Food Security, Perceptions of Food Neighborhood Environment, and Dietary Quality in Women Residing in the Mexico-US Border.

by

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ABSTRACT

Objective: Migration to the United States (U.S.) has been associated with food insecurity and detrimental changes in diet quality. How these changes affect women in context of their neighborhood food environment has not been thoroughly explored. This study aimed to assess if food security is associated with diet quality and to explore if perceived food availability moderates this purported association in a sample of Mexican immigrant women.

Methods: Mexican-born women (n=57, 41±7 years) residing in the U.S. for more than 1 year self-reported food security status, monthly fast-food frequency, and their perception of fruit, vegetables, and low-fat product availability within their neighborhood via survey. Diet was assessed using the Southwest Food Frequency Questionnaire to estimate intake of fruit, vegetables, salty snacks, sugar, and healthy eating index (HEI)-2015 score. Bivariate correlations assessed the relationships between study variables. Independent samples t-tests compared dietary outcomes between women classified as food secure (n=41; high or marginal food security) and food insecure (n=16; low or very low food security). A moderation analysis assessed the effe

ct of the perception of the neighborhood food environment on the relationship between food security and HEI-2015 score.

Results: Fifty four percent of participants worked full time and 42% had a monthly household income <$2,000. Time residing in the U.S. was 20±9 years. Relative to women classified as food secure, participants experiencing food insecurity had lower HEI-2015 (61±8 vs. 66±6; p=0.03). Albeit not significantly different, women experiencing food

insecurity reported lower intake of fruit (236±178 vs. 294±239 g), vegetables (303±188 vs. 331±199 g), and salty snacks (6±5 vs. 8±10 g), as well as higher intake of sugar (99±55 vs. 96±56 g) and fast food (2.5±2.5 vs. 1.8±1.7 times per month); $p>0.05$ for all. Among women experiencing food insecurity, there was a trend for a lower perception of neighborhood fruit, vegetable and low-fat product availability being associated with lower HEI-2015 scores (54±6) relative to those who perceived moderate (63±6) or high (65±8) neighborhood availability of those foods ($p=0.07$).

Conclusions: HEI-2015 scores were associated with participants' food security status. Findings suggest a need for better understanding of how neighborhood food availability may affect diet quality among Mexican immigrant women experiencing food insecurity.

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CHAPTER 1

INTRODUCTION

Overview

The Mexican immigrant population in the United States (U.S.) has increased fivefold since the 1980s, and they have the highest population of any immigrant group in the U.S. (Migration Policy Institute, 2016). The steep increase of minority populations has also increased the interest of public health researchers to explore how immigration is correlated to health disparities and health in these populations. Minority immigrant populations may experience many disparities such as lower wages and lower socioeconomic status, lower levels of education, less insurance coverage, and less access to nutritious foods (Durand, Massey, Zenteno, 2001; Vozoris & Tarasuk, 2003; U.S. Census Bureau, 2016; The Office of Disease Prevention and Health Promotion, 2015), all of which have been documented to negatively impact health, well-being, and nutritional status of Hispanic individuals (Castañeda et al., 2015).

Hispanics could experience many adversities that may contribute to the risk for developing diet-related chronic diseases (U.S. Hunger Relief Organization, 2018). Approximately 43% of Hispanics residing in the U.S. are obese, and nearly 77% of Hispanic women are overweight or obese (Centers for Disease and Control Prevention [CDC], 2017b; U.S Department of Health and Human Services, 2017). Among different Hispanic subgroups, 13.8% of Mexican Americans have been diagnosed with diabetes and Mexico has the highest rate of diabetes mellitus type 2 (American Diabetes Association, 2018). In addition, cardiovascular disease is one of the primary causes of death among Hispanics (American Heart Association [AHA], 2016). Consequently, it is

important to explore Mexican immigrants' nutritional status to better understand how adversities such as having less access and less income to obtain nutritious foods can affect their dietary intake.

It has been established that obese people are at higher risk to develop cardiovascular diseases, cancer, and diabetes (Van, Mertens, & Christophe, 2006; Bray, 2002). Cardiovascular disease is one of the primary causes of death in the U.S.; one out of four Americans die of heart disease every year (CDC, 2017a). Even though Hispanics face a lower prevalence of cardiovascular disease than non-Hispanic whites, 48.3% and 32.4% of Hispanic men and women had cardiovascular disease in 2015, respectively (Balfour et al., 2016; AHA, 2016). According to Poirier et al. (2006), the increased adipose tissue mass seen in obese individuals is correlated to cardiovascular disease, coronary artery disease, risk for stroke, and hypertension. Furthermore, obesity is characterized by having inflammatory markers that can affect insulin uptake and can cause insulin resistance observed in diabetes (Al-Goblan, Al-Alfi, & Khan, 2014). Obesity has also been linked to food insecurity and both could be contributable factors to the prevalence of chronic diseases (Rogers et al., 2016; Seligman, Laraia, & Kushel, 2009).

Dietary intake is a contributing factor for the development of chronic diseases and obesity in the U.S. (Micha et al., 2017). Over the past few decades, chronic diseases and obesity have become more prevalent and this prevalence is accompanied with significant changes in diet (Desilver, 2016). Foods have become more processed, frozen entries are readily available, and sugar is one of the main sources of energy intake (Steele et al., 2016; Poti, Mendez, Ng, & Popkin, 2015). Also, portion sizes increased by

approximately 60% from the 1970s until the 2000s (Young and Nestle, 2002). Currently, it is estimated that most Americans exceed the intake recommendations for added sugars, sodium, and saturated fats and only one fourth meet the recommendations for fruit and vegetable consumption (U.S. Department of Health and Human Services and U.S. Department of Agriculture [USDA], 2015). Hispanics may be at a higher risk to face diet-related disparities, which means that they do not obtain a wide variety of nutrients in the food they consume, they lack monetary means and access to nutritious foods, and they follow dietary patterns that could negatively affect their health (Satia, 2009). Lacking access to foods and not having sufficient money to purchase healthful and nutritious meals is directly linked to the feelings of food insecurity Hispanics may experience (USDA, 2018).

Food security is defined as "having access by all people at all times to enough food for an active, healthy life" (Coleman-Jensen, Gregory, & Rabbitt, 2019); whereas food insecurity is defined as having a "limited or uncertain ability to acquire acceptable foods in socially acceptable ways" (Alaimo, 2005). Food insecure individuals are limited to access adequate food by lack of resources or money (Coleman-Jensen, Gregory, & Singh, 2014); consequently, these individuals have a reduced quality, variety, and desirability of diet (USDA, 2018). In 2016, approximately 15.6 million Americans were food insecure (USDA, **2017**). Minority groups such as Hispanics are more likely to experience food insecurity than all U.S. households (Rabbitt, Smith, & Coleman-Jensen, 2016). In fact, one in five Hispanics experiences food insecurity, in contrast to one in ten whites (U.S. Hunger Relief Organization, 2018). Individuals with food insecurity might have a diet deficient in foods beneficial for their health because they do not have the

economic means to obtain fresh and healthy foods. Consequently, they might be more likely to consume cheaper foods that are high in calories, salt, sodium, and sugar and low in other nutrients. These foods could contribute to weight gain and potentially lead to becoming overweight or obese. Food insecurity has been positively correlated to lower health status and chronic diseases like hypertension, diabetes, obesity and cardiovascular diseases (Leung, Epel, Willett, Rimm, & Laraia, 2015; Seligman et al., 2009).

Researchers have examined the link between food insecurity and dietary quality. For example, Bhattacharya, Currie, and Haider (2004) found that poverty and food insecurity projected nutritional outcomes in adults; people from households with lower incomes scored lower on the Healthy Eating Index (HEI) and consumed most of their calories from non-nutritive sources. In addition, Smith and colleagues (2015) suggested that food insecurity can influence the prevalence of excess body weight. In this study, researchers found that food insecurity and obesity were correlated in Hispanic women, 75% of the participants who were Mexican reported to be food insecure and they were overweight or obese.

The food environment is one of the main components of food security (Berry et al., 2015). Some researchers have found that some traits of the neighborhood food environment are linked to increased fast-food and convenience food consumption (Hilmers, Hilmers, & Dave, 2012), higher rates of obesity (Lovasi, Hutson, Guerra, & Neckerman, 2009), and diseases (Shaw, Theis, Self-Brown, Roblin, & Barker, 2016). Low-income minority neighborhoods have a lower number of supermarkets, grocery stores, and farmers' markets and a higher number of convenience stores and fast-food restaurants than neighborhoods with people from higher incomes (Larson et al., 2009).

Similarly, a study in Texas found that Mexican communities had a higher number of convenience stores without gas stations than non-Hispanic white communities, which affected the diet quality of the people living in those neighborhoods (Lisabeth et al., 2010). Having low accessibility to food can be an additional disparity Hispanics face because this might interfere in their decisions to obtain affordable fresh foods that are usually higher in nutrients than prepackaged or frozen foods.

Women play a significant role in family dynamics and they can influence the food choices for their household, including their husbands and children (Larsen et al., 2013). Since Mexicans are the highest immigrant group in the U.S., it is important to explore disparities that Mexican women might face as a result of the migratory process. Nonetheless, only a few studies have explored whether the food environment plays a role in how pre-menopausal immigrant Mexican women experience food insecurity and how that translates to diet quality. Therefore, the purpose of this study is to explore feelings of food security improve dietary outcomes among pre-menopausal Mexican-born women; and to observe if the perceptions of the neighborhood food environment (see Figure 1) moderate this relationship. Because Mexican women are at a high risk for chronic diseases and obesity, this study will analyze how low availability of foods can influence their nutritional outcomes. This research will focus on Mexican-born pre-menopausal women who resided in the United States for at least twelve months.

Purpose of the study

The purpose of this study is to evaluate if food security is related to a higher dietary quality through a questionnaire administered to pre-menopausal Mexican-born women residing in Phoenix, Arizona. We will assess if the perceptions of the neighborhood food environment (divided into availability to fruits, vegetables, and low-fat products; availability to fast-food restaurants; and food shopping access) moderate the relationship between food security and dietary quality. For purposes of this study, diet quality will be assessed by the Healthy Eating Index 2015 (HEI-2015), as well as by looking at the consumption of fruit, vegetables, sugar, salty snacks, and fast foods.

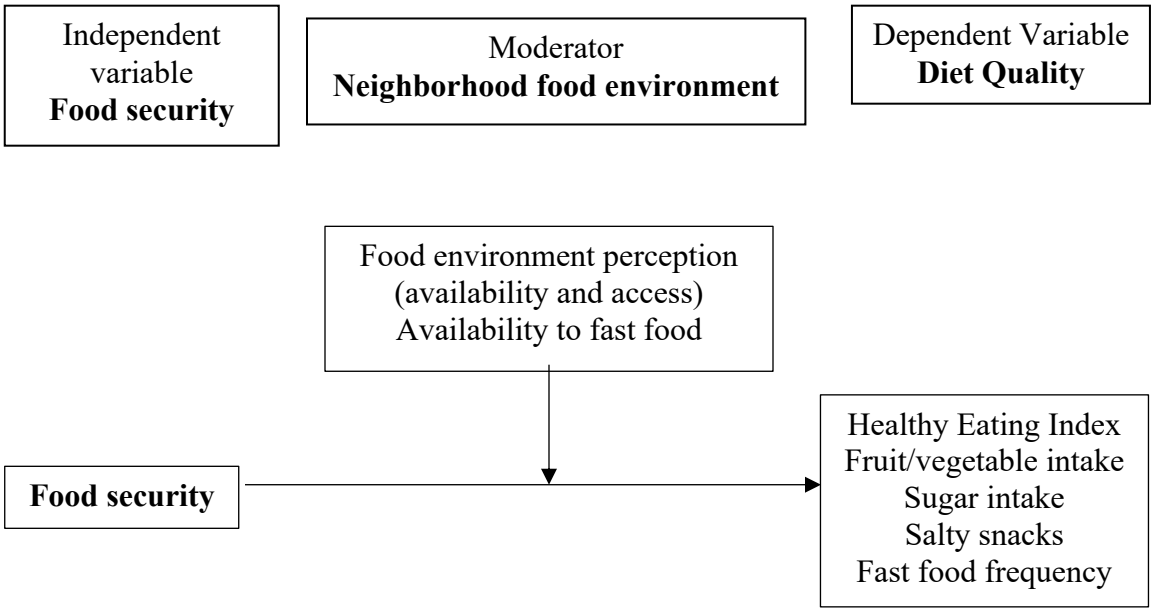

Figure 1. Study conceptual model. The model outlines possible pathways that can influence the relationship between food security, perception of the food environment (fruit, vegetable, low-fat product availability, and food shopping access) and dietary quality.

Research Aims

1. To evaluate food security, HEI scores, sugar, fast-food, and fruit and vegetable consumption among Mexican-born women living in the Phoenix metropolitan area.
2. To explore if the participants' perceptions of the neighborhood food environment moderate the association between food security and dietary quality in Mexican-born women living in the Phoenix metropolitan area.
3. To explore if fast food availability within the neighborhood moderates the association between food security and dietary quality in Mexican-born women living in the Phoenix metropolitan area.

Hypotheses

1. Greater food security will be associated with a better dietary quality, as indicated by a greater HEI score, higher fruit and vegetable consumption, and a lower intake of sugar, salty snacks, and fast foods among Mexican-born women residing in the metropolitan area.
2. The availability of healthy foods, which will be measured by the perceptions of the neighborhood food environment, will positively moderate the association between food security and diet quality, assessed by scores on the HEI, and consumption of fruits and vegetables, sugar, and fast-food.
3. The association of food security and monthly fast-food consumption will be stronger among participants who have a higher perception of fast food availability.

Definition and Terms

- Food deserts: Areas characterized by low access to fresh produce such as fruits and vegetables, or other healthy foods to maintain a healthy and balanced diet. People who reside in food deserts are usually poor and minority populations that do not own a car and do not have access to walk, bike, or use public transportation to shop at supermarkets within one-mile (American Nutrition Association, 2010; CDC, 2017b).
- Food insecurity: Defined as having a reduced availability and access to food partially or most of the time throughout 12 months. Not having access and availability to obtain foods influences food intake (USDA, 2018).
- Food security: Defined as having the 'physical, social, economic access' and availability to obtain nutritious foods at all times to meet dietary needs and sustain an active and healthy lifestyle (Food and Agriculture Organization of the United Nations, 2002; World Food Programme, 2018).
- Obesity: Obesity is classified by Body Mass Index (BMI). There are three ranges used for obesity; class I – 30.0 - 34.9 kg/m^2, class II – 35.0 - 39.9 kg/m^2, and class III > 40 kg/m^2 (Poirier et al., 2006).
- Overweight: Overweight people are classified by BMI. People who are overweight have a BMI of 25.0 - 29.9 kg/m^2 (Poirier et al., 2006).

CHAPTER 2

REVIEW OF LITERATURE

INTRODUCTION

The Hispanic population settling in the U.S. has increased tremendously over the years (Craig & Richeson, 2018). Approximately 17.8% of the population of the U.S. is Hispanic (U.S. Census Bureau, 2017). Out of the 57.5 million Hispanics, the U.S. Census Bureau (2016) estimated that 63.4% of those are from Mexico. In the Phoenix metropolitan area alone, there were 344,000 Mexican immigrants according to the 2010-2014 Census tract (U.S. Census Bureau, 2016). The large number of Mexican people residing in the U.S. increases the importance of studying the adversities, access to food, diet, and living conditions that immigrants might face when migrating to this country.

After migrating to the U.S., Hispanics increase their risks to become overweight or obese and develop cardiovascular diseases (CDV) and type 2 diabetes mellitus (T2DM) (Torres & Nowson, 2007). Furthermore, Hispanics often face adversities such as lower wages, food insecurity, lack of health insurance, unmet medical needs, health problems, and less purchasing power to obtain nutritious foods, all of which negatively impact health outcomes (Leung, Epel, Ritchie, Crawford, & Laraia, 2014; Neckerman, Garfinkel, Teitler, Waldfogel, & Wimer, 2016). Additionally, the neighborhood food environment of Hispanic populations might have less access to grocery stores and more access to fast-foods and convenience stores which usually sell items highly saturated with sugar, sodium, and fats which can contribute to the prevalence of chronic disease (Ball, Timperio, & Crawford, 2006). Exploring the health status of minority populations is relevant because these could impact the costs invested by the government and the

healthcare system (U.S. Census Bureau, 2017). Thus, there is a great need to explore pre-menopausal Mexican women's food accessibility, neighborhood food environment, food security, and dietary quality.

SOCIAL DETERMINANTS OF HEALTH

Social Determinants of Health (SDOH) are defined by the Office of Disease Prevention and Health Promotion (2016b) as the social, economic, physical, and environmental conditions that people experience that can affect their health and well-being. The main social determinants of health are: neighborhood and built environment, health and health care, economic stability, education, and social and community context (Figure 2) (ODPHP, 2016b). All of these dimensions play a role in health and help explain the variability of morbidity and mortality among racial or ethnic groups (Castañeda et al., 2015). Experiencing barriers such as undocumented migratory status, unemployment, low income, lower education levels, and less knowledge about nutrition or diseases can become a disparity when Hispanics migrate to this country, which is why improving these conditions could help Hispanics reach better nutritional outcomes.

Figure 2. Social Determinants of Health Components

Since the incidence of diet-related illnesses remains high among the Hispanic population, it is important to assess the role of SDOH among immigrants. The prevalence of diabetes, obesity, and cardiovascular disease in 2017 and 2018 was 13.8%, 42.5%, 32.3%, respectively (Benjamin et al., 2018; CDC, 2017a). Findings suggest that physical inactivity and an inadequate diet are some of the main factors that contribute to these diseases. Therefore, assessing the relationship between social determinants of health, Mexican immigrant's neighborhoods, economic stability, food access, and dietary quality could help better understand how these contribute to the prevalence of disparities and diseases.

Neighborhood and built environment.

Neighborhood and built environment can affect individuals' workspace, neighborhood, transportation availability, and access to food (Office of Disease Prevention and Health Promotion [ODPHP], 2016a). Findings suggest that low-income neighborhoods are more likely to have safety concerns which could result in worse health outcomes (Meyer, Castro-Schilo, & Aguilar-Gaxiola, 2014). A study found that immigrants might experience housing hardship such as rent burden (Hernández, Jiang, Carrión, Phillips, & Aratani, 2016). Moreover, the neighborhood environment is an important predictor of an individual's diet (ODPHP, 2016). On average, supermarkets are approximately 2.2 miles from U.S. households (Ver Ploeg, Mancino, Todd, Clay, & Scharadin, 2015), which might increase barriers for families who earn lower incomes, do not own a vehicle, or do not have access to transportation.

Food secure households might be able to drive or have the economic means to access food stores; however, food-insecure households might not have the financial

means to access food stores and can be more prone to purchase at stores that sell food items that are not ideal to meet nutritional needs. Additionally, living in food desert areas in which supermarkets are not available might require low-income groups to walk to food stores and this is where the built environment (safety, sidewalks, and roads) can facilitate or impede food access. Thus, it is important to explore how food accessibility, neighborhood food environment and food insecurity influence dietary quality among vulnerable populations at high risk for nutrition-related diseases.

Economic stability.

Social determinants of health can affect individuals' financial security, access to food, and food insecurity among the household (Gundersen & Seligman, 2017; Kushel, Gupta, Gee, & Haas, 2006) The Centers for Disease Control and Prevention (CDC) (2015) reported that in the U.S., one in four Hispanics live below the poverty line and the median household income for Hispanics was approximately $50,000 compared to $68,000 for non-Hispanic whites (Fontenot, Semega, & Kollar, 2018). Economic instability can affect the ability to obtain nutritious foods and increase food insecurity (Smith et al., 2015). Lack of access, transportation, or financial resources to purchase healthful products are barriers that food insecure individuals might face. Experiencing lack of funds to buy nutritious foods can lead people to consume foods higher in sodium, sugar, and saturated fats (Drewnowski & Eichelsdoerfer, 2010), which can place them at an even higher risk to develop diet-related chronic diseases such as high blood pressure, diabetes, and cardiovascular disease (Vozoris & Tarasuk, 2003).

Minority groups are more likely to experience food insecurity (Rabbitt, Smith, & Coleman-Jensen, 2016; U.S. Hunger Relief Organization, 2018), and lack of access to

food outlets that tend to offer a wider variety of more healthful products (Walker, Keane, & Burke, 2010). In addition, the presence of food deserts has been related to populations with low incomes and low socioeconomic status (Carter, Dubois, & Tremblay, 2014). Researchers have also found that lower-income women were more likely to frequently consume food at fast-food restaurants because these were more available in their neighborhoods (Inglis, Ball, & Crawford, 2008). Consequently, facing financial instabilities can increase the risk of fast-food and calorie-dense food exposure might lead to weight gain and the rise of diet-related diseases. In fact, some researchers have also suggested that obesity is more common among populations with more poverty and less education (Drewnowski & Specter, 2004).

Education.

Education can increase the household's income and make it more accessible to obtain health insurance through employment. Prior research shows that individuals with higher levels of education have greater knowledge about food, better health, more stable jobs, and family stability (Hout, 2012; Lawrence, 2017), all of which contribute to living healthier lives. It has been proposed that people without college degrees are more likely to live in poverty (Fontenot et al., 2018). Because low socioeconomic status is correlated to education levels (Rogers, Kegler, Berg, Haardörfer, & Frederick, 2016), low levels of education affect the economy of the household and can also contribute to food insecurity and obesity (Berry, Dernini, Burlingame, Meybeck, & Conforti, 2015; Carter et al., 2014; Ogden, Fakhouri, Carroll, Hales, & Fryar, 2017).

Even though education level has improved among Hispanics, the gap remains present and academic performance, stereotypes, and completion of college remain lower

for Hispanics than non-Hispanic-whites (Bauman, 2017). Interestingly, only 15% of Hispanics over the age of 25 had a bachelor's degree in 2015 compared to 36% of non-Hispanic whites (Ryan & Bauman, 2016). Education could help Hispanics earn a higher income, obtain health insurance, and possibly live in neighborhoods with better food access which could prevent feelings of food insecurity and improve their perception of the food environment.

The lack of language proficiency has also been found to influence Hispanics' health, in part because it creates communication barriers to learn about diet or diseases (Viruell-Fuentes, 2007). Currently, one in three Hispanics living in the U.S. does not speak English very well; this can play a role in their health because they might understand less about diseases such as cancer, heart disease, or obesity (CDC, 2015). For example, a study among obese Hispanics showed that English-speaking Hispanics were more likely to attempt to lose weight or get informed about their health status than non-English speaking Hispanics (New, Xiao, & Ma, 2013). Similar findings suggest that English proficiency can help this population obtain more information due to better health literacy which could help them improve their health outcomes (Jacobson, Hund, & Soto Mas, 2017).

Lower education could influence the knowledge Hispanics have about nutritious diets and diet-related diseases. For example, adults with college degrees had higher consumption of fruits, vegetables, and whole grains; this study suggested that an increased nutritional knowledge could influence people's diets by increasing their consumption of more nutritious foods (Hiza, Casavale, Guenther, & Davis, 2013). Similarly, Inglis and colleagues (2008) found that women with less than 12 years of

schooling were 1.66 less likely to consume vegetables than women with higher levels of education. Additionally, people with lower levels of education have also been found to lack health insurance (Neckerman et al., 2016) and be less aware of weight maintenance and less aware of recommendations to reduce the risk factors to prevent CVD and T2DM (CDC, 2015).

Health and health care.

Facing health care barriers places Hispanics at risk and might increase the prevalence of diseases. (Hacker, Anies, Folb, & Zallman, 2015). In 2015, approximately 20% of Hispanics did not have health insurance (CDC, 2015) This percentage might be even higher among undocumented Hispanics (Office of Disease Prevention and Health Promotion, 2015). Health insurance can increase benefits and accessibility to medical care as well as treatment for diet-related diseases (Sommers, Gawande, & Baicker, 2017). Findings have shown that people who are in medical debt or do not have continuous health insurance are more likely to delay visits to physicians or obtain medications (Herman, Rissi, & Walsh, 2011). In addition, households who lack transportation are less likely to adhere to medications, skip or reschedule appointments, and treat chronic diseases (Syed, Gerber, & Sharp, 2013).

Findings show that Hispanics were the least likely ethnic group across the U.S. to visit a physician from 2011 to 2014 (Chen, Vargas-Bustamante, Mortensen, & Ortega, 2016). In Arizona, Hispanics or Latinos reported that they are more likely not to visit a physician than other ethnic groups (Herman et al., 2011). Some of the reasons why Hispanics skip physician visits are low income and undocumented status (Alcalá, Chen, Langellier, Roby, & Ortega, 2016). Undocumented Hispanics might be scared to visit a

hospital, emergency room, or physician because they might be afraid of getting deported (Zayas & Gulbas, 2017). As a result, Hispanics might have worse health outcomes because less visits to a health care facility have been linked to lack of awareness about hypertension, diabetes, or other cardiovascular diseases (Heintzman et al., 2017; Liao, Siegel, White, Dulin, & Taylor, 2016; Yoon, Burt, Louis, & Carroll, 2012). Medications or changes in dietary quality might be recommended and encouraged to prevent diseases. Therefore, not having contact with healthcare providers could lead Hispanics to be unaware of the importance of a well-balanced diet and knowledge of obesity-related diseases.

Social and community context.

Social and community support are essential networks for emotional support and well-being (ODPHP, 2016b). Recent immigrants may be prone to discrimination, racism, and distrust of the government in the U.S. (Gee, Ryan, Laflamme, & Holt, 2006). Discrimination has been linked with poor mental health status and less use of medical services (Gee, Ryan, Laflamme, & Holt, 2006). Viruell-Fuentes (2007) organized open interviews on first-generation Hispanics that asked them about their feelings when they encountered people from the majority groups. In this study, some women did not feel any type of discrimination, while others felt like they were looked in "condescending" or "suspicious" ways. Discrimination can be intentional or unintentional (Castañeda et al., 2015); nevertheless, experiencing it can have a negative effect and cause segregation among minority populations. Recent immigration can increase the feelings of unbelonging (ODPHP, 2016b), which is why it is important that people are active within their community or neighborhoods and receive social support for their surroundings.

NEIGHBORHOOD FOOD ENVIRONMENT

Access to healthy foods varies across neighborhoods, socioeconomic conditions, and ethnic backgrounds (Helbich, Schadenberg, Hagenauer, & Poelman, 2017). Personal and social environments might facilitate food access and availability and consequently influence people's diet. The food environment is defined as the 'physical, socioeconomic, cultural, and political factors' that impact the dimensions of the food environment within one's neighborhood (Rideout, Mah, & Minaker, 2015). Food environments can be measured as the geographic location with a given mile radius (1, 3, or 5 miles), experiences inside a store, or infrastructure settings (Lisabeth et al., 2010; Moore, Diez Roux, & Brines, 2008). The description of the food environment can be assessed through objective methods (Caspi, Sorensen, Subramanian, & Kawachi, 2012; Liese et al., 2015); however, researchers have shown that the perception of the food environment plays a significant role in dietary behaviors because it shows people's thoughts and feelings about their food environment (Sharkey, Johnson, & Dean, 2010; Williams et al., 2010).

The dimensions of food environment were first suggested by Penchansky and Thomas (1981), and include acceptability, accommodation, accessibility, availability, and affordability. *Acceptability* refers to how well people accept the food supply around them; *accommodation* is based mainly on how the local food sources integrate resident's needs, such as store hours or product offering; *accessibility* is defined as how approachable is the location of the food outlet; *availability* refers to the amount of healthy food available; and *affordability* is related to prices, promotions and the local cost of food (Caspi et al., 2012). Acceptability and accommodation are beyond the scope of this paper. The other three dimensions will be further discussed in the following sections.

The increased prevalence of obesity, CVD, and T2DM has open field to investigate food environment as a contributor to these diseases because living in an obesogenic environment can influence diet (Ball et al., 2006). Recent findings suggest that there is a relationship between the environment and the type of food residents are able to obtain such as fruits, vegetables, or fast food. Thus influencing dietary quality (Gustafson et al., 2010; Powell & Han, 2011; Sharkey, Dean, Nalty, & Xu, 2013). Having less accessibility to supermarkets might lead to having less than optimal diets because residents are not able to obtain whole products at a reasonable price or distance (Hearst, Pasch, & Laska, 2012; Liese et al., 2015; Odoms-Young, et al., 2016). In turn, overweight and obesity can be influenced by the neighborhood food access (Rose, Bodor, Hutchinson, & Swalm, 2010).

The presence of food outlets might influence where and how often people purchase foods. The relationship between food store placement, store characteristics, and store prices are shown in Figure 3. As a result, people may have a higher consumption of healthful products due to the more favorable living circumstances to obtain fresh produce (Liese et al., 2015). Since grocery stores offer a wider variety of fresh food products at a more affordable price, it is believed that having more access to grocery stores rather than convenience stores is beneficial for people's diets. For example, residents have reported that finding access to healthy foods helps them making healthier food choices (Osypuk, Diez Roux, Hadley, & Namratha Kandula, 2009). Similarly, women who reported having more access to healthier foods in their neighborhoods were less likely to eat fast food (Inglis et al., 2008). Nevertheless, other studies have found no relationship between shopping frequency or store accessibility and an improved diet (Inglis et al., 2008; Liese

et al., 2015). This has led researchers to believe that food swamps (areas with higher access to unhealthy foods) play a bigger role in diet than access to supermarkets (Fielding & Simon, 2011).

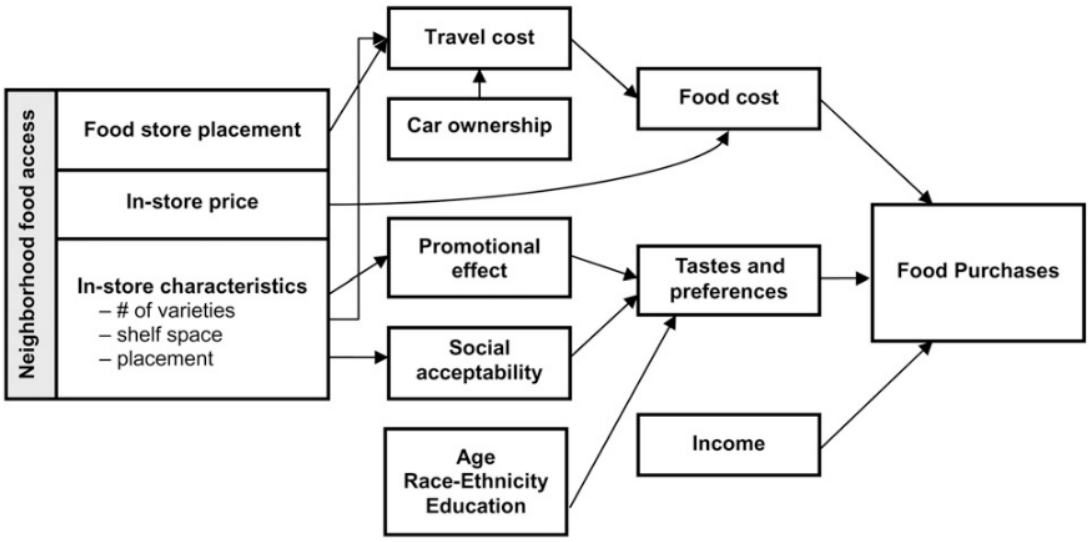

Figure 3. Neighborhood food access and consumer food choices, obtained from Rose et al. (2010).

Food deserts, food swamps, or food oasis can also occur within some food environments. The 2008 Farm Bill defined food deserts an "area with limited access to affordable and nutritious food" (Title VI, Sec. 7527). Other definitions of food deserts have been proposed by researchers (Cummins & Macintyre, 2002; Walker et al., 2011). For example, Gordon and colleagues measured food desert as the healthy and unhealthy food options for residents through distance; whereas Walker et al. focused solely on supermarket distance (0.5 miles from zip code). In addition, for rural areas a food desert has been defined as access to supermarket for more than 10 miles (Morton & Blanchard, 2007). The concept of food desert focuses mainly on lack of accessibility to healthy foods by distance. Hence, Rose et al. (2009) proposed that in addition to accessibility, the type

of food individuals consume is an important predictor of food intake. The term used for disproportionately higher access to fast foods and convenience foods which are generally of low nutritional value is "food swamps" (Albert et al., 2017). Contrarily to food deserts which are areas with minimal access to food options (Dubowitz et al., 2015), researchers define "food oases" as areas with higher access to more healthful foods, for example a chain supermarket within 0.5 or 1 mile of the zip code (Walker, Block, & Kawachi, 2012). All of the concepts mentioned above focus on the food environment and how it can influence dietary intake. Food deserts and food swamps are usually found among minority populations with low-incomes with either low access to food or higher fast-food outlet exposure (Howlett, Davis, & Burton, 2016; Smoyer-Tomic et al., 2008). Placing this group at risk to consume a greater amount of energy due to the availability of energy-dense foods in convenience stores (Walker et al., 2011).

The association between the local food environment and diet can be influenced by perceived food availability, accessibility, affordability, and the presence of food deserts or food swamps (Inglis et al., 2008). All of these can influence food choices, shopping frequency and the type of food individuals consume. It has been well established that access to grocery stores and more healthful food products are scarce in rural areas (Sharkey et al., 2010). However, in urban areas such as the Phoenix Metropolitan area, the perception of food environment among minority groups, such as Mexicans, has not been thoroughly investigated.

Food accessibility.

Caspi and colleagues defined food accessibility as the 'location of the food supply' and how easy it is for individuals to reach that particular location (Caspi et al.,

2012). Some of the main subdomains of food accessibility are travel time and distance. Home production of foods, vehicle ownership, household income, and purchasing power also play a role in food accessibility (Lisabeth et al., 2010). Greater accessibility to fresh produce has been associated with higher consumption of fruits and vegetables (Caldwell, Miller Kobayashi, Dubow, & Wytinck, 2009). Since findings show a correlation between diet-related diseases and store location (Karpyn et al., 2010), living in an obesogenic environment with more access to convenience stores or fast-food restaurants might lead to higher body weight (Bodor et al., 2010; Dubowitz et al., 2012).

The environment can play an important role on diet because food access can limit individuals' preferences and food exposure. Minorities are likely to live in obesogenic environments which decreases the access to whole foods and increases the access of prepackaged, convenient foods (Rideout et al., 2015). For example, Hispanic mothers stated that sugary drinks are less affordable in their countries so consumption is lower; however, in the U.S. those items are cheaper and can become more desirable (Colón-Ramos et al., 2017). Healthy foods are less accessible for people with low socioeconomic status, and this can increase the consumption of fast foods that can negatively impact the body (Delavari et al., 2013).

The lack of accessibility has become a disparity for Hispanic, Latino, or African-American populations, and these minority groups are not able to attain healthy foods (Raja, Ma, & Yadav, 2008; Walker et al., 2010). In particular, communities with greater numbers of Hispanics tend to live in areas considered as food swamps due to the higher access to convenience stores or small stores that do not have a wide variety of food products (Bustillos, Sharkey, Anding, & McIntosh, 2009; Powell, Slater, Mirtcheva, Bao,

& Chaloupka, 2007). Studies have found that corner and convenience stores do not offer or offer few fresh fruits or vegetables (MacNell, Elliott, Hardison-Moody, & Bowen, 2017). A Texas study found that counties with 76% of Mexican American residents had approximately five times the number of convenience stores than counties with 36% of Mexican Americans (Lisabeth et al., 2010). Suggesting that the higher exposure to convenience stores and fast-food restaurants could possibly increase unhealthy eating due to its products being convenient, affordable, and energy-dense (Hilmers et al., 2012).

Proximity to food outlets refers to the distance from one's home to that particular store which is when food deserts can arise (Charreire et al., 2010). Also, travel time to supermarkets is less for privileged neighborhoods than underprivileged ones (Charreire et al., 2010). Distance and travel time can increase the barriers that people face to obtain food. It has been suggested that higher access to supermarkets can increase fruit and vegetable consumption (Morland, Wing, & Diez Roux, 2002) and lower the prevalence of overweight or obesity (Morland, Diez Roux, & Wing, 2006). On the other hand, other researchers have found that distance or proximity to a grocery store is not correlated to body mass index or diet (Drewnowski, Aggarwal, Hurvitz, Monsivais, & Moudon, 2012; Dubowitz et al., 2015).

An additional barrier to food access is transportation. Within the city of Phoenix, the USDA (Ver Ploeg & Rhone, 2019) has found that there are many low-income areas with low vehicle access; specifically, 33% of households do not have a vehicle to access supermarkets. Residents who live in food desert or food swamps might need to travel longer times and spend more money on gas or transportation fare (Rose, 2010) which increases expenses related to food shopping. Low-income people might not want to spend

that money because it can be used for other necessities such as rent or utilities. It has been found that food secure households (92%) use their own vehicle to do grocery shopping; however, among food insecurity households only 69% use their own car for grocery shopping (Ver Ploeg et al., 2015). Even though, public transportation can be used to obtain groceries, some women have mentioned that it is difficult to carry groceries in the bus and that relying on friends and family can feel like a burden (MacNell et al., 2017). Transportation can influence food shopping frequency because people might be able to go more often to a grocery store if they have a vehicle (MacNell et al., 2017). Consequently, people who are not able to shop many times per month might also not be able to meal plan or have enough fridge storage which limits the availability of fresh foods and the amount of produce they can buy.

Food affordability.

Even though proximity to supermarkets plays a role in the food environment, some researchers have suggested that income is a key predictor of food choices because it is one of the main barriers to obtain more healthful food (Alkon et al., 2013). Less affluent families tend to spend higher proportions of their salary on food than more affluent families (Bridle-Fitzpatrick, 2015), this reduces their purchasing power and influences individuals to opt for non-healthy, cheaper choices within the environment. Within a neighborhood, people can encounter different types of prices, promotions, and nutritional quality within a food store (Charreire et al., 2010). The price of food and people's perception of how much a product costs are part of food affordability.

Some people might perceive that food is not worth what they are paying; meanwhile, others might view the price is fair, which can play a role in the amount of

fruits and vegetables people eat every day. A study of 4131 women showed that when women thought of fruits and vegetables more expensive when they perceived their neighborhood to have less availability of fresh produce (L. K. Williams, Thornton, Crawford, & Ball, 2012). In addition, researchers have found that food items considered healthy such as apples, wheat bread, and milk cost 25% more at convenience stores than supermarkets. For example, a pound of fresh apples were $1.39 in the supermarket versus $1.94 in the convenience store. Similarly, whole wheat bread was $3.82 versus $4.19 in the convenience store (MacNell et al., 2017); and milk was $2.69 in the supermarket versus $3.29 in a tienda in a South San Diego county (Emond, Madanat, & Ayala, 2012).

In food desert areas, price has also been found as a factor that influenced the type of store in which Latino women shopped (MacNell et al., 2017). Some women in this study obtained more items for a lower price in supermarkets rather than corner stores. In food swamp areas, a study found that low income neighborhoods did not offer the lowest prices of fruits and vegetables but they did offer the lowest prices for prepacked snacks and sugar sweetened beverages (Bridle-Fitzpatrick, 2015). Unfortunately, residents of food swamps who are exposed to convenience stores and fast food stores might be forced to choose for cheaper options commonly lower in nutritional quality because healthful foods are more expensive (Krukowski, West, Harvey-Berino, & Prewitt, 2010).

Food availability.

Within a neighborhood, people have a different number of stores, sit-down restaurants, or fast-food restaurants accessible to them. Studies have shown an association between diet and food availability (Osypuk et al., 2009; Sharkey, Dean, & Johnson, 2011; L. Williams et al., 2010). A healthier food environment can promote

access and availability to healthy foods and promote healthy eating which can have a positive impact among residents (Rideout et al., 2015). Food availability can be described as how much supply of healthy food is available for people (Caspi et al., 2012). Researchers have found that people perceive high availability in healthy foods even when both convenience stores and supermarkets are available (Gustafson et al., 2010). Which suggests that perceived availability to healthy food is subjective to people's opinions of their environment.

Researchers found that neighborhoods with higher number of immigrants scored higher on the availability of healthy food environment scale; however, they scored lower on walkability, safety, and social cohesion scales than neighborhoods with lower number of immigrants (Osypuk et al., 2009). This presents several barriers to obtain healthy foods because neighborhoods are not adapted for easy food access. Food store types can vary dramatically based on products offered. For example, quality, freshness, variety, and culturally appropriate foods have been found as an important factor to choose a store among Latino mothers (MacNell et al., 2017) and Mexican women (Bridle-Fitzpatrick, 2016). Immigrant mothers discussed that they prefer to cook dishes from their home country so they travelled to stores in which they could find Hispanic foods (Colón-Ramos et al., 2017; MacNell et al., 2017) such as beans Similarly, Helbich and colleagues (2017) suggested that small stores can be sources of healthy foods among ethnic groups because of their preferences. Therefore, food availability plays a role among people who continue with their home country's diet.

Availability plays a role in the dimensions of food because it can impact personal views of food access regardless of proximity or price. For example, a study found that

low socioeconomic status women were more likely to consume fruits and vegetables if they perceived a greater availability to healthy foods even if they had to travel outside of their shopping area (Williams et al., 2010). The perception of the food environment can vary among people and lack of supermarkets might have a negative impact on food availability because the possibility to obtain fresh and more healthful foods is limited in convenience stores (Moore et al., 2008). However, some findings suggest that even if individuals have access to fruits and vegetables through supercenters and convenience stores consumed less fruits and vegetables than those who did not have access to stores within their census tracts (Gustafson et al., 2010).

In-store food availability is an important factor to consider because shelf space and placement of foods can influence individuals food purchases (Rose et al., 2010). Convenience stores have less variety of products to offer and this can be perceived as low food availability. Moore et al., (2008) found that less density of supermarkets within one mile resulted in 17% less availability to low-fat products and fresh produce than participants with higher density of supermarkets. Limited availability to healthy foods can become problematic for residents because convenience stores are characterized by selling products that are generally higher in price, more calorie-dense, and have higher amounts of sugar, saturated fat, and sodium (Stern, Ng, & Popkin, 2016), leading residents to purchase non-nutritional choices because it is what is available for them. Researchers have found that convenience stores do not have a view of fruits and vegetables from the entrance whereas supermarkets have fruits and vegetables at sight (Dubowitz et al., 2015). Stocking healthier foods could improve the perception of the food environment because residents might feel like they have more items available to

them. A study found that 52% and 62% of corner stores had green beans and corn respectively; whereas all supermarkets had 100% of those items (MacNell et al., 2017). Similar findings showed that the highest percentage of fruits and vegetables found in convenience stores were apples (12%); the rest of fruits and vegetables ranged from zero to eight percent (MacNell et al., 2017).

Since food swamps are characterized by a higher density of fast-food restaurants, dietary intake might be affected from the easy availability. For example, a study found that having an additional fast-food chain within a 3-kilometer radius increased monthly fast food purchasing by 13% (Thornton, Bentley, & Kavanagh, 2009). Similarly, when the environment offers sugary drinks at an affordable price, this can increase the consumption of that item (Colón-Ramos et al., 2017). Frequently consuming food outside of home might lead to a higher intake of sodium, fat, and soft drinks (Larson et al., 2009) items which are not the most ideal for weight maintenance and prevention of diseases. In addition, areas saturated with unhealthful food choices might influence the household choices; for example, a study of Central American women found that the neighborhood influenced the choices of their children and this created conflict when making food choices (Colón-Ramos et al., 2017).

FOOD SECURITY

Food security refers to having the accessibility to obtain enough foods, safely, and at all times. When a person is food secure, they are able to use that food to sustain a healthy and active life (World Food Programme, 2018). Contrarily, when a person or household does not have adequate access to food, they can develop feelings of food insecurity. Food insecurity occurs when a person at any point in life does not have a reliable or safe mechanism to obtain nutritious food. In addition, food insecure individuals are not able to access food in socially acceptable ways (U.S. Department of Agriculture, 2018).

Depending on the severity, food security is generally classified into *high food security* in which there are no indicators of lack of food access. In *marginal food security* there are one or two indicators that there is not enough food. In *low food security*, there are indicators that there is not enough food but there is no reduced food intake. In *very low food insecurity* food intake is reduced (Nord, Andrews, & Carlson, 2005). Scientists have found that there are three main domains of food security (food availability, food accessibility, and utilization of food) all of which play a role and affect the household's food security (Food and Agriculture Organization of the United Nations, 2018; Upton, Cissé, & Barrett, 2016). These domains were discussed in the previous section.

Food insecurity in the U.S. increased during the great recession which occurred between 2007 and 2009. During this period, unemployment rates and poverty rates increased, and so did the percentages of household food insecurity (Pilkauskas, Currie, & Garfinkel, 2012). Food insecurity has been decreasing since 2009, however, there are still 11.8% of food insecure households in the U.S. (USDA, 2017). Among minority groups,

Hispanic households are particularly at higher risk to experience food insecurity; in 2014, 22.4% of Hispanic households were food insecure (U.S. Hunger Relief Organization, 2018; Rabbitt et al., 2016). In particular, Hispanic women might be at higher risk for food insecurity due to low wages, limited access to food, and other disparities (Mora & Dávila, 2018; Larson et al, 2009). These SDOH might affect the neighborhood food environment and are linked to food insecurity and dietary quality. Additional relationships between these factors are depicted in Figure 4.

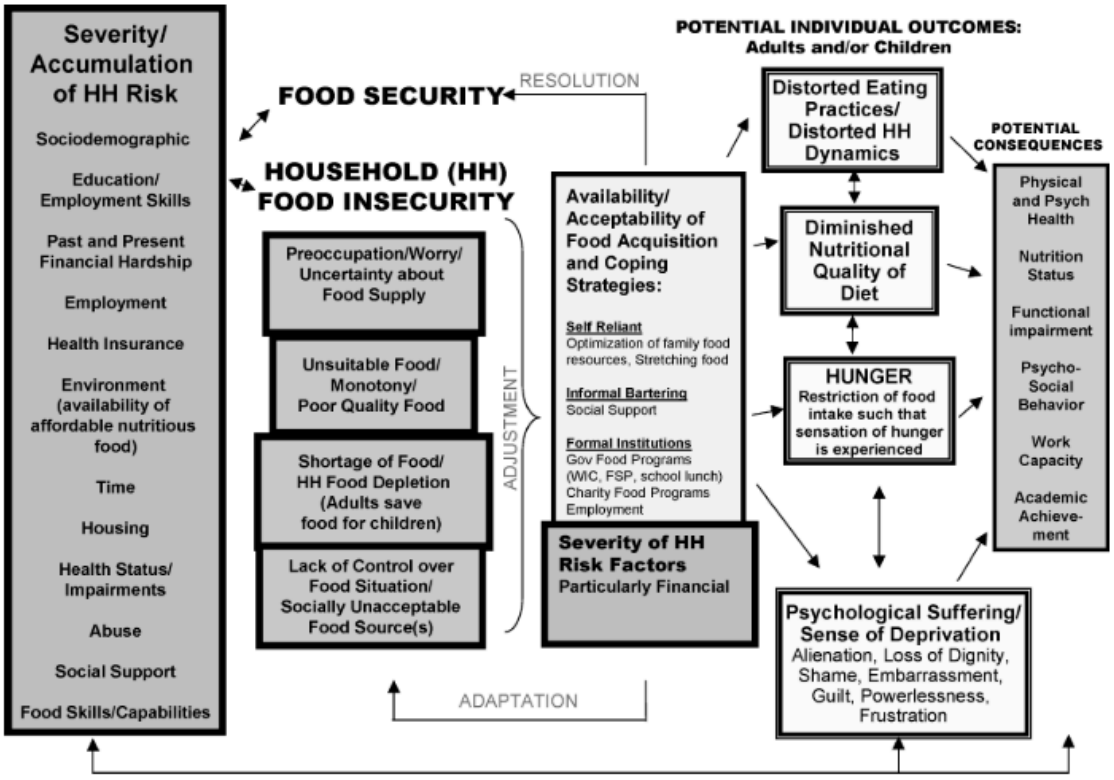

Figure 4. Social determinants of health, food insecurity, environment, and nutritional quality of diet. Obtained from Alaimo (2005).

Among Hispanics, a study that interviewed and surveyed 7,964 women in California showed that 36% of Hispanic participants felt food insecurity (Adams et al., 2003). Similarly, Acheapmong et al. (2013) showed that 77% of Hispanic subjects felt low food security and Sharkey, Dean, and Johnson (2011) found that Mexican families living in the border of Texas and Mexico experienced food insecurity. Even though Hispanic women are at high risk to be food insecure (CDC, 2015), the factors that contribute to food insecurity have not been completely established. Currently, literature has not explored how the food environment after migration is correlated to feelings of food insecurity among this group.

Some researchers have suggested that food insecurity could help explain Hispanics' high prevalence for being overweight and obese and they have found that this relationship is more common among women (Acheampong & Haldeman, 2013; Hernandez, Reesor, & Murillo, 2017; Martin & Ferris, 2007). For example, Adams et al. (2003) found that 26% of food insecure Hispanic participants living in California were obese. Similar findings were found among Mexican-American women (Smith et al., 2016). Dhurandhar (2016) suggested that the high rates of overweight and obesity seen in food insecure adults can be explained by a physiological response of the body because it is experiencing low food supply or stress which might lead the body to accumulate fat. Researchers have shown that traumatic and stressful events led obese individuals to overeat comfort foods (Brogan & Hevey, 2009). Interestingly, a study that analyzed healthy premenopausal women showed that women with high stress were more likely to overeat nutrient-dense foods (cookies or ice cream) because these foods provide a sense of comfort (Tomiyama, Dallman, & Epel, 2011; Wansink, Cheney, & Chan, 2003).

Because the Hispanic population is at high risk to develop diet-related chronic diseases and be overweight or obese (Jones et al., 2016; Leung et al., 2014; Seligman et al., 2009), it is important to measure frequency of fast food consumption and the stressors that could negatively impact their nutritional choices.

FACTORS THAT INFLUENCE DIETARY QUALITY

The *Dietary Guidelines for Americans* (DGA) suggests that consuming a variety of vegetables, whole fruits, grains, and low-fat products is a way of following a healthy eating pattern (U.S. Department of Agriculture and U.S. Department of Health and Human Services, 2015). Regardless, people's dietary quality in the U.S. is far from optimal. In fact, Go and colleagues (2014) found that among adults, 51.9% met the recommendation for sugar sweetened beverages but only 7.3% and 18.3% met the recommendations for whole grains and fish respectively (Go et al., 2014). Similarly, fruit and vegetable consumption is low, and in 2015 only 12.2% and 9.3% of Americans met the goal fruit and vegetable recommendations respectively (Lee-Kwan, Moore, Blanck, Harris, & Galuska, 2017). Among Mexican Americans, 14% met the dietary guidelines recommendations for fruits, and only 2.5% met recommendations for vegetables (Go et al., 2014). Although assessing compliance with the US Dietary Guidelines for Americans is complex, several groups have proposed the use of composite scores that compile how closely individuals follow each of the Dietary Guidelines' individual recommendations. For purposes of the present work we will solely focus on the HEI-2015.

The HEI-2015 is an indirect assessment of dietary quality of a person in comparison with the DGA (USDA, 2019). The HEI-2015 assesses the density of food and beverages usually in "amount per 1,000 kcal" (Krebs-Smith et al., 2018) to estimate a pattern of dietary quality. The HEI-2015 has 13 components, 9 of which measure adequacy of consumption of foods or nutrients considered as healthful, and 3 that measure intake of foods advised to be consumed in moderation. Adequacy components such as total fruit, whole fruit, total vegetables, greens and beans, whole grains, dairy,

total protein foods, seafood and plant proteins, and fatty acids (ratio of polyunsaturated [PUFAs] and monounsaturated fatty acids [MUFAs] to saturated fatty acids [SFAs]) are encouraged for consumption. Moderation components are sodium, added sugars, and saturated fats. The recommendations for the latter two is to keep those components below 10% of total energy (Krebs-Smith et al., 2018).

Dietary quality among Hispanic adults.

The average HEI score for the U.S. in the 2009-2010 NHANES data was 57 out of 100 for 31-50 year old adults, which suggest that the dietary patterns of Americans is not optimal (USDA, 2015). Nevertheless, a recent study reported a mean score of 71 out of 100 for individuals of Mexican-origin (Siega-Riz et al., 2019). This could be explained by healthier dietary habits such as higher consumption of plant proteins, more home cooked meals, and fruits and vegetables. A study of Central American immigrants found that women preferred to cook traditional foods to their children such as soups, rice, tortillas, local cheese (Colón-Ramos et al., 2017), and fruits and vegetables (Cohen, Sturm, Scott, Farley, & Bluthenthal, 2010). Researchers have suggested the diet of less acculturated Hispanics' is better than that of non-Hispanic whites or African Americans because they are more closely related to their traditions and they tend to cook more often (Yoshida et al., 2017) with higher quantities of fruits, vegetables, and beans (Ayala, Baquero, & Klinger, 2008). A study of Hispanics from different countries showed that less acculturated Hispanics (measured by country of birth, language and the Marin's Short Acculturation Scale) had higher HEI scores than more acculturated Hispanics (Siega-Riz et al., 2019). Contrarily, other researchers have found that regardless of age, young or old, Mexican-American women had low intake of nutrient-dense foods and

their diets needed improvement (Neuhouser, Thompson, Coronado, & Solomon, 2004; Pignotti et al., 2015).

The monetary value of food is also an important factor to reach the recommendations of the DGA. Since Hispanics can face financial strains after migrating to the U.S. (Hilmers et al., 2012), they are at higher risk to develop food insecurity which has been linked to a lower score in the HEI (Hiza et al., 2013; Huet, Rosol, & Egeland, 2012). Cohen and colleagues (2010) found that people with incomes lower than $20,000 were more likely to consume calories from sweet foods and sugar sweetened beverages (SSB) than people with higher incomes which is consistent with findings that suggest that food insecure individuals have a higher sugar and SSB consumption than food secure individuals (Bruce, Thorpe Jr, Beech, Towns, & Odoms-Young, 2018; Morales & Berkowitz, 2016). Food insecure households may be more likely to purchase energy-dense foods which are usually high in sugars, refined grains, sodium, saturated fats (Drewnowski et al., 2004), and limited variety of fruits and vegetables (Drewnowski & Eichelsdoerfer, 2010) because those foods have a lower cost and they are more affordable for people who are experiencing financial burdens.

People with a low socioeconomic status have fewer healthy food-choices such as fruits, vegetables, and unprocessed foods (Acheapmong et al., 2013; Townsend, Peerson, Love, Achterberg, & Murphy, 2001) and these can result in a lower dietary quality. Fats, oil, sugar, potatoes, refined grains, and beans are cheaper and provide more energy than fruits, vegetables, meat, and dairy, thus, increasing fruit and vegetables resulted in higher amount of dollars spend on food; whereas higher consumption of fats and sweets resulted in less amount of money for diet costs (Drewnosky & Darmo, 2005). People who are

trying to save money might be less likely to purchase more expensive options. For example, a study with 30-60 year old low-income adults found that an increase of $3 per day resulted in approximately 5 points more in the HEI total score (Beydoun et al., 2015). Similarly, an annual household income greater than $10,000 resulted in more adherence with DGA guidelines and HEI scores (Siega-Riz et al., 2019). Because low HEI scores have been linked with obesity and worse health outcomes (Tande, Magel, & Strand, 2010), lacking monetary means to purchase healthier food options has important implications for chronic disease health disparities.

Fruit and vegetable consumption.

Fruits and vegetables have many benefits for health such as vitamins, minerals, high water content, and fiber (Slavin & Beate, 2012). The USDA recommends a fruit and vegetable intake of 1-2 cups and 1-3 cups respectively (2018a). In spite of recommendations, Hispanic populations do not consume the recommended quantities (Di Noia et al., 2016; Kamphuis et al., 2006). Nevertheless, Hispanics reportedly consumed more fruits and vegetables than non-Hispanic blacks (Moore et al., 2015) and non-Hispanic whites. For example, a study found that the mean subscores among Hispanics for whole fruit, vegetable, and dark green and orange vegetable were 61, 71, and 32 respectively. These subscores were higher than non-Hispanic whites which subscored 55, 69, and 24 and non-Hispanic blacks which subscored 44, 56, 22 for whole fruit, vegetable, and dark green and orange vegetables respectively (Hiza et al., 2013). Similar findings are shown with legumes, plantains, and root crops (Di Noia et al., 2016).

Social determinants of health such as education, language, income, and neighborhood food environment are also important factors to consider when estimating

fruit and vegetable consumption. Nutrition knowledge could increase Hispanics consumption of various types of fruits and vegetables that can provide a wider range of vitamins and minerals (Acheampong & Haldeman, 2013). In addition, researchers have found that among Hispanics there is a lack of knowledge of the benefits of fruits, vegetables and other food products and some participants reported that they had a hard time reading food labels (Acheampong & Haldeman, 2013).

Moreover, economic means is one of the main barriers that Hispanics might face when purchasing fruits and vegetables. Higher fruit consumption has been seen on high food secure or marginal food secure individuals than low or very low food secure individuals (Acheampong & Haldeman, 2013). Suggesting that having the economic means to purchase produce might increase the consumption of these foods. Produce availability might be higher in southern states than northern states. Additionally, cities with higher proportions of Hispanics might offer more traditional foods for this population. For example, *tiendas* (i.e., traditional corner stores) in south San Diego were found to have fresh produce for $3/day cheaper than supermarkets (Emond et al., 2012). *Tiendas* offered cheaper prices per unit in cantaloupes, pinneaples, grapes, pears, peaches, spinach, yams, and any type of chile.

Interestingly, some studies have found that Mexican immigrants had higher HEI scores than immigrants of other Hispanic/Latino heritages (Siega-Riz et al., 2019). The relationship between country of origin and diet could predict why some Hispanics comsume more quatities of fruits and vegetables among others. Some countries add more natural foods and less fried foods to their overall daily dishes than others, and this can result in overall higher HEI scores. A study found that Mexicans had higher HEI

subscores for whole fruit, total fruit, and total vegetable than other Hispanics while Puerto Ricans had the lowest scores (Siega-Riz et al., 2019). When grouping Hispanics as an overall population (diverse group of Central Americans, South Americans, and Spaniards) the mean for HEI subscores may not accurately represent the dietary quality of individual groups based on their country of origin. Therefore, it is important to focus on Mexican women to have a better understanding of diet quality and overall fruit and vegetable consumption of this specific population.

Sugar.

The World Health Organization (2015) recommends that sugar consumption for adults and children should be less than 10% of the total energy intake (roughly 50 grams). This recommendations are reinforced among Hispanic populations because they are at higher risk to develop type 2 diabetes than non-Hispanic whites (CDC, 2019). NHANES data from 2003 to 2006 showed that 17.1% of total calories consumed by the overall U.S. population were provided by desserts, snacks, and beverages, resulting in 83 grams of added sugar intake a day (Huth, Fulgoni, Keast, Park, & Auestad, 2013). The exceeded recommendations provide many calories to an individual's diet with little nutritional value.

Among Mexican-Americans data from the NHANES 2008 findings showed that sugar sweetened beverages was 7% of total energy (29 grams) and total added sugars was 15% of total energy intake (79 grams) (Welsh, Sharma, Grellinger, & Vos, 2011). Additional findings from the Hispanic Community Health Study/Study of Latinos have shown that Mexican-Americans consumed 1.5 servings per day of sweetened beverages which roughly estimates to 12 fluid ounces a day (Siega-Riz et al., 2014). Park and

colleagues (2016) found that Spanish-speaking and foreign-born Hispanics consumed more SSB (fruit drinks, sports, energy, and sweetened coffee/tea drinks, and nondiet soda) than English-speaking and U.S. born Hispanics. Reserchers have suggested that not all Hispanics have a high sugar intake, and that sugar intake might be influenced by lower acculturation; however, acculturation measures are not consistent and relationships can vary by measures (Ayala et al., 2008).

It has been suggested that females have a strong preference for sweet foods such as chocolate and candy (Wansink et al., 2003). A study found that Hispanic women consumed 438 calories a day from snacks such as salty snacks, cookies, candy, soda, and alcohol (Cohen et al., 2010) which exceeds the recommendations from the DGA which is approximately 200 calories (ODPHP, 2016a). Research has shown that store high availability and convenient placement of sugar-sweetened beverages in supermarkets and convinience increases the consumption of these products (Nakamura, Pechey, Suhrcke, Jebb, & Marteau, 2014). A study found that minority neighborhoods in New York that the highest the consumption of sugar sweetened beverages received higher amount of advertisement and cheaper prices for the products (Adjoian, Dannefer, Sacks, & Van Wye, 2014). Since Hispanic neighborhoods are usually considered food swamps, this population might be at an increased risk to consume sugary choices that are more affordable and easily available to them.

Salty snack intake.

Salt is a prevalent ingredient of processed foods to add flavor, to preserve foods, and for food safety (Ahuja et al., 2015). It has been suggested that the average American consumes 3,400mg of sodium a day which exceeds the recommendations by 1,100mg

(American Heart Association, 2018). Higher intake of salt and empty calories has been linked to consuming more processed foods, which can increase obesity risk (Drenowatz, Shook, Hand, Hébert, & Blair, 2014; Yoshida et al., 2016) and risk to develop high blood pressure, kidney problems, fluid dysregulation, and cardiovascular risk (Farquhar, Edwards, Jurkovitz, & Weintraub, 2015).

NHANES data from 2007 to 2010 shows that Mexican American women consume less sodium than other Hispanics, non-Hispanic blacks, and non-Hispanic whites but still consume more than 2,300mg per day; grain products attributed 60-70% of daily sodium consumption (Fulgoni, Agarwal, Spence, & Samuel, 2014). Similarly, a study on Hispanics showed that there was 2% adherence to the sodium recommendations on the HEI (Siega-Riz et al., 2019). Salty snacks such as crackers, pretzels, potato chips, or tortilla chips can have a high density of sodium. For example, pretzels or crackers contribute 1150 to 943mg of sodium for every 100 grams (Ahuja et al., 2015). Consequently, just snacking on these foods can quickly add up and surpass the recommended sodium intake. Reducing sodium consumption is important because this population faces disparities in obtaining hypertension-related health screening services, medications, and medical care (Liao et al., 2016).

Fast food consumption.

According to Go and colleagues (2014), the time spent eating at home has reduced significantly since the 1980s. During 2013 to 2016, 35.8% Hispanic women consumed fast-food on a given day (Fryar, Hughes, Herrick, & Ahluwalia, 2018). Food consumption can be impacted by many factors such as cost, time available to prepare foods, food knowledge, cooking skills, education, income, and cultures and beliefs

(Acheampong & Haldeman, 2013; Monsivais, Aggarwal, & Drewnowski, 2014). Nowadays, household members need to work to be able to maintain the household. This increase in workforce demand has also reduced meal preparation and cooking time and families can be more prone to choose convenience or fast-foods (Drewnowski & Eichelsdoerfer, 2010). For example, a cross-sectional study of approximately 1,300 adults (67% women) showed that people who spent less time preparing foods were usually working participants who opted for fast-foods or convenience foods (Monsivasis, et al., 2014). Since immigrant women might have to work more hours to compensate for salary inequality (Flippen, 2016), time for cooking might be reduced and they might opt to eat fast-food for convenience.

In addition, the social context, environmental factors, and stress might influence the frequency for consuming comfort foods that are usually palatable sweet or salty foods (Wansink et al., 2003). Potato chips, ice cream, cookies, candy, pizza, and steaks are characterized as some of the favorite comfort foods. Low income adults may be more prone to consume food at fast-food restaurants than full service restaurants because fast-foods are a lot more accessible options around their environment (Drewnowski & Darmon, 2005). Nackers and Appelhans (2013) also found that food insecure participants were more likely to opt for microwavable and frozen foods. Interestingly, researchers have found that Hispanics are more prone to receive marketing about unhealthy food and beverage marketing. For example, Spanish language TV networks have been found to have more advertisement for fast-food restaurants and unhealthy foods than English language TV networks (Adeigbe, Baldwin, Gallion, Grier, & Ramirez, 2015). This can

increase cravings of fast-food among the household and increase average fast-food consumption.

CONCLUSION

Hispanic women might be more prone to experience food insecurity due to lack of education, monetary resources, and health disparities. In addition to worry that food will be insufficient for a given period of time, food insecurity is accompanied by poor diet quality and lack of control over food availability for a household (Alaimo, 2005). Therefore, it is important to assess dietary quality among individuals who are at higher risk to having inadequate access to healthier food options. Different social determinants of health are linked to each other and they all play a role in people's health. Racial inequalities can play a role in an individual's neighborhood, employment status, and income (Pager & Shepherd, 2008), which can influence dietary choices and the food environment. Since, lower income neighborhoods have been found to offer limited variety of healthful products (Odoms-Young et al., 2016), it is important to explore the access that immigrants have to food and the economic means they require to have a balanced diet. In addition, education, language, and literacy are factors to consider when focusing on helping Hispanics obtain more access to food and other resources such as health care.

Household's income, neighborhood, and preferences play a role in family dynamics and living in food deserts, food swamps, or food oases can influence the dietary choices that individuals make (Alkon et al., 2013). All of the dimensions of food environment might not be treated individually because they all interact and can shape each other (MacNell et al., 2017). For example, food affordability can be affected by food

accessibility and vice-versa. Similarly, food availability and the supply of food within a neighborhood is affected by the socioeconomic status and how accessible those grocery stores are. Therefore, it is important to note that the food environment does not dictate people' behaviors but it can play a significant role in nutritional outcomes. The food environment is an important subject to explore because it can be a possible contributor to the prevalence of diseases such as diabetes, hypertension, dyslipidemia, overweight, or obesity. Therefore, exploring how the perception of the food environment influences Mexican women's diet can be used as a possible area to implement prevention programs.

It is important to note that in addition to food accessibility, availability, and affordability there are other factors that can play role in dietary outcomes. Since food insecurity is connected to the domains of food environment, exploring the prevalence of food insecurity among Hispanics can help us further understand the barriers Mexicans face after immigration. Food intake can be influenced by many factors such as family practices, environmental factors, and personal preferences. Researchers have found that neighborhoods with higher proportion of Hispanic immigrants had diets lower in fat, processed foods, and sodium than non-immigrant neighborhoods (Osypuk et al., 2009; Yoshida et al., 2017). Contrarily, other researchers have suggested that immigration could be accompanied by drastic changes in immigrant's lives and economic status could affect food insecurity and food accessibility in their neighborhoods. For example, when individuals are facing financial burdens, they might look for cheaper ways to fill their hunger and might reduce the consumption of lean proteins, whole grains, fruits, and vegetables (Drewnowski & Eichelsdoerfer, 2010).

Given that vulnerable populations, such as immigrant Mexican women, are more susceptible to experience health disparities and have a greater burden from social determinants of health, it is crucial to explore how food accessibility, neighborhood food environment, and food insecurity influence dietary quality (fruit and vegetable intake, sugar, salty snack, and fast-food consumption) in this population.

CHAPTER 3

METHODS

STUDY DESIGN

This study was a secondary data analysis using data from a cross-sectional study conducted in Phoenix, Arizona. The purpose of the parent study is to evaluate the environment, lifestyle, stress, and diet and explore how these factors can influence the risk to develop obesity and cardiometabolic diseases among Mexican women who have migrated to the U.S. For purposes of this analysis, only a subset of data focusing on food security, perceived neighborhood food environment, and dietary intake was used. The subsequent description of methods only includes procedures related to the variables used for this analysis. The study was approved by the Institutional Review Board at Arizona State University (STUDY00008281; Appendix A).

PARTICIPANTS

Sixty-one adult women between 25 and 50 years old were recruited through posting flyers (Appendix B) in churches, community centers, community-based organizations, and schools, through distributing the flyer electronically (listservs and social media), and through word of mouth.

Women included in this study had to meet the following criteria: be Mexican-born; residing in the U.S. for at least 12 months; reside in the Phoenix metropolitan area; have a full-time job or be a full-time homemaker. Exclusion criteria encompassed pregnancy or planning to become pregnant; currently breastfeeding; known chronic diseases such as cardiovascular disease, diabetes mellitus, active cancer, hepatitis or thyroid irregularities; use of medications likely to impact metabolic outcomes (such as

metformin or statins); following a restrictive diet such as veganism or Atkins; and having gained or lost more than 5 kg six months prior to the beginning of the study.

STUDY PROTOCOL

Potential participants who expressed interest in partaking were screened for the inclusion and exclusion criteria using a study screening form (Appendix C). Once study eligibility was confirmed, women were asked to attend a study visit to the Nutrition Laboratory at Arizona State University. During their appointment, written informed consent was obtained using materials in the participant's language of preference (English or Spanish; Appendices D, E, respectively). After explaining study procedures and allowing participants to ask questions about the study. Participants who agreed to participate in the study and provided written consent had their anthropometric measurements and blood pressure taken in duplicate using standardized procedures. Participants were asked to complete a survey in their language of preference (English or Spanish; Appendix F) with the assistance of trained bilingual interviewers to collect sociodemographic information, food security status, information about their perceived neighborhood food environment, and dietary intake data.

MEASURES

Anthropometric measures.

Participants were asked to use the restroom to empty their bladder prior to taking any measurements. The researcher took participant's height without shoes using a stadiometer. Weight and body composition were obtained by using a Tanita SC-240. Waist circumference was measured to the nearest centimeter using a tape measure. All measures were taken in duplicate.

Sociodemographic characteristics.

We collected sociodemographic information including age, marital status, monthly household income, level of education completed, time in the U.S., and current employment status via survey. Age and time in the U.S. were open-ended questions. The question for marital status presented the following options: married and living with spouse, married but not living with spouse, not married but living with partner, single, divorced, widower, or refuse. The main sociodemographic characteristics used for the present analysis are monthly household income, education level, and current employment status since these can influence the food neighborhood environment and food insecurity status. To better approximate socioeconomic status, we collected education level and monthly income.

For income, participants were asked "*Including money from all salaries/work, government assistance and (if applicable) unemployment, what is the total amount of money your* ***household*** *receives* ***PER MONTH****?".* The choices for monthly income ranged from $0 to $1000, $1001 to $2000, $2001 to $3000, $3001 to $4000, to more than $4000. For education, participants were asked *"What is the highest grade you completed in school?"*. The options were: less than 6th grade, completed elementary school, completed middle school, some high school, completed high school, some college, never attended school, don't know/not sure, other, and refuse. Lastly, participants were asked "*Which of the following best describes your current employment status*?" and had the following options to choose from: working full-time (40 hours per week or more), working part-time (less than 40 hours per week), homemaker and do not work, homemaker with informal employment (prepared food sales, catalog sales, babysitting,

etc.), unemployed or laid off and looking for work, unemployed and not looking for work, don't know/not sure, other, and refuse.

Food security questionnaire.

Food security was assessed using the short-form six-question food security questionnaire, obtained from the U.S. Department of Agriculture (2012). The six-question questionnaire is an advisable questionnaire to reduce participant burden. In addition, the six questions only explore adult food security which complies with the objective of this study (USDA, 2012). This questionnaire preserves the important concepts of food security and it has been tested for reliability with minimal bias (Blumberg, Bialostosky, Hamilton, & Briefel, 1999). Participants were asked to think about how often within the past 12 months they experienced questions asking them about food security in their household. After scoring, participants were allocated to one of three subcategories: scores indicating food security were categorized into high food security and marginal food security; scores indicating food insecurity were divided into low food security or very low food security, as described below.

To assess food security status, raw scores were calculated (USDA, 2012). Questions *"In the last 12 months, the food that we bought just didn't last and we didn't have money to get more"* and *"In the last 12 months, we couldn't afford to eat balanced meals"* were given a score of 1 if respondents answered 'often true' or 'sometimes true'. Question *"In the last 12 months, did you or other adults in your household ever cut the size of your meals or skip meals because there wasn't enough money for food?*" was given a score of 2 when participants answered 'yes, almost every month' and 'yes, some months but not every month'; participants received a score of 1 when they answered 'yes,

only 1 or 2 months'. Questions *"In the last 12 months, did you ever eat less than you felt you should because there wasn't enough money for food?"* and *"In the last 12 months, were you ever hungry but didn't eat because there was not enough money for food?*" were given a score of 1 if participants responded 'yes'. After adding raw scores, participants who scored 0-1 were placed in the high or marginal food security scale. Scores of 2-4 had low food security and scores of 5-6 had very low food security.

Perceived neighborhood food environment questionnaire.

For the scope of this paper, respondent-based measures of the neighborhood food environment, such as perceived availability and accessibility to food stores, were measured. The survey included the Perceptions of Food Environment scale (Sharkey et al., 2010; Williams et al., 2012). The Perceptions of Food Environment scale has been tested for reliability when focusing on the information that residents are able to provide about their food environment (Ma et al., 2013). Participants were asked to think of their neighborhood as the area within a 20-minute walk or one mile from their homes and report about availability, access, and quality of healthy food options. Participants were asked the following questions: "*A large selection of fresh fruits and vegetables is available in my neighborhood.*" "*The fresh fruits and vegetables in my neighborhood are of high quality.*" "*A large selection of low-fat products is available in my neighborhood.*" The five response categories were: strongly agree (1) to strongly disagree (5). For analysis, these three questions were summed, a score of 3 indicated higher availability to fruits, vegetables, and low-fat products and a score of 15 indicated less availability to fruits, vegetables, and low-fat products.

To assess perceived availability to fast-food, participants were asked "*There are many opportunities to purchase fast foods in my neighborhood such as McDonald's, Taco Bell, KFC, and takeout pizza places, etc.*" Participant's answers could range from strongly agree (5) to strongly disagree (1) on a Likert scale. A score of 5 indicated more availability to fast-food restaurants and a score of 1 indicated less avaialability to fast-food restaurants. The last question asked participants about food shopping access, participants were asked "*How much of a problem would you say that lack of access to adequate food shopping is in your neighborhood?*" This question ranged from a 'not really a problem' (1) to 'very serious problem (4).

Diet Assessment.

Dietary intake was assessed using the Southwest Food Frequency Questionnaire (SWFFQ) (Appendix G) which has been tested for reliability and validity for the Hispanic population (Taren, et al., 2000). The SWFFQ asks how often 158 food items are consumed; participants have to indicate the item's portion size and the average use of the foods listed on the questionnaire. Participants have the option to choose the average use of food from an 8-item scale ranging from '3 or more times a day' to 'less than 1 time a month'. For the purpose of this research, the following food groups were included in the analysis: total vegetable and fruit consumption, total sugar consumption, and intake of salty snacks. SWFFW data will also be used in order to estimate the HEI (described below). The Arizona Diet, Behavior and Quality of Life Assessment Laboratory scored the questionnaires and generated an output with the nutrient content of foods (Taren, et al., 2000) and HEI scores.

Healthy Eating Index-2015 (HEI-2015) Scoring.

The HEI-2015 was calculated as described by Krebs-Smith et al. (2018). A low dietary score refers to higher consumption of added sugars, refined grains, sodium, and saturated fats and lower consumption of fruits, vegetables, and low-fat products. Adequacy components receive maximum scores of 5 or 10, based on cups or ounce equivalents that are desirable for each after adjustment for energy intake (for each 1,000 kilocalories). For more information on specific values for each component refer to Table 1.

For adequacy components, greater scores indicate more compliance with the DGA. Moderation components include refined grains, sodium, added sugars and saturated fats; DGA recommends these to a limited consumption. For moderation components, greater scores refer to lower consumption of ounce equivalents for grains, grams of sodium, and total percentage of added sugars and saturated fats. If these components are consumed in quantities higher than the recommended, a score of zero is assigned (Center for Nutrition Policy and Promotion, 2013). Scoring of the HEI can result in a maximum of 100 points. For the purpose of this analysis, we used the total HEI score to estimate overall dietary quality.

Table 1.

Healthy Eating Index Components as Indicated by the 2015 Dietary Guidelines for Americans. Obtained and adapted from (Krebs-Smith et al., 2018).

	HEI component	Maximum points	Standard for maximum score (/1,000 kcal)	Standard for minimum score	Includes
Adequacy Components	Total fruit	5	≥ 0.8 cup equiv.	No fruit	100% fruit juice
	Whole fruit	5	≥ 0.4 cup equiv.	No whole fruit	All forms except juice
	Total vegetables	5	≥ 1.1 cup equiv.	No vegetables	Any beans and peas not counted as Total Protein Foods
	Greens and Beans	5	≥ 0.2 cup equiv.	No dark-green vegetables, beans, or peas	Any beans and peas not counted as Total Protein Foods
	Whole Grains	10	≥ 1.5 ounce equiv.	No whole grains	
	Dairy	10	≥ 1.3 cup equiv.	No dairy	All milk products, such as fluid milk, yogurt, and cheese, and fortified soy beverages.
	Total Protein Foods	5	≥ 2.5 ounce equiv.	No protein foods	Beans and peas when the Total Protein Foods standard is otherwise not met.
	Seafood and Plant Proteins	5	≥ 0.8 ounce equiv.	No seafood or plant proteins	Seafood, nuts, seeds, soy products (other than beverages) as well as beans and peas counted as Total Protein Foods.
	Fatty Acids	10	(PUFAs + MUFAs) / SFAs > 2.5	(PUFAs + MUFAs) / SFAs < 1.2	
Moderation Components	Refined Grains	10	≤ 1.8-ounce equiv.	≥ 4.3 ounce equiv. / 1,000 kcal	
	Sodium	10	≤ 1.1 gram	≥ 2.0 grams / 1,000 kcal	
	Added sugars	10	≤ 6.5% of energy	≥ 26% of energy	
	Saturated fats	10	≤ 8% of energy	≥ 16% of energy	

Statistical Analyses.

Of the 61 women enrolled in the study. One was excluded due to missing dietary data. Three participants had an overall reported energy intake greater than 3 standard deviations from the mean, which was deemed implausible, and therefore were excluded from the analysis. A total of 57 women were included in the present analysis. All statistical analyses were carried out using the Statistical Program for Social Sciences (SPSS, Version 24). All variables were tested for normality and collinearity. All variables were normally distributed except for salty snack consumption. This variable was log-transformed to approach normality.

Descriptive statistics are presented as mean (Standard Deviation) for continuous variables and frequency with percentages for categorical values. Spearman correlations were used to test for associations between food security and the perceptions of the food environment and the following: salty snack and sugar intake, fruit and vegetable consumption, total HEI score, and frequency of fast-food consumption. Spearman correlations coefficients that are closer to 1 or -1 were considered more strongly correlated than values closer to 0. A p-value of < 0.05 was considered statistically significant.

Independent samples t-tests were conducted to explore the mean differences between participants with high or marginal food security and low or very low food security. An additional independent samples t-test was conducted to compare outcome means between participants with high food security compared to those with marginal, low, and very low food security (combined to have a more balanced number of

participants in each of the groups). Given that this approach did not change the outcome of the analysis, these results are not included herein.

A moderation analysis was carried using the PROCESS macro for SPSS (Hayes, 2013) to assess whether the perception of the neighborhood food environment and fast food availability influence the relationship between food security and dietary outcomes. The PROCESS macro conducts a logistic regression analysis and is widely used to test hypothesis with moderation analysis (Hayes & Rockwood, 2017). Samples were centered and bootstrapped (5000 resamples) in all moderation models. To avoid error, we employed the heteroscedasticity HC3 model (Davidson-MacKinnon) which has been recommended for nominal and small sample size data (Hayes & Cai, 2007). The PROCESS macro created an interaction term to test the effect of the moderator and the independent variable on the model. The constant values calculated were presented in the results for an easier construct of the full regression model. Results reported coefficients such as beta values, standard error, t- and p-values which helps us analyze the hypothesis.

CHAPTER 4

RESULTS

Sociodemographic characteristics of study participants are shown in Table 2. Mean participant age was 41±7 years (ranging from 25 to 50 years). The mean residence time in the U.S. was 20±9 years (ranging from 1 to 43 years). Almost all participants (98%) spoke Spanish during the interviews. Most participants were married (46%) and did not complete high school (46%); 26% of participants completed high school but not college and 28% of participants completed college degrees. Monthly household income for 42% of participants was less than $2,000; 32% reported a monthly income of $2,000 to $4,000 and 19% of more than $4,000. Most participants (54%) worked more than 40 hours per week, 2% worked less than 40 hours per week, the remaining participants were homemakers. The majority of participants reported high or marginal food security (72%), 19% reported low food security, and 9% reported very low food security.

Dietary outcomes including macronutrient intake, food group consumption, and the HEI-2015 components are displayed in Table 3. Mean daily energy intake was 1889±977 kilocalories, with 50±8%, 18±3% and 33±5% being provided by carbohydrates, protein, and fat, respectively. Total sugar consumption was 97±56g and salty snack intake was 7±9g. The mean for fruit and vegetable consumption was 278±224g and 323±194g respectively. Fast food frequency was 2±2 times per month. The mean total HEI score was 64±7.

Table 2.

Sociodemographic Characteristics of Study Participants.

	Mean	SD
Age (25-50 years)	41.1	7.2
Time in the United States (1-43 years)	20.0	8.8
	Frequency	
	n (57)	**%**
Language spoken at interview		
Spanish	56	98
English	1	2
Marital status		
Married and living with spouse	26	45.6
Married but not living with spouse	4	7.0
Not married but living with partner	10	17.5
Single	11	19.3
Divorced	6	10.5
Educational attainment		
Less than high school	26	45.6
Complete high school but incomplete college	15	26.3
College graduate or higher	16	28.1
Household monthly income		
<$2,000	24	42.1
$2,000 - 4,000	18	31.6
>$4,000	11	19.3
Don't know/Not sure	4	7.0
Employment status		
Working full-time (40 hours or more per week)	31	54.4
Working part time (<40 hours per week)	1	1.8
Homemaker	25	43.9
Food security		
High or marginal food security	41	71.9
Low food security	11	19.3
Very low food security	5	8.8

Table 3.

Daily Intakes of Energy, Macronutrients, Study's Dietary Outcomes and Components of the Healthy Eating Index (HEI) 2015 (n=57).

	RDA* / AMDR**	Mean	SD
Nutrient			
Energy (kcal)		1889	977
Total Carbohydrate (g)	130	236	128
Carbohydrate (% of total calories)	45-65	50	8
Total Protein (g)	46	85	46
Protein (% of total calories)	10-35	18	3
Total Fat (g)	44-77	70	38
Fat (% of total calories)	20-35	33	5
Dietary outcomes			
Fruits (g)		278	224
Vegetables (g)		323	194
Total sugar (g)		97	56
Salty snacks (g)***		7	9
Fast food frequency (times per month)		2	2
HEI-2015 Dietary Component (maximum score)			
Total Fruits (5)		4.1	1.1
Whole Fruits (5)		4.8	0.7
Total Vegetables (5)		3.6	1.2
Greens and Beans (5)		4.8	0.5
Whole Grains (10)		2.1	1.4
Total Dairy (10)		5.5	2.2
Total Protein Foods (5)		4.9	0.1
Seafood and Plant Protein (5)		4.9	0.2
Fatty acid Ratio (10)		5.8	2.3
Refined grains (10)		6.6	2.7
Sodium (10)		1.3	2.7
Added Sugar (10)		9.0	1.6
Saturated Fats (10)		6.7	2.5
Total HEI score (100)		**64.4**	**6.6**

* RDA: Recommended Dietary Allowance for protein and carbohydrate in grams for females 19 to 50 years old based on a 2000 kcal diet (DHHS & USDA, 2010).

** AMDR: Acceptable Macronutrient Distribution Range for females 19 to 50 years old based on a 2000 kcal diet (DHHS & USDA, 2010).

[***]n=50

Participants' perceptions of their neighborhood food environment are presented in Table 4. Results show that, in average, participants perceived having a large selection of fruits, vegetables, and low-fat products of high quality within their neighborhood. Most participants also agreed or strongly agreed that they had many opportunities to purchase fast food within their neighborhood. The total score for this scale was 13±4 from a 3 to 15 range.

Table 4.

Participants' Perceptions of the Neighborhood Food Environment (n=57).

	Mean	SD
Availability to fruits, vegetables, and low-fat products		
Selection of fruits and vegetables[*]	2.1	1.2
High-quality fresh fruits and vegetables[*]	2.3	1.1
Large selection of low-fat products[*t]	2.5	1.3
Perceptions of fruit, vegetable, and low-fat product availability score[** t]	6.9	3.2
Availability to fast-food		
Opportunities to purchase fast food[***]	4.5	0.9
Food shopping access		
Lack of access to adequate shopping[****]	1.8	1.1

[*]Range of scores: 1=strongly agree, 2=agree, 3=neutral, 4=disagree, 5=strongly disagree

[**]The overall perceptions of the neighborhood environment scores were calculated by adding the three five variables. A score of 3=High availability to fruits, vegetables, low-fat products, 15=low availability to fruits, vegetables, and low-fat products

[***]Range of scores 1=strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree

[****]Range of scores 1=not really a problem, 2=minor problem, 3=somewhat serious problem, 4=very serious problem

[t] n=56

Table 5 displays Spearman correlations between the food security score, the perceptions of the food environment score (availability of fruit, vegetables, and low-fat products), food shopping access, and dietary outcomes. Although the food security score was not significantly associated with dietary intake outcomes (fruit, vegetables, total sutar, and salty snacks), the weak negative correlation between food security score and the HEI score approached significance (r= -0.25; p=0.054). The associations between food security and perceptions of the food environment, fast food intake frequency, and opportunities to purchase fast food were not statistically significant. However, there was a weak positive correlation between food security and the perception food shopping access within the neighborhood (r=0.31; p=0.018). There was a strong association between availability to fruits, vegetables, and low-fat products and food shopping access (p=0.000). Perceptions of fruit, vegetables, and low-fat product availability was not associated with dietary or other neighborhood environment outcomes. Other correlations between the perception of food shopping access and dietary intake outcomes and perceptions of the neighborhood food environment were not statistically significant.

Table 6 displays independent samples t-tests which were used to explore the differences in means between participants with high or marginal food security (combined) and participants with low or very low food security(combined). HEI total scores for high or marginal food secure participants was significantly higher than for low or very low food secure participants. The difference was -4.09 (CI 95% [0.29, 7.87]; p=0.035). Although fruit and vegetable consumption were higher among high and marginal food secure than among low or very low food secure participants, differences were not statistically significant. The difference for grams of fruit was -57.54 (CI 95% [-

74.3, 189.90]; p=0.35). The difference for vegetables (g) was -27.58 (CI 95% [-87.94, 143.10]; p=0.634).

Table 5.

Spearman Correlations Coefficients between Dietary Variables and Food Security, Perceptions of the Food Environment (availability of fruit, vegetables, and low fat-products, availability to fast-food restaurants, and food shopping access).

Dietary outcomes	**Food security score**		**Fruit, vegetables and low-fat products availability**		**Food shopping access**	
	r	**p value**	**r**	**p value**	**r**	**p value**
HEI score	-0.25	0.054	-0.19	0.164	-0.11	0.430
Fruit (g)	-0.08	0.562	-0.01	0.944	-0.10	0.453
Vegetables (g)	-0.14	0.305	0.11	0.430	-0.08	0.542
Total sugar (g)	0.04	0.789	0.09	0.512	-0.04	0.748
Salty snacks (g)[t]	-0.07	0.594	0.26	0.071	0.03	0.823
Fruit, vegetables and low-fat products availability	0.12	0.372	--		0.49	0.000
Food shopping access	0.31	**0.018**[*]	0.49	**0.000**	--	
Fast food frequency (times per month)	0.01	0.929	-0.08	0.528	0.11	0.408
Opportunities to purchase fast food	-0.01	0.894	-0.03	0.834	0.01	0.931

[t] Log for salty snacks was used for correlation values

[*] $p<.05$

Table 6.

Independent Samples t-test for High and Marginal (combined) Food Secure Households versus Low or Very Low Food Secure (combined) Households.

	High/marginal food security n=41		**Low/very low food security n=16**				
	M	**SD**	**M**	**SD**	**df**	**t**	**Sig.**
HEI score	65.5	5.6	61.4	8.2	55	2.16	**0.035***
Fruits (g)	293.6	238.9	236.1	178.3	55	0.87	0.387
Vegetables (g)	330.6	198.5	303.0	187.6	55	0.48	0.634
Sugar (g)	96.4	56.2	98.7	55.3	55	-1.39	0.890
Salty snacks (log g)	1.6	0.9	1.3	0.9	48	0.70	0.486
Fast food frequency (monthly)	1.8	1.7	2.5	2.5	55	-1.07	0.291

*$p<.05$

Participants with low or very low food security consumed more sugar, less salty snacks, and more fast food than high or marginal food secure participants, but these differences were not statistically significant.

To test the hypothesis that the availability to fruits, vegetables, and low-fat products and food shopping access moderate the relationship between food security categories (high and marginal food security versus low and very low food security) and dietary outcomes, a hierarchical multiple regression or "moderation" analysis was performed and displayed in Table 7 and Table 8. Results indicate that associations between food security; perceptions of fruit, vegetable, and low-fat product availability, food shopping access; and total sugar intake, HEI, salty snack consumption, and fruit and vegetable intake are not statistically significant.

Table 7.

Linear Model of Predictors of Dietary Outcomes with 95% bias with Score of Availability of Fruits, Vegetables, and Low-fat Products (AFVL) as the Moderator. Confidence Intervals and Standard Errors Based on 5000 Bootstrap Samples (n=56).

	b	SE b	t	p
HEI-2015				
Constant	64.32	0.86	75.14	0.000
Food security categories	-3.47	2.20	-1.58	-0.158
AFVL	-0.33	0.25	-1.32	0.191
Food security x AFVL	-1.12	0.62	-1.81	0.077
Fruit (g)				
Constant	281.02	31.43	8.94	0.000
Food security categories	-62.07	62.39	-0.99	0.324
AFVL	3.24	9.63	0.34	0.737
Food security x AFVL	-7.17	21.17	-0.34	0.736
Vegetable (g)				
Constant	327.15	27.50	11.89	0.000
Food security categories	-30.76	60.29	-0.51	0.612
AFVL	1.60	8.97	0.18	0.859
Food security x AFVL	-11.49	20.26	-0.57	0.573
Sugar Intake (g)				
Constant	98.18	7.71	12.73	0.000
Food security categories	-0.07	17.08	-0.00	0.996
AFVL	1.77	2.24	0.79	0.434
Food security x AFVL	0.16	5.40	0.03	0.976
Salty Snack consumption (log g)[t]				
Constant	1.48	0.14	10.41	0.000
Food security categories	-0.27	0.28	-0.95	0.346
AFVL	0.08	0.05	1.59	0.118
Food security x AFVL	0.14	0.09	1.49	0.142

n=49

Table 8.

Linear Model of Predictors of Dietary Outcomes with 95% bias with Food Shopping Access (FSA) as the Moderator. Confidence Intervals and Standard Errors Based on 5000 Bootstrap Samples (n=56).

	b	SE b	t	p
HEI-2015				
Constant	64.47	0.91	70.63	0.000
Food security categories	-3.78	2.41	-1.57	0.122
FSA	-0.52	0.82	-0.64	0.528
Food security x FSA	-0.58	1.99	-0.29	0.773
Fruit (g)				
Constant	271.88	29.46	9.23	0.000
Food security categories	-61.71	58.67	-1.05	0.297
FSA	-20.24	21.47	-0.94	0.350
Food security x FSA	70.36	45.64	1.54	0.129
Vegetable (g)				
Constant	320.32	26.35	12.16	0.000
Food security categories	-23.40	60.09	-0.39	0.698
FSA	-24.84	21.46	-1.16	0.252
Food security x FSA	32.43	55.28	0.586	0.560
Sugar Intake (g)				
Constant	94.93	7.04	13.48	0.000
Food security categories	-1.05	15.08	-0.07	0.945
FSA	-3.37	6.16	-0.55	0.587
Food security x FSA	27.11	17.57	1.54	0.129
Salty Snack consumption (log g)[t]				
Constant	1.44	0.15	9.78	0.000
Food security categories	-0.29	0.30	-0.99	0.329
FSA	0.03	0.16	0.19	0.847
Food security x FSA	0.57	0.30	1.88	0.066

[t] n=49

In addition, results indicate that associations between food security, fast food availability, and monthly fast-food consumption are not statistically significant (Table 9).

Table 9.

Linear Model of Predictors of Dietary Outcomes with 95% bias with Availability to Fast-food as the Moderator. Confidence Intervals and Standard Errors Based on 5000 Bootstrap Samples (n=56).

	b	SE b	t	p
Fast food consumption monthly				
Constant	2.05	0.29	7.01	0.000
Food security categories	0.65	0.77	0.85	0.399
Avaiability to fast-food	-0.03	0.54	-0.06	0.955
Food security x Availability to fast food	0.43	0.81	0.54	0.59

Figure 5, displays participant's food security level (high or marginal food security versus low or very low food security) and participants' fruit, vegetable, and low-fat product availability (categorized into high, medium, or low availability to healthy food). These variables approached a significant amount of variance in HEI scores, R^2=0.058, F(1, 52)=3.26, p=0.07. The model shows a trend that with lower participant's food security and lower perception of food availability, HEI scores also lower. At high or marginal food security, HEI scores were similar for high, medium, or low perception of food availability. However, participants with low or very low food security and a low perception of the neighborhood's food availability had the worst HEI scores.

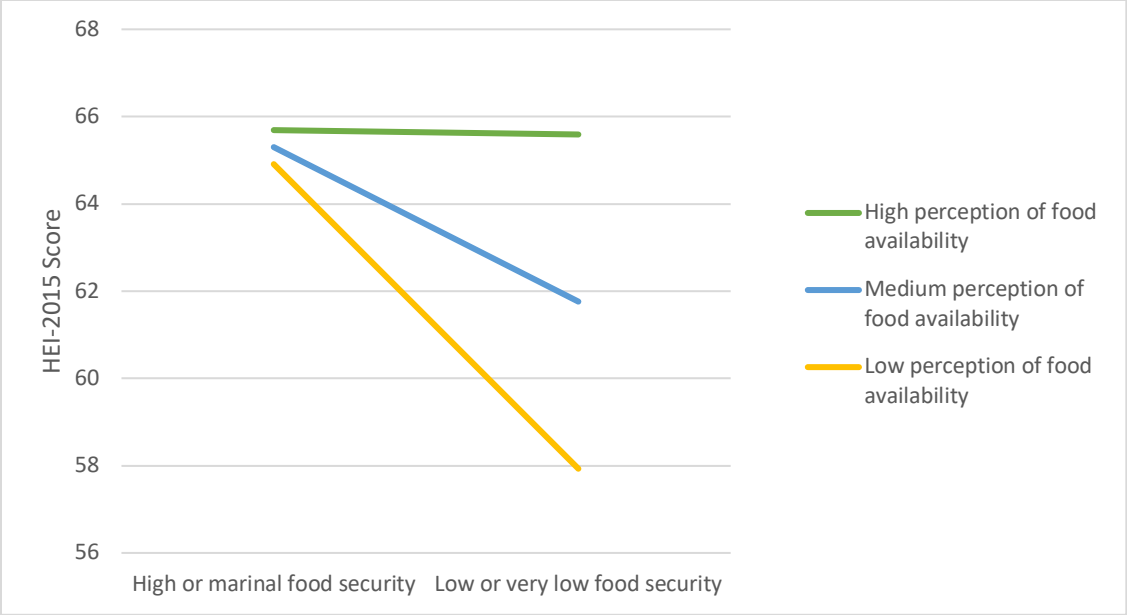

Figure 5. Simple slope equations of the regression of HEI-2015 on food security at three levels of the perceptions of fruit, vegetable, and low-fat availability. R^2=0.058 and p=0.07.

CHAPTER 5

DISCUSSION

Migration to the United States (U.S.) has been associated with food insecurity and detrimental changes in diet quality that can ultimately result in increased chronic disease risk. Since food security and the neighborhood food environment can influence the type of diet a person chooses, there is an urgent need to better understand how neighborhood food availability may contribute to dietary changes of Mexican women after migration, particularly when faced with food insecurity. Findings from this study suggest that food secure participants had better dietary outcomes than food insecure participants as shown on the HEI-2015 and that the neighborhood food environment might affect food insecure women's diet more than food secure women.

Almost half of the participants from this sample did not graduate high school and had a household income of less than $2,000 which placed them at higher risk to experience food insecurity. Since immigration to the U.S. could be accompanied with economic instability, lack of access to higher education and health care, and living in areas with poor acces to healthy foods, Hispanic women are at higher risk to experience food insecurity and opt for dietary choices that are more affordable and are usually lower in nutrient density.

Food insecurity has been associated with lower intake of nutrient-dense foods such as fruit and vegetables (Acheampong & Haldeman, 2013) and an overall dietary quality (Hiza et al., 2013). Studying this association among Mexican immigrant women is important because exploring if dietary quality of women changes after immigration can help us target that specific population and aim to improve their dietary outcomes. Results

from the present study suggested a marginal association between total HEI scores and food security among Mexican-born women living in the Phoenix metropolitan area. Other studies have indicated that as food security decreases, dietary quality and HEI scores lowers (Leung et al., 2014; Nguyen, Shuval, Njike, & Katz, 2014). However, most participants from these studies mostly included non-Hispanic white participants.

When comparing food secure (high and marginal food secure groups) to food insecure women (low and very low food secure groups) from the present study, HEI scores were lower among participants experiencing food insecurity. Albeit not significant, women from food secure households reported consuming more fruit, vegetables than women from food insecure households. Interestingly, women from food secure and food insecure households met the Food and Agriculture Organization (2003) recommendations for consuming at least 400 grams for fruits and vegetables per day. In contrast, women from food insecure households consumed more sugar and fast-food. Previous findings suggest that food secure individuals might have better dietary outcomes (greater vitamin, mineral, fruit, and vegetable intake) (Hanson & Connor, 2014), while other studies suggest that this relationship is not supported when food insecure individuals receive governmental help such as SNAP (Montoya et al., 2011). Futher researching dietary quality among food insecure Hispanic women participating in programs such as SNAP and WIC is needed.

In addition to food security status, the neighborhood food environment also influences food intake and dietary quality (Dubowitz et al., 2015; Liese et al., 2015). The food environment might have a higher effect on people from lower socioeconomic status because of lack of transportation, economic means, and food deserts or food swamps

within their neighborhoods. Interestingly, participants from this study reported low availability to healthful foods but they described that food shopping access was not a problem, which can suggest that participants are living in areas considered as food swamps. Previous research has suggested that ethnic minorities live in areas that have easy access to fast-food restaurants and convenience stores (Rideout et al., 2015).

Of the three analyses conducted to assess whether perceptions of the food environment moderate the association between food insecurity and dietary quality, only perceived fruit, vegetable, and low-fat product accessibility seemed to play a role that approached statistical significance. Findings from this study suggest that women with high or marginal food security had higher HEI scores regardless of their level of perception of the food environment (accessibility for fruits, vegetables, and low fat products). However, the HEI of women with low or very low food security depended on their perception of food availability. Women with the lowest perception of fruit, vegetable, and low-fat product access had lower HEI scores than women with medium or high perceived access. It has been suggested that perceived food access might influence dietary choices among low income groups more than higher income groups (Inglis et al., 2008). However, some studies also suggest there is no relationship between food accessibility and measured density of supermarkets (Gustafson et al., 2010), or between food accessibility and dietary outcomes (Flint, Cummins, & Matthews, 2013). Although there were no significant moderation effects in this study, it is important to generate these analyses because they can create stronger hypothesis which can be tested in minority populations that have been found to live in obesogenic and food swamp environments.

Strengths and limitations

The present study has several strengths worth discussing. Diet was assessed using the SWFFQ (Dubowitz et al., 2015), a validated instrument that has been tailored for the Hispanic population of the Southwestern U.S. In addition, two bilingual and bicultural interviewers administered surveys and the SWFFQ. Having bilingual and bicultural staff has been found to positively influence the quality of the data (Lee, Sulaiman-Hill, & Thompson, 2014). Overall diet quality was measured by the HEI-2015 which is a validated and reliable tool comparing overall dietary intake to the most current dietary guidance recommendations in the U.S. (Krebs-Smith et al., 2018). Few research studies focus on Mexican-born women; being forein-born can influence dietary behaviors and culinary traditions that women maintain over time. Exploring the dietary outcomes of this population can help us create intervention programs that target the whole family since Mexican women might decide what types of foods to purchase and cook for the household.

This study also has several limitations. Only Mexican-born women were included in the study limiting the generalizability of its findings. It is not clear if the same results would have been found in Mexican-American women or other Hispanics. All data were self-reported by study participants which could have resulted in reporting bias (overreporting or underreporting specific foods), a trend that could occur among women because there is focus on having a healthy diet across this gender (Drenowatz et al., 2014). The use of food frequency questionnaires for dietary assessment is known to pose important challenges often resulting in inaccurate reporting of food amounts consumed (Cade, Thompson, Burley, & Warm, 2002). Specific to the SWFFQ, participants were

asked to recall portion sizes frequently consumed (small, medium, large). Interpretations of portion sizes could have varied across people, which introduces error. Because some study participants were relatively recent immigrants to the US, the possibility cannot be ruled out that the HEI-2015 may not be the most reliable indicator of their compliance with dietary recommendations. The perceptions of the neighborhood food environment scale is subjective to participants calculations of distance (1 mile or 20-minute walk) and to their assessment of food availability. An objective measure of food environment might have given us a more accurate density of grocery stores or convenience stores located in the neighborhood to measure food access; however, we did not collect participants' zip codes. In addition, conducting such an assessment would have been labor intensive and cost-prohibitive. There is also a possibility that, due to the current immigrant and political situation in the U.S., sampling for this study may have been biased and with a low response from Mexican women who were concerned of someone asking about their immigration status. The sample is small which limits the statistical power to find significant associations between food security, perceptions of the neighborhood food environment, and dietary outcomes. Finally, the analysis was cross-sectional and causality cannot be inferred.

CONCLUSIONS

In conclusion, findings suggest that food secure women have better dietary outcomes than food insecure women and that the neighborhood food environment might not affect food secure women's diet as strongly as food insecure women. Low and very low food security affect dietary outcomes and may influence the development of chronic

disease (Seligman et al., 2009). Overall, current study results are congruent with other studies (Bhattacharya et al., 2004; Champagne et al., 2007; Hanson et al., 2014) suggesting that food insecure individuals are not able to meet dietary recommendations based on HEI scores and that the environment might affect food insecure individuals differently than food secure individuals.

Future studies should consider exploring Mexican immigrant women's neighborhood food environment through geocoding methods (Larson et al., 2009). Obtaining information about food desserts and food oases can help future policy implications to reduce health disparities among this group. In addition, screening for food security during wellness visits, community events, or school events could help Hispanic women learn about resources to obtain a wider variety of healthy foods. Bilingual and bicultural education from governmental agencies such (e.g. SNAP, WIC) can help Hispanics improve their nutritional knowledge and apply better nutritional behaviors within the household. Understanding how the neighborhood food environment plays a role in decision making processes could help explain the barriers that minority immigrant women face to obtain food.

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APPENDIX A

INSTITUTIONAL REVIEW BOARD APPROVAL LETTER

ASU Knowledge Enterprise Development

APPROVAL: EXPEDITED REVIEW

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

Dear Sonia Vega-Lopez:

On 5/15/2018 the ASU IRB reviewed the following protocol:

Type of Review:	Initial Study
Title:	Association between social and labor conditions and their effect on dietary patterns and cardiometabolic risk factors among Mexican-descent women residing in two urban areas along the Mexico-United States border
Investigator:	Sonia Vega-Lopez
IRB ID:	STUDY00008281
Category of review:	(4) Noninvasive procedures, (7)(a) Behavioral research
Funding:	Name: Consejo Nacional de Ciencia y Tecnología, Grant Office ID: FA 13766, Funding Source ID: 2016-01-1883
Grant Title:	FA 13766;
Grant ID:	FA 13766;
Documents Reviewed:	• Southwest Food Frequency Questionnaire, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions); • TransborderWomen-ConsentForm-English-CLEAN, Category: Consent Form; • TransborderWomen-ResultsLetter, Category: Other (to reflect anything not captured above); • Screening Form, Category: Screening forms; • List Of Clinics, Category: Resource list; • TransborderWomen-ConsentForm-English-Tracked for Review, Category: Consent Form; • TransborderWomen-Protocol, Category: IRB

	Protocol; • TransborderWomen-RecruitmentFlyer, Category: Recruitment Materials; • Proposal, Category: Sponsor Attachment; • Conacyt Notice of Award, Category: Sponsor Attachment; • CIAD-ASU Agreement, Category: Sponsor Attachment; • TransborderWomen-Survey, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions); • CIADTransborderWomen-Translation-form-SIGNED.pdf, Category: Translations;

The IRB approved the protocol from 5/15/2018 to 5/14/2019 inclusive. Three weeks before 5/14/2019 you are to submit a completed Continuing Review application and required attachments to request continuing approval or closure.

If continuing review approval is not granted before the expiration date of 5/14/2019 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:
Sonia Vega-Lopez
Adriana Verdezoto Alvarado

APPENDIX B

RECRUITMENT FLYERS

College of Health Solutions
Arizona State University

Are you a Mexican woman 25-50 years old?

We need your help!

We would like to understand how women who move into the United States may change the way they eat, and whether working plays a role in those changes.

If you would like to participate…

First, you will be asked a series of questions to see if you qualify to complete the study. Once you enroll in the study, we will ask you to do the following:

- **A study visit** to have your body measured and to give a small blood sample.
- Complete a series of questions about your personal characteristics, lifestyle, stress, cultural preferences, job characteristics, and diet.
- Once you complete the study you will receive a **$30 Target gift card** as our way of saying thank you for your time.

You can participate if you…

- Are a **Mexican woman 25-50 years old**
- Have lived in the United States for at least **12 months**
- Currently live in the Phoenix area

chs.asu.edu

Location

Downtown Phoenix Campus

445 N 5th St
Phoenix, AZ 85004

For more information or to sign up contact:

602-496-3353

Adriana Verdezoto
averdezo@asu.edu

or

Berenice Ochoa
cnogale1@asu.edu

College of Health Solutions
Arizona State University

Eres Mexicana de 25 a 50 años de edad?

¡Necesitamos tu ayuda!

Queremos entender mejor cómo es que las mujeres que llegan a vivir a Estados Unidos pueden cambiar su forma de comer, y si el trabajar influye en esos cambios.

Si te interesa participar…

Primero te haremos algunas preguntas para saber si calificas para completar el estudio. Una vez inscrita en el estudio, te pediremos hacer lo siguiente:

- Una visita en la que se te tomarán medidas y una pequeña muestra de sangre
- Que completes una serie de preguntas acerca de tus características personales, tu estilo de vida, estrés, preferencias culturales, características de tu trabajo, y dieta.
- Cuando completes el estudio, recibirás una tarjeta **Target de $30** como una muestra de agradecimiento por tu tiempo.

Puedes participar si…

- Eres **mujer Mexicana de 25 a 50 años de edad**
- Has vivido en los Estados Unidos por cuando menos **12 meses**
- Actualmente vives en la zona de Phoenix

chs.asu.edu

Localización

Downtown Phoenix Campus

445 N 5th St
Phoenix, AZ 85004

Para más información o para inscribirse, contáctanos a:

602-496-3353

Adriana Verdezoto
averdezo@asu.edu
o
Berenice Ochoa
cnogale1@asu.edu

APPENDIX C

SCREENING FORM

Association between social and labor conditions and their effect on dietary patterns and cardiometabolic risk factors among Mexican-descent women residing in two urban areas along the Mexico-United States border

Screening Form

Screening ID#: _____ Date of Phone Call: _____ Recruiter: _____

Recruiter: After explaining the nature of the study, obtain verbal consent to ask eligibility criteria questions by reading and asking the following:

In order to determine whether you qualify or not for the study I need to ask a few questions about you and some general health information. This will take about 15 minutes. Can I ask these questions at this time?
Para saber si calificas o no para participar en este estudio tengo que hacerte algunas preguntas acerca de ti y de tu estado general de salud. Esto tomará alrededor de 15 minutos. ¿Puedo hacerte estas preguntas en este momento?

YES ☐ NO ☐

If YES, continue.
If NO, inform participant that you cannot proceed and thank him/her for their time. **(STOP)**

(Do not read) Participant's gender: MALE ☐ FEMALE ☐

If FEMALE, continue asking eligibility verification questions.
If MALE, inform participant that you cannot proceed and thank him/her for their time. **(STOP)**

ELIGIBILITY VERIFICATION / *VERIFICACION DE CRITERIOS DE ELEGIBILIDAD*

How old are you? / *¿Cuántos años tienes?* _____

(Do not read) Is age between 25 and 50 years? YES ☐ NO ☐

Are you originally from Mexico? / *¿Eres originaria de México?* YES ☐ NO ☐

How long have you lived in the United States? _____
¿Cuantos años has vivido en los Estados Unidos?

(Do not read) Is time in the US at least 5 years? YES ☐ NO ☐

Do you currently live in the Phoenix metropolitan area?
¿Vives en el área metropolitana de Phoenix? YES ☐ NO ☐

Do any of your children currently live in the same household as you?
¿Tienes hijos que viven en la misma casa que tú? YES ☐ NO ☐

If the answer to all of these questions is YES, continue.
If the answer to any of these questions is NO, read:
At this point you do not qualify for this study. Thank you very much for your time.
En este momento no calificas para este estudio. Muchas gracias por tu tiempo. **(STOP)**

Screening Form

Do you currently work? / *¿Trabajas acualmente?* YES ☐ NO ☐

If NO, continue to the BLOOD DRAW HISTORY section.
If YES, ask:
Do you work full time (40 hours or more)? /*¿Trabajas tiempo completo (40 horas o más)?* YES ☐ NO ☐

If YES, continue.
If NO, read:
At this point you do not qualify for this study. Thank you very much for your time.
En este momento no calificas para este estudio. Muchas gracias por tu tiempo. **(STOP)**

BLOOD DRAW HISTORY
Are you afraid of needles or blood drawing? YES ☐ NO ☐
¿Te dan miedo las agujas o que te saquen sangre?

Do you faint when you have your blood drawn? YES ☐ NO ☐
¿Te desmayas cuando te sacan sangre?

Is it usually hard for medical personnel to draw your blood? YES ☐ NO ☐
¿Regularmente le cuesta trabajo al personal médico sacarte sangre?

If the answer to all of these questions is NO, continue.
If the answer to any of these questions is YES, read:
At this point you do not qualify for this study. Thank you very much for your time. **(STOP)**
En este momento no calificas para este estudio. Muchas gracias por tu tiempo.

PREGNANCY, BREASTFEEDING AND DIET
Are you / ¿Estás… Pregnant? / *Embarazada?* YES ☐ NO ☐

Breastfeeding? / *Lactando?* YES ☐ NO ☐

Are you planning to become pregnant in the next 3 months? YES ☐ NO ☐
¿Planeas embarazarte en los próximos 3 meses?

Are you following any of the following diets? / *¿Estás llevando alguna de las siguientes dietas?*
Vegan / *vegetariana estricta* YES ☐ NO ☐
Very low carbohydrate / *Muy baja en carbohidratos* YES ☐ NO ☐
Atkins / *Atkins* YES ☐ NO ☐

Are you following any other specific diet? What type? _____
¿Estás siguiendo alguna otra dieta específica? ¿De qué tipo?

(Do not read) Is this a restrictive diet? YES ☐ NO ☐
Recruiter: consider any extreme diet or any diet that restricts a major food group, except for regular vegetarian diets, as a restrictive diet.

If the answer to all of these questions is NO, continue.
If the answer to any of these questions is YES, read:

Association between social and labor conditions and their effect on dietary patterns and cardiometabolic risk factors among Mexican-descent women residing in two urban areas along the Mexico-United States border

Screening Form

At this point you do not qualify for this study. Thank you very much for your time. **(STOP)**
En este momento no calificas para este estudio. Muchas gracias por tu tiempo.

Has a doctor or health care provider ever told you that you have any of the following:
¿Alguna vez te ha dicho tu doctor o personal médico que tienes….

Heart disease? / *Enfermedad del corazón?*
Diabetes?
High blood pressure? / *Alta presión?*
Kidney disease? / *Enfermedad de los riñones?*
Liver disease?/ *Enfermedad del hígado?*
Cancer?
Hepatitis?
Thyroid disease? / *Enfermedad de la tiroides?*
HIV? / *VIH?*
Arthritis? / *Artritis?* YES ☐ NO ☐

Are you taking any of the following medications? / *¿Tomas alguna de las siguientes medicinas?*
Cholesterol-lowering / *para bajar el colesterol*
Blood pressure / *para la presión*
Diabetes or blood sugar control / *para controlar el azúcar o diabetes*
YES ☐ NO ☐

Have you lost or gained more than 10 pounds in the last 6 months? YES ☐ NO ☐
¿Has perdido o ganado más de 10 libras en los últimos 6 meses?

Are you enrolled in any other diet or physical activity research study anywhere?
¿Estás participando en cualquier otro estudio de investigación? YES ☐ NO ☐

If the answer to all of these questions is NO, continue.
If the answer to any of these questions is YES, read:
At this point you do not qualify for this study. Thank you very much for your time. **(STOP)**
En este momento no calificas para este estudio. Muchas gracias por tu tiempo.

Complete for ALL potential participants:

Is patient eligible for the study?	**YES ☐**	**NO ☐ (STOP)**

If YES, continue explaining the study procedures.
We asked you all of these questions to make sure you qualify to participate in our study. If you still want to participate, we will ask you to provide written informed consent for all study-related procedures next time we meet with you. If you decide to participate, we will ask you to come for a study visit during which we will measure your height, weight, waist, blood pressure, we will draw your blood, and ask you to donate a small hair sample. You will have to fast for 12 hours before this study visit. This means you that you should not eat or drink anything but water starting 12 hours before your appointment. Are you willing to participate in this study?

Screening Form

Te hicimos todas estas preguntas para asegurarnos de que calificas para participar en nuestro estudio. Si aún deseas participar, te pediremos que brindes tu consentimiento informado por escrito para todos los procedimientos relacionados con el estudio la próxima vez que nos reunamos contigo. Si decides participar, te pediremos que vengas a una visita del estudio durante la cual mediremos tu altura, peso, cintura, presión arterial, te sacaremos la sangre y te pediremos que dones una pequeña muestra de cabello. Tendrás que ayunar durante 12 horas antes de esta visita. Esto significa que no debes comer ni beber nada que no sea agua, comenzando 12 horas antes de tu cita. ¿Estás dispuesta a participar en el estudio?

☐ YES ☐ NO

If YES, continue explaining.
If NO, inform participant that you cannot proceed and thank him/her for their time. **(STOP)**

Because we will draw your blood, the study visit will be scheduled early in the morning so that you can come before you have breakfast. We will give you a light snack after the blood draw.

Debido a que sacaremos tu sangre, la visita del estudio se programará temprano en la mañana para que puedas venir antes de desayunar. Te daremos un refrigerio después de sacar tu sangre.

Which of the following would you prefer? / *¿Cuál de las siguientes opciones prefieres?*

☐ **A**. Meet first to sign the consent form and subsequently schedule your formal study visit.
Reunimos primero para firmar el consentimiento y hacer la cita para la visita del estudio para una fecha posterior.
Recruiter: Fill out A. and B. in the box below.

☐ **B.** Consent now to fast prior to attending the study visit at which I will sign the screening consent form before any other procedure takes place.
Dar mi consentimiento para ir a mi primera cita en ayunas para firmar el consentimiento y que inmediatamente después se me practique cualquier procedimiento.
Recruiter: Only fill out B. in the box below.

Have you donated blood in the past 4 weeks? YES ☐ NO ☐
¿Has donado sangre en las últimas 4 semanas?

If YES, when? *¿cuándo?* _____

Recruiter: Schedule screening visit at least 4 weeks after the blood donation date.

A. Meeting to sign consent form date and time: _____

B. Study visit date and time: _____

Recruiter: Read the following:
Thank you for your time. / *Gracias por tu tiempo.*

APPENDIX D

CONSENT FORM IN ENGLISH

Consent Form

Title of research study: *Association between social and labor conditions and their effect on dietary patterns and cardiometabolic risk factors among Mexican-descent women residing in two urban areas along the Mexico-United States border*

Investigator: ***Dr. Sonia Vega-López, Associate Professor of Nutrition in the College of Health Solutions at Arizona State University***

Why am I being invited to take part in a research study?

We invite you to take part in a research study because you are a Mexican woman 25-50 years old, who came to the United States at least 5 years ago, currently lives in the Phoenix metropolitan area, has at least one of your children living with you.

Why is this research being done?

We know that when Mexican people move to the United States they change the way they eat and generally end up eating less healthy than when they lived in Mexico. However, the specific details of how this impacts women's health has not been studied. The purpose of this research is to better understand how moving into the United States changes the way Mexican women eat, how the demands of working or being a homemaker influence the way they eat, and how these changes impact their risk for future diseases. This will allow us to design more specific recommendations to help Mexican women follow a healthier way of eating when they are in the United States.

How long will the research last?

We expect that individuals will spend about 4 hours, potentially split in different days, participating in the proposed activities.

How many people will be studied?

We expect about 60 people will participate in this research study in the Phoenix area.

What happens if I say yes, I want to be in this research?

It is up to you to decide whether or not to participate. If you decide to enroll in the study and sign this form, we will ask you to do the following activities, all of which will be done for research purposes only:

- We will schedule an appointment for you to come to our laboratory at Arizona State University in downtown Phoenix. This appointment will be scheduled early in the morning so that you can come before you have breakfast.

- You will need to fast for 12 hours prior to your study visit. This means that you should not eat or drink anything but water starting 12 hours before your appointment.
- At the time of your visit we will give you a chance to ask any additional questions you may have about this study. We will then ask you to sit down for a few minutes after which we will measure your blood pressure three times.
- We will ask you to use the restroom to empty your bladder after which we will measure your height, weight and the measurement around your waist.
- A trained study staff member will collect a blood sample to measure your blood cholesterol and triglycerides, sugar and other indicators of stress, risk for diabetes and heart disease, the type of fat, vitamins, and other compounds that you normally eat in the diet, and indicators of how your antioxidant system responds. We will not use your blood for DNA or genetic testing. The total amount of blood that we will draw will be about ½ fluid ounce (about 1 tablespoon). We will store some of the blood we collect (about ¼ fluid ounce or about ½ tablespoon) for the future measurement of additional indicators of diabetes and heart disease risk, diet quality and response to oxidation. We will store samples for up to 10 years after completing the study, after which they will be thrown away with our laboratory waste. You will be given the option to decide whether you want us to store your blood for future use. If you agree to have your blood stored for future use, you give us permission to share this blood with other investigators without notifying you.
- We will take a small sample of your hair to measure cortisol, a chemical produced by the body in response to stress. We will do this by cutting a small amount of hair (about 80-150 strands) from the back of your head, making sure the place where we cut is below additional hair so the cut is not noticeable.
- We anticipate that this laboratory visit will take approximately 1 hour. After we draw your blood and cut a small amount of hair, we will give you a light snack.
- We will ask you to complete a survey with help of one of our study team members. This survey will ask questions about yourself, your diet and physical activity habits, your neighborhood, your work and work environment, your lifestyle and living conditions, and how you have adapted to living in the United States. You can skip questions of this survey if you do not feel comfortable answering specific questions. It will take about 1 to 2 hours to complete the survey. You can complete the survey at the end of the laboratory visit, or we can complete this over the phone at a different time after the laboratory visit.
- We will also ask you to complete a food frequency questionnaire. This is a questionnaire that asks questions about how often you eat several foods, and takes about 1 hour to complete.
- We will ask if you agree to be contacted in the future to participate in other research studies we may have going on at a later date.

Consent Form

What happens if I say yes, but I change my mind later?

You can leave the research at any time for any reason. It will not be held against you.

If you decide to leave the research, there will be no negative consequences. If you decide to leave the research, please contact the investigator or inform one of the research team members so that the team does not keep trying to reach you.

Is there any way being in this study could be bad for me?

If you decide to enroll in the study, we anticipate small risks associated with the following:

- You may feel uncomfortable from hunger or slightly lightheaded from fasting prior to the study visit. We will give you a light snack after the blood draw to reduce discomfort from fasting.
- You may get bruising, swelling, or discomfort, feel dizziness, or fainting from the blood draw. To minimize risks, only trained personnel will draw your blood. If you are afraid or often faint with blood draws, you can either decide not to give a blood sample, or not participate in the study.
- You may feel embarrassed when we measure your weight or your waist, or when answering some of the survey questions. We will collect these data in private settings for you to feel more comfortable with these procedures.
- You may feel some emotional uneasiness as we collect your hair sample. There is also a small possibility that the area where we cut your hair may be noticeable. Our study staff will be trained to be careful to ensure we cut your hair from an area that can be covered with additional hair. You can choose not to provide a hair sample.

Taking part in this research study may lead to added costs to you associated with transportation and parking to attend the study visit.

Will being in this study help me in any way?

We do not anticipate any direct benefit to you from your taking part in this research.

What happens to the information collected for the research?

Efforts will be made to limit the use and disclosure of your personal information, including research study records, to people who have a need to review this information. We cannot promise complete secrecy. Organizations that may inspect and copy your information include the IRB and other representatives of this organization.

All information related to the study is strictly confidential unless disclosure is required by law. The results of this research study may be used in the aggregate form in reports, presentations, and publications, but the researchers will not identify you. In order to maintain confidentiality of your records, Dr. Vega-López will code all the data and blood samples so

that they do not contain any information that could identify you. All confidential information will be kept in a locked filing cabinet in Dr. Vega-López' office or in a password-protected computer, and will only be available to members of the research team. All samples and study materials will be destroyed 10 years after the study has been completed or upon your withdrawal from the study. At this point, blood samples will be discarded and study-related documents will be shredded.

What else do I need to know?

This research is being funded by Consejo Nacional de Ciencia y Tecnología (CONACYT, México).

If you agree to take part in this research study, we will give you a $15 gift card to Walmart or Target as a way to thank you for participating and to compensate for your time and effort once data collection is complete (even if you decide not to complete all procedures). If you agree to participate in the study, then consent does not waive any of your legal rights. However, no funds have been set aside to compensate you in the event of injury.

If you request it from the research team, we will give you a copy of your laboratory measurements for glucose and cholesterol once the samples have been analyzed. Please note it may take us several months after your participation to finish analyzing the blood samples. Any results we provide will not be measured for diagnostic purposes and will need to be evaluated by a medical care provider for proper interpretation.

Who can I talk to?

If you have questions, concerns, or complaints, or think the research has hurt you, talk to the research team at (602) 827-2268.

This research has been reviewed and approved by the Bioscience IRB ("IRB"). You may talk to them at (480) 965-6788 or research.integrity@asu.edu if:

- Your questions, concerns, or complaints are not being answered by the research team.
- You cannot reach the research team.
- You want to talk to someone besides the research team.
- You have questions about your rights as a research participant.
- You want to get information or provide input about this research.

If you agree to participate in the study, please sign in the following page.

Consent Form

Your signature documents your permission to take part in this research.

Signature of participant	Date
Printed name of participant	
Signature of person obtaining consent	Date
Printed name of person obtaining consent	

Hair sample

Your initials here indicate whether you give us permission to collect a sample of your hair.

I ☐ DO consent to have a sample of my hair cut.

I ☐ DO NOT consent to have a sample of my hair cut. _____

Subject's initials

Blood archiving

Your initials here indicate whether you give us permission to store 0.5 fluid ounces (¼ tablespoon) of your blood for future use.

I ☐ DO consent to have my blood stored for future analyses.

I ☐ DO NOT consent to have my blood stored for future analyses. _____

Subject's initials

Contact for future studies

Your initials here indicate whether you give us permission to contact you about future studies.

I ☐ DO consent to be contacted for future studies.

I ☐ DO NOT consent to be contacted for future studies. _____

Subject's initials

APPENDIX E

CONSENT FORM IN SPANISH

Forma de Consentimiento

Título del estudio de investigación: *Condiciones sociales y laborales y su efecto en los patrones de alimentación y riesgo cardiometabólico en mujeres de origen mexicano residentes en dos localidades urbanas de la frontera México-Estados Unidos*

Investigadores: ***Dr. Sonia Vega-López, profesora asociada de Nutrición del Colegio de Soluciones de Salud en la Universidad Estatal de Arizona (ASU)***

¿Por qué me invitan a participar en este estudio de investigación?

Te invitamos a participar en un estudio de investigación porque eres una mujer mexicana de 25 a 50 años, que llegó a los Estados Unidos hace al menos 5 años, actualmente vives en el área metropolitana de Phoenix, y al menos uno de tus hijos(as) vive contigo.

¿Por qué se está haciendo esta investigación?

Sabemos que cuando los mexicanos se mudan a los Estados Unidos, cambian su forma de comer y generalmente terminan comiendo menos saludable que cuando vivían en México. Sin embargo, no se han estudiado los detalles específicos de cómo esto afecta la salud de las mujeres. El propósito de esta investigación es entender mejor cómo el mudarse a los Estados Unidos cambia la forma en que las mujeres mexicanas comen, cómo las exigencias de trabajar o ser ama de casa influyen la forma en que comen, y cómo estos cambios afectan el riesgo de desarrollar enfermedades más adelante. Esto nos permitirá diseñar recomendaciones más específicas para ayudar a las mujeres mexicanas a comer de una forma más sana cuando están en los Estados Unidos.

¿Cuánto tiempo durará la investigación?

Esperamos que la participación dure aproximadamente 4 horas, que pueden dividirse en días diferentes, participando en las actividades del estudio.

¿Cuántas personas serán estudiadas?

Esperamos que aproximadamente 60 personas del área de Phoenix participen en este estudio.

¿Qué sucede si digo que sí quiero estar en este estudio de investigación?

El participar o no es tu decisión. Si decides inscribirte en el estudio y firmar este formulario, te pediremos que realices las siguientes actividades, todas las cuales se realizarán solamente con fines de investigación:

- Programaremos una cita para que vengas a nuestro laboratorio en la Universidad Estatal de Arizona en el centro de Phoenix. Esta cita se programará temprano en la mañana para que puedas venir antes de desayunar.
- Tendrás que ayunar durante 12 horas antes de la visita del estudio. Esto significa que no debes comer ni beber nada que no sea agua 12 horas antes de tu cita.

Forma de Consentimiento

- Al momento de la visita, te daremos la oportunidad de hacer cualquier pregunta adicional que puedas tener sobre este estudio. Luego te pediremos que te sientes durante unos minutos, y después te mediremos la presión arterial tres veces.
- Te pediremos que uses el baño para vaciar tu vejiga, y después mediremos tu estatura, peso y la medida alrededor de tu cintura.
- Un miembro capacitado del personal del estudio te sacará una muestra de sangre para medir tu colesterol, triglicéridos, azúcar y otros indicadores de estrés, riesgo de diabetes y enfermedad del corazón, el tipo de grasa, vitaminas y otros compuestos que normalmente consumes en la dieta, e indicadores de cómo responde tu sistema antioxidante. No usaremos tu sangre para hacer pruebas genéticas o de DNA. La cantidad total de sangre que sacaremos será de aproximadamente ½ onza líquida (aproximadamente 1 cucharada). Vamos a guardar parte de la sangre que saquemos (alrededor de ¼ de onza fluida o aproximadamente ½ cucharada) para medir indicadores adicionales de diabetes y riesgo de enfermedades del corazón, calidad de la dieta y respuesta a la oxidación en el futuro. Vamos a almacenar las muestras por hasta 10 años después de completar el estudio; después de este tiempo tiraremos las muestras con el resto de los desechos del laboratorio. Tienes la opción de decidir si quieres que almacenemos tu sangre para usarla en el futuro o no. Si aceptas que almacenemos tu sangre para un uso futuro, nos das permiso de compartir esta sangre con otros investigadores sin notificarte.
- Tomaremos una pequeña muestra de tu cabello para medir el cortisol, una sustancia producida por el cuerpo en respuesta al estrés. Tomaremos la muestra cortando una pequeña cantidad de cabello (alrededor de 80-150 hebras) de la parte de atrás de la cabeza, asegurándonos de que el lugar donde cortamos esté debajo del resto del cabello para que el corte no se note.
- Esperamos que la visita al laboratorio dure aproximadamente 1 hora. Después de sacar tu sangre y cortar la muestra de cabello, te daremos un refrigerio ligero.
- Te pediremos que completes una encuesta con la ayuda de uno de los miembros de nuestro equipo. Esta encuesta incluye preguntas acerca de ti, de tus hábitos de dieta y actividad física, tu vecindario, tu trabajo y el entorno en tu trabajo, tu estilo de vida y condiciones de vida, y cómo te has adaptado a vivir en los Estados Unidos. Puedes saltarte preguntas de esta encuesta si no te sientes a gusto respondiendo preguntas específicas. Completar la encuesta tomará entre 1 y 2 horas. Podrás completar la encuesta al final de la visita al laboratorio o por teléfono en otra ocasión después de la visita al laboratorio.
- te pediremos que completes un cuestionario de frecuencia de alimentos. Este es un cuestionario que hace preguntas sobre la frecuencia con la que comes varios alimentos y toma alrededor de 1 hora en completarse.
- Te preguntaremos si aceptas que te contactemos en el futuro para participar en otros estudios de investigación que podamos tener más adelante.

Forma de Consentimiento

¿Qué sucede si digo que sí, pero después cambio de opinión?

Puedes salirte del estudio en cualquier momento por cualquier motivo, y esto no se considerará como algo negativo contra ti.

Si decides salirte del estudio no habrá consecuencias negativas. Si decides salirte del estudio, comunícate con la investigadora o informa a uno de los miembros del equipo de investigación para que el equipo no siga tratando de comunicarse contigo.

¿Hay alguna forma en la que participar en este estudio podría ser malo para mí?

Si decides participar en el estudio, anticipamos pequeños riesgos asociados con lo siguiente:

- Puedes sentirte incómoda por hambre o un poco mareada por el ayuno antes de la visita. Te daremos un refrigerio ligero después de sacar tu sangre para reducir la incomodidad por el ayuno.
- Es posible que tengas moretones, hinchazón o malestar, mareos o desmayos por sacar tu sangre. Para minimizar los riesgos, sólo el personal capacitado sacará tu sangre. Si te da miedo que te saquen sangre o te desmayas fácilmente cuando te sacan sangre, puedes decidir no dar una muestra de sangre o no participar en el estudio.
- Es posible que te dé vergüenza cuando midamos tu peso o tu cintura, o cuando respondas algunas de las preguntas de la encuesta. Vamos a tomar estos datos en privado para que te sientas más cómoda con estos procedimientos.
- Es posible que sientas cierta inquietud emocional cuando cortemos la muestra de cabello. También hay una pequeña posibilidad de que se note el área de donde cortemos tu cabello. El personal de nuestro estudio estará entrenado para tener cuidado de asegurarse de cortar el cabello de un área que pueda cubrirse con cabello adicional. Puedes elegir no proporcionar una muestra de cabello.

Participar en este estudio de investigación puede generarle costos adicionales relacionados con el transporte y el estacionamiento para asistir a la visita del estudio.

¿Estar en este estudio me ayudará de alguna manera?

No anticipamos ningún beneficio directo para ti por tu participación en esta investigación.

¿Qué sucede con la información recopilada para este estudio?

Haremos lo posible para limitar el uso y la divulgación de tu información personal, incluyendo los registros del estudio, sólo a las personas que deben revisar esta información. No podemos prometer el secreto completo. Las organizaciones que pueden inspeccionar y copiar tu información incluyen al IRB y otros representantes de esta organización.

Toda la información relacionada con el estudio es estrictamente confidencial a menos que la

ley exija la divulgación de información. Los resultados de esta investigación pueden usarse en forma agregada en informes, presentaciones y publicaciones, pero en ellos no se te identificará. Con el fin de mantener la confidencialidad de sus registros, la Dra. Vega-López asignará códigos a todos los datos y muestras de sangre para que no contengan ninguna información que pueda identificarte. Toda la información confidencial se guardará en un archivero cerrado en la oficina de la Dra. Vega-López o en una computadora protegida con contraseña, y solo estará disponible para los miembros del equipo de investigación. Todas las muestras y materiales del estudio se destruirán 10 años después de que el estudio se haya completado o cuando te salgas del estudio. En este punto, desecharemos las muestras de sangre y trituraremos los documentos relacionados con el estudio.

¿Qué más necesito saber?

Esta investigación está siendo financiada por el Consejo Nacional de Ciencia y Tecnología (CONACYT, México).

Si aceptas participar en este estudio de investigación, te daremos una tarjeta de regalo de $15 de Walmart o Target como forma de agradecer tu participación y para compensarte por tu tiempo y esfuerzo cuando completemos la colección de datos (incluso si decides no completar todos los procedimientos). Si aceptas participar en el estudio, el consentimiento no renuncia a ninguno de tus derechos legales. Sin embargo, no hay fondos asignados para compensarte en caso de lesión.

Si lo solicitas al equipo de investigación, te daremos una copia de tus valores de glucosa y colesterol una vez que las muestras hayan sido analizadas. Por favor ten en cuenta que puede tomarnos varios meses después de tu participación para terminar de analizar las muestras de sangre. Cualquier resultado que proporcionemos no se medirá con fines de diagnóstico y deberá ser evaluado por un proveedor de atención médica para su interpretación adecuada.

¿Con quién puedo hablar?

Si tienes preguntas, inquietudes o quejas, o crees que la investigación te ha causado algún daño, habla con el equipo de investigación al (602) 827-2268.

Esta investigación ha sido revisada y aprobada por el Comité de Revisión Institucional de Biociencias (Bioscience "IRB"). Puedes hablar con ellos al (480) 965-6788 o research.integrity@asu.edu si:

- Tus preguntas, inquietudes, o quejas no están siendo respondidas por el equipo de investigación.
  - No puedes contactar al equipo de investigación.
  - Deseas hablar con alguien además del equipo de investigación.
  - Tienes preguntas sobre tus derechos como participante de investigación.
  - Deseas obtener información o proporcionar información sobre esta investigación.

Si estás de acuerdo en participar en el estudio, por favor firma en la siguiente página.

Forma de Consentimiento

Tu firma indica que das permiso para participar en este estudio.

Firma del participante	Fecha
Nombre impreso del participante	
Firma de la persona que obtiene el consentimiento	Fecha
Nombre de la persona que obtiene el consentimiento	

Muestra de cabello

Tus iniciales a continuación indican si nos das permiso de tomar una muestra de tu cabello.

Yo ☐ ESTOY de acuerdo con que me corten una muestra de mi cabello.

Yo ☐ NO ESTOY de acuerdo con que me corten una muestra de mi cabello.

_____
Iniciales del participante

Almacenamiento de muestras de sangre

Tus iniciales a continuación indican si nos das permiso de guardar 0.5 onzas (¼ cucharada) de su sangre para uso en el futuro.

Yo ☐ ESTOY de acuerdo en que se guarde mi sangre para hacer análisis en el futuro.
Yo ☐ NO ESTOY de acuerdo en que se guarde mi sangre para hacer análisis en el futuro.

_____
Iniciales del participante

Contacto para estudios en el futuro

Tus iniciales a continuación indican que nos das permiso para contactarle para estudios en el futuro.

YO ☐ ESTOY de acuerdo a que me contacten para estudios en el futuro.

YO ☐ NO ESTOY de acuerdo a que me contacten para estudios en el futuro.

_____
Iniciales del participante

APPENDIX F

SURVEY

Date / Fecha: _____ Participant ID _____ Interviewer_____

DEMOGRAPHICS / INFORMACIÓN SOCIODEMOGRÁFICA

1. How old are you? ¿Cuál es tu edad? _____

2.What is your marital status? ¿Cuál es tu estado civil?

☐1 Married and living with spouse / Casada y vive con cónyuge
☐2 Married but not living with spouse / Casada pero no vive con cónyuge
☐3 Not married but living with partner / No es casada pero vive con su pareja
☐4 Single / Soltera
☐5 Divorced / Divorciada
☐6 Widower/Viuda
☐99 Refuse / Se rehúsa

3. Including money from all salaries/work, government assistance and (if applicable) unemployment, what is the total amount of money your household receives PER MONTH?
¿Cuánto es el ingreso total de dinero que tu casa recibe POR MES, incluyendo el dinero de todos los salarios de trabajo, asistencia del gobierno y el desempleo (si aplica)?
(Interviewer, if participant is not sure read all the options; make sure answer includes food stamps, alimony, and foster care)

☐1 $0-1000
☐2 $1001-2000
☐3 $2001-3000
☐4 $3001-4000
☐5 >$4000
☐77 Don't know/Not sure / No sé/No estoy segura
☐88 Other (please specify)/ Otro, por favor especifica:
_____
☐99 Refuse / Se rehúsa

4. Who earns the main income of your family? / ¿Quién aporta el ingreso principal en la familia?

☐1 Me/ Yo
☐2 Husband/Partner / Esposo/pareja
☐3 Son/daughter (s) / Hijo(s)
☐4 Other family members / Otros miembros familiares
☐88 Other/ Otros _____

5. What is the highest grade you completed in school?
¿Cuál es el último grado escolar que completaste?

☐1 Less than 6th grade / Menos de 6º grado
☐2 Completed elementary school (6th grade) / Escuela primaria completa (6º grado)
☐3 Completed middle school (9th grade) / Escuela secundaria completa (9º grado)
☐4 Some high school (< 12th grade) / Algo de preparatoria (< 12º grado)
☐5 Completed high school (12th grade) or GED
Escuela preparatoria completa (12º grado) o GED
☐6 Some college / Algo de universidad
☐7 College graduate or higher / Graduada de la universidad o posgrado
☐8 Never attended school / Nunca fue a la escuela
☐77 Don't know/Not sure / No sé/No estoy segura
☐88 Other (please specify)/ Otro, por favor especifica:
_____
☐99 Refuse / Rehúsa

6. Which of the following best describes your current employment status?
¿Cuál de las siguientes condiciones describe mejor tu estado actual de empleo?

☐1 Working full-time, 40 hours per week or more
Trabaja de tiempo completo, 40 horas o más por semana
☐2 Working part-time, less than 40 hours per week
Trabaja de medio tiempo, menos de 40 horas por semana
☐3 Homemaker and do not work
Ama de casa y no trabajo
☐4 Homemaker with informal employment (prepared food sales, catalog sales, babysitting, etc.)
Ama de casa y tengo empleo informal (venta de comida, venta de artículos por catálogo, cuidado de niños, etc.)
☐5 Unemployed or laid off and looking for work
Desempleado o suspendido temporalmente por falta de trabajo y buscando trabajo
☐6 Unemployed and not looking for work
Desempleado y no está buscando trabajo
☐99 Refuse / Se rehúsa

MEMORIA CULTURAL ALIMENTARIA

58. Do you EAT traditional Mexican foods? Examples: caldo de queso, pozole, menudo, tacos, carne asada, mole, tamales, chimichangas, etc.
¿Consumes comida tradicional Mexicana? Ejemplos: caldo de queso, pozole, menudo, tacos, carne asada, mole, tamales, chimichangas, etc.

☐$_1$ Yes / Sí ☐$_0$ No, skip to # 59 / ve a la pregunta #59 ☐$_{99}$ Refused / Rehúsa

59. During a typical week, how many days do you eat traditional Mexican foods?
Normalmente, ¿cuántos días en una semana consumes comidas tradicionales Mexicanas?

_____ days/wk / días por semana

60. Do you EAT traditional American foods? Examples: hot dogs, hamburgers, french fries, chicken wings, peanut butter and jelly sandwiches, grilled cheese, pizza, etc.
Normalmente ¿consumes comida tradicional Americana? Ejemplos: hot dogs, hamburguesas, pizzas, papas fritas, alitas, sándwich de crema de cacahuate y mermelada, etc.

☐$_1$ Yes / Sí ☐$_0$ No, skip to # 61 ☐$_{99}$ Refused / Rehúsa

61. During a typical week, how many days do you eat traditional American foods?
Normalmente ¿Cuantos días en una semana consumes comidas tradicionales Americanas?

_____ days/week / días por semana

62. On the average, how many times per month do you go out to eat to the places listed below?
En promedio, ¿cuántas veces al mes sales a comer a los lugares de comida de la lista de abajo?

Do you eat at…? ¿Usted come en…?	# Times per month # Veces al mes	[0]Never Nunca	Which ones do you go to more often? ¿A cuál(es) va con más frecuencia?
Fast food restaurants (McDonalds, Burger King, Taco Bell, Kentucky Fried Chicken, Pizza Hut, etc.) Restaurantes de comida rápida (McDonald's, Burger King, Kentucky Fried Chicken, Pizza Hut, etc)			
Mexican restaurants (Filiberto's, Los Reyes de la Torta, Manuel's, Comedor Guadalajara, Los Dos Molinos, Macayo's, Rosita's, Sí Señor, etc) Restaurantes de comida mexicana sonorense (Papá Frijol, Viva Sonora, Cenadurías, Antojería, Xochimilco, Palominos, Casa Grande, Mochomos, etc.)			
American "chain" restaurants (Applebee's, Chili's, IHOP, Buffalo Wings, etc.) Restaurantes americanos de cadena (Applebee's, Chili's, iHop, Buffalo Wings, etc)			
Other restaurants Otros restaurantes			
Food trucks Comida en la calle (tacos, hot dogs, barbacoa, etc.)			
Home delivered or takeout meals (Pizza, Chinese) Comida a domicilio o para llevar (como pizza, comida china)			

FOOD INSECURITY / INSEGURIDAD ALIMENTARIA

Please indicate how often each statement was true for your household in the last 12 months:
Por favor indica con qué frecuencia pasó cada una de las siguientes situaciones en tu hogar en los últimos 12 meses:

63. In the last 12 months, the food that we bought just didn't last, and we didn't have money to get more.
En los últimos 12 meses, la comida que compramos simplemente no duró, y no tuvimos dinero para comprar más.

☐1 Often true / Muchas veces
☐2 Sometimes true / A veces
☐3 Never true / Nunca
☐77 Don't know / No lo sé

64. In the last 12 months, we couldn't afford to eat balanced meals.
En los últimos 12 meses, no nos alcanzó el dinero para comer comidas balanceadas.

☐1 Often true / Muchas veces
☐2 Sometimes true / A veces
☐3 Never true / Nunca
☐77 Don't know / No lo sé

65. In the last 12 months, did you or other adults in your household ever cut the size of your meals or skip meals because there wasn't enough money for food?
En los últimos 12 meses, ¿tú u otros adultos en tu casa comieron porciones más pequeñas o se saltaron alguna comida porque no había suficiente dinero para comprar comida?

☐1 Yes, almost every month / Sí, casi cada mes
☐2 Yes, some months but not every month / Sí, unos meses pero no cada mes
☐3 Yes, only 1 or 2 months / Sí, solo 1 ó 2 meses
☐4 No
☐77 Don't know / No lo sé

66. In the last 12 months, did you ever eat less than you felt you should because there wasn't enough money for food?
En los últimos 12 meses, ¿alguna vez comiste menos de lo que piensas que deberías comer porque no había suficiente dinero para comprar comida?

☐$_1$ Yes /Sí
☐$_2$ No
☐$_{77}$ Don't know / No lo sé

67. In the last 12 months, were you ever hungry but didn't eat because there was not enough money for food?
En los últimos 12 meses, ¿alguna vez tuviste hambre pero no comiste porque no había suficiente dinero para comprar comida?

☐$_1$ Yes / Sí
☐$_2$ No
☐$_{77}$ Don't know / No lo sé

PERCEPTIONS OF THE FOOD ENVIRONMENT / PERCEPCION DEL AMBIENTE DE ALIMENTOS

Using the scale below please complete the following table about the food environment in your neighborhood
Utilizando la escala a continuación, completa la siguiente tabla sobre el entorno alimentario en tu colonia/barrio

For each of the following statements, please think of your neighborhood as the area within a 20-minute walk or about a mile from your home.
Para cada una de las siguientes preguntas, piensa en tu vecindario como el área alrededor de tu casa que queda a unos 20 minutos caminando o aproximadamente a una milla de distancia.

	[1]Strongly agree / totalmente de acuerdo	[2]Agree / de acuerdo	[3]Neutral	[4]Disagree / Desacuerdo	[5]Strongly disagree / Muy en desacuerdo	[77]I don't know / No se
68. A large selection of fresh fruits and vegetables is available in my neighborhood / En mi colonia hay una gran selección de frutas y verduras frescas disponibles	1	2	3	4	5	
69. The fresh fruits and vegetables in my neighborhood are of high quality / Las frutas y verduras frescas en mi colonia son de alta calidad	1	2	3	4	5	
70. A large selection of low-fat products is available in my neighborhood / En mi colonia hay una gran selección de productos bajos en grasa disponibles	1	2	3	4	5	
71. There are many opportunities to purchase fast foods in my neighborhood such as McDonald's, Taco Bell, KFC and takeout pizza places etc. / Hay muchas oportunidades para comprar comida rápida en mi colonia, como McDonald's, Carl´s Jr, KFC, Domino's Pizza y lugares de pizzas para llevar, etc.	5	4	3	2	1	

72. How much of a problem would you say that lack of access to adequate food shopping is in your neighborhood? ¿Qué tan problemática es la falta de acceso a una compra de alimentos adecuados en tu colonia?

☐1 Very serious problem / Problema muy serio
☐2 Somewhat serious problem / Problema algo serio
☐3 Minor problem/ Problema menor
☐4 Not really a problem / No es realmente un problema

Perceived presence of food retail outlet

Which of the following stores, if any, are located in Your Neighborhood. Please indicate by marking "yes" or "no".
¿Cuáles de las siguientes tiendas, si las hay, se encuentran en tu colonia? Indique marcando "sí" o "no".

	[1]Yes / Si	[0]No
73. A supercenter such as Costco, Wal-Mart or Target Un supercentro como Costco, Wal-Mart, Target.		
74. A supermarket such as Bahsa's, Safeway, Albertson's, Fry's, Food City, Ranch Market Un supermercado como Basha's, Safeway, Albertson's, Fry's, Food City, Ranch Market		
75. A smaller grocery store / Abarrotes, tienditas		
76. A convenience store with or without a gas station attached such as Circle K, Seven-Eleven Tienda de conveniencia, Circle K, Seven-Eleven		
77. A specialty store such as ethnic specialty store, meat market, seafood market, green grocer, or bakeries Tienda de especialidades como una carnicería, pescadería, frutería, panadería		
78. A freestanding drug store or pharmacy Store such as CVS, Rite-Aid, or Walgreens Farmacias como CVS, Ride-Aid o Walgreens		
79. A dollar variety, dollar general, dollar store, or dollar tree Tienda de productos de descuento como dollar general, dollar store o dollar tree		
80. A franchised fast food restaurant including places like McDonalds, Subway, KFC, Domino's Pizza, Peter Piper Pizza or Taco Bell Restaurantes tipo franquicia de comida rápida como McDonald's, Subway, KFC, Domino's Pizza, Peter Piper Pizza o Taco Bell		
81. A sit down restaurant or buffet restaurant Restaurantes o Buffet		

APPENDIX G

SOUTHWEST 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 / SEX — MASCULINO / MALE (M) — FEMENINO / FEMALE (F)

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.

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

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

FOR OFFICE USE

ID NUMBER

STUDY

NO ESCRIBA EN ESTA ZONA - PLEASE DO NOT WRITE IN THIS AREA

0423

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	○	●	○	○	⓪	○	●	⓪	○	○	○
FRIJOLES DE LA OLLA, CHARROS, BAYOS, NEGROS, PINTOS, ALUBIAS. Baked / Cooked Beans, "Charro-Style" Beans, Black, Pinto, and Kidney Beans	○	○	○	○	⓪	○	○	⓪	○	○	●

NO ESCRIBA EN ESTA ZONA
PLEASE DO NOT WRITE IN THIS AREA

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	○	○	○	○	○	○	○	○	○	○	○
FRIJOLES DE LA OLLA, CHARROS BAYOS, NEGROS, PINTOS, ALUBIAS. Baked / Cooked Beans, "Charro-Style" Beans, Black, Pinto, and Kidney Beans	○	○	○	○	○	○	○	○	○	○	○
ARROZ BLANCO. Plain Rice	○	○	○	○	○	○	○	○	○	○	○
ARROZ A LA MEXICANA. Mexican Rice	○	○	○	○	○	○	○	○	○	○	○
SOPAS DE PASTA / FIDEO (SIN QUESO Y SIN CARNE). Noodle Soup, Pastas without Cheese or Meat	○	○	○	○	○	○	○	○	○	○	○
LENTEJAS, GARBANZOS, HABAS (COCIDAS, EN SOPAS, ETC.). Lentils, Garbanzo Beans (Cooked, in Soups, etc.)	○	○	○	○	○	○	○	○	○	○	○
PAPAS FRITAS, PAPITAS, O PAPAS A LA FRANCESA. French Fries and Fried Potatoes	○	○	○	○	○	○	○	○	○	○	○
PAPAS HERVIDAS, AL HORNO, PURE DE PAPA, OTRAS PAPAS. Other Potatoes, Including Boiled, Baked, Mashed	○	○	○	○	○	○	○	○	○	○	○
MOLE ROJO O VERDE, CON POLLO, PUERCO, CABRA U OVEJA. Red or Green Mole, with Chicken, Pork, Goat, or Lamb	○	○	○	○	○	○	○	○	○	○	○
CALABACITAS CON QUESO. Zucchini with Cheese	○	○	○	○	○	○	○	○	○	○	○
CHILES RELLENOS CON QUESO O PICADILLO. Chiles Rellenos with Cheese or Meat	○	○	○	○	○	○	○	○	○	○	○
TAMALES DE CARNE. Meat Tamales	○	○	○	○	○	○	○	○	○	○	○
TAMALES DE ELOTE. Corn Tamales	○	○	○	○	○	○	○	○	○	○	○
QUESADILLAS DE HARINA O DE MAIZ. Flour or Corn Quesadillas	○	○	○	○	○	○	○	○	○	○	○
CHIMICHANGAS	○	○	○	○	○	○	○	○	○	○	○

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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	O	O	O	O	O	O	O	O	O	O	O
TOSTADAS	O	O	O	O	O	O	O	O	O	O	O
BURRITOS	O	O	O	O	O	O	O	O	O	O	O
ENCHILADAS, CHILAQUILES, PASTEL AZTECA	O	O	O	O	O	O	O	O	O	O	O
FLAUTAS / TACOS DORADOS. Crispy Tacos (Fried)	O	O	O	O	O	O	O	O	O	O	O
SALSA MEXICANA, SALSA PARA TACOS, OTRAS SALSAS. Mexican Sauce, Taco Sauce, Other	O	O	O	O	O	O	O	O	O	O	O
POZOLE, MENUDO, GALLINA PINTA	O	O	O	O	O	O	O	O	O	O	O
CAZUELA, SOPA DE ALBONDIGAS. Cazuela Soup, Meatball Soup	O	O	O	O	O	O	O	O	O	O	O
SOPA DE TORTILLA. Tortilla Soup	O	O	O	O	O	O	O	O	O	O	O
CALDO DE QUESO. Cheese Soup	O	O	O	O	O	O	O	O	O	O	O
SOPA DE VERDURAS, SOPA DE VERDURAS CON CARNE, COCIDO, MINESTRONE, Y SOPA DE TOMATE. Vegetable Soup, Vegetable Beef, Cocido, Minestrone, and Tomato Soup	O	O	O	O	O	O	O	O	O	O	O
OTRAS SOPAS. Other Soups	O	O	O	O	O	O	O	O	O	O	O
ESPAGUETI, LASAGNA, OTRAS PASTAS CON PURE O SALSA DE TOMATE. Spaghetti, Lasagna, Other Pasta with Tomato Sauce	O	O	O	O	O	O	O	O	O	O	O
PIZZA	O	O	O	O	O	O	O	O	O	O	O
PLATILLOS QUE CONTENGAN QUESO COMO MACARRONES CON QUESO. Mixed Dishes with Cheese, like Macaroni and Cheese	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?

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	○	○	○	○	○	○	○	○	○	○	○
TOCINO. Bacon	○	○	○	○	○	○	○	○	○	○	○
CHORIZO. Mexican Sausage	○	○	○	○	○	○	○	○	○	○	○
SALCHICHON. Sausage	○	○	○	○	○	○	○	○	○	○	○
SALCHICHAS. Hot dogs	○	○	○	○	○	○	○	○	○	○	○
HAMBURGUESAS, HAMBURGUESAS CON QUESO, PASTEL DE CARNE, MILANESA DE TERNERA, PICADILLO. Hamburgers, Cheeseburgers, Meat Loaf, Veal Dishes	○	○	○	○	○	○	○	○	○	○	○
JAMON, MORTADELA, BOLOGNA Y SPAM. Ham, Lunch Meats, and Spam	○	○	○	○	○	○	○	○	○	○	○
BISTEC DE RES, ASADO AL HORNO, CARNE ASADA. Beef-Steaks, Roasts, Carne Asada	○	○	○	○	○	○	○	○	○	○	○
GUISADOS DE CARNE CON ZANAHORIA Y OTRAS VERDURAS. Beef Stew or Pot Pie with Carrots and Other Vegetables	○	○	○	○	○	○	○	○	○	○	○
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.	○	○	○	○	○	○	○	○	○	○	○
MACHACA. Dried Beef	○	○	○	○	○	○	○	○	○	○	○
HIGADO DE RES, POLLO, TERNERA. Liver: Beef, Chicken, Veal	○	○	○	○	○	○	○	○	○	○	○
PUERCO: INCLUYENDO CARNITAS CHULETAS, AL HORNO, MILANESAS. Pork, including Carnitas Chops, Roasts, Fried	○	○	○	○	○	○	○	○	○	○	○

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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	○	○	○	○	ⓓ	○	○	⑥	○	○	○
LIMONES Y JUGO DE LIMON. Lemon/Limes and Lime Juice	○	○	○	○	ⓓ	○	○	⑥	○	○	○
PLATANOS. Bananas	○	○	○	○	ⓓ	○	○	⑤	○	○	○
PIÑA. Pineapple	○	○	○	○	ⓓ	○	○	⑤	○	○	○
MANZANAS, PERAS, GUAYABAS. Apples, Pears, Guavas	○	○	○	○	ⓓ	○	○	⑥	○	○	○
MANGOS. Mangoes	○	○	○	○	ⓓ	○	○	⑥	○	○	○
DURAZNOS, CHABACANOS, ALBARICOQUES, Y NECTARINAS. Peaches, Apricots, and Nectarines	○	○	○	○	ⓓ	○	○	⑤	○	○	○
SANDIA. Watermelon	○	○	○	○	ⓓ	○	○	⑤	○	○	○
MELÓN. Cantaloupe and other melons	○	○	○	○	ⓓ	○	○	⑤	○	○	○
FRESAS. Strawberries	○	○	○	○	ⓓ	○	○	⑥	○	○	○
OTRAS MORAS (Frambuesas, zarzamoras). Other berries (blueberries/raspberries)	○	○	○	○	ⓓ	○	○	⑥	○	○	○
UVAS. Grapes	○	○	○	○	ⓓ	○	○	⑤	○	○	○
CEREZAS. Cherries	○	○	○	○	ⓓ	○	○	⑤	○	○	○
PASAS, CIRUELAS PASAS, HIGOS. Raisins, Prunes, Figs	○	○	○	○	ⓓ	○	○	⑥	○	○	○
CIRUELAS FRESCAS. Fresh Plums	○	○	○	○	ⓓ	○	○	⑤	○	○	○
TORONJAS. Grapefruit	○	○	○	○	ⓓ	○	○	⑥	○	○	○

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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	O	O	O	O	O	O
PANECITOS / BIZCOCHOS DE SALVADO, O INTEGRALES. **Bran or whole wheat muffin**	O	O	O	O	O	O	O	O	O	O	O	O
PANCAKES Y WAFFLES. **Pancakes and Waffles**	O	O	O	O	O	O	O	O	O	O	O	O
PAN DULCE. **Sweet Bread**	O	O	O	O	O	O	O	O	O	O	O	O
POSTRES **Sweets**												
NIEVE DE LECHE O HELADO. **Ice Cream**	O	O	O	O	O	O	O	O	O	O	O	O
NIEVE DE AGUA, PALETAS. **Sherbet, Popsicles**	O	O	O	O	O	O	O	O	O	O	O	O
NATILLA O FLAN, BUDIN. **Custard or Pudding**	O	O	O	O	O	O	O	O	O	O	O	O
ARROZ CON LECHE Y PASAS. **Rice Pudding with Raisins**	O	O	O	O	O	O	O	O	O	O	O	O
DONAS. **Doughnuts**	O	O	O	O	O	O	O	O	O	O	O	O
GALLETAS. **Cookies**	O	O	O	O	O	O	O	O	O	O	O	O
PASTEL. **Cake**	O	O	O	O	O	O	O	O	O	O	O	O
PASTEL, O DULCE DE CALABAZA, CAMOTE DE DULCE. **Pumpkin Pie, Sweet Potato Pie**	O	O	O	O	O	O	O	O	O	O	O	O
BUÑUELOS, SOPAPILLAS, PASTELILLOS. **Pastries**	O	O	O	O	O	O	O	O	O	O	O	O
EMPANADAS, COYOTAS. **Turnovers, Coyotas**	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								
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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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	○	○	○	○	○	○	○	○	○	○	○	○
TE CON CAFEINA (NEGRO / VERDE) HELADO O CALIENTE. Tea, Hot or Iced	○	○	○	○	○	○	○	○	○	○	○	○
A SU CAFE O TE, ¿LE AÑADE: To your coffee or tea, do you add:												
CREMA EN POLVO PARA CAFE? Non-Dairy Creamer?	○	○	○	○	○	○	○	○	○	○	○	○
LECHE? Milk?	○	○	○	○	○	○	○	○	○	○	○	○
O CREMA? or Real Cream?	○	○	○	○	○	○	○	○	○	○	○	○
¿A SU CAFE O TE, LE AÑADE: To your coffee or tea, do you add:												
AZUCAR? Sugar	○	○	○	○	○	○	○	○	○	○	○	○
O ENDULZANTE ARTIFICIAL (AZUCAR DE DIETA, AZUCAR ARTIFICIAL)? Diet Sugar or Artificial Sweetener?	○	○	○	○	○	○	○	○	○	○	○	○
LECHE ENTERA Y BEBIDAS CON LECHE ENTERA (SIN INCLUIR EN CEREALES). Whole Milk and Beverages with Whole Milk (excluding milk in cereals)	○	○	○	○	○	○	○	○	○	○	○	○
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)	○	○	○	○	○	○	○	○	○	○	○	○

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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 (exduding milk in cereals)	O	O	O	O	O	O	O	O	O	O	O	O
LECHE CONDENSADA. Condensed Milk	O	O	O	O	O	O	O	O	O	O	O	O
LECHE EVAPORADA. Evaporated Milk	O	O	O	O	O	O	O	O	O	O	O	O

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.	O	O	O	O	O	O	O	O	O	O	O
B.	O	O	O	O	O	O	O	O	O	O	O
C.	O	O	O	O	O	O	O	O	O	O	O
D.	O	O	O	O	O	O	O	O	O	O	O
E.	O	O	O	O	O	O	O	O	O	O	O
F.	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 (exduding milk in cereals)	O	O	O	O	O	O	O	O	O	O	O	O
LECHE CONDENSADA. Condensed Milk	O	O	O	O	O	O	O	O	O	O	O	O
LECHE EVAPORADA. Evaporated Milk	O	O	O	O	O	O	O	O	O	O	O	O

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.	O	O	O	O	O	O	O	O	O	O	O	
B.	O	O	O	O	O	O	O	O	O	O	O	
C.	O	O	O	O	O	O	O	O	O	O	O	
D.	O	O	O	O	O	O	O	O	O	O	O	
E.	O	O	O	O	O	O	O	O	O	O	O	
F.	O	O	O	O	O	O	O	O	O	O	O	

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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 JUGCS 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		0 1 2 3 4 5 6 7 8 9
		0 1 2 3 4 5 6 7 8 9

MARCA / Brand Name _____

○ FORMULA TERAPEUTICA O STRESS.
Therapeutic or Stress Formula

# PASTILLAS POR SEMANA / # of Pills Per Week		0 1 2 3 4 5 6 7 8 9
		0 1 2 3 4 5 6 7 8 9

MARCA / Brand Name _____

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

# PASTILLAS POR SEMANA / # of Pills Per Week		0 1 2 3 4 5 6 7 8 9
		0 1 2 3 4 5 6 7 8 9

MARCA / Brand Name _____

○ COMPLEJO B.
B-Complex

# PASTILLAS POR SEMANA / # of Pills Per Week		0 1 2 3 4 5 6 7 8 9
		0 1 2 3 4 5 6 7 8 9

MARCA / Brand Name _____

SUPLEMENTOS INDIVIDUALES / Individual Supplements

○ VITAMINA A. Vitamin A

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

○ VITAMINA B_6. Vitamin B_6

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

○ VITAMINA C. Vitamin C

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

○ VITAMINA D. Vitamin D

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

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SUPLEMENTOS INDIVIDUALES
Individual Supplements

○ VITAMINA E. Vitamin E

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

○ VITAMINA K. Vitamin K

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

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

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

○ HIERRO. Iron

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

○ MAGNESIO. Magnesium

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

○ SELENIO. Selenium

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

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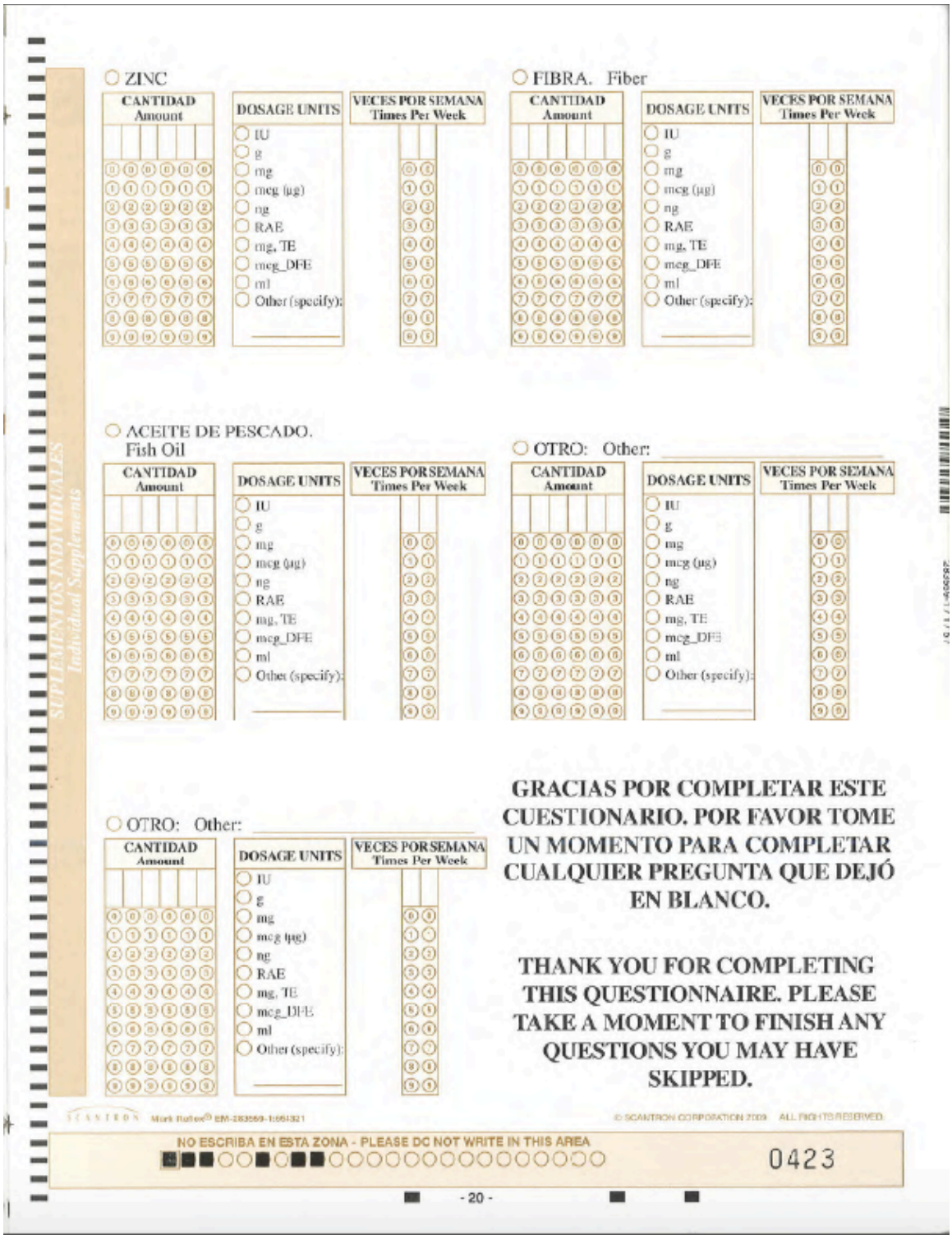
SUPPLEMENTOS INDIVIDUALES
Individual Supplements
ZINC
FIBRA. Fiber
ACEITE DE PESCADO.
Fish Oil
OTRO: Other:
OTRO: Other:
CANTIDAD
Amount
DOSAGE UNITS
IU
g
mg
mcg (µg)
ng
RAE
mg_TE
mcg_DFE
ml
Other (specify):
VECES POR SEMANA
Times Per Week
GRACIAS POR COMPLETAR ESTE CUESTIONARIO. POR FAVOR TOME UN MOMENTO 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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