284	.132291	.064311	.571429	.000000
10287	.103108	.025717	1.000000	.289371
10295	.011846	.000000	.495238	.000000
10300	.413992	.052837	1.638095	.000000
10301	.185776	.061090	.133333	.000000
10305	.437820	.232109	2.428571	.084117
10329	.026621	.000000	1.428571	.000000
10341	.235309	.261091	1.495238	.000000

Data Sheets

ID	Food group servings consumed per day			
	Fish	Poultry	Drinks	Alcohol
10495	.112713	.022575	1.571429	.000000
10542	.033565	.153731	.542857	.064837
10543	.182472	.076637	1.495238	.064825
10608	.138091	.023001	3.142857	.000000
10616	.170935	.000000	.133333	.064842
10618	.948964	.459682	1.200000	.064866
10621	.805055	.284256	.428571	.123010
10633	.000000	.029895	1.000000	.000000
10637	.072288	.000000	2.000000	.000000
10643	.088090	.720191	1.571429	.000000
10648	.000000	.098361	.428571	.000000
10649	.012524	.146011	2.000000	.000000
10651	.253353	.057474	.428571	.035897
10654	.147232	.030033	1.066667	.064825
10657	.418882	.112169	3.133333	.000000
10667	.169420	.261814	.276190	.000000
10678	.030827	.043308	.571429	.000000
10680	.099874	.074263	.571429	.000000
10695	.028260	.078311	1.352381	.000000
10699	.675890	.203767	1.704762	.079661
10703	.061433	.030465	3.066667	.000000
10708	.285726	.023052	2.852381	.000000
10711	.285045	.297949	.133333	.000000
10726	.164174	.110517	6.571429	.000000
10729	.042554	.082334	1.276190	.000000

Data Sheets

ID	Food group servings consumed per day			
	Fish	Poultry	Drinks	Alcohol
10731	.319746	.468939	1.352381	.000000
10735	.062732	.066154	2.495238	.000000
10737	.000000	.000000	1.000000	.000000
10752	.086075	.091732	1.561905	.000000
10758	.050559	.022966	.000000	.000000
10769	.537213	.020022	2.142857	.074339
10788	.387897	.022923	2.214286	.000000
10793	.127589	.118355	1.209524	.000000
10795	.121166	.000000	1.000000	.000000
10796	.886070	.342686	1.352381	.416993
10798	.198781	.263539	2.000000	.000000
10799	.409198	.472510	4.000000	.000000
10800	.169005	.148055	.495238	.000000
10801	.445933	.074304	2.561905	.000000
10804	.504978	.118021	2.428571	.064802
10809	.032637	.186204	.142857	.000000
10810	.667002	1.722888	4.071429	.000000
10822	.929930	.205348	1.000000	.000000
10848	.028796	.050687	2.066667	.000000
10851	.091905	.098377	1.428571	.000000
10903	.033565	.104561	.704762	.000000
10904	.447261	.145832	.704762	.000000
10906	.279516	.031035	.209524	.037885
10907	.517021	.137888	4.142857	.000000
10915	.076007	.073486	1.000000	.000000

Data Sheets

ID	Food group servings consumed per day			
	Fish	Poultry	Drinks	Alcohol
10917	.106054	.116471	.428571	.000000
10923	.079446	.083283	1.000000	.000000
10940	.000000	.000000	1.785714	.000000
10943	.070854	1.416831	1.066667	.000000
10946	.030326	.029895	.857143	.000000
10952	.545964	.165423	2.000000	.620679
10954	.390721	.367465	2.428571	.000000
10959	.108658	.032372	.142857	.000000
10963	.079269	.000000	3.066667	.000000
10977	.310034	.073788	2.133333	.000000
10982	.195523	.103919	1.142857	.000000
10984	.096479	.346756	1.000000	.000000
10985	.189265	.070296	5.571429	.000000
10986	.319106	.110509	3.000000	.000000
10987	.000000	.346756	.428571	.000000
10989	.183139	.183125	1.857143	.000000
10995	.000000	.000000	2.000000	.138998
11002	.120661	.563817	2.066667	.000000
11008	.000000	.044483	1.428571	.000000
11009	.104396	.164281	.923810	.000000
11011	.030859	.062700	2.000000	.000000
11014	.329034	.638675	.333333	.000000
11015	.116898	.598457	1.000000	.000000
11019	.101031	.067000	.857143	.000000
11025	.000000	.000000	1.000000	.000000

Data Sheets

ID	Food group servings consumed per day			
	Fish	Poultry	Drinks	Alcohol
11029	.126796	.081756	.923810	.000000
11031	.142238	.193232	.571429	.000000
11039	.029325	.223370	1.000000	.000000
11042	.183590	.000000	1.000000	.000000
11046	.030835	.316235	.923810	.000000
11103	.058773	.033123	6.704762	.064900
11117	.182399	.137826	.200000	.090584
11120	.059159	.188569	1.000000	.076240
11121	.326730	.431505	2.000000	.000000
11124	.000000	.000000	1.000000	.000000
11127	.377754	.235485	1.409524	.152908
90001	.293383	.057260	2.066667	.000000
90002	.154971	.031035	4.066667	.000000
90003	.169223	.142772	1.428571	.000000
90004	.164896	.246285	3.066667	.000000
90005	.308935	.124499	1.928571	.000000
90007	.038473	.377253	1.571429	.101798
90008	.118328	.031035	1.428571	.000000
90011	.151601	.197793	.495238	.000000
90013	.074863	.244990	2.638095	.000000
90015	.317483	.086026	.571429	.000000
90017	.140264	.000000	1.342857	.000000
90018	.715062	.000000	2.285714	.000000
90019	.116414	.107830	3.066667	.063782
90020	.542832	.341781	1.771429	.032976

Data Sheets

ID	Food group servings consumed per day			
	Fish	Poultry	Drinks	Alcohol
90021	.000000	.000000	.000000	.000000
90022	.000000	.189105	.209524	.000000
90023	1.419503	.131445	3.133333	.090605
90024	.053018	.029135	.495238	.000000
90025	.721778	.337729	1.561905	.000000
90027	.030829	.028946	1.142857	.000000
90028	.056854	.371960	1.209524	.000000
90032	.028669	.077740	1.066667	.000000
90033	.122776	.053040	.571429	.000000
90035	.197812	.458388	.000000	.000000
90037	.376708	.202199	.561905	.000000
90038	.773943	.411224	.133333	.000000
90040	.107128	.106957	.200000	.000000
90041	.802771	.470976	.428571	.000000
90042	.000000	.070055	1.000000	.000000
90044	.000000	.000000	.209524	.000000