

The Relationship between Food Insecurity and Weight Status, Eating Behaviors, the
Home Food Environment, Meal Planning and Preparation, and Perceived Stress

in Parents Living in the Phoenix Metropolitan Area

by

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ABSTRACT

Objectives

Through a cross-sectional observational study, this thesis evaluates the relationship between food insecurity and weight status, eating behaviors, the home food environment, meal planning and preparation, and perceived stress as it relates to predominantly Hispanic/Latino parents in Phoenix, Arizona. The purpose of this study was to address gaps in the literature by examining differences in “healthy” and “unhealthy” eating behaviors, foods available in the home, how time and low energy impact meal preparation, and the level of stress between food security groups.

Methods

Parents, 18 years or older, were recruited during two pre-scheduled health fairs, from English as a second language classes, or from the Women, Infants, and Children’s clinic at a local community center, Golden Gate Community Center, in Phoenix, Arizona. An interview, electronic, or paper survey were offered in either Spanish or English to collect data on the variables described above. In addition to the survey, height and weight were collected for all participants to determine BMI and weight status. One hundred and sixty participants were recruited. Multivariate linear and logistic regression models, adjusting for weight status, education, race/ethnicity, income level, and years residing in the U.S., were used to assess the relationship between food security status and weight status, eating behaviors, the home food environment, meal planning and preparation, and perceived stress.

Results

Results concluded that food insecurity was more prevalent among parents reporting lower income levels compared to higher income levels ($p=0.017$). In adjusted models, higher perceived cost of fruits ($p=0.004$) and higher perceived level of stress ($p=0.001$) were associated with food insecurity. Given that the sample population was predominately women, a post-hoc analysis was completed on women only. In addition to the two significant results noted in the adjusted analyses, the women-only analysis revealed that food insecure mothers reported lower amounts of vegetables served with meals ($p=0.019$) and higher use of fast-food when tired or running late ($p=0.043$), compared to food secure mothers.

Conclusion

Additional studies are needed to further assess differences in stress levels between food insecure parents and food insecure parents, with special consideration for directionality and its relationship to weight status.

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CHAPTER 1

INTRODUCTION

Overview

Food security, as described by the United States Department of Agriculture (USDA), is “access at all times to enough food for an active, healthy life” (Coleman-Jensen, Nord, Andrews, & Carlson, 2012). Food insecurity has been linked to poor nutritional outcomes related to inadequate intake of key nutrients and overweight/obesity status (Vozoris, & Tarasuk, 2003; Weigel, Armijos, Holben, 2006; Hall, Ramirez, & Orozco, 2007). Less “healthy” foods available in the home, lack of time for meal preparation, and less access to affordable and quality fruits and vegetables present as barriers for food insecure individuals to consume a healthy diet (Holben, 2006; Storfer-Isser, & Musher-Eizenman, 2012).

The Phoenix metropolitan area ranks as the nation’s fifth worst for food insecurity, with Arizona’s 4th congressional district reporting a 31.8 percent food insecurity rate compared to a 15.8 percent average rate for the state of Arizona and a 14.9 percent rate for the nation (Coleman-Jensen, et al., 2012; Cooper, & Burke, 2012). As such, there is a critical need to reduce hunger in Phoenix, Arizona. Associations between food insecurity and weight status have been studied since Dr. William H. Dietz first recognized that hunger might be a reason for obesity (Dietz, 1995). Several studies since then have linked food insecure individuals with a greater risk for overweight/obesity (Townsend, Peerson, Love, Achterberg, & Murphy, 2001; Casey et al., 2006; Martin, & Lippert, 2012; Ivers, & Cullen, 2011; Leung, Williams, & Villamor, 2012). Current

evidence is not conclusive as to whether food insecurity alone attributes to increased weight status or if other causative factors related to food insecurity such as binge eating associated with food cycling, household income, or level of stress play a role in weight status (Larson & Story, 2011; Townsend, et al., 2001).

The purpose of this thesis will be to investigate potential correlations between food security status and weight status, eating behaviors, meal planning and preparation, and perceived stress. If differences are noted between food insecure and food secure individuals, further studies can be conducted to assess directionally and causality of the varying factors.

The increased prevalence of overweight/obesity among food insecure individuals is important to address, as overweight/obesity is a risk factor for many chronic diseases such as cardiovascular disease, cancer, and/or diabetes (Seligman, Laraia, & Kushel, 2010). Nationally, obesity presents a \$147 billion economic burden of medical costs, yearly (Finkelstein, Trogon, Cohen, & Dietz, 2009). Medical costs for an obese individual are roughly 42 percent higher than for a normal weight individual (Finkelstein, et al., 2009). Medical costs related to obesity put more financial burden on those that are already financially strained.

Arizona's need to alleviate hunger is increasing. A spike in food insecurity occurs in individuals when household incomes are below 185 percent of the poverty line and consequently more so when household income levels are below 130 percent of the poverty line (Coleman-Jensen, et al., 2012). Over the past few years, along with the rest of the United States, Arizona has suffered economic challenges (Hipple, 2009). Arizona's participation in the Supplemental Nutrition Assistance Program (SNAP), a program that

provides supplemental food assistance for individuals/families below the 130 percent poverty line, has seen a participant increase from 6.9 percent in 2007 to 13.2 percent in 2010 (The Centers for Disease Control (CDC), 2011a).

Food insecurity disproportionately affects some groups more than others. Almost 21 percent of households with children, 27 percent of Hispanic households, and 37 percent of households with children headed by a single woman are food insecure (Coleman-Jensen, et al., 2012); Arizona has high proportions of these population groups. As of July 2011, the Arizona Department of Economic Security reported over one million adults and children receiving SNAP benefits in Arizona (CDC, 2011a). These numbers alone are startling and provide evidence to better understand the needs of those that are hungry.

Because of the increased risk for overweight/obesity, and the high prevalence of food insecurity in Arizona, it is important to understand factors associated with the problem. The following section is a summary, which acknowledges what is currently known and addresses gaps in the literature that warrant further research.

Eating behaviors

Eating gives us the energy that we need to get through the day. Whether the behaviors are described as “healthy” or “unhealthy”, we all have eating behaviors that we do with little thought. Understanding what eating behaviors are associated with food insecurity is important because “unhealthy” eating behaviors are often risk factors for chronic diseases (Seligman, et al., 2010). Pilgrim et al. (2012) reported that food insecure individuals are more likely to consume white bread, processed meat, potato chips, and

consume fewer fruits and vegetables than individuals that are food secure. Other studies also suggest that diet quality of food insecure individuals is poorer than food secure individuals (Crawford & Webb, 2011; Bruening, MacLehose, Loth, Story, & Neumark-Sztainer, 2012). Barriers to consuming a “healthy” diet may include time, associated with irregular work hours or busy lifestyle; taste preferences, the thought of having to give up foods liked; and the thought that one’s current diet is already “healthy” (Kearney & McElhone, 1999). Lack of access to healthy, affordable, and quality foods may also be reason for decreased diet quality (Macintyre & Cummins, 2006). Finally, a recent study (Bruening, et al., 2012) noted higher rates of binge eating among food insecure individuals. Binge eating is an “unhealthy” eating behavior, and if it is consistently associated with food insecurity interventions regarding coping with binge eating may be beneficial for weight management in food insecure individuals. Further research is needed to replicate these findings and to investigate if these correlations exist among the Hispanic/Latino population, where little research has been conducted.

Home Food Environment

The home food environment, foods that are available at home and served at mealtime, plays a role in “healthy” eating habits (Widome, Neumark-Sztainer, Hannan, Haines, & Story, 2009). Serving or not serving specific food/drink items at a meal may be the result of what is available in the home at the time of meal preparation; therefore, assessing the home food environment may be a good way to understand what type of food is being eaten. On average, food insecure households are less likely to serve fruits and vegetables at a meal and more likely than food secure households to serve sugar-

sweetened beverages with meals (Boutelle, Fulkerson, Neumark-Sztainer, Story, & French, 2007; Bruening, et al., 2012). The home food environment has only been researched in a few studies, and findings need to be replicated to gain more understanding of their relationship with food insecurity.

Meal Planning and Preparation

Meal quality may suffer when there is a lack of time to plan, grocery shop, and/or prepare meals. Previous research has looked at time scarcity and fatigue as barriers to parents preparing healthy meals; however, 94 percent of participants in this study were affluent well-educated Caucasian women (Storfer-Isser & Musher-Eizenman, 2012). It would be expected that food insecure families would have greater barriers related to time and skill in meal planning and preparation. Further research is needed to explore how food accessibility/affordability, time, and energy play a role in healthy meal planning and preparation in food insecure households.

Perceived Stress

Research shows a strong relationship between levels of stress and eating behaviors (Grosez, et al., 2012). When individuals perceive themselves to be under a lot of stress, their eating patterns change (Dallman, 2010). During times of stress, food preferences change from low-fat, nutritious options, to higher fat, less “healthy” more palatable options (Zellner, et al., 2006; Grosez, et al., 2012). Increased levels of stress are also related to an overall increase in food consumption leading to possible increased weight status (Grosez, et al., 2012). What needs to be further examined is if perceived

stress levels differ between food secure individuals and food insecure individuals. As stated earlier, higher levels of stress are often related to “unhealthy” eating behaviors and may be reason for weight gain. If differences in perceived level of stress exists between food secure and food insecure individuals, then, further research should be conducted to examine the directionality of stressors and possible impacts on weight status. This meditational analysis is beyond the scope of this thesis; however, one objective of this thesis is to set the stage for this type of study by assessing differences in perceived stress levels based on food security status.

Below is the conceptual model for this thesis. As seen below, the goal of this thesis is to understand if there is a relationship between food security and weight status, eating behaviors, meal planning and preparation, home food environment, and perceived stress among predominantly Hispanic/Latino parents in Phoenix, Arizona. While we will not be able to assess the directionality of these relationships within this cross-sectional study, the arrows indicates the hypothesized relationships.

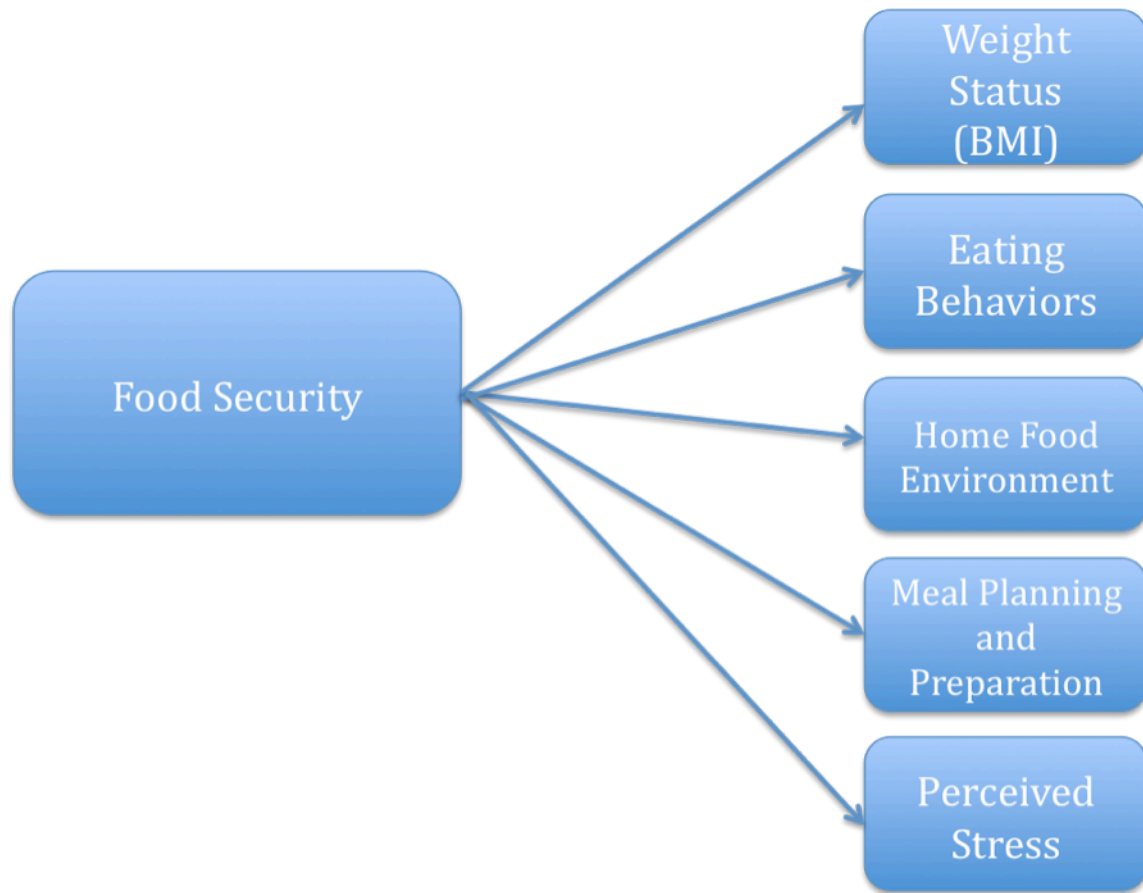


Figure 1: Conceptual Model and Visual Display of Thesis Objectives

Purpose of the Study

The purpose of this cross-sectional, observational study is to evaluate the relationship of food insecurity with weight status, eating behaviors, the home food environment, meal planning and preparation, and stress as it relates to predominantly Hispanic/Latino parents in Phoenix, Arizona. The Hispanic/Latino population in Phoenix, Arizona is a particularly vulnerable group to obesity, diabetes, and high rates of food insecurity (Sharkey, Dean, & Johnson, 2011a; Coleman-Jensen, et al., 2012). Seeking out information regarding parent's level of food security, BMI, eating behaviors, home food environment, meal planning and food preparation, and perceived stress may enhance our understanding of these variables and their correlation to food security status.

This study has practical implications for addressing the relationship between food insecurity and obesity. As stated previously, the prevalence of obesity and food insecurity continues to rise (Coleman-Jensen, et al., 2012). Research needs to be conducted to assess how food insecurity may be associated with disordered eating and imbalanced nutritional status. If there is a true relationship between obesity and food insecurity, one's risk for chronic disease will increase as one's level of food insecurity increases (Kendall, Olson, & Frongillo, 1996; Seligman, et al., 2010). Together, food insecurity and obesity are detrimental to an individual's overall health and well-being.

This study can add to the knowledge and available literature regarding the relationship between food insecure parents, eating behaviors, and overweight/obesity. This knowledge can then be applied for the development of interventions to better address health related needs of food insecure parents. For example, if it is found that food insecure parents exhibit increased levels of perceived stress, when compared to food

secure parents, the development of an intervention to reduce stress among food insecure parents might be beneficial.

Primary Research Questions/Hypotheses

Study aim: Determine how food insecurity is correlated with weight status, eating behaviors, the home food environment, meal planning and preparation, and stress in parents, with children 18 years old or younger living at home, in the Phoenix metropolitan area.

- *Research question 1:* How is food insecurity associated with body mass index among parents in the Phoenix metropolitan area?
 - **H₁:** Food insecure parents will have a higher body mass index than food secure parents.
- *Research question 2:* How is food insecurity associated with eating behaviors among parents in the Phoenix metropolitan area?
 - **H₂:** Food insecure parents will have more “unhealthy” eating behaviors, such as lower fruit and vegetable intake and higher intakes of sugar-sweetened beverages and fast food, than food secure parents.
- *Research question 3:* How is food insecurity associated with the home food environment among parents in the Phoenix metropolitan area?
 - **H₃:** Food insecure parents will report more “unhealthy” foods, such as sugar-sweetened beverages, potato chips, or candy, available in the home when compared to food secure parents.

- *Research question 4:* How is food insecurity associated with meal planning and preparation behaviors among parents in the Phoenix metropolitan area?
 - **H₄:** Food insecure parents will report less meal planning and preparation than food secure parents.
- *Research question 5:* How is food insecurity associated with perceived stress among parents in the Phoenix metropolitan area?
 - **H₅:** Food insecure parents will report higher perceived stress than food secure parents.

Definition of Terms

Body mass index (BMI) –A value calculated from a person's weight and height. BMI correlates with body fatness for most people, but it does not directly measure body fatness. BMI is used to screen for weight categories that may lead to health problems (CDC, 2012).

- **Underweight** – for adults is characterized a BMI of 18.4 or less
- **Normal Weight-** for adults is characterized by a BMI of 18.5 to 24.9
- **Overweight** - for adults is characterized by a BMI of 25 to 29.9
- **Obese** - for adults is characterized by a BMI of 30 or greater

Food Security - Food security means access by all people at all times to enough food for an active, healthy life (Coleman-Jensen, et al., 2012).

Food Insecurity – can include any of the following at varying degrees: anxiety over food sufficiency or shortage of food in the house, reports of reduced quality, variety, or desirability of diet, and/or reports of multiple indications of disrupted eating patterns and reduced food intake (Coleman-Jensen & Nord, 2012)

Hunger-Obesity Paradox – states that those living in poverty experience simultaneously high levels of food insecurity and high levels of obesity (Crawford & Webb, 2011)

Perceived Stress - interactions between persons and their environment that are perceived as straining/exceeding their adaptive capacities and threaten their well-being (Frey, 2006)

Research Design

Adult participants were recruited during two pre-scheduled health fairs, from English as a second language (ESL) classes, or from the Women, Infants, and Children's (WIC) clinic at a local community center (Golden Gate Community Center) in Phoenix, Arizona. An interview, electronic, or paper survey were offered in either Spanish or English to collect data in the following categories: level of food insecurity, eating behaviors (i.e. emotional/binge eating, fast food consumption, fruit and vegetable consumption, etc), home food environment, meal planning and preparation, and perceived level of stress. Height and weight were collected for all participants to determine BMI and weight status. The goal was to understand associations among food insecurity and the factors listed above.

Assumptions, Limitations, and Strengths

It was assumed that all participants answered interview/survey questions truthfully and accurately. Limitations include the cross-sectional design of the study, which does not allow for causation to be determined due to the lack of temporality in the design. Cross-sectional studies can only identify associations without directionality of the causation. The limited sample size and distinct population may not allow findings to be generalized to the overall/other populations; however, findings will provide insights for a vulnerable, understudied group. Similar studies will have to be conducted across a wider population to show generalizability. Many of the participant's responses collected are subjective, self-reports, leaving error for personal interpretation and/or reliance on memory recall of information being collected, which may bias results.

Strengths of this study include addressing gaps in the literature regarding weight status, eating behaviors, home food environment, meal planning and preparation, and perceived stress as they relate to food insecurity among parents. Using objective measures such as weight and height provide strength to the data collected. Because this is a preliminary study it will set the stage for future studies regarding eating patterns and perceived stress among food insecure parents. This study will provide insight among the Hispanic/Latino population as well, as they were the predominate group in this study.

Delimitations include data collection from participants attending one of two pre-scheduled health fairs, from English as a second language (ESL) classes, or from the Women, Infants, and Children's (WIC) clinic at Golden Gate Community Center in Phoenix, Arizona. Data was collected from adult parents, 18 years or older, with children 18 years or younger living in their homes. Interview/survey questions were provided in

Spanish and English; therefore, participants must have been able to speak or understand one of the two languages.

Summary

Food insecure individuals are especially vulnerable to risk factors associated with obesity such as affordability and accessibility to “healthy” foods, limited resources, food cycling (consisting of food deprivation and then patterns of overeating), and binge-eating (Townsend, et al. 2001; Larson & Story, 2011; Bruening et al., 2012). Obesity is an epidemic and it appears to be paradoxically seen in individuals that are food insecure. While obesity is found in both food secure and food insecure individuals the difference arises in that food insecure individuals struggle with regular access to food, yet, they still have a high prevalence of obesity, making the relationship between those that are food insecure versus food secure and obesity unique (Hartline-Grafton, 2011).

CHAPTER 2

REVIEW OF LITERATURE

Food Insecurity

Food insecurity may be reported when the variety, desirability, or quality of food is reduced or when eating patterns are disrupted due to decreased food availability. Food hardship, hunger, and food insufficiency are a few terms that have also been used to describe food insecurity (Holben, 2006). Many levels of food security exist from very low (food insecure) to high (food secure) (Coleman-Jensen, et al., 2012). Table 1 displays the current USDA categorization of food security/insecurity.

Food security category	Term	Definition
Food secure	High food security <i>(old label=Food security)</i>	No reported indications of food-access problems or limitations
	Marginal food security <i>(old label=food security)</i>	One or two reported indications—typically of anxiety over food sufficiency or shortage of food in the house. Little or no indication of changes in diets or food intake
Food insecure	Low food security <i>(old label=Food insecurity without hunger)</i>	Reports of reduced quality, variety, or desirability of diet. Little or no indication of reduced food intake
	Very low food security <i>(old label=Food insecurity with hunger)</i>	Reports of multiple indications of disrupted eating patterns and reduced food intake

Table 1. Food Security/Insecurity Definitions (Coleman-Jensen, McFall & Nord, 2013).

Several characteristics distinguish food insecure families from food secure families. For instance, food insecure families, when compared to food secure families of

the same size and composition, typically spend 24 percent less on food (Coleman-Jensen, et al., 2012). Food insecure adults also face more worries and struggles with food acquisition and consumption than food secure adults. Frequently stated worries and struggles among food insecure adults include: worries about food running out, food bought did not last, could not afford balanced meals, skipped a meal, ate less than felt they should, hungry but did not eat, lost weight, and/or did not eat a whole day (Coleman-Jensen, et al., 2013).

When it comes purchasing food, including “healthy” or any food at all, poverty is the root to frequently stated challenges by food insecure households. High housing, utility, and medical costs also intensify an individual’s and household’s food insecurity situation (Joyce, Breen, Ettinger de Cuba, Cook, & Barrett, 2012). Frequently, food insecure households are forced to prioritize bills and utilities over the purchase of food. Lack of food affordability and decreased/inconsistent access to food are often two key variables associated with food insecurity (Sharkey, et al., 2011a). Limited resources including lack of supermarkets or transportation to access “healthy” food, or any food at all, pose as barriers for many food insecure individuals too (Mullany, et al., 2012). For instance, when the distance needed to travel to acquire “healthy” foods and/or the cost of purchasing “healthy” foods are high the result is a decrease of “healthy” foods available in food insecure households (Mullany, et al., 2012; Sharkey, et al., 2011a).

The presence of a supermarket is frequently seen as the hallmark of a healthy neighborhood. The term “food desert” is often used to describe an area that lacks a supermarket or access to a full service grocery store (Furey, Strugnell, & McIlveen, 2001). Families living in “food deserts” have reported that carrying heavy grocery bags

was a deterrent to purchasing food, especially when they had to take public transportation or walk a distance to get home (Walker, Block, & Kawachi, 2012). “Food deserts” are often characterized by low-income minority neighborhoods where nutritious affordable foods are at minimum (Reisig & Hobbiss, 2000; Hendrickson, Smith, & Eikenberry, 2006). When a neighborhood lacks a supermarket there is often a correlation to an increase in the consumption of energy-dense foods and an increase in the risk for diet-related diseases in those neighborhoods (Fosyth, Macintyre, & Anderson, 1994; Shohaimi, et al., 2004; Macintyre & Cummins, 2006). Studies have shown that the closer a person lives to a supermarket, the more likely they will be to consume healthier foods, including a higher consumption of fruits and vegetables (Zenk et al., 2005; Moore, Diez Roux, Nettleton, & Jacobs, 2008). Living in a “food desert” is of great concern because when food insecure individuals already struggle economically, decreased access to “healthy” affordable foods may exacerbate the food insecurity situation whereby nutrition and maintaining a healthy diet are compromised (Hendrickson, et al., 2006; Walker, Keane, & Burke, 2010).

Hispanic/Latino Food Insecurity

When it comes to food insecurity, 26.2 percent of Hispanic households nationally, as compared to 11.4 percent of white non-Hispanic households, report food insecurity (Coleman-Jensen, et al. 2012). This disparity is cause for special consideration among the Hispanic/Latino population as Hispanics/Latinos are one of the fastest growing groups in the United States. In 2000, Hispanics and Latinos represented 13 percent of the United States population (Ennis, Rios-Vargas, & Albert, 2011). By 2010, Hispanics and Latinos

represented 16 percent of the United State's population (Ennis, et al., 2011). Nearly 30 percent of Arizona's population is Hispanic or Latino (United States Census Bureau, 2010). Individuals born in Mexico and now living in the United States exhibit some of the highest levels of food insecurity (Sharkey, et al., 2011a). Sharkey, et al. (2011a), worked to reveal contributors to the high levels of food insecurity among this population. Key components noted to affect food insecurity status in Hispanic/Latino populations are decreased perceived access to food, decreased perceived quality of food, and/or distance needed to travel to obtain food.

Mazur, Marquis, & Jensen (2003) stated that acculturation is negatively associated with the level of food insecurity exhibited by Latinos. It is suggested that the more acculturated an individual is in the United States the less food insecure they will be. Increased networking, which is developed in concordance with the length of time living in the United States, allows individuals to better cope when food resources are in need (Pérez-Escamilla, 2009). There is need, however, for a consistent measure of acculturation among individuals. Some studies use years living in the United States, while other studies refer to the fluency of English spoken to measure acculturation (Kaiser, et al., 2002).

Being food insecure, not having enough money to purchase food at all times, can have an influence on diet quality by impacting one's eating behaviors, home food environment, meal planning and preparation, and/or level of stress, which ultimately impacts an individual's health and weight status. These five key factors will be explored in this review of literature by assessing what is currently known and where gaps in the literature express further investigation.

Food Insecurity and Weight Status

Among Arizona's adults, 18 years and older, approximately 65 percent are overweight, having a BMI of 25-29.9, or obese, having a BMI of 30 or greater (CDC, 2011a). Overweight and obesity among Arizona's adults is of great concern because overweight/obesity is a risk factor for many chronic diseases such as heart disease, cancer, stroke, and diabetes, all of which are leading causes of preventable death (CDC, 2011b). Between the 1980's and 2005 the level of physical energy expenditure has not decreased, which during the same period rates of obesity rose (Westerterp & Speakman, 2008). This suggests that other factors besides physical activity are associated with the rise in obesity.

Hunger-Obesity Paradox

Some may choose to address food insecurity and obesity as separate problems, while others may address both of these public health concerns together in a relationship called the hunger-obesity paradox (Scheier, 2005). Dr. William H. Dietz first noted the hunger-obesity paradox, a seemingly odd relationship, in 1995. In a case study, Dietz took note of a 7-year-old girl that was 220 percent of her ideal body weight for age, yet her mother stated that at times there was not enough money to buy food. Dietz suggested two possibilities for the relationship of hunger and obesity in the same person: food choices and physiological adaptation. High fat foods may be consumed to decrease hunger when there is not enough money to buy food. With frequent episodes of food insufficiency the body may develop an adaptive response, which promotes weight retention. Dietz made a bold statement by saying if the hunger-obesity paradox exists

then we may actually need to supplement the hungry obese population with food, to create consistent eating patterns, rather than advise them to restrict food (Dietz, 1995). Increasing access to healthy food can decrease hunger and obesity among the food insecure (Dietz, 1995; Pan, et al., 2012).

Support for Dietz's hunger-obesity paradox has been provided by many studies (Olson, 1999; Townsend, et al., 2001; Jones, Jahns, Laraia, & Haughton, 2003; Pan, et al. 2012). In one study (Pan, et al., 2012), the rate of food insecurity to weight status related as follows: 22.5 percent among underweight, 16.4 percent among normal weight, 17.2 percent among overweight, and 24.7 percent among obese adults. Adults that were obese had a significantly higher prevalence of food insecurity than those of normal weight. In a population-based study, BMI was found to be significantly higher in women that lived in food insecure households than those that lived in food secure households (Olson, 1999). Respectively overweight women in each food security category were as follows: 34 percent in food secure, 41 percent in mildly food insecure, and 52 percent in moderately food insecure households (Townsend, et al., 2001). These studies suggest a dose-response effect between food insecurity and overweight status.

Weight Cycling

The Supplemental Nutrition Assistance Program (SNAP), a federal nutrition assistance program, is intended to provide food assistance to low-income households and individuals. Following the recent economic recession, SNAP participation increased by 63 percent (Breen, Cahill, Ettinger, Cook, & Chilton, 2011). In 2011, 45 million Americans were reported receiving SNAP benefits (United States Department of

Agriculture (USDA), 2012). The "Food stamp cycle" (Townsend, et al., 2001), or as it might be referred to today as the SNAP cycle, is a possible explanation for the high prevalence of overweight/obesity among food stamp recipients. SNAP benefits are received at the beginning of the month. At this point household food supplies are usually sufficient. By the end of the month SNAP benefits run low or run completely out leaving little to no money to purchase food. When money or access to SNAP benefits becomes available again at the beginning of the month, episodes of binge eating may occur. Food insecure individuals may over compensate with food during times of plenty, and weight cycling associated with feast or famine may also cause the body to be more adaptive to storing food during times of feast (Townsend, et al., 2001).

SNAP participation has been associated with higher rates of overweight/obesity (Townsend, et al., 2001; Gibson, 2003; Meyerhoefer & Pylypchuk, 2008; Webb, Schiff, Currivan, & Villamor, 2008; Kohn, Bell, Grow, & Chan, 2013), but we cannot determine a causal relationship using cross-sectional studies alone. It has also been suggested that SNAP participation and overweight/obesity status may have bi-directional influence (Gibson, 2006). Perhaps it is not the participation in SNAP that causes overweight/obesity, but rather the overweight/obese status of an individual causes them to seek additional assistance for food (DeBono, Ross, & Berrang-Ford, 2012).

The food insecurity and obesity relationship can yet be contributed to by other factors, confounders, not yet considered or accounted for such as psychological factors. Knowledge, attitudes, perceived control about body weight, health beliefs, and social support could all be psychological factors not accounted for; yet they may play a role in the relationship of food insecurity and obesity (Townsend, et al., 2001).

Confounders in the Relationship between Hunger and Obesity

Previous studies have noted gender differences in the relationship between food security and obesity. Among males, results are mixed as some studies show an inverse relationship (Hanson, Sobal, & Frongillo, 2007; Wilde & Peterman, 2006) between the level of food security and weight status, while other studies show no relationship (Beydoun & Wang, 2010; Townsend, et al., 2001; Laraia, Siega-Riz, & Evenson, 2004). Among women, the literature is a bit more consistent. A number of cross-sectional studies (Townsend, et al., 2001; Hanson, et al., 2007; Laraia, Siega-Riz, & Gundersen, 2010) exhibit an inverse relationship between food security and weight status. That is as the level of food security decreases an individual's weight status is noted to increase. Food insecurity, when all other confounders are controlled for, remains the single best predictor of obesity in women (Townsend, et al., 2001). Suggested reasons for the gender differences include the role of the mother, which may include taking on the responsibility of "feeding the family" (DeVault, 1991) and making the mother, especially single mothers, more susceptible to parental stressors under food insecurity and susceptible to increased weight status (Bauer, Hearst, Escoto, Berge, & Neumark-Sztainer, 2012; Martin, & Lippert, 2012).

Other confounders include region of country, level of income, level of education, and race/ethnicity. As reported by the National Center for Health Statistics, the highest rates of obesity are found in the South at 29.5 percent, and the Midwest follows at 29.0 percent, the Northeast at 25.3 percent, and the West at 24.3 percent (Ogden, Lamb, Carroll, & Flegal, 2010). Based on income, women with low-income levels have higher obesity rates than women of higher income levels. The inverse relationship is noted

among non-Hispanic black or Mexican-American men where a higher income level is associated with a higher level of obesity (Ogden, et al., 2010). Women with more education have lower rates of obesity, while no difference is noted between men's education level and weight status (Ogden, et al., 2010). While rates of obesity vary based on socio-demographics, regardless of education, income, gender, or race/ethnicity, there has been an increase in the prevalence of obesity in adults (Ogden, et al., 2012).

Relationship Between Hunger and Obesity

When a household lacks money to purchase food, they may increase their consumption of inexpensive calorie-dense foods such as sugar sweetened beverages, fast foods, low-cost cuts of meat, added fat foods, and inexpensive grains, which displaces nutritionally dense foods such as fruits, vegetables, and whole grains (Drewnowski, & Specter, 2004; Drewnowski & Darmon, 2005). It is suggested that cost is an effective motivator for food purchases (Drewnowski & Darmon, 2005). Foods containing added sugars, added fats, and refined grains offer the lowest cost source of energy for the diet. Federal food assistance participants stated, for economic reasons, that they would purchase inexpensive energy dense foods to obtain adequate calories at a low cost to prevent family members from being hungry (Wilde, McNamara, & Ranney, 2000).

Lack of time for meal preparation along with economic and physiological factors associated with long-term poverty may also influence eating behaviors (Caprio, et al., 2008; Crawford & Webb, 2011). Compensatory feeding practices in which parents give their children energy-dense food supplements, such as Pediasure, Boost, or Carnation Instant Breakfast, are frequently used among the food insecure to make sure their

children are getting enough to eat (Feinberg, Kavanagh, Young, & Prudent, 2008). This act may play a role in obesity in food insecure households when excess calories are consumed through supplementation.

Food Insecurity and Eating Behaviors

The 2010 *Dietary Guidelines for Americans* emphasizes a healthy eating plan, which consists of plenty of fruits and vegetables along with whole grains, low-fat/fat free dairy products, and healthy proteins such as beans, lean meats, fish, and nuts (USDA, 2010). The 2010 *Dietary Guidelines for Americans* also emphasizes low consumption of fats, such as saturated and trans fat, as well as low consumption of cholesterol, added sugars, and salt (USDA, 2010). These recommendations are made to reduce chronic health conditions such as obesity, cardiovascular disease, diabetes, and cancer. Rates of chronic disease are higher among low-income food insecure individuals compared to food secure individuals (Seligman, Laraia, & Kushel, 2010). Replacing consumption of energy-dense foods with nutrient-dense foods, along with moderate physical activity, can promote a healthy lifestyle and mitigate preventable chronic diseases. Most Americans fall short of meeting these dietary goals, and those that are food insecure struggle even more than the general population (USDA, 2010; Leung, et al., 2012).

The Healthy Eating Index is a measure of how individuals conform to the national *Dietary Guidelines for Americans*. According the Healthy Eating Index-2005 (HEI-2005), SNAP participants scored lowest at 54 out of 100, income-eligible nonparticipants of SNAP came next at 56 out of 100, and high-income non-SNAP participants scored an average of 58 out of 100, suggesting higher rates of “unhealthy” eating behaviors among

SNAP participants (USDA, 2012). SNAP participants, when compared to income eligible non-SNAP participants, consume nearly 40 percent fewer whole grains, 55 percent more potatoes, and 50 percent more red meat (Leung, et al., 2012). These eating behaviors often displace consumption of more “healthy” foods such as fruits and vegetables, low-fat/fat free dairy, and lean proteins. This is of concern as many food insecure households are SNAP participants.

Meal patterns differ among food secure and insecure individuals (Holben, 2006). Studies have found that food insecure individuals struggle more often, than food secure individuals, to consume healthy foods (Widome, et al., 2009; Bruening, et al., 2012). Food insecure individuals are more likely to consume energy-dense foods, which often contain added sugars, increased trans and saturated fats, refined grains, and overall poor nutrient quality, as a significant portion of their diets (Seligman, et al., 2010; Bruening, et al., 2012). Energy-dense foods when consumed frequently displaces fruits and vegetables in the diet while allowing for increased amounts of fat and sodium (Boutelle, et al., 2007). Food insecure households typically have less access and consume far fewer fruits and vegetables than do food secure individuals (Kendall, et al., 1996; Bruening, et al., 2012). As compared to food secure households, food insecure households typically decrease the variety, quantity, and quality of food eaten in response to inadequate food supply (Kendall, et al, 1996). Compensatory food actions taken by food insecure individuals may be reason for poorer diet quality and health among food insecure individuals. Eating behaviors such as binge eating and emotional eating will be discussed later, but they too can have a negative impact on eating behaviors and health outcomes, as “unhealthy” eating behaviors have been often associated with increased weight status

(Medanic & Pucarín-Cvetković, 2013). Identifying eating behavior differences between food secure and food insecure is a starting point, which can then be used to address health issues.

Eating Behaviors Among Hispanic/Latino Populations

Health and dietary consequences associated with acculturation are critical to address among Hispanics and Latinos. Acculturation is found to negatively impact eating behaviors among Hispanics and Latinos (Pérez-Escamilla & Putnik, 2007). Dietary quality decreases with acculturation among Hispanics and Latinos (Winham & Florian 2010). Flores et al. (2010) provides evidence to support “unhealthy” dietary patterns of Mexican individuals living in the United States, which included consumption of refined foods and sweets (RS), which is “characterized by the highest contribution of alcohol, soft drinks, white bread, fast food, sweets and candies, and salty snacks to total energy intake”, traditional (of Mexican origin) foods (T), which included “maize and maize foods accounting for almost 50% of energy intake”, and diverse foods (D), which included the “lowest contribution of maize and the highest proportion of whole-fat dairy, rice and pasta, meat, poultry, eggs, saturated fat, fruits, and vegetables”. Individuals that consumed predominantly the RS and D dietary patterns were more likely to be overweight/obese than individuals that consumed the T dietary pattern. This study suggests that as Mexicans lose their traditional diet and adopt other diet patterns, such as the RS or D patterns, weight status is negatively affected.

In an attempt to disseminate causes of overweight/obesity among Hispanics/Latinos living in the United States patterns of food insecurity, dietary

behaviors, and acculturation must be examined (Pérez-Escamilla, 2009). This is important because cardiovascular disease and type 2 diabetes are prevalent among Hispanic/Latino individuals living in the United States of which weight status is a major contributor (Sharkey, Johnson, & Dean, 2011b; Dixon, Sundquist & Winkleby, 2000).

Emotional Eating

Emotional eating, eating in response to a negative feelings and situations, is one coping mechanism by which individuals may override their normal physiological functioning and overeat (Wallis, & Hetherington, 2004; Hernandez-Hons & Woolley, 2012). Emotional eating typically results in higher consumption of sugary and fatty foods (Oliver, et al., 2000). Studies have shown that individuals who practice restrained eating behaviors typically overeat under stress, with restrained eating being the cognitive decision to restrict the intake of food to control one's weight status (Lowe & Kral, 2006). Meanwhile, free eaters, those that do not practice restrained eating, will consume less food than highly restrained eaters in stressful conditions (Heatherton & Baumeister, 1991; Wardle, Steptoe, Oliver, & Lipsey, 2000).

There are some gender differences in the types of emotional eating. Among women, emotional eating tends to be triggered predominately by stress. While among men, emotional eating tends to be trigger by boredom or anxiety. No matter what the trigger is for emotional eating, "unhealthy" foods are the preferred food in coping situations, resulting in possibility for weight gain and health consequences (Bennett, Greene, & Schwartz-Barcott, 2013). Little to no research has been conducted to look at rates of emotional eating among food insecure individuals especially among

Hispanic/Latinos. Emotional eating can be triggered by stress, boredom, anxiety, and more. Emotional eating can have a negative impact on weight status and thus avoidable health consequences in food insecure individuals. Findings of higher rates of emotional eating among food insecure individuals may be a point of intervention to help increase the health status of food insecure individuals.

Binge Eating

Binge eating entails consuming a larger than normal quantity of food in a short period of time, being embarrassed about that eating, as well as a loss of control over eating (Vorvick, Merrill, & Zieve, 2013). During binge eating, the brain associates reward and pleasure with foods consumed (Dallman, 2010). Binge eating is characterized by habit formation and reduced cognitive control. Memory and learning formation are key components in binge eating episodes.

Chronic stress is associated with binge eating. Chronic stress affects many biochemical pathways, which are suggested to play a negative role in appetite and eating behaviors (Sojcher, Fogerite, & Perlman, 2012). Beyond chronic stress, binge eating is often associated with negative emotions, such as depression, loneliness, anxiety, and/or anger (De Zwaan, 2001; Ricca, et al., 2009). While obesity is not present in all individuals with binge eating disorder it is certainly a characteristic of many (De Zwaan, 2001). Furthermore, the severity of binge eating is correlated with the degree of obesity (Bruce & Agras 1992).

There is very little literature on the prevalence of binge eating among food insecure individuals. One study (Bruening, et al., 2012), noted a higher prevalence of

binge eaters among food insecure versus food secure individuals. While this study did include about a 17 percent Hispanic/Latino participation rate, it did not assess differences between this and other subpopulation groups. Understanding if there is a relationship between food insecure Hispanics/Latinos and rates of binge eating is of interest as binge eating is often associated with negative health consequences such as weight gain and chronic diseases associated with weight gain.

Food Insecurity and Home Food Environment

The home food environment includes foods served at family meals, foods available in the household, and perceived access and quality of fruits and vegetables. Foods available in the home is associated with food that will be eaten among household members (Fulkerson, et al., 2010). As the availability of fruits and vegetables increase in the home so does the consumption of fruits and vegetables (Hanson, Neumark-Sztainer, Eisenberg, Story, & Wall, 2005). This also suggests the importance of having access to quality and affordable produce, which is a barrier to many food insecure households (Furey, et al., 2001). Lack of quality and affordable produce may be a predictor of less fruits and vegetables available in the home.

The Thrifty Food Plan (TFP) was created to by the USDA, for families on SNAP benefits, to show how healthy low-cost meals could be prepared with allotted food allowance. Meals prepared by the TFP include low-cost staple foods where meals are prepared from scratch. When the TFP was created in the 1970s most low-income households still had at least one nonworking parent who could assume the responsibilities of preparing meals. Nowadays, that is not the case as, typically, both parents are working.

At present, however, many low-income households are often headed by a single working parent who faces budget as well as time constraints (Mancino, & Newman, 2007).

The home food environment, including meal patterns and healthfulness, can be impacted by parental employment, food insecurity, SNAP participation, family composition, income, and gender (Mancino, & Newman, 2007; Bauer et al., 2012; Beatty, Nanney, & Tuttle, 2013). Full-time employed mothers reported lower intakes of fruits and vegetables as well as less time spent on meal preparation, when compared to part-time or not-employed mothers (Bauer et al., 2012). Full-time work status of fathers was related to significantly fewer hours a week spent on meal preparation (Bauer et al., 2012). If fewer meals are prepared at home, it is expected that the remaining meals are eaten away from the home. Meals eaten away from the home are often high in salt, fat, and calories (Mancino, Todd, & Lin, 2009). Based on SNAP participation, married households spend less time on meal preparation compared to non-SNAP participants, and single food insecure and SNAP participating households spend more time on meal preparation (Beatty, et al., 2013). Davis and You (2010) suggest that married households participating in SNAP have more financial resources than single households participating in SNAP; however, married households participating in SNAP struggle more with time constraints whereby time allotted for meal preparation is decreased. Time spent on meal preparation is suggested to reduce the cost of a meals offering reason for increased mealtime preparation among single households whom struggle with less financial resources. (Rose, 2007; Beatty, et al., 2013).

Home Food Environment Among Food Insecure Hispanics/Latinos

As stated previously, nationally almost 27 percent of Hispanic households are food insecure; therefore, given Arizona's large Hispanic/Latino community further studies should be conducted to understand foods served at family meals, foods available in the household, and perceived access and quality of fruits and vegetables among this population (Coleman-Jensen, et al., 2012). As the literature suggests, time and budget constraints impact food choices among those that received federal food assistance. It is also critical to assess the components of time associated with meal preparation, such as time to prepare "healthy" meals or any meals at all for the family.

Food Insecurity and Meal Planning and Preparation

Frequently stated barriers to healthy eating among low-income individuals include the variables of time, cost, and taste/taste perception of "healthy" foods (Eikenberry, & Smith, 2004; Storfer-Isser, & Musher-Eizenman, 2012). Time refers to the acquisition and preparation of food, cost refers to the economic burden of purchasing "healthy" foods, and taste refers to the acceptance of "healthy" food flavors and textures. This suggests that by addressing "healthy" food access, preparation, affordability, and acceptability, barriers may be overcome to increase "healthy" eating in low-income food insecure households.

Cooking practices have changed dramatically from that of mostly raw ingredient preparation to that of dependence on processed and/or convenience foods (Barton, Wrieden, & Anderson, 2011). The trend in today's market is consuming convenience food items (Brunner, Van der Horst, & Siegrist, 2010), such as frozen meals or ready to

eat meals. Time constraints are noted for increased dependence on convenience/pre-prepared foods, as well (Lang & Caraher, 2001; Ternier, 2010). Convenience foods do not require a high level of cooking skill or understanding of food preparation. Lack of cooking or meal preparation skills/knowledge results in disempowerment of “healthy” meal production (Beshara, Hutchinson, & Wilson, 2010).

Individuals older in age, with a higher level of cooking skill or with an increased level of nutrition knowledge, consume less convenience food items than their counterparts. (Brunner, et al., 2010). Additionally, food secure individuals, when compared to food insecure individuals, are more likely to prepare meals of increased complexity that use basic ingredients (Engler-Stringer, Stringer, & Haines, 2011). This suggests that by addressing level of cooking skill, healthfulness and nutritional status of meals may be increased. Over consumption of pre-prepared, processed, and ready-to-eat convenience foods offer additional unneeded calories, sugars, fats, and sodium (Monteiro, Levy, Claro, de Castro, & Cannon, 2011), which only intensify chronic diseases.

Improving the cooking skills of low-income individuals is key to improving their diet quality (Engler-Stringer, 2010). Wrieden et al. (2002) evaluated the impact of CookWell, a community-based program that taught practical food skills to low-income individuals. The results revealed that intervention participants were more likely to prepare meals from basic ingredients and had more confidence in following a basic recipe than the control group. Barriers that existed and need to be further addressed included time scarcity, childcare demands, the taste preference especially among family members,

and decreased confidence that occurred when a recipe failed to meet expectations (Storfer-Isser, & Musher-Eizenman, 2012).

Previous research with focus groups, containing low-income individuals, has also revealed the preference for pasta in meal preparation, as it is versatile and inexpensive (Engler-Stringer, 2011). Sauces, in the form of dry packages or condensed soups, were also commonly used to create dishes for a reasonable price (Engler-Stringer, 2011). The financial risk of experimenting with new recipes can be perceived as too high, but with the use of the sauces mentioned above, new flavors can be offered at a low risk (Engler-Stringer, 2011). Meals prepared from minimally processed foods often require more preparation time and tend to cost more (Engler-Stringer, et al., 2011). Nutritional quality is often sacrificed when convenience foods are purchased for meals (Engler-Stringer, et al., 2012). Further research is needed to understand how time scarcity and/or fatigue play a role in the use of convenience foods and their effect on health and weight status in food insecure adults.

Food Insecurity and Stress

Stress can be defined as “the generalized, non-specific response of the body to any factor that overwhelms, or threatens to overwhelm, the body’s compensatory abilities to maintain homeostasis” (Sherwood, 2012). Stressors may be acute or they may be chronic. Stressors can be physical, chemical, physiological/emotional, and/or social. Stressors activate one of two physiological pathways: the Sympathetic-Adrenal Medullary System, which is also known as the “active fight-or-flight”, or the Pituitary-

Adrenal Corticoid System, which is a “passive” process involving the hypothalamic-pituitary-adrenal (HPA) axis (Sherwood, 2012).

When acute stress is experienced, the "flight or fight" response kicks in, which increases noradrenaline and decreases blood flow to the digestive system, whereby appetite is suppressed (Sherwood, 2012; Hernandez-Hons & Woolley, 2012).

Corticotropin-releasing hormones are also released during acute stress and decrease appetite as well (Takeda, et al., 2004). However, not all individuals respond the same to stress as 30 percent of individuals will decrease food intake and experience weight loss in relation to stress, whereas the other 70 percent will increase food intake in relation to stress and face possible weight gain (Epel, et al., 2004). A few studies (Oliver, Wardle, & Gibson, 2000; Zellner, et al., 2006; Adam & Epel, 2007) have exhibited a relationship between acute stress and negative eating patterns during meals. In those studies, it is stated that acute stress alters food preferences towards foods that are sweet and high in fat while also increasing the frequency and amount of food consumed (Zellner, et al., 2006; Adam & Epel, 2007). With frequent bouts of acute stress the body may not fully recover leading to a state of chronic stress.

In times of chronic stress, hyperactivity of the HPA axis results in the release of corticosteroids, or cortisol, which increases appetite during the stress recovery stage (Takeda, et al., 2004). Alcohol consumption, smoking, laying awake, overeating “unhealthy” foods, skipping meals, and disordered eating are a number of behavioral responses to acute and chronic stress (American Psychological Association (APA), 2012; Hernandez-Hons & Woolley, 2012). Food preferences are influenced by daily hassles and stress. As daily hassles and stress increase, consumption of high fat and high sugar snacks

increase while consumption of main meals and vegetables decrease (O'Connor, Jones, Conner, Mcmillan, & Ferguson, 2008). Westernized society makes it easy to access highly palatable, high fat foods. It is reported that 50 percent of the U.S. population will cope with stress through smoking or eating (Stambor, 2006). Disordered eating behaviors during times of stress and chronic deregulation of energy intake related to stress may lead to excess storage of energy as fat, which increase a person's weight status (Rutters, et al., 2009).

Other reported physical and non-physical symptoms of stress are fatigue, irritability or anger, changes in sleeping habits, and feeling overwhelmed (APA, 2012). Almost half of Americans have reported that their stress has increased in the last five years. The main contributors to stress include the following issues: money, work, the economy, family responsibilities, relationships, family health problems, and personal health concerns (APA, 2012), all of which are likely exasperated with food insecurity. Overall, females are more likely than males to increase food consumption in stressful situations (Zellner, et al., 2006). Minimal research has been conducted on the relationship of stress and food insecurity. Given that food insecure individuals are a vulnerable population to many stressors this relationship should be better understood.

Perceived Stress

Perceived stress is correlated with both physiological and psychological changes associated with increased levels of stress (Barrington, Ceballos, Bishop, McGregor, & Beresford, 2012). When perceived stress levels are increased for long periods of time they correlate with increased levels of cortisol, which affects abdominal adiposity

(Cohen, Janicki-Deverts, & Miller, 2007). Perceived stress is correlated to lack of control over eating (Sims, et al., 2008). As perceived stress increases more frequent binge-eating episodes and more “unhealthy” food consumption occurs (Groesz, et al., 2012). These studies suggest that as perceived stress increases the ability to control appetite and types of foods decreases, which may result in weight gain. Physiological responses to perceived stress may be to blame for deregulation of appetite during stressful times.

Reward-Based Stress Eating

Hunger and satiety signals produced by the hypothalamus in the brain help to regulate food/energy homeostasis (Erlanson-Albertsson, 2005). Hunger and satiety signals are not the only cues that influence us to increase or decrease the amount of food we consume. Regulation of food can also be determined by the food reward system (where the body has a psychological reward response to fat, sugar, and salt), environmental cues, and cognitive factors (Berthoud, 2006). Stress, in some instances, may override a person's food reward system leading to increased energy intake (Erlanson-Albertsson, 2005). Long-term stress, or overriding of a person's food reward system, leads to positive energy balance and weight gain over the long run (Dallman, 2010).

Adam & Epel (2007) proposes that chronic stress and/or repeated bouts of stress can result in overconsumption of highly palatable foods in their Reward-Based Stress Eating theory. This theory states that with chronic stress, levels of cortisol increase. High levels of cortisol can have a direct impact on the food reward system and an indirect impact; whereby, levels of insulin, leptin, and neuropeptide Y increase and also stimulate

the food reward system. Consumption of highly palatable foods increases with greater sensitization of the food reward system, resulting in visceral fat accumulation.

In light of our growing obesity epidemic, it is critical to address stress-induced eating behaviors, with special consideration for food insecure individuals, due to the easy accessibility of calorie-dense foods, which are often choice foods to consume during stressful times (Flegal, Carroll, Ogden, & Johnson, 2002; Ogden, 2012). Calorie dense, high sugar, and high fat foods are often inexpensive compared to nutrient dense foods, such as fruits and vegetables (Lucan, Caryn, & Sherman, 2010). Food insecure individuals are susceptible to purchasing these calorie dense, high sugar, and high fat foods due to their low cost easy accessibility. Stress among food insecure individuals has yet to be thoroughly investigated; however, it would be suspect that food insecure parents would face high levels of stress due to budget constraints and being emotionally overwhelmed with food insecurity. There are many levels of stress severity and types of stress that exist, along with many stress models to explain these modes. Further studies should investigate differences in stress levels between food secure and food insecure individuals.

Eating in the Absence of Hunger

The "Eating in the absence of hunger" paradigm (Fisher & Birch, 2002) is used to describe why individuals may eat even when they are not hungry or lack an appetite. Primarily used in children, this paradigm allows us to understand disinhibited eating in adults. In a study by Rutters et al. (2009), the "Eating in the absence of hunger" paradigm is used to investigate eating patterns among acutely stressed overweight and normal

weight individuals. The study concluded that acute psychological stress is associated with eating in the absence of hunger. Increased anxiety and disinhibition were reasons noted for increased consumption of sweet foods and total energy compared to those in the control group. The study participants were men and women ages 18-48; however, there is no mention of demographics such as race/ethnicity or income level. More research should be conducted to see how “Eating in the absence of hunger” impacts vulnerable populations, such as those that are food insecure or Hispanic/Latino.

In another study, Lemmens, Rutters, Born, & Westerberp-Plantenga (2011) try to understand the relationship between food choice and the brains reward system by looking at acute psychological stress in overweight and normal weight women and their reward value of food in terms of "liking" versus "wanting". "Liking" is described as "the relative preference of two food items". Whereas "wanting" is described as "the motivation to obtain food items by working to earn items to choose from." Subjects were tested in a fasted and well-satiated state. Overall, the "liking" of food did not appear to be influenced by either the presence or absences of stress in neither the normal nor overweight individual. The "wanting" of food was higher in subjects that were overweight and under stress than subjects of normal weight under stress. Foods "wanted" consisted of high fat and sugar foods. Stress can play an important role in food consumption patterns; therefore, level of stress should be better understood among food insecure individuals as it may be helpful in identifying “healthy” versus “unhealthy” eating patterns among this population.

Summary

This review of literature has examined the association of food insecurity with weight status, eating behaviors, the home food environment, meal planning and preparation, and stress. More research is needed to address gaps in the literature related to these factors and food insecurity. Special consideration should be given to the Hispanic/Latino population, particularly immigrants, as current literature states varying levels of acculturation may impact eating behaviors. Hispanics/Latinos are an important minority group to study given their high rates of food insecurity, obesity, and diet related diseases.

CHAPTER 3

METHODS

Study Design

This was a cross-sectional observational study, using a convenience sample of participants recruited from a local community center (Golden Gate Community Center) in Phoenix, Arizona serving low-income and immigrant families. Participants included adult (18 years and older) parents, one per household, with children (age 18 or younger) living in their homes. All participants were recruited during events held at the community center including two health fairs, from English as a second language (ESL) classes, or from a Women, Infants, and Children (WIC) clinic at Golden Gate Community Center. Participants completed a 91-item survey assessing food security, eating behaviors, home food environment, meal planning and preparation, and perceived stress level.

Prior to participation all participants provided consent through an information form (see Appendix A) available in English or Spanish, describing the study's risks, benefits, confidentiality, withdrawal privileges, and voluntary consent. Participants were given a choice between an interview, paper, or electronic survey in either English or Spanish administered by bilingual trained research staff. Thirty-one percent of participants participated in the interview survey, 53 percent participated the paper survey, and 16 percent participated in the electronic version of the survey. The Spanish version of the survey was translated and back-translated into English to ensure accurate translation. Interview surveys were offered to all participants with the intent to accommodate those with literacy and/or language barriers. Total participation time approximated 15-25

minutes; participants received a \$10 gift card for their participation. The Arizona State University Institutional Review Board (IRB) approved all study protocols.

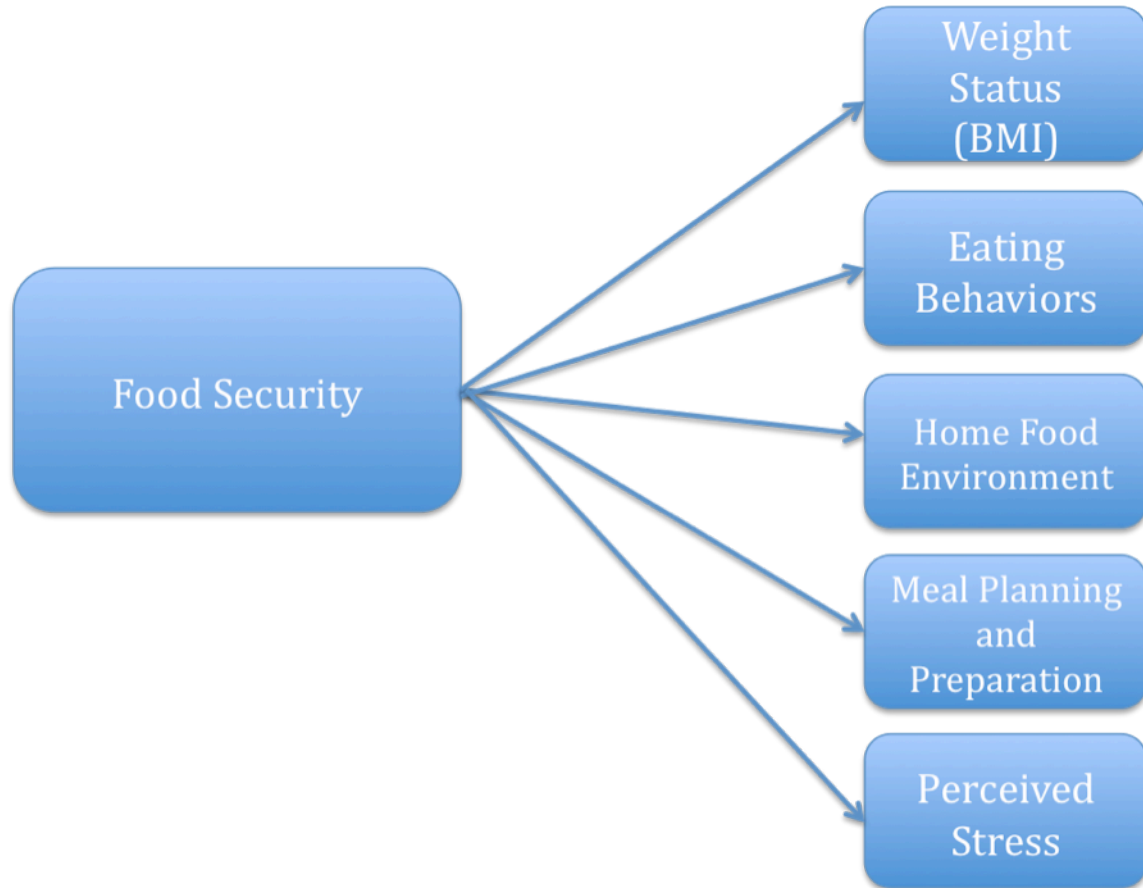


Figure 2: Conceptual Model Used in Survey Design

Measures

Figure 2 provides a visual representation of the relationships researched in this study. For example, how is food security associated with weight status or how is food security associated with eating behavior, either “healthy” or “unhealthy”? In the following section survey questions used to assess each variable (food security, weight

status, eating behaviors, home food environment, meal planning and preparation, and stress) will be stated along with how each question's answers were coded. Based on participant's responses statistical analysis was completed to analyze the relationship between food security status and weight status, eating behaviors, home food environment, meal planning and preparation, and perceived stress.

Weight Status

Anthropometric measurements of weight (to the nearest 0.5kg) and height (to the nearest 0.1cm) were collected by trained research staff. Participants were asked to remove shoes and jackets and empty pockets before height was measured with a stadiometer and weight collected with a Tanita scale. BMI was calculated with the following formula from these measurements: $\text{weight (kg)} / [\text{height (m)}]^2$. Participants were coded as "Normal weight" for BMIs of 18.5 to 24.9, "Overweight/obese" for BMIs of 25 or greater.

Food Insecurity

Food insecurity was assessed using the 6-Item Food Security Module (Blumberg, Bialostosky, Hamilton, & Briefel, 1999). The 6-Item Food Security Module is a shortened and acceptable version of the 18-Item U.S. Household Food Security Module, which is used to identify individuals that are food insecure. Participants were asked to indicate how often each statement was true for their household in the last 12 months: "The food that we bought just didn't last, and we didn't have money to get more" and "We couldn't afford to eat balanced meals". Response options to both questions will

included: “often true”, “sometimes true”, or “never true”. Participants were then asked: “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?” Response options included: “No”, “Yes, only 1 or 2 months”, “Yes, some months but not every month”, or “Yes, almost every month”. The last two questions that participants were asked to respond to were: “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?” Response options for these two questions were: “No”, “Yes”, and “I don’t know”. If participants answered affirmative to two or more responses, then they were considered to be food insecure. Otherwise, participants were categorized as food secure.

Eating Behaviors

Eating behaviors regarding fruit and vegetable intake, sugar-sweetened beverage consumption, fast food intake, binge eating and emotional eating were assessed for each participant. Participant’s fruit and vegetable intake were assessed with the following two questions: “During the past week, how many servings of fruit did you usually eat on a typical day? (A servings is $\frac{1}{2}$ a cup of fruit or 100% fruit juice or 1 medium piece of fruit)” and “During the past week, how many servings of vegetables did you usually eat on a typical day? (A serving is $\frac{1}{2}$ a cup of cooked vegetables or 1 cup of raw vegetables)”. Responses included seven options from “zero servings per day”, to “5 or more servings per day”. Responses were coded from zero to five servings per day. Participants’ sugar-sweetened beverage consumption was assessed by asking: “During

the past week, how often did you drink sugar-sweetened beverages (e.g., regular soda pop, kool-aid, sports drinks, vitamin water)?” Responses included “less than once per week”, “1 drink per week”, “2-4 drinks per week”, “5-6 per week”, “1 per day”, or “2 or more per day”. Responses were recoded to number of SSB consumed per week.

Responses were coded as “0.5”, “1”, “3”, “5.5”, “7”, and “14” SSB per week, respectively. Fast food intake was assessed by asking: “During the past week, how often did you eat something from a fast food restaurant (like McDonald’s, Burger King, etc)?” Responses options included eight options from “none” to “7 times” (Boutelle, et al., 2007). Responses were coded as zero to seven times per week.

Four questions were used to assess participant’s binge eating practices (Neumark-Sztainer, Wall, Story, & Fulkerson, 2004). First participants were asked “In the past year, have you ever eaten so much food in a short time that you would be embarrassed if others saw you?” Responses include “yes” or “no”. If participant selected “yes”, they were directed to move on to the next binge eating assessment question. Selecting “no” reflected no presence of binge eating and participant was directed to skip the remaining binge eating survey questions. The next binge eating question asked: “During the time when you ate this way, did you feel you couldn’t stop eating or control what or how much you were eating?” Participants were asked to select “yes” or “no”. Again if “yes” was chosen, participants were directed to answer the remaining two binge eating questions. If “no” was selected, then participants skipped the remaining binge eating survey questions. The third binge eating question, which assessed loss of control related to binge eating asks: “How often, on average, did you have times when you ate this way – that is, large amounts of food plus the feeling that your eating was out of control?”

Response options included “nearly every day”, “a few times a week”, “a few times a month”, or “less than once a month”. The final binge-eating question, which assessed embarrassment related to binge eating asked: “In general, how upset were you by overeating (eating more than you think is best for you)?” Responses included “not at all”, “a little”, “some”, or “a lot”. Presence of binge eating was recorded if participant answered affirmative questions 1, 2, 4 and indicated an occurrence of binge eating more than once a month in question 3. Binge eating responses were coded as “binge eating” or “no binge eating”.

Emotional eating questions were adopted from a validated, theory-based eating behaviors questionnaire (Schembre, Greene, & Melanson, 2009), which included the following questions: “I tend to eat more when I am anxious, worried or tense”, “When I feel lonely I console myself by eating”, and “I tend to eat when I am disappointed or feel let down”. Participants responded to the emotional eating questions with one of the following: “not at all ” = 1, “slightly” = 2, “more or less” = 3, “pretty well” = 4, or “completely” = 5. Emotional eating responses were added together and divided by three in order to have a binary variable. If a score of 3 or higher was received responses were re-coded as “emotional eating”. If a score of 2.99 or lower was received responses were re-coded as “no emotional eating”.

Home Food Environment

“Healthy” and “unhealthy” foods available in the home were assessed with five questions. Questions regarding “healthy” food options available in the home were assessed with the following two statements: “In the past week, vegetables were available

in my home” and “In the past week, fruit was available in my home”. Three items assessed “unhealthy” food options available in the home: “In the past week, regular soda pop or other sugar sweetened drinks were available in my home”, “In the past week, potato chips or other salty snacks were available in my home”, and “In the past week, candy was available in my home”. Participants reported the frequency of the availability of “healthy” and “unhealthy” foods with the following response options: “never”, “sometimes”, “usually”, or “always” (Story et al., 2003). Answers were recoded as percent that agree to each corresponding statement: answers of “usually” or “always” were considered agreeing with the statement.

Participants were also asked three questions about what types of foods are regularly served at family meals. Items included: “In the past week, vegetables were served at meals in my home”, “In the past week, fruit was served at meals in my home”, and “In the past week, regular soda pop or other sugar sweetened drinks were served at meals in my home”. Response options included: “never”, “sometimes”, “usually”, or “always” (Fulkerson et al., 2010). Answers were recoded as percent that agree to each corresponding statement. Answers of “usually” or “always” were coded as agreeing with the statement.

To better understand if cost, accessibility, and/or quality are possible barriers to participants purchasing produce, each participant was asked how strongly they felt about the following statements: “I don’t buy many fruits because they cost too much”, “I don’t buy many vegetables because they cost too much”, “At the store where I buy my groceries, the variety of fresh fruits and vegetables is limited”, and “At the store where I buy my groceries, the condition of fruits and vegetables is poor”. Responses options

include “strongly agree”, “agree”, “disagree”, or “strongly disagree” (Campbell et al., 2007). Answers were recoded as percent that agree to each corresponding statement. Answers of “agree” or “strongly agree” were coded as agreeing with the statement.

Meal Planning and Preparation

Participants were asked to share how often they prepare meals from basic ingredients and convenience foods, which is used to assess the complexity of meal preparation. Items included: “In the past week, how often did you prepare and cook a main meal from basic ingredients?” and “In the past week, how often did you cook convenience foods and ready meals? (Such as frozen dinners, heat and serve meals from the deli, etc)”. Response options for each question ranged from “never” to “more than 7 times”. Answers were coded as number of times per week.

Survey participants were also asked to respond to the following statements to assess barriers to meal planning and preparation: “I do not have enough time or energy to feed my children ‘right’ ”, “I find time to cook meals for my children even when I am busy or tired”, “I make whatever food is handy for my children”, “When I am tired or running late, I grab something quick for dinner because my children like fast food”, “I do not have enough time or energy to cook meals for my children”, “I plan meals for my children at least 1 day in advance”, “I plan meals for my children ahead of time when I know I am going to be busy”, “I do not have enough time or energy to plan meals for my children”, and “I ‘go with the flow’ and do not plan meals for my children or family”. Response options for these questions were “never”, “rarely”, “sometimes”, “often”, or “always” (Storfer-Isser & Musher-Eizenman, 2012). Answers were recoded as percent

that agree to each corresponding statement. Answers of “sometimes”, “often”, or “always” were coded as agreeing with the statement in order to have a dichotomous variable.

Participants were asked to respond in one of four ways, “strongly agree”, “agree”, “disagree”, or “strongly disagree”, to the following statements about adequacy of food storage/preparation space in their household: “My family has consistent access to adequate space to store food in my home”, “My family has consistent access to a refrigerator to store food”, “My family has consistent access to a stove to prepare food”, and “ My family has consistent access to a hotplate or microwave to prepare food”. Answers were recoded as percent that agree to each corresponding statement. Responses of “strongly agree” or “agree” were coded as agreeing with the statement.

Participants were asked about their use of filler foods in meal preparation with an item developed for this study: “At times when there is not enough food to eat, do you use any of the following to stretch your food further? (You may select more than one answer)”. Responses included “pasta”, “rice”, “potatoes”, or “other (please specify)”. Responses were recoded as percent of respondents that agreed to using each filler food. Due to an overwhelming 49 responses of “beans” in the “other (please specify)” category “beans” was recoded as its own category. No additional similar “other (please specify)” items were reported more than three times, therefore they were not included in the analyses as their own category.

Perceived Stress

The level of perceived stress was assessed using the validated Perceived Stress Scale (PSS-4) (Cohen, Kamark & Mermelstein, 1983). The PSS-4 is a commonly used psychological tool to appraise perception of stress. Four questions are asked about thoughts and feelings over the last month: “In the last month, how often have you felt that you were unable to control the important things in your life?”, “In the last month, how often have you felt confident about your ability to handle your personal problems?”, “In the last month, how often have you felt that things were going your way?”, and “In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?” Responses included: “never”, “almost never”, “sometimes”, “fairly often”, or “very often”. Responses for the first two questions were coded from 0 to 4. Responses for the last two questions were reverse coded from 4 to 0. Respondent answers to all four questions were summed for a final continuous PSS score.

Demographics

The following demographic information was collected: gender, household size, number of children in household, age, education level, race/ethnicity, marital status, income level, and years residing in the United States. Participant’s gender of “male” or “female” was collected with the following question: “What is your gender?”. Household size, number of children in household, and age were as assessed with open-ended questions with the following items: “How many people live in your home?”, “How many children under the age of 18 live in your home?”, and “What is your age?”

Participants were then asked to report on their education level with the following question: “What is the highest degree or level of school that you have completed?” Responses included: “Less than high school”, “High School Graduate (received Diploma or the equivalent, GED for example)”, “Completed some college credit, but no degree”, “Associate’s degree”, “Bachelor’s degree”, or “Master’s, Professional, or Doctoral Degree”. Responses of “Less than high school” or “High School Graduate (received Diploma or the equivalent, GED for example)” were coded as “High school education or less”. Responses of “Completed some college credit, but no degree”, “Associate’s degree”, “Bachelor’s degree”, or “Master’s, Professional, or Doctoral Degree” were recoded as “Some college credit or higher”.

Participants reported race/ethnicity with: “Which of the following best describes you? (Check all that apply)”. Participants selected from the following response options: “American Indian or Alaskan Native”, “Asian”, “Black or African American”, “Hispanic or Latino/Latina”, “Native Hawaiian or Pacific Islander”, “White”, or “Other: (please describe)”. Responses were coded as “Black or African American”, “Hispanic or Latino/Latina”, or “White/non-Hispanic”. Only one respondent claimed “Asian”, therefore they were combined in the “White/non-Hispanic” category. The other race/ethnicity categories were not coded for as no participants claimed those race/ethnicities.

Marital status was asked with the following item: “What is your current marital status?” Participants selected from the following response options: “Married”, “Not married, living with significant other”, “Separated”, “Divorced”, “Widowed”, or “Single/Never Married”. Marital status was recoded as “Married” or “Not-married”.

Responses of “Not married, living with significant other”, “Separated”, “Divorced”, “Widowed”, or “Single/Never Married” were included in the “Not-married” category.

Household income was asked with the following item: “What is the total income for your household in the past year?” Participants selected from the following response options: “Less than \$20,000”, “\$20,000 - \$34,000”, “\$35,000 - \$49,000”, “\$50,000 - \$74,000”, “\$75,000 - \$99,000”, “\$100,000 or more”. Responses were coded as < \$20,000, \$20,000-\$34,999, and \geq \$35,000 or greater.

Years living within the U.S. was collected with the following item: “If you were born outside the United States, how long have you currently been living in the United States?” Participants selected from the following responses: “Less than 1 year”, “1-2 years”, “3-5 years”, “5-7 years”, “8-10 years”, “More than 10 years”, “Does not apply to me”. Responses were coded as “less than 5 years”, “5-10 years”, “more than 10 years/does not apply to me”.

Statistical Analysis

Bivariate analysis between food security and weight status (BMI), eating behaviors, home food environment factors, meal planning and preparations factors, and stress variables were examined. Chi-square and t-tests were used to assess differences between these key variables. SPSS statistical software (IBM Corp. Released 2010. IBM SPSS Statistics for Windows, Version 19.0. Armonk, NY: IBM Corp.) was used to complete this analysis.

Multivariate linear regression models assessing the relationship between food security and household size, number of children in household, age, BMI, eating behaviors

(such as fruits, vegetable, SSB, or fast-food servings per day), food preparation (such as number of times per week basic ingredients or convenience foods are used), and perceived stress, adjusting for weight status, education, race/ethnicity, income level, and years residing in the U.S., were examined. Logistic regression models assessing the relationship between food security and education level, race/ethnicity, marital status, income level, years residing in the U.S., weight status, eating behaviors (such as binge eating or emotional eating), home food environment (such as are fruits, vegetable, SSBs, etc available in the home or served at family meal), and meal planning and preparation, adjusting for weight status, education, race/ethnicity, income level, and years residing in the U.S., were also examined. Models were run with the entire sample and post-hoc analyses were run separately for women only since nearly 90 percent of the sample population were women. In order to test differences in means of food insecure as compared to food secure participants, multivariate models were run using Stata Statistical Software (Release 12, College Station, TX: StataCorp LP, 2011). For all analyses, p-values of <0.05 were considered to be statistically significant.

CHAPTER 4

RESULTS

Descriptive Characteristics

There were 160 respondents, but 2 surveys were excluded because respondents did not complete the questions related to food insecurity. The respondents were primarily female (87.8 percent) and Hispanic/Latino (89.8 percent). Eighty-five percent of participants reported to have been born outside the United States. The mean age of participants was 38 years old (± 8.3). More than two-thirds of participants had an education level of high school or less. More than half of the participants reported household income levels of \$20,000 or less. Nearly 58 percent of the sample population reported food insecurity. There were no significant differences by food security status among socio-demographic variables, with the exception of income level. Parents reporting lower household income levels, of less than \$20,000/year, were more likely to report food insecurity compared to parents reporting higher levels of income of greater than \$20,000/year ($p=0.017$) (Table 2).

Table 2. Socio-demographics of Participants by Food Security Status¹ (n=158)

Characteristics	Total	Food Secure (n= 66)	Food Insecure (n= 92)	p-value
Gender %<i>(n)</i>				1.000
Female	87.8% (137)	87.7% (57)	87.9% (80)	
Male	12.2 % (19)	12.3% (8)	12.1% (11)	
Age mean ± SD	38.0 ±8.3	37.4 ±7.9	38.5 ±8.6	0.417
Education Level %<i>(n)</i>				0.124
High School or less	69% (107)	61.5% (40)	74.4% (67)	
Some College credit of higher	31% (48)	38.5% (25)	25.6% (23)	
Race/Ethnicity %<i>(n)</i>				0.386
Black or African American	3.8% (6)	6.1% (4)	2.2% (2)	
Hispanic or Latino	89.8% (141)	86.4% (57)	92.3% (84)	
White/non-Hispanic	6.4% (10)	7.6% (5)	5.5% (5)	
Marital Status %<i>(n)</i>				1.000
Married	60.8% (96)	60.6% (40)	60.9% (56)	
Not Married	39.2% (62)	39.4% (26)	39.1% (36)	
Household Income, \$ %<i>(n)</i>				0.017
<20,000	56.2% (82)	43.3% (26)	65.1% (56)	
20,000-34,999	32.2% (47)	45.0% (27)	23.3% (20)	
35,000+	11.6% (17)	11.7% (7)	11.6% (10)	
Years Residing in the U.S. %<i>(n)</i>				0.659
Less than 5 years	6.2% (9)	3.2% (2)	8.1% (7)	
5-10 Years	15.8% (23)	17.7% (9)	16.3% (14)	
More than 10 years	63% (92)	62.9% (39)	6.6% (53)	
Does not apply to me	15% (22)	16.1% (10)	14.0% (12)	
Household Size mean ± SD	4.9 ±1.9	4.8 ±1.8	4.9 ±2.0	0.862
Number of Children in Household mean ± SD	2.6 ±1.4	2.6 ±1.3	2.6 ±1.4	0.985

¹Bivariate analysis, using chi-square and t-tests

Unadjusted Results

Unadjusted bivariate analysis results of BMI/weight status, eating behaviors, home food environment, meal planning/preparation, and perceived stress by food security status are listed in Table 3. Food insecurity status was not significantly associated with BMI or overweight/obese weight status. Food insecurity status was, also, not significantly associated with eating behaviors, most of the home food environment factors, or food preparation and planning behaviors. However, there were a few significant findings. Food insecure parents were less likely to serve vegetables at family meals than food secure parents ($p=0.021$). Food insecure parents were more likely to perceive fruits ($p=0.009$) and vegetables ($p=0.039$) to cost more than food secure parents. Poor quality of produce offered in local grocery stores was reported more frequently by food insecure parents compared to food secure parents ($p=0.026$). Finally, the level of perceived stress reported by participants was significantly higher among food insecure parents ($p<0.001$).

Table 3. Unadjusted Predicted Means and Percentages of Key Variables by Food Security Status¹ (n=158)

<u>Dependent variables</u>	<u>Food Secure</u> (n= 66)	<u>Food Insecure</u> (n= 92)	<u>p-value</u>
BMI mean ± SD	29.4 ±5.2	30.6 ±6.8	0.237
Weight Status %(n)			1.000
Normal Weight	21.2% (14)	20.7% (19)	
Overweight/obese	78.8% (52)	79.3% (73)	
Eating Behaviors mean ± SD			
Fruit consumption, servings/day	2.1 ±1.4	1.7 ±1.2	0.121
Vegetable consumption, servings/day	2.1 ±1.4	1.8 ±1.2	0.137
Sugar-sweetened beverages, drinks/week	3.7 ±3.7	4.4 ±4.1	0.313
Fast food consumption, times/wk	1.1 ±1.4	1.3 ±1.2	0.086
Binge Eating %(n)	12.1% (8)	19.6% (18)	0.304
Emotional Eating %(n)	18.5% (12)	27.2% (25)	0.282
Home Food Environment %(n)			
Vegetables are available	80.3% (53)	70.7% (65)	0.234
Fruits are available	83.3% (55)	75.0% (69)	0.289
Sugar-sweetened beverages are available	42.4% (28)	49.5% (45)	0.478
Potato Chips/salty snacks are available	22.7% (15)	28.3% (26)	0.549
Candy is available	13.6% (9)	21.7% (20)	0.276
Foods Served at Family Meals%(n)			
Vegetables	72.7% (48)	53.3% (49)	0.021
Fruits	56.1% (37)	44.0% (40)	0.182
Sugar-sweetened beverages	33.3% (22)	45.1% (41)	0.189
Perceived Fruit and vegetable access %(n)			
Fruits cost too much	14.8% (9)	35.6% (31)	0.009
Vegetables cost too much	14.3% (9)	30.0% (27)	0.039
Limited variety of produce at grocery store	16.7% (18)	25.8% (23)	0.242
Poor quality of produce at grocery store	9.1% (6)	24.2% (22)	0.026
Meal Planning and Food Preparation %(n)			
Prepare meal with basic ingredients, times/week	4.7 ±2.5	4.2 ±2.3	0.231
Prepare meal with convenience foods, times/week	0.9 ±1.5	0.9 ±1.4	0.648
Preparation % agree (n)			
Low time/energy to cook to feed my children “right”	18.2% (12)	23.9% (21)	0.562
Find time to cook even when busy/tired	81.8% (54)	69.7% (62)	0.124
Make whatever food is handy	52.4% (33)	54.4% (49)	0.931
Use fast food when tired /running late	10.8% (7)	21.1% (19)	0.138
Low time/energy to cook meals	18.8% (12)	13.5% (12)	0.510
Planning % agree (n)			
Plan meals 1 day in advance	56.9% (37)	58.4% (52)	0.983
Plan meals even when busy	66.2% (43)	53.9% (48)	0.175
Low time/energy to plan meals	17.2% (11)	20.9% (19)	0.714
No meal planning	21.5% (14)	28.6% (26)	0.420

<u>Dependent variables</u>	<u>Food Secure</u> (n= 66)	<u>Food Insecure</u> (n= 92)	<u>p-value</u>
<i>Food storage/preparation %(n)</i>			
Adequate space to store food	75.8% (50)	71.7% (66)	0.703
Access to refrigeration	90.9% (60)	81.5% (75)	0.155
Access to Stove	95.5% (63)	88.0% (81)	0.183
Access to microwave or hot plate	83.3% (55)	78.0% (71)	0.534
<i>Use filler foods %(n)</i>			
Pasta	50.0% (33)	52.2% (48)	0.914
Rice	69.7% (46)	76.1% (70)	0.475
Potatoes	51.5% (34)	56.5% (52)	0.645
Beans	25.8% (17)	33.7% (31)	0.371
Perceived Stress			
Perceived Stress Scale Scores <i>mean ± SD</i>	4.6 ±2.9	7.0 ±3.1	<0.001

[†]Unadjusted logistic and linear regression models

Adjusted Results

Results for multivariate linear and logistic regression models, adjusted for education, income, weight status, race/ethnicity, and years in the U.S., can be found in Table 4. After adjustment, it was found that only participants' perceived cost of fruits ($p=0.004$) and level of perceived stress ($p<0.001$) varied by food security status. Food insecure parents reported higher perceived cost of fruits and higher perceived levels of stress when compared to food secure parents. While not statistically significant, the following trends were noted: food insecure parents were more likely to report higher levels of emotional eating, lower levels of vegetables served with meals, and higher perceived cost of vegetables than food secure parents. Food insecure parents were also more likely to report it harder to plan meals and find time to cook when busy or tired, when compared to food secure parents.

Table 4. Adjusted Predicted Means and Percentages of Key Variables by Food Security Status¹ (n=158)

<u>Dependent variables</u>	<u>Food Secure</u> (n= 66)	<u>Food Insecure</u> (n= 92)	<u>p-value</u>
BMI² mean ± SD	29.8	30.2	0.677
Weight Status³ %(n)			0.777
Normal Weight	19.2%	21.9%	
Overweight/obese	80.8%	78.1%	
Eating Behaviors mean ± SD			
Fruit consumption, servings/day	2.0	1.8	0.431
Vegetable consumption, servings/day	2.0	2.0	0.983
Sugar-sweetened beverages, drinks/week	3.7	4.3	0.364
Fast food consumption, times/wk	1.0	1.3	0.228
Binge Eating %(n)	15.1	18.4	0.612
Emotional Eating %(n)	16.4	27.1	0.152
Home Food Environment %(n)			
Vegetables are available	78.3%	73.6%	0.530
Fruits are available	83.5%	76.0%	0.293
Sugar-sweetened beverages are available	40.4%	44.1%	0.673
Potato Chips/salty snacks are available	21.1%	27.2%	0.423
Candy is available	16.5%	18.2%	0.800
Foods Served at Family Meals %(n)			
Vegetables	71.0%	55.9%	0.076
Fruits	52.9%	42.6%	0.243
Sugar-sweetened beverages	31.9%	41.5%	0.268
Perceived Fruit and vegetable access %(n)			
Fruits cost too much	12.1%	35.7%	0.004
Vegetables cost too much	14.1%	27.1%	0.088
Limited variety of produce at grocery store	17.9%	20.8%	0.694
Poor quality of produce at grocery store	7.8%	16.5%	0.170
Meal Planning and Food Preparation %(n)			
Prepare meal with basic ingredients, times/week	4.5	4.2	0.594
Prepare meal with convenience foods, times/week	0.7	1.0	0.288
Preparation % agree (n)			
Low time/energy to cook to feed my children “right”	18.4%	22.7%	0.548
Find time to cook even when busy/tired	81.7%	67.9%	0.076
Make whatever food is handy	55.0%	49.6%	0.538
Use fast food when tired /running late	12.5%	23.1%	0.150
Low time/energy to cook meals	21.4%	12.5%	0.194
Planning % agree (n)			
Plan meals 1 day in advance	61.4%	61.3%	0.995
Plan meals even when busy	70.2%	53.8%	0.061
Low time/energy to plan meals	18.6%	16.7%	0.786
No meal planning	21.0%	22.4%	0.851

<u>Dependent variables</u>	<u>Food Secure</u> (n= 66)	<u>Food Insecure</u> (n= 92)	<u>p-value</u>
<i>Food storage/preparation %(n)</i>			
Adequate space to store food	71.8%	73.1%	0.873
Access to refrigeration	89.3%	81.1%	0.220
Access to Stove	94.3%	86.7%	0.175
Access to microwave or hot plate	84.8%	79.3%	0.425
<i>Use filler foods %(n)</i>			
Pasta	53.3%	52.0%	0.886
Rice	71.6%	77.4%	0.450
Potatoes	53.3%	57.1%	0.685
Beans	30.5%	31.5%	0.896
Perceived Stress			
Perceived Stress Scale Score <i>mean ± SD</i>	5.0	6.8	0.001

¹Multivariate linear and logistic regression models adjusted for education, income, weight status, race/ethnicity, and years in the U.S.

²Multivariate linear regression model adjusted for education, income, race/ethnicity, and years in the U.S.

³Multivariate logistic regression model adjusted for education, income, race/ethnicity, and years in the U.S.

Adjusted Results for Post-Hoc Analyses with Women Only

Given nearly 90 percent of the study participants were women, we conducted post-hoc analyses for the subsample of women participants (Table 5). Similarly to the full sample adjusted analyses, significant associations were observed between food insecurity and perceived cost of fruits ($p=0.003$) and perceived stress ($p<0.001$) among the subsample of women. Food insecure women reported that fruits were too expensive to buy at a rate three times higher than the food secure women. Perceived stress was reported 1.5 times higher among food insecure women compared to food secure. In addition, among the women only analysis, food insecure mothers reported significantly lower amounts of vegetables served with meals than food secure mothers ($p=0.019$). Also, there was a significant difference by food security status in reports of using fast-food when tired or running late. Food insecure mothers reported using fast-food when tired or running late at a higher rate compared to food secure mothers ($p=0.043$).

Table 5. Adjusted Predicted Means and Percentages of Key Variables by Food Security Status Among Women Subsample¹ (n=137)

<u>Dependent variables</u>	<u>Food Secure</u> (n= 57)	<u>Food Insecure</u> (n= 80)	<u>p-value</u>
BMI² mean ± SE	29.7 (0.8)	30.3 (0.7)	0.517
Weight Status³ %(SE)			
Normal Weight	20.1% (5.7)	25.3% (5.3)	0.514
Overweight/obese	79.9% (5.7)	74.7% (5.3)	
Eating Behaviors mean ± SE			
Fruit consumption, servings/day	2.1 (0.2)	1.8 (0.2)	0.237
Vegetable consumption, servings/day	2.0 (0.2)	2.0 (0.2)	0.919
Sugar-sweetened beverages, drinks/week	3.5 (0.5)	3.9 (0.5)	0.559
Fast food consumption, times/wk	1.0 (0.2)	1.3 (0.2)	0.197
Binge Eating %(SE)	18.6% (5.6)	21.1% (5.1)	0.755
Emotional Eating %(SE)	16.8% (5.1)	28.3% (5.5)	0.147
Home Food Environment %(SE)			
Vegetables are available	79.0% (6.5)	69.5% (5.9)	0.303
Fruits are available	88.9% (4.3)	75.0% (5.3)	0.071
Sugar-sweetened beverages are available	39.6% (6.9)	42.1% (6.0)	0.795
Potato Chips/salty snacks are available	20.2% (5.5)	27.0% (5.5)	0.410
Candy is available	18.7% (5.7)	19.4% (5.1)	0.936
Foods Served at Family Meals %(SE)			
Vegetables	77.3% (5.9)	56.2% (5.8)	0.019
Fruits	55.3% (6.9)	41.2% (6.0)	0.134
Sugar-sweetened beverages	30.7% (6.5)	40.0% (6.1)	0.314
Perceived Fruit and vegetable access %(SE)			
Fruits cost too much	11.9% (4.6)	38.6% (6.1)	0.003
Vegetables cost too much	14.4% (5.1)	26.7% (5.5)	0.131
Limited variety of produce at grocery store	16.2% (5.3)	18.3% (4.8)	0.778
Poor quality of produce at grocery store	6.1% (3.4)	15.1% (4.7)	0.158
Meal Planning and Food Preparation %(SE)			
Prepare meal with basic ingredients, times/week	4.5 (0.3)	4.2 (0.3)	0.441
Prepare meal with convenience foods, times/week	0.7 (0.2)	1.0 (0.2)	0.186
Preparation % agree (SE)			
Low time/energy to cook to feed my children “right”	17.0% (5.4)	20.6% (4.9)	0.633
Find time to cook even when busy/tired	80.8% (5.2)	65.6% (5.9)	0.074
Make whatever food is handy	54.7% (6.8)	47.2% (5.9)	0.420
Use fast food when tired /running late	8.2% (3.9)	24.0% (5.5)	0.043
Low time/energy to cook meals	20.3% (5.9)	12.9% (4.0)	0.292
Planning % agree (SE)			
Plan meals 1 day in advance	65.1% (6.2)	63.1% (5.8)	0.819
Plan meals even when busy	71.0% (6.1)	57.6% (6.0)	0.137
Low time/energy to plan meals	18.2% (5.6)	18.6% (4.4)	0.953
No meal planning	22.2% (5.8)	22.9% (5.1)	0.926

<u>Dependent variables</u>	<u>Food Secure</u> (n= 57)	<u>Food Insecure</u> (n= 80)	<u>p-value</u>
<i>Food storage/preparation</i> %<i>(SE)</i>			
Adequate space to store food	69.0% (6.5)	75.3% (5.2)	0.456
Access to refrigeration	88.2% (4.6)	81.9% (4.8)	0.317
Access to Stove	93.9% (3.4)	86.7% (4.1)	0.222
Access to microwave or hot plate	84.0% (5.2)	80.7% (4.8)	0.650
<i>Use filler foods</i> %<i>(SE)</i>			
Pasta	54.5% (6.9)	51.8% (6.0)	0.771
Rice	74.0% (6.0)	77.8% (5.2)	0.635
Potatoes	54.4% (7.0)	51.9% (6.0)	0.794
Beans	31.9% (6.4)	32.9% (5.5)	0.906
Perceived Stress			
Perceived Stress Scale Score <i>mean ± SE</i>	4.6 (0.4)	7.0 (0.4)	<0.001

¹Multivariate linear and logistic regression models adjusted for education, income, weight status, race/ethnicity, and years in the U.S.

²Multivariate linear model adjusted for education, income, race/ethnicity, and years in the U.S.

³Multivariate logistic regression model adjusted for education, income, race/ethnicity, and years in the U.S.

CHAPTER 5

DISCUSSION

The purpose of this study was to evaluate the relationship between food insecurity and weight status, eating behaviors, the home food environment, meal planning and preparation, and perceived stress among parents in Phoenix, Arizona. This study sought to address gaps in the literature examining differences in “healthy” and “unhealthy” eating behaviors between food insecure and food secure parents. Other variables such as foods available in the home, how time and low energy impact meal preparation, as well as level of stress were compared between groups reporting different levels of food security. The current study found that food insecure parents reported higher barriers to accessing fruit and higher levels of perceived stress as compared to their food secure counterparts. These results were magnified among the subsample of food insecure women, of who also reported less healthful meal planning. Findings can be used to inform future research and intervention studies with families vulnerable to food insecurity.

Weight Status

The current study did not show a statistically significant relationship between food security status and weight status, in either the full sample analysis or the women only analysis. Previous research describes a relationship between food insecurity and higher weight status/BMI (Olson, 1999; Townsend, et al., 2001; Jones, et al., 2003; Pan, et al. 2012; Bruening, 2012). Studies regarding women (Townsend, et al., 2001; Hanson,

et al., 2007; Laraia, et al., 2010), especially mothers, have supported the food insecurity and weight relationship while other studies regarding men and children have provided mixed results (Townsend, et al., 2001; Laraia, et al., 2004; Wilde & Peterman, 2006; Hanson, et al., 2007; Beydoun & Wang, Y., 2010). Many reasons are suspect for similar weight status among both food secure (average BMI 29.4 ± 5.2) and food insecure (average BMI 30.6 ± 6.8) parents in this study. First, the study's sample population was predominantly Hispanic/Latino, who tend to have a higher overall weight status compared to non-Hispanic Whites (Schiller, Lucas, Ward & Peregoy, 2012). Among women living in the United States, Hispanic/Latino women present a 75.7 percent overweight/obese rate compared to non-Hispanic White women who present a 59.5 percent overweight/obesity rate (Ogden & Carroll, 2010; Flegal, Carroll, Ogden, & Curtin, 2010; Flegal, et al., 2012). Therefore, whether food insecure or food secure participants weight status may have correlated more with their race/ethnicity rather than their food security status.

Those living in poverty are often noted to have higher rates of overweight/obesity. Kim & Leigh (2010) stated that weight status is inversely related to wages, which means that those individuals with lower wages are more likely to be overweight or obese. Over 56 percent of our sample population reported a household income level of \$20,000 or less, and over 88 percent of our sample population reported household income levels of \$34,000 or less. The lack of variability in other factors related to weight status in the current population may have contributed to the lack of significant findings.

Despite not seeing significant differences in weight status by food security status in the current study, the rates of overweight and obesity among the study participants

(79.0 percent) was higher than the national average (68.8 percent) (Ogden, 2012; Flegal, Carroll, Kit, & Ogden, 2012). High weight status is often associated with high levels of diabetes among Hispanic/Latino women (Phelan, 2009; Carrera, Xiang, & Tucker, 2007). In addition, 85 percent of our sample population reported to be immigrants. Multiple studies have suggested that acculturation of United States dietary practices is positively associated with weight status of Mexican born individuals (Benavides-Vaello, 2005; Perez-Escamilla & Putnik, 2007; Ayala, et al., 2008). Acculturation patterns among Mexican born individuals can be influenced by their age, the number of years residing in the United States, the region, city, or town an individual lives in as well as their social networks (Ayala et al., 2008). Given the high prevalence of overweight/obesity among the study's predominate Hispanic/Latino immigrant sample population, programs are needed at Golden Gate Community Center to increase healthy food choice knowledge, including how to shop healthy on a limited budget, how to read and understand nutrition labels, how to prepare low fat meals, and understanding how diet is related to health.

Eating Behaviors

Results of the current study did not support the hypothesis that food insecure parents would report more “unhealthy” eating behaviors than food secure parents. There was no significant difference between food insecure and food secure parents in reports of “unhealthy” foods, such as SSBs, potato chips, and candy. Additionally, there were no differences in the reports of lower consumption of “healthy” foods, such as fruits and vegetables, among food secure/insecure parents, even after controlling for sociodemographic variables (Table 4). This finding is supported by Mello et al. (2010)

who reported that fruit and vegetable consumption did not differ significantly between food insecure and food secure individuals after controlling for possible confounders.

However, studies often report food insecure individuals to make less “healthy” food choices (consuming a higher fat intake and higher juice intake along with lower participation in fat reducing behaviors such as avoiding fat as a flavor or substituting with low fat alternatives) than food secure individuals (Mello, 2010; Crawford & Webb, 2011; Pilgrim et al., 2012). Other “unhealthy” eating behaviors associated with food insecurity include increased fast-food and SSB consumption along with decreased fruit and vegetable consumption (Kendall, et al., 1996; Bruening, et al., 2012). Similar trends were noted among this study’s data regarding over all “healthy” and “unhealthy” eating behaviors between food secure and food insecure parents; however, the results did not reach statistical significance.

We saw no differences in binge eating behaviors among food insecure and food secure parents. Overall, parents reported extremely high levels of binge eating and emotional eating. In fact, binge eating was reported five times higher among study participants (16.8 percent) than the national average (2.8 percent) (Hudson, Hiripi, Pope, & Kessler, 2007). Then again, in other studies, Hispanics have been noted to have a higher prevalence of binge eating compared Whites and African Americans (Alegria, 2007; Marques, 2011). The majority of the current study participants were Hispanic/Latino, which may offer reason for higher rates of binge eating observed in this study. Lifetime binge eating disorder is noted to be associated with obesity (Hudson, Hiripi, Harrison, & Kessler, 2008). More research is needed to investigate binge eating among food insecure and Hispanic/Latino groups.

Eating behaviors among Mexican born men and women is only beginning to be investigated to account for dietary patterns that may attribute to their high weight status (Flores et al., 2010; Dixon, et al., 2000). The consumption of sugar-sweetened beverages and fast-food are suggested as major contributors to increase weight status among Mexican born individuals (Sharkey, et al., 2011b; Phelan, 2009; Carrera, et al., 2007). Sharkey, et al. (2011b) found that among Mexican born women those that were born in the United States consumed more SSB and fast-food than those women born in Mexico. This suggests that with acculturation dietary practices change as the obesogenic diet of the United States is adopted. On average non-Hispanic Whites consume 5.3 percent of daily calories as SSBs, whereas Mexican Americans consume 8.2 percent of their daily calories as SSBs (Ogden, Kit, Carroll, & Park, 2011). Contrary to the American Heart Association's recommendation of three-12 ounce SSB servings or less per week our study population stated to consume an average of four SSBs per week, which increases the risk of overweight/obesity.

Home Food Environment

No significant differences were noted among the foods reported at family meals. However, while not statistically significant, fewer fruits and vegetables and more sugar-sweetened beverages were served at family meals among food insecure households compared to food secure households (Table 4). This finding is similar to significant findings reported in other studies (Seligman, et al., 2010; Bruening, et al., 2012), which have found higher levels of “unhealthy” home food environments among food insecure individuals compared to food secure individuals. This is of concern as “unhealthy” eating

behaviors are often associated with higher risk for chronic diseases (Seligman, et al., 2010).

The United States offers an obesogenic environment with easy and affordable access to high calorie, low nutrient foods (Lieberman, 2006). Low-income individuals, such as those included in this study, are most noted for living in “food deserts” where barriers to obtaining “healthy” foods are high, including decreased access and decreased affordability of “healthy” foods (Lucan, et al., 2010; Gordon, et al., 2011; Budzynska, et al., 2013). Many “food deserts” are strewn with fast-food outlets and corner stores rather than full service grocery stores (Gallagher, et al., 2007; Gordon, et al., 2011; Budzynska, et al., 2013). The cost of corner store foods are often much higher than a supermarket or full service grocery store and the quality and variety is often lacking (Lucan, et al., 2010).

We did not assess where the participants lived, but if most study participants did come from the neighborhood surrounding Golden Gate Community Center it would not be surprising that participants’ eating behaviors were similar across food security status, given that the participants may have come from similar environments (Taylor, Schoon, Crouch, & Talbot, 2011). In addition, similarities in race/ethnicity, incomes, and education may offer reason for similarities in the home food environment as well. We observed an overall trend of higher availability of “unhealthy” foods within the home and higher perceived barriers to obtaining “healthy” foods among food insecure parents, in the study. We also observed that food insecure parents reported higher perceived cost of fruits and vegetables along with higher reports of limited variety and poor quality produce available in their grocery stores. Programs and policies that seek to increase

access to healthy, affordable foods in the neighborhood surrounding Golden Gate Community Center are essential.

Meal Planning and Preparation

Time scarcity and fatigue are common barriers to meal planning and preparation, which may result in less nutritious meal preparation (Eikenberry, & Smith, 2004; Storfer-Isser & Musher-Eizenman, 2012). We found that food insecure parents reported less often that they could find time to cook and plan meals even when busy or tired compared to food secure parents (Table 4). Among the subsample of women participants, food insecure mothers were more likely to use fast-food when tired or running late compared to food secure mothers (Table 5). Lack of time to plan and prepare meals along with increased use of fast-food, as a result of time constraints, represents behavioral risk factors for increased weight status, which the participants in this study likely face. In order to overcome barriers related to time, interventions should be focused on time and resource management. One option includes providing individuals with the skills and knowledge to prepare freezer meals for a week at a time. Providing weekly meal planner ideas would be one option to overcome time constraints and increase nutritious meals. Meals can be thawed out and reheated for a quick meal during busy workdays. Crockpot meals or simple one-dish meals can be nutritious time saving options, as well.

Overall, meal planning and preparation did not differ significantly among food secure/insecure parents in this study. Further research should be conducted to assess cooking skills and confidence in recipe/meal preparation among food security groups. Increasing knowledge, cooking skills, and confidence in recipe/meal preparation can lead

to more meals prepared at home (Wrieden et al., 2002; Engler-Stringer, 2010). Little research has been conducted in the area of meal planning and preparation, especially among food insecure individuals or the Hispanic/Latino population. The results from this study add insight to the possibility of time and fatigue as barriers to “healthy” eating differences between food secure and food insecure parents. While lack of time and fatigue may be contributors to “unhealthy” eating behaviors, further research should investigate the possibility of lack of time and fatigue barriers as mediators in to increased weight status.

Means by which foods are stored or prepared, such as having adequate storage space or access to refrigeration, a stove, and/or a microwave/hot plate, are important to note as they too can be barriers to preparing “healthy” meals, or any meals at all. Among those participants that reported food *security*, over 10 percent reported not having access to refrigeration or a microwave/hot plate, and over 5 percent reported not have access to a stove. The numbers are even more staggering for participants reporting food insecurity, as almost 20 percent reported not having access to refrigeration or a microwave/hot plate, and almost 13 percent reported not have access to a stove. It is important to note the high numbers among the food secure individuals because although they reported food security they still lack some essentials, such as refrigeration, stove and microwave/hot plate to prepare and store a “healthy” meal. Similarities in the lack of availability of food storage and meal preparation appliances among the food secure and food insecure groups provides reason that eating behaviors, too, may be similar between both food security groups.

Based on the current study's findings, providing general nutrition knowledge on how to prepare and eat more nutritious meals may not be as affective for certain populations lacking resources, such as a stove, microwave/hotplate, and/or refrigerator. Without these tools, it makes it difficult for these individuals to prepare and consume "healthy" meals. Interventions tailored to specific individual needs would most likely have the greatest impact. For instance, if an individual does not have a refrigerator or stove but has a microwave, education on how to use the microwave to prepare meals could be beneficial. Individuals may also eat many meals away from home because they do not have appliances at home to prepare meals. At this point, education on "healthy" eating-out meal options could benefit the individual. Or strategies for a combination meal may also be used where an individual purchases a fast-food sandwich as an entrée and fresh vegetables, as a side dish, are prepared at home in the microwave for dinner. Finally, helping individuals find financial assistance or available funding to purchase kitchen appliances could increase the number of "healthy" meals prepared at home.

Perceived Stress

The results of this study show that food insecure parents have statistically significant higher levels of perceived stress than food secure parents. Previous research stated that increased levels of stress are to blame for weight gain and/or higher weight status among chronically stressed and/or prolonged acutely stressed individuals (Takeda, et al., 2004; Zellner, et al., 2006; Adam & Epel, 2007; Hernandez-Hons & Woolley, 2012). Future research is needed on how perceived stress plays a role in the weight status

of food insecure individuals. In addition, more research is needed on how stress affects eating behaviors and the home food environment.

Study Strengths and Weaknesses

Study strengths include addressing gaps in the literature regarding differences in “healthy” and “unhealthy” eating behaviors, foods available in the home, how time and low energy impact meal preparation, as well as level of stress and how they relate to food insecurity among parents. The use of objective measures, including weight and height, provide strength to the data collected. Given the significant difference in stress levels between food secure and food insecure parents, this preliminary study allows for further research to be conducted to assess possibilities for these stress level differences. This study also provides insight among the Hispanic/Latino population, as they were the predominate group in this study.

In this cross-sectional study, only associations without directionality of causation can be reported, as participant responses were collected at only one point in time rather than overtime, negating the possibility to show cause and effect. Findings from this study may not be generalizable to the overall population as the sample size was limited and consisted of a distinct population, predominately Hispanic/Latino parents. The sample population used in this study shared many similarities in gender, race/ethnicity, immigrant status, education, and household income making this sample population rather homogeneous and possibly contributing the lack of significant findings. In addition to having a limited number of questions to assess behaviors and foods, many of the survey questions were subjective, self-reports, leaving error for personal interpretation and/or

reliance on memory recall of information being collected, which may bias results. Surveys were offered in a variety of forms such interview, paper, or electronic. While participants were given the option between a written, electronic, or interview style survey, there is still concern that some participants may have chosen the written/electronic versions of the survey with little to no ability to read.

Summary

Results from this study indicate that food insecurity is not associated with weight status/BMI. Even after the women only post-hoc analysis, there was no relationship between food security and weight status/BMI, as noted by other studies. Overall, food insecure parents did not report more “unhealthy” eating behaviors or more “unhealthy” foods available in the home, such as lower fruit and vegetable intake/availability or higher intakes/availability of sugar-sweetened beverages and fast food, than food secure parents. As a whole, food insecurity was not associated with meal planning and preparation behaviors among parents. Finally, food insecurity was associated with perceived stress levels among our sample population of predominantly Hispanic/Latino mothers.

CHAPTER 6

CONCLUSION

Food insecurity is a major public health nutrition problem nation-wide, and particularly in the Phoenix metropolitan area. This cross-sectional study enrolled a convenience sample of parents in Phoenix, AZ to assess the relationship between food insecurity, weight status, eating behaviors, home food environment, meal planning and preparation, and stress.

The majority of the hypotheses for this study were not upheld. The results of this study failed to support the first hypothesis, which stated that food insecure parents would have a higher BMI than food secure parents. As displayed in the results section (Chapter 3) food insecure parents did not have significantly different BMIs than food secure parents. The second hypothesis stated that food insecure parents would have more “unhealthy” eating behaviors, such as lower fruit and vegetable intake, than food secure parents. No statistically significant differences were reported in “unhealthy” eating behaviors between food security groups. The third hypothesis stated that food insecure parents would report more “unhealthy” foods available in their home such as potato chips or candy when compared to food secure parents. No significant differences were noted among the home food environment. While trends were noted in Chapter 4, we cannot confidently report more “unhealthy” foods available in food insecure households when compared to food secure households. The fourth hypothesis, which stated that food insecure parents would report less meal planning and preparation than food secure parents, was only partially upheld when analysis was completed on women (mother)

participants only. Food insecure mothers in this sample were more likely to use fast-food with increased time and fatigue barriers when compared to food secure mothers. The fifth hypothesis stated that food insecure parents would report higher perceived stress levels than food secure parents. The fifth hypothesis was accepted as perceived stress scores varied significantly between food secure and food insecure parents; this finding was consistent among unadjusted, adjusted, and subsample analyses.

The lack of variability in the sample population may be a cause for the limited number of statistically significant results. The sample was overwhelmingly low-income, Hispanic/Latino immigrant women who likely have similar environmental, cultural, social, and personal factors relating to the outcomes assessed in this study. Despite this, findings provide key areas in which programs, policies, and research can be developed to promote the nutrition and health of this vulnerable population.

Creating programs that bring fresh fruits and vegetable to the neighborhood surrounding Golden Gate community is essential to increase access to fruits and vegetables. For instance, a program that brings a truck with fresh fruits and vegetables once or twice a week may be beneficial; however, just because the produce is available does not mean that everyone can afford the produce. Implementing policies to keep produce prices affordable and seeking funding to provide monetary vouchers to purchase fruits and vegetables may help to increase fruit and vegetable purchases. Given the high rates of overweight/obesity in the study participants, offering education on healthy food choice knowledge, how to prepare low fat meals, and understanding how diet is related to health may prove beneficial. Food insecure parents, in this study, exhibited higher levels

of perceived stress than food secure parents. The development of an intervention to reduce stress among food insecure parents might be valuable, as well.

This study provides a springboard for future studies regarding stress and food insecurity. Levels of stress among food insecure parents should not be overlooked. Further research includes addressing how food insecurity may affect an individual's level of stress, how a food insecure individual's level of stress may affect their eating behaviors, and how a food insecure individual's eating behaviors, as a result of their level of stress, may impact their weight status. Further research should also be conducted to evaluate the effectiveness of stress reducing programs in this population. Reducing levels of stress may provide additional health benefits among food insecure individuals as stress is often linked with negative/"unhealthy" eating behaviors, such as emotional eating and binge eating, which in turn are associated with obesity.

REFERENCES

- Adam, T. C., & Epel, E. S. (2007). Stress, eating and the reward system. *Physiology & behavior, 91*(4), 449–58. doi:10.1016/j.physbeh.2007.04.011
- American Psychological Association (APA). (2012). *Our Health at Risk Stress in America*: Retrieved from <http://www.apa.org.ezproxy1.lib.asu.edu/news/press/releases/stress/2011/final-2011.pdf>
- Alegria, M., Woo, M., Cao, Z., Torres, M., Meng, X. L., & Striegel-Moore, R. (2007). Prevalence and correlates of eating disorders in Latinos in the United States. *International Journal of Eating Disorders, 40*(S3), S15-S21.
- Barrington, W. E., Ceballos, R. M., Bishop, S. K., McGregor, B. A., & Beresford, S. A. (2012). Perceived stress, behavior, and body mass index among adults participating in a worksite obesity prevention program, Seattle, 2005-2007. *Preventing chronic disease, 9*(1). doi:10.5888/pcd9.120001
- Barton, K. L., Wrieden, W. L., & Anderson, a S. (2011). Validity and reliability of a short questionnaire for assessing the impact of cooking skills interventions. *Journal of human nutrition and dietetics: the official journal of the British Dietetic Association, 24*(6), 588–95. doi:10.1111/j.1365-277X.2011.01180.x
- Bauer, K. W., Hearst, M. O., Escoto, K., Berge, J. M., & Neumark-Sztainer, D. (2012). Parental employment and work-family stress: associations with family food environments. *Social science & medicine (1982), 75*(3), 496–504. doi:10.1016/j.socscimed.2012.03.026
- Beatty, T. K., Nanney, M. S., & Tuttle, C. (2013). Time to eat? The relationship between food security and food-related time use. *Public health nutrition, (6)*, 1–7. doi:10.1017/S1368980012005599
- Bennett, J., Greene, G., & Schwartz-Barcott, D. (2013). Perceptions of emotional eating behavior. A qualitative study of college students. *Appetite, 60*(1), 187–92. doi:10.1016/j.appet.2012.09.023
- Benavides-Vaello S. (2005). Cultural influences on the dietary practices of Mexican Americans: a review of the literature. *Hispanic Health Care International 2005, 3*:27-
- Berthoud, H. R. (2006). Homeostatic and non-homeostatic pathways involved in the control of food intake and energy balance. *Obesity (Silver Spring, Md.), 14 Suppl 5*(August), 197S–200S. doi:10.1038/oby.2006.308

- Beshara, M., Hutchinson, A., & Wilson, C. (2010). Preparing meals under time stress. The experience of working mothers. *Appetite*, 55(3), 695–700. doi:10.1016/j.appet.2010.10.003
- Beydoun, M. A. & Wang, Y. (2010). Pathways linking socioeconomic status to obesity through depression and lifestyle factors among young US adults. *Journal of affective disorders*, 123(1-3), 52–63. doi:10.1016/j.jad.2009.09.021
- Blumberg, S. J., Bialostosky, K., Hamilton, W. L., & Briefel, R. R. (1999). The effectiveness of a short form of the Household Food Security Scale. *American journal of public health*, 89(8), 1231–4. Retrieved from <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1508674&tool=pmcentrez&rendertype=abstract>
- Boutelle, K. N., Fulkerson, J. A., Neumark-Sztainer, D., Story, M., & French, S. a. (2007). Fast food for family meals: relationships with parent and adolescent food intake, home food availability and weight status. *Public health nutrition*, 10(1), 16–23. doi:10.1017/S136898000721794X
- Bruce, B., & Agras, W. S. (1992). Binge eating in females: A population-based investigation. *International Journal of Eating Disorders*, 12(4), 365-373.
- Bruening, M., MacLehose, R., Loth, K., Story, M., & Neumark-Sztainer, D. (2012). Feeding a family in a recession: food insecurity among Minnesota parents. *American journal of public health*, 102(3), 520–6. doi:10.2105/AJPH.2011.300390
- Brunner, T. A, Van der Horst, K., & Siegrist, M. (2010). Convenience food products. Drivers for consumption. *Appetite*, 55(3), 498–506. doi:10.1016/j.appet.2010.08.017
- Breen, A. B., Cahill, R., Ettinger, S., Cook, J., & Chilton, M. (2011). *Real cost of a healthy diet: 2011*. Retrieved from www.childrenshealthwatch.org
- Budzynska, K., West, P., Savoy-Moore, R. T., Lindsey, D., Winter, M., & Newby, P. (2013). A food desert in Detroit: associations with food shopping and eating behaviours, dietary intakes and obesity. *Public health nutrition*, 1–10. doi:10.1017/S1368980013000967
- Campbell, K. J., Crawford, D. A, Salmon, J., Carver, A., Garnett, S. P., & Baur, L. A. (2007). Associations between the home food environment and obesity-promoting eating behaviors in adolescence. *Obesity (Silver Spring, Md.)*, 15(3), 719–30. doi:10.1038/oby.2007.553
- Caprio, S., Daniels, S. R., Drewnowski, A., Kaufman, F. R., Palinkas, L. a, Rosenbloom, A. L., & Schwimmer, J. B. (2008). Influence of race, ethnicity, and culture on childhood obesity: implications for prevention and treatment. *Obesity (Silver Spring, Md.)*, 16(12), 2566–77. doi:10.1038/oby.2008.398

- Carrera, P. M., Xiang, G., & Tucker, K. L. (2007). A study of dietary patterns in the Mexican-American population and their association with obesity. *Journal of the American Dietetic Association*, 107(10), 1735-1742.
- Casey, P. H., Simpson, P. M., Gossett, J. M., Bogle, M. L., Champagne, C. M., Connell, C., Harsha, D., et al. (2006). The association of child and household food insecurity with childhood overweight status. *Pediatrics*, 118(5), e1406–e1413. doi:10.1542/peds.2006-0097
- The Centers for Disease Control (CDC). (2011a). The Obesity Epidemic. Retrieved from http://www.azdhs.gov/phs/bnp/nupao/documents/ObesityInArizona_121611.pdf
- The Centers for Disease Control (CDC). (2011b). Healthy Communities Preventing Chronic Disease by Activating Grassroots Change: At a Glance 2011.. Retrieved from http://www.cdc.gov/chronicdisease/resources/publications/aag/pdf/2011/Healthy_Communities_AAG_Web.pdf
- The Center for Disease Control (CDC). (2012). Defining overweight and obesity. Retrieved from <http://www.cdc.gov/obesity/adult/defining.html>
- Cheung, Y. B., Machin, D., Karlberg, J., & Khoo, K. S. (2004). A longitudinal study of pediatric body mass index values predicted health in middle age. *Journal of clinical epidemiology*, 57(12), 1316–22. doi:10.1016/j.jclinepi.2004.04.010
- Cohen S, Kamark T, Mermelstein R. (1983). A Global Measure of Perceived Stress. *Journal of Health and Social Behavior*. 24:385-396.
- Cohen, S., Janicki-Deverts, D., & Miller, G. E. (2007). Psychological stress and disease. *JAMA: the journal of the American Medical Association*, 298(14), 1685-1687.
- Coleman-Jensen, A., Nord, M., Andrews, M., Carlson, S. (2012). Household Food Security in the United States in 2011, (September). Retrieved from <http://www.ers.usda.gov/media/884525/err141.pdf>.
- Coleman-Jensen, A., Nord, M. (2012). Definitions of food security. Retrieved from <http://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-us/definitions-of-food-security.aspx#ranges>
- Coleman-Jensen, A., McFall, W., & Nord, M. (2013). Food Insecurity in Households With Children: Prevalence, Severity, and Household Characteristics, 2010-11, EIB-113, U.S. Department of Agriculture, Economic Research Service. Retrieved from: <http://www.ers.usda.gov/media/1120651/eib-113.pdf>.
- Cooper, R., & Burke, M. (2012). *Food Hardship in America 2011* (Vol. 10, pp. 1–28).

- Crawford, P. B., & Webb, K. L. (2011). Unraveling the paradox of concurrent food insecurity and obesity. *American journal of preventive medicine*, 40(2), 274–5. doi:10.1016/j.amepre.2010.11.003
- Cummins, S., & Macintyre, S. (2006). Food environments and obesity--neighbourhood or nation? *International journal of epidemiology*, 35(1), 100–4. doi:10.1093/ije/dyi276
- Dallman, M. F. (2010). Stress-induced obesity and the emotional nervous system. *Trends in endocrinology and metabolism: TEM*, 21(3), 159–65. doi:10.1016/j.tem.2009.10.004
- Davis, G. & You, W. (2010). The time cost of food at home: general and food stamp participant profiles. *Appl Econ* 42, 2537–2552.
- DeBono, N. L., Ross, N. A., & Berrang-Ford, L. (2012). Does the Food Stamp Program cause obesity? A realist review and a call for place-based research. *Health & place*, 18(4), 747–56. doi:10.1016/j.healthplace.2012.03.002
- DeVault, M. L. (1991). *Feeding the Family*. Chicago: University of Chicago Press.
- De Zwaan, M. (2001). Binge eating disorder and obesity. *International journal of obesity*, 25(Suppl 1), S51–S55. doi:10.1038/sj.ijo.0801699
- Dietz, W. H. (1995). Does Hunger Cause Obesity? *Pediatrics*, 95(5), 766–767.
- Dixon, L.B., Sundquist, J., Winkleby, M. (2000). Differences in Energy, Nutrient, and Food Intakes in a US Sample of Mexican-American Women and Men: Findings from the Third National health and Nutrition Examination Survey, 1988-1994. *Am J Epidemiol*; 152:548-57.
- Drewnowski, A., & Specter, S. E. (2004). Poverty and obesity: the role of energy density and energy costs. *American Society for Clinical Nutrition*, 79(1), 6–16.
- Drewnowski, A., & Darmon, N. (2005). The economics of obesity: dietary energy density and energy cost. *The American Journal of Clinical Nutrition*, 82(1), 265S-273S.
- Eikenberry, N., & Smith, C. (2004). Healthful eating: perceptions, motivations, barriers, and promoters in low-income Minnesota communities. *Journal of the American Dietetic Association*, 104(7), 1158–61. doi:10.1016/j.jada.2004.04.023
- Engler-Stringer, R., Stringer, B., & Haines, T. (2011). Complexity of Food Preparation and Food Security Status in Low-income Young Women. *Canadian Journal of Dietetic Practice and Research*, 72(3), 133–136. doi:10.3148/72.3.2011.133
- Engler-Stringer, R. (2010). Food, cooking skills, and health: a literature review. *Canadian Journal of Dietetic Practice and Research*, 71(3), 141-145.

- Ennis, S. R., Rios-Vargas, M., Albert, N. G. (2011). The Hispanic population: 2010. *2010 Census Briefs*. Retrieved from <http://www.census.gov/prod/cen2010/briefs/c2010br-04.pdf>
- Epel, E., Jimenez, S., Brownell, K., Stroud, L., Stoney, C., & Niaura, R. (2004). Are stress eaters at risk for the metabolic syndrome? *Annals of the New York Academy of Sciences*, *1032*, 208–10. doi:10.1196/annals.1314.022
- Erlanson-Albertsson, C. (2005). How Palatable Food Disrupts Appetite Regulation. *Basic & Clinical Pharmacology & Toxicology*, *97*, 61–73.
- Feinberg, E., Kavanagh, P. L., Young, R. L., & Prudent, N. (2008). Food insecurity and compensatory feeding practices among urban black families. *Pediatrics*, *122*(4), e854–e860. doi:10.1542/peds.2008-0831
- Finkelstein, E. A., Trogon, J. G., Cohen, J. W., & Dietz, W. (2009). Annual medical spending attributable to obesity: payer-and service-specific estimates. *Health affairs (Project Hope)*, *28*(5), 822–831. doi:10.1377/hlthaff.28.5.w822
- Fisher, J. O., & Birch, L. L. (2002). Eating in the absence of hunger and overweight in girls from 5 to 7 y of age. *The American journal of clinical nutrition*, *76*(1), 226–31. Retrieved from <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2604807&tool=pmcentrez&rendertype=abstract>
- Flegal, K. M., Carroll, M. D., Ogden, C. L., & Johnson, C. L. (2002). Prevalence and trends in obesity among US adults, 1999-2000. *JAMA: the journal of the American Medical Association*, *288*(14), 1723-1727.
- Flegal, K.M., Carroll, M.D., Ogden, C.L., Curtin, L.R. (2010). Prevalence and trends in obesity among US adults, 1999-2008. *JAMA*, *303*(3):235-241.
- Flegal, K. M., Carroll, M. D., Kit, B.K., & Ogden, C. L. (2012). Prevalence of obesity and trends in the distribution of body mass index among U.S. adults, 1999-2010. *Journal of the American Medical Association*, *307*(5), 491-497.
- Flores, M., Macias, N., Rivera, M., Lozada, A., Rivera-dommarco, J., & Tucker, K. L. (2010). Dietary Patterns in Mexican Adults Are Associated with Risk of Being Overweight. *The Journal of Nutrition*, 1869–1873. doi:10.3945/jn.110.121533.1869
- Fosyth, A., Macintyer, S., & Anderson, A. (1994). Diet for Disease? Intraurban Variation in Reported Food Consumption in Glasgow. *Appetite*, (22), 259–274.
- Franklin, B., Jones, A., Love, D., Puckett, S., Macklin, J., & White-Means, S. (2012). Exploring mediators of food insecurity and obesity: a review of recent literature. *Journal of community health*, *37*(1), 253–64. doi:10.1007/s10900-011-9420-4

- Frey RJ. (2006). *The Gale Encyclopedia of Medicine*. Vol 4. 3rd ed. Detroit: Gale
- Fulkerson, J. A, Neumark-Sztainer, D., & Story, M. (2006). Adolescent and parent views of family meals. *Journal of the American Dietetic Association*, 106(4), 526–32. doi:10.1016/j.jada.2006.01.006
- Fulkerson, J. A., Rydell, S., Kubik, M. Y., Lytle, L., Boutelle, K., Story, M., Neumark-sztainer, D., et al. (2010). Healthy home offerings via Mealtime Environment (HOME): feasibility, acceptability, and outcomes of a pilot study. *Obesity*, 18(Suppl 1), 612–624. doi:10.1038/oby.2009.434.Healthy
- Furey, S., Strugnell, C., & McIlveen, H. (2001). An investigation of the potential existence of “ food deserts ” in rural and urban areas of Northern Ireland. *Agriculture and Human Values*, 18, 447–457.
- Gallagher Research & Consulting Group. (2007). *Examining the impact of food deserts on public health in Detroit*. Retrieved from <http://yaleruddcenter.org/resources/upload/docs/what/policy/DetroitFoodDesertReport.pdf>
- Gibson, D. (2003). Food stamp program participation is positively related to obesity in low income women. *The Journal of nutrition*, 133(7), 2225-2231.
- Gibson, D. (2006). Symposium : Food Assistance and the Well-Being of Low-Income Families Long-Term Food Stamp Program Participation Is Positively Related to Simultaneous Overweight in Young Daughters and Obesity in Mothers 1 , 2, 1–5.
- Gordon, C., Purciel-Hill, M., Ghai, N. R., Kaufman, L., Graham, R., & Van Wye, G. (2011). Measuring food deserts in New York City’s low-income neighborhoods. *Health & place*, 17(2), 696–700. doi:10.1016/j.healthplace.2010.12.012
- Groesz, L. M., McCoy, S., Carl, J., Saslow, L., Stewart, J., Adler, N., & Laraia, B. (2012). What is eating you? Stress and the drive to eat. *Appetite*, 58(2), 717–21. doi:10.1016/j.appet.2011.11.028
- Gucciardi, E., Vogt, J. A., DeMelo, M., & Stewart, D. (2009). Exploration of the Relationship Between Household Food Insecurity and Diabetes in Canada. *Diabetes Care*, 32(12), 2218–2224. doi:10.2337/dc09-0823.
- Hanson, N. I., Neumark-Sztainer, D., Eisenberg, M. E., Story, M., & Wall, M. (2005). Associations between parental report of the home food environment and adolescent intakes of fruits, vegetables and dairy foods. *Public Health Nutrition*, 8(01), 77–85. doi:10.1079/PHN2004661

- Hanson, K. L., Sobal, J., & Frongillo, E. A. (2007). Gender and marital status clarify associations between food insecurity and body weight. *The Journal of nutrition*, 137(6), 1460–5. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/17513407>
- Hartline-Grafton, H. (2011). *Food Insecurity and Obesity: Understanding the Connections*. Retrieved from http://frac.org/pdf/frac_brief_understanding_the_connections.pdf
- Heatherton, T. F., & Baumeister, R. F. (1991). Binge eating as escape from self-awareness. *Psychological bulletin*, 110(1), 86–108. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/1891520>
- Hendrickson, D., Smith, C., & Eikenberry, N. (2006). Fruit and vegetable access in four low-income food deserts communities in Minnesota. *Agriculture and Human Values* 23, 371–383.
- Hernandez-Hons, A., & Woolley, S. R. (2012). Women's experiences with emotional eating and related attachment and sociocultural processes. *Journal of marital and family therapy*, 38(4), 589–603. doi:10.1111/j.1752-0606.2011.00239.x
- Hipple, S. F. (2009). *The labor market in 2009: recession drags on*. Retrieved from <http://stat.bls.gov.ezproxy1.lib.asu.edu/opub/mlr/2010/03/art1full.pdf>
- Holben, D. H. (2006). Position of the American Dietetic Association: Food Insecurity and Hunger in the United States. *Journal of the American Dietetic Association*, 106(3), 446–458. doi:10.1016/j.jada.2006.01.016
- Hromi-Fiedler, A., Bermudez-Millan, A., Segura-Pérez, S., & Pérez-Escamilla, R. (2012). Household food insecurity is associated with depressive symptoms among low-income pregnant Latinas. *Matern Child Nutr*, 7(4), 421–430. doi:10.1111/j.1740-8709.2010.00266.x
- Hudson, J. I., Hiripi, E., Pope, H. G., Kessler, R. C. (2007). The prevalence and correlates of eating disorders in the National Comorbidity Survey Replication. *Biological Psychiatry*. 61:348-58.
- Hudson, J. I., Hiripi, E., Harrison, G. P., & Kessler, R. C. (2008). The prevalence and correlates of eating disorders in the national comorbidity survey replication. *Biol Psychiatry*, 61(3), 348–358.
- Ivers, L. C., & Cullen, K. A. (2011). Food insecurity: special considerations for women. *Am J Clin Nutr, Suppl* 94, 1740–1744. doi:10.3945/ajcn.111.012617.1

- Jones, S. J., Jahns, L., Laraia, B. A., & Haughton, B. (2003). Lower risk of overweight in school-aged food insecure girls who participate in food assistance: results from the panel study of income dynamics child development supplement. *Archives of pediatrics & adolescent medicine*, 157(8), 780.
- Joyce, K. M., Breen, A., Ettinger de Cuba, S., Cook, J. T., & Barrett, K. W. (2012). Household Hardships, Public Programs, and Their Associations with the Health and Development of Very Young Children: Insights from Children's HealthWatch. *Journal of Applied Research on Children: Informing Policy for Children at Risk*, 3(1).
- Kaiser, L.L., Melgar-Quiñonez, H.R., Lamp, C.L., Johns, M.C., Sutherlin, J.M., Harwood, J.O. (2002). Food security and nutritional outcomes of preschool-age Mexican-American children. *J Am Diet Assoc*;102:924–9.
- Kearney, J. M., & McElhone, S. (1999). Perceived barriers in trying to eat healthier-- results of a pan-EU consumer attitudinal survey. *The British journal of nutrition*, 81 Suppl 2, S133–7. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/10999038>
- Kendall, A., Olson, C. M., & Frongillo, E. A. (1996). Relationship of Hunger and Food Insecurity to Food Availability and Consumption. *Journal of the American Dietetic Association*, 96(10), 1019–1024.
- Kim, D., & Leigh, J. P. (2010). Estimating the effects of wages on obesity. *Journal of Occupational and Environmental Medicine*, 52(5), 495-500.
- Kohn, M. J., Bell, J. F., Grow, H. M. G., & Chan, G. (2013). Food insecurity, food assistance and weight status in US youth: new evidence from NHANES 2007–08. *Pediatric obesity*.
- Lang, T., & Caraher, M. (2001). Is there a culinary skills transition? Data and debate from the UK about changes in cooking culture. *Journal of the HEIA*, 8(2), 2-14.
- Laraia, B. A., Siega-Riz, A. M., & Evenson, K. R. (2004). Self-reported overweight and obesity are not associated with concern about enough food among adults in New York and Louisiana. *Preventive Medicine*, 38(2), 175–181. doi:10.1016/j.ypmed.2003.09.033
- Laraia, B. A., Siega-Riz, A. M., & Gundersen, C. (2010). Household food insecurity is associated with self-reported pregravid weight status, gestational weight gain, and pregnancy complications. *Journal of the American Dietetic Association*, 110(5), 692–701. doi:10.1016/j.jada.2010.02.014

- Larson, N. I., & Story, M. T. (2011). Food insecurity and weight status among U.S. children and families: a review of the literature. *American journal of preventive medicine*, 40(2), 166–73. doi:10.1016/j.amepre.2010.10.028
- Lemmens, S. G., Rutters, F., Born, J. M., & Westterterp-Plantenga, M. S. (2011). Stress augments food “wanting” and energy intake in visceral overweight subjects in the absence of hunger. *Physiology & behavior*, 103(2), 157–63. doi:10.1016/j.physbeh.2011.01.009
- Leung, C. W., Ding, E. L., Catalano, P. J., Villamor, E., Rimm, E. B., & Willett, W. C. (2012). Dietary intake and dietary quality of low-income adults in the Supplemental Nutrition Assistance Program. *The American journal of clinical nutrition*, 96(5), 977-988.
- Leung, C. W., Williams, D. R., & Villamor, E. (2012). Very low food security predicts obesity predominantly in California Hispanic men and women. *Public Health Nutrition*, 1(1), 1-9.
- Lieberman, L. S. (2006). Evolutionary and anthropological perspectives on optimal foraging in obesogenic environments. *Appetite*, 47(1), 3–9. doi:10.1016/j.appet.2006.02.011
- Lowe, M. R., & Kral, T. V. E. (2006). Stress-induced eating in restrained eaters may not be caused by stress or restraint. *Appetite*, 46(1), 16–21. doi:10.1016/j.appet.2005.01.014
- Lucan, S. C., Karpyn, A., & Sherman, S. (2010). Storing empty calories and chronic disease risk: snack-food products, nutritive content, and manufacturers in Philadelphia corner stores. *Journal of urban health: bulletin of the New York Academy of Medicine*, 87(3), 394–409. doi:10.1007/s11524-010-9453-5
- Mancino, L. & Newman, C. (2007). Who Has Time To Cook? How Family Resources Influence Food Preparation. Economic Research Report no. ERR-40. Washington, DC: Economic Research Service, USDA. Retrieved from: http://www.ers.usda.gov/media/198978/err40_1_.pdf.
- Mancino, L., Todd, J., & Lin, B. H. (2009). Separating what we eat from where: Measuring the effect of food away from home on diet quality. *Food Policy*, 34(6), 557-562.
- Martin, M. A., & Lippert, A. M. (2012). Feeding her children, but risking her health: the intersection of gender, household food insecurity and obesity. *Social science & medicine (1982)*, 74(11), 1754–64. doi:10.1016/j.socscimed.2011.11.013

- Marues, L., Alegria, M., Becker, A. E., Chen, C. N., Fang, A., Chosak, A., & Diniz, J. B. (2011). Comparative prevalence, correlates of impairment, and service utilization for eating disorders across US ethnic groups: Implications for reducing ethnic disparities in health care access for eating disorders. *International Journal of Eating Disorders*, 44(5), 412-420.
- Mazur, R.E., Marquis, G.S., Jensen, H.H. (2003). Diet and food insufficiency among Hispanic youths: acculturation and socioeconomic factors in the third National Health and Nutrition Examination Survey. *Am J Clin Nutr*;78:1120–7.
- Medanic, D. & Pucarín-Cvetković, J. (2013). Obesity – A public health problem and challenge. *ACTA Medic Croatica*, 66(5), 347-354.
- Mello, J. A, Gans, K. M., Risica, P. M., Kirtania, U., Strolla, L. O., & Fournier, L. (2010). How is food insecurity associated with dietary behaviors? An analysis with low-income, ethnically diverse participants in a nutrition intervention study. *Journal of the American Dietetic Association*, 110(12), 1906–11. doi:10.1016/j.jada.2010.09.011
- Meyerhoefer, C. D., & Pylypchuk, Y. (2008). Does Participation in the Food Stamp Program Increase the Prevalence of Obesity and Health Care Spending?. *American Journal of Agricultural Economics*, 90(2), 287-305.
- Monteiro, C. A., Levy, R. B., Claro, R. M., de Castro, I. R. R., & Cannon, G. (2011). Increasing consumption of ultra-processed foods and likely impact on human health: evidence from Brazil. *Public health nutrition*, 14(1), 5–13. doi:10.1017/S1368980010003241
- Moore, L. V, Diez Roux, A. V, Nettleton, J. a, & Jacobs, D. R. (2008). Associations of the local food environment with diet quality--a comparison of assessments based on surveys and geographic information systems: the multi-ethnic study of atherosclerosis. *American journal of epidemiology*, 167(8), 917–24. doi:10.1093/aje/kwm394
- Mullany, B., Neault, N., Tsingine, D., Powers, J., Lovato, V., Clitso, L., & Massey, S. (2012). Food insecurity and household eating patterns among vulnerable American-Indian families: associations with caregiver and food consumption characteristics. *Public health nutrition*, 16(4), 752–60. doi:10.1017/S136898001200300X
- Neumark-Sztainer, D., Wall, M., Story, M., & Fulkerson, J. A. (2004). Are family meal patterns associated with disordered eating behaviors among adolescents? *The Journal of adolescent health : official publication of the Society for Adolescent Medicine*, 35(5), 350–9. doi:10.1016/j.jadohealth.2004.01.004

- O'Connor, D. B., Jones, F., Conner, M., Mcmillan, B., & Ferguson, E. (2008). Effects of Daily Hassles and Eating Style on Eating Behavior. *Health Psychology, 27*(No. 1 (Suppl.)), 20–31. doi:10.1037/0278-6133.27.1(Suppl.).S20
- Ogden, C. L., Carroll, M. D. (2010). Prevalence of overweight, obesity, and extreme obesity among adults: United States, Trends 1976-1980 through 2007- 2008. Retrieved from http://www.cdc.gov/nchs/data/hestat/obesity_adult_07_08/obesity_adult_07_08.pdf
- Ogden, C. L., Lamb, M. M., Carroll, M. D., & Flegal, K. M. (2010). *Obesity and Socioeconomic Status in Adults: United States, 2005-2008. NCHS data brief no. 50.* Hyattsville, MD: National Center for Health Statistics.
- Ogden, C. L., Kit, B. K., Carroll, M. D., & Park, S. (2011). Consumption of sugar drinks in the United States, 2005-2008. *NCHS data brief, (71)*, 1–8. Retrieved from <http://www.cdc.gov/nchs/data/databriefs/db71.pdf>
- Ogden, C. L., Carroll, M. D., Kit, B. K., & Flegal, K. M. (2012). *Prevalence of Obesity in the United States, 2009-2010. NCHS data brief, no. 82.* Hyattsville, MD. Retrieved from <http://www.cdc.gov.ezproxy1.lib.asu.edu/nchs/data/databriefs/db82.pdf>
- Oliver, G., Wardle, J., & Gibson, E. L. (2000). Stress and food choice: a laboratory study. *Psychosomatic medicine, 62*(6), 853–65. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/11139006>
- Olson, C. M. (1999). Nutrition and Health Outcomes Associated with Food Insecurity and Hunger. *American Society for Nutritional Sciences, 521–524.*
- Pan, L., Sherry, B., Njai, R., & Blanck, H. M. (2012). Food insecurity is associated with obesity among US adults in 12 states. *Journal of the Academy of Nutrition and Dietetics, 112*(9), 1403–9. doi:10.1016/j.jand.2012.06.011
- Parks, E. P., Kumanyika, S., Moore, R. H., Stettler, N., Wrotniak, B. H., & Kazak, A. (2012). Influence of stress in parents on child obesity and related behaviors. *Pediatrics, 130*(5), e1096–104. doi:10.1542/peds.2012-0895
- Pérez-Escamilla, R., & Putnik, P. (2007). The role of acculturation in nutrition, lifestyle, and incidence of type 2 diabetes among Latinos. *The Journal of nutrition, 137*(4), 860–70. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/17374645>
- Pérez-Escamilla, R., Hromi-Fiedler, A., Vega-López, S., Bermúdez-Millán, A., & Segura-Pérez, S. (2008). Impact of peer nutrition education on dietary behaviors and health outcomes among Latinos: A systematic literature review. *J Nutr Educ Behav, 40*(4), 208–225. doi:10.1016/j.jneb.2008.03.011. Impact

- Perez-Escamilla, R., & Segall-Correa, A. M. (2008). Food insecurity measurement and indicators. *Rev Nutr Campinas*, 21, 15–26.
- Perez-Escamilla, R. (2009). Dietary quality among Latinos: Is acculturation making us sick? *J Am Diet Assoc*, 109(6), 988–991. doi:10.1016/j.jada.2009.03.014.
- Phelan, S.T. (2009). Obesity in minority women: calories, commerce, and culture. *Obstetrics and Gynecology Clinics of North America*, 36(2):379-392.
- Pilgrim, A., Barker, M., Jackson, A., Ntani, G., Crozier, S., Inskip, H., Godfrey, K., et al. (2012). Does living in a food insecure household impact on the diets and body composition of young children? Findings from the Southampton Women's Survey. *J Epidemiol Community Health*, 66, 1–6.
- Reisig, V. M. T., & Hobbiss, A. (2000). Food deserts and how to tackle them: a study of one city's approach. *Health Education Journal*, 59(2), 137-149.
- Ricca, V., Castellini, G., Lo Sauro, C., Ravaldi, C., Lapi, F., Mannucci, E., Rotella, C. M., et al. (2009). Correlations between binge eating and emotional eating in a sample of overweight subjects. *Appetite*, 53(3), 418–21. doi:10.1016/j.appet.2009.07.008
- Rose, D. (2007). Food stamps, the Thrifty Food Plan and meal preparation: the importance of the time dimension for US Nutrition Policy. *J Nutr Educ Behav* 39, 226–232.
- Rutters, F., Nieuwenhuizen, A. G., Lemmens, S. G. T., Born, J. M., & Westerterp-Plantenga, M. S. (2009). Acute stress-related changes in eating in the absence of hunger. *Obesity (Silver Spring, Md.)*, 17(1), 72–7. doi:10.1038/oby.2008.493
- Seligman, H. K., Laraia, B. A., & Kushel, M. B. (2010). Food Insecurity Is Associated with Chronic Disease among Low-Income NHANES Participants. *American Society for Nutrition*, 304–310. doi:10.3945/jn.109.112573.number
- Schembre, S., Greene, G., & Melanson, K. (2009). Development and validation of a weight-related eating questionnaire. *Eating behaviors*, 10(2), 119–24. doi:10.1016/j.eatbeh.2009.03.006.
- Scheier, L. M. (2005). What is the hunger-obesity paradox? *Journal of the American Dietetic Association*, 105(6), 883–4, 886. doi:10.1016/j.jada.2005.04.013
- Schiller, J., Lucas, J., Ward, B., & Peregoy, J. (2012). Summary health statistics for U.S. adults: National Health Interview Survey, 2010. *National Center for Health Statistics. Vital Health Stat*, 10(252). Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/22834228>

- Sharkey, J. R., Dean, W. R., & Johnson, C. M. (2011a). Association of household and community characteristics with adult and child food insecurity among Mexican-origin households in colonias along the Texas-Mexico border. *International journal for equity in health*, *10*(1), 19. doi:10.1186/1475-9276-10-19
- Sharkey, J. R., Johnson, C. M., & Dean, W. R. (2011b). Nativity is associated with sugar-sweetened beverage and fast-food meal consumption among Mexican-origin women in Texas border colonias. *Nutrition journal*, *10*(101). doi:10.1186/1475-2891-10-101
- Sherwood, L. (2012). *Human physiology: from cells to systems*. Thomson Brooks/Cole.
- Shohaimi, S., Welch, A., Bingham, S., Luben, R., Day, N., Wareham, N., & Khaw, K.-T. (2004). Residential area deprivation predicts fruit and vegetable consumption independently of individual educational level and occupational social class: a cross sectional population study in the Norfolk cohort of the European Prospective Investigation into Cancer (EPIC-Norfolk). *Journal of epidemiology and community health*, *58*(8), 686–91. doi:10.1136/jech.2003.008490
- Sims, R., Gordon, S., Garcia, W., Clark, E., Monye, D., Callender, C., & Campbell, A. (2008). Perceived stress and eating behaviors in a community-based sample of African Americans. *Eating behaviors*, *9*(2), 137–42. doi:10.1016/j.eatbeh.2007.06.006
- Sojcher, R., Fogerite, S. G., & Perlman, A. (2012). Evidence and potential mechanisms for practices and energy psychology for obesity and binge-eating disorder. *Explore*, *8*(5), 271–276.
- Stambor, Z. (2006). Stressed out nation. *Monitor on Psychology*, *37*(4), 28-29.
- Storfer-Isser, A., & Musher-Eizenman, D. (2012). Measuring Parent Time Scarcity and Fatigue as Barriers to Meal Planning and Preparation: Quantitative Scale Development. *Journal of nutrition education and behavior*. 1-7. doi:10.1016/j.jneb.2012.08.007
- Story, M., Sherwood, N. E., Himes, J. H., Davis, M., Jr, D. R. J., Cartwright, Y., Smyth, M., et al. (2003). An after-school obesity prevention program for African-American girls: the Minnesota GEMS pilot study. *Ethnicity & Disease*, *13*, 54–64.
- Takeda, E., Terao, J., Nakaya, Y., Miyamoto, K., Baba, Y., Chuman, H., Kaji, R., et al. (2004). Stress Control and Human Nutrition. *The Journal of Medical Investigation*, *51*(5), 139–145.

- Taylor, C., Schoon, B., Crouch, C., & Talbot, K. (2011). *Maryvale Nutrition Environment Measures Survey: Availability and Affordability of Healthy Food Options in Maryvale and Canyon Corridor - Phoenix, Arizona* (pp. 1–36). Retrieved from http://slhi.org/wp-content/uploads/2011/10/MaryvaleNEMSReport_Final_1021.pdf
- Ternier, S. (2010). Understanding and measuring cooking skills and knowledge as factors influencing convenience food purchases and consumption. *Studies by Undergraduate Research at Guelph*, 3(2), 69–76.
- Townsend, M. S., Pearson, J., Love, B., Achterberg, C., & Murphy, S. P. (2001). Community and International Nutrition Food Insecurity Is Positively Related to Overweight in Women 1, 2, (September 2000), 1738–1745.
- United States Census Bureau. (2010). 2010 Census interactive population search. Retrieved from <http://www.census.gov/2010census/popmap/ipmtext.php?fl=04>
- United States Department of Agriculture (USDA) and United States Department of Health and Human Services. (2010). *Dietary Guidelines for American, 2010*. 7th Edition, Washington, DC; U.S. Government Printing Office. Retrieved from: <http://www.cnpp.usda.gov/Publications/DietaryGuidelines/2010/PolicyDoc/PolicyDoc.pdf>
- United States Department of Agriculture (USDA). (2012) *Building a Healthy America : Nutrition Assistance Program*. Retrieved from <http://www.fns.usda.gov/ora/MENU/Published/snap/FILES/Other/BuildingHealthyAmerica.pdf>
- Vorvick, L. J., Merrill D. B., Zieve, D. (2013). Binge eating. National Institutes of Health. Retrieved from <http://www.nlm.nih.gov/medlineplus/ency/article/003265.htm>.
- Vozoris, N. T., & Tarasuk, V. S. (2003). Community and International Nutrition Household Food Insufficiency Is Associated with Poorer Health. *American Society for Nutritional Sciences*, 120–126.
- Walker, R. E., Keane, C. R., & Burke, J. G. (2010). Disparities and access to healthy food in the United States: a review of food deserts literature. *Health & place*, 16(5), 876-884.
- Walker, R. E., Block, J., & Kawachi, I. (2012). Do residents of food deserts express different food buying preferences compared to residents of food oases? A mixed-methods analysis. *The international journal of behavioral nutrition and physical activity*, 9(c), 41. doi:10.1186/1479-5868-9-41

- Wallis, D. J., & Hetherington, M. M. (2004). Stress and eating: the effects of ego-threat and cognitive demand on food intake in restrained and emotional eaters. *Appetite*, 43(1), 39–46. doi:10.1016/j.appet.2004.02.001
- Wardle, J., Steptoe, a, Oliver, G., & Lipsey, Z. (2000). Stress, dietary restraint and food intake. *Journal of psychosomatic research*, 48(2), 195–202. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/10719137>
- Webb, A. L., Schiff, A., Currivan, D., & Villamor, E. (2008). Food Stamp Program participation but not food insecurity is associated with higher adult BMI in Massachusetts residents living in low-income neighbourhoods. *Public health nutrition*, 11(12), 1248–55. doi:10.1017/S1368980008002309
- Weigel, M. M., Armijos, R. X., Hall, Y. P., Ramirez, Y., & Orozco, R. (2007). The household food insecurity and health outcomes of U.S.-Mexico border migrant and seasonal farmworkers. *Journal of immigrant and minority health / Center for Minority Public Health*, 9(3), 157–69. doi:10.1007/s10903-006-9026-6
- Westerterp, K. R., & Speakman, J. R. (2008). Physical activity energy expenditure has not declined since the 1980s and matches energy expenditures of wild mammals. *International journal of obesity (2005)*, 32(8), 1256–63. doi:10.1038/ijo.2008.74
- Winham, D.M., Florian, T.A. (2010). Hispanic women in EFNEP have low adherence with dietary guidelines regardless of acculturation level. *Journal of Hunger & Environmental Nutrition*; 5(4):498-509.
- Widome, R., Neumark-Sztainer, D., Hannan, P. J., Haines, J., & Story, M. (2009). Eating when there is not enough to eat: eating behaviors and perceptions of food among food-insecure youths. *American journal of public health*, 99(5), 822–8. doi:10.2105/AJPH.2008.13975
- Wilde, P. E., McNamara, P. E., & Ranney, C. K. (2000). Food and Rural Economics Division, Economic Research Service, U.S. Department of Agriculture. Food Assistance and Nutrition Research Report Number 9. Retrieved from: http://www.ers.usda.gov/media/927363/fanrr9_002.pdf.
- Wilde, P. E., & Peterman, J. N. (2006). Community and International Nutrition Individual Weight Change Is Associated with Household Food, (December 2005), 1395–1400.
- Winkler, E., & Turrell, G. (2010). Confidence to cook vegetables and the buying habits of Australian households. *Journal of the American Dietetic Association*, 110(5 Suppl), S52–S61. doi:10.1016/j.jada.2010.03.007

- Wrieden, W. L., Anderson, A. S., Longbottom, P. J., Valentine, K., Stead, M., Caraher, M., & Dowler, E. (2002). Assisting dietary change in low-income communities: assessing the impact of a community-based practical food skills intervention (CookWell). *Food Standards Agency, London*.
- Zellner, D. A., Loaiza, S., Gonzalez, Z., Pita, J., Morales, J., Pecora, D., & Wolf, A. (2006). Food selection changes under stress. *Physiology & behavior*, 87(4), 789–93. doi:10.1016/j.physbeh.2006.01.014
- Zenk, S. N., Schulz, A. J., Hollis-Neely, T., Campbell, R. T., Holmes, N., Watkins, G., Nwankwo, R., et al. (2005). Fruit and vegetable intake in African Americans income and store characteristics. *American journal of preventive medicine*, 29(1), 1–9. doi:10.1016/j.amepre.2005.03.002

APPENDIX A

INSTITUTIONAL REVIEW BOARD APPROVAL AND INFORMATION FORM



To: Meredith Bruening

From: *for* Carol Johnston, Chair *on*
Biosci IRB

Date: 01/30/2013

Committee Action: Expedited Approval

Approval Date: 01/30/2013

Review Type: Expedited F4 F7

IRB Protocol #: 1301008723

Study Title: THE ROLE OF STRESS ON EATING BEHAVIORS and MEAL PLANNING AMONG PARENTS

Expiration Date: 01/29/2014

The above-referenced protocol was approved following expedited review by the Institutional Review Board.

It is the Principal Investigator's responsibility to obtain review and continued approval before the expiration date. You may not continue any research activity beyond the expiration date without approval by the Institutional Review Board.

Adverse Reactions: If any untoward incidents or severe reactions should develop as a result of this study, you are required to notify the Biosci IRB immediately. If necessary a member of the IRB will be assigned to look into the matter. If the problem is serious, approval may be withdrawn pending IRB review.

Amendments: If you wish to change any aspect of this study, such as the procedures, the consent forms, or the investigators, please communicate your requested changes to the Biosci IRB. The new procedure is not to be initiated until the IRB approval has been given.

Please retain a copy of this letter with your approved protocol.

INFORMATION FORM
**THE ROLE OF STRESS ON EATING BEHAVIORS and MEAL PLANNING
AMONG PARENTS**

INTRODUCTION

The purposes of this form are to provide you information that may affect your decision as to whether or not to participate in this research and to record the consent of those who agree to be involved in the study.

RESEARCHERS

Professor Meg Bruening, PhD, MPH, RD and graduate student Christina Villanova in the School of Nutrition and Health Promotion at Arizona State University have invited your participation in a research study.

STUDY PURPOSE

The purpose of the research is to gather information regarding short-term and long-term stress and its relationship to eating behaviors in parents.

DESCRIPTION OF RESEARCH STUDY

If you decide to participate, then measurements of your height and weight will be taken by a trained research staff. You will also be asked to participate in an interview conducted in Spanish or English, based on your preference. Questions asked on the survey will include questions about your eating, physical activity, meal planning and preparation, and stress levels as well as age and gender. Everything is voluntary. You can choose to skip any questions at any time. You will not be asked to provide your name.

If you agree to participate, the interview will last for approximately 20-30 minutes and you will be asked to participate in the measurements listed above.

RISKS

The only identifiable risk is that you may feel uncomfortable providing your height, weight or answering some of the survey questions. However, in any research, there is some possibility that you may be subject to risks that have not yet been identified.

BENEFITS

There are no direct benefits to participation. Indirect benefits of your participation include helping the researcher to understand the relationship of stress on eating behaviors. Information collected will be used to develop programs and interventions to decrease stress in low-income families.

CONFIDENTIALITY

All information obtained in this study is strictly confidential. The results of this research study may be used in reports, presentations, and publications, but the researchers will not identify you.

WITHDRAWAL PRIVILEGE

Participation in this study is completely voluntary. It is ok for you to say no at any time. Even if you say yes now, you are free to say no later, and withdraw from the study at any time.

COSTS AND PAYMENTS

You will receive a \$10 gift card to Walmart for participating.

	ASU IRB Approved
Sign <i>SM</i>	
Date 11/30/13 - 1/29/14	

VOLUNTARY CONSENT

Any questions you have concerning the research study or your participation in the study, before or after your consent, will be answered by Dr. Meg Bruening. Phone number: 602.827.2266

If you have questions about your rights as a subject/participant in this research, or if you feel you have been placed at risk; you can contact the Chair of the Human Subjects Institutional Review Board, through the ASU Office of Research Integrity and Assurance, at 480.965.6788.

This form explains the nature, demands, benefits and any risk of the project. Your participation is voluntary. You may choose not to participate or to withdraw your consent and discontinue participation at any time without penalty or loss of benefit. A copy of this form will be given to you.

By completing the interview you will have consented to participate in this study.

FORMA DE CONSENTIMIENTO
EL PAPEL DEL ESTRÉS EN LOS MANIERISMOS DE COMER y EL PLANIFICACIÓN DE
COMIDAS ENTRE LOS PADRES

INTRODUCCIÓN

Los propósitos de ésta forma son proveerle a usted con información que puede efectuar su decisión de participar en éste estudio de investigación, y registrar el consentimiento de los que deciden involucrarse en éste estudio.

INVESTIGADORES

La Profesora Meg Bruening, PhD, MPH, RD y estudiante de posgrado Christina Villanova en la Escuela de Nutrición y Promoción de Salud de la Universidad del Estado de Arizona han invitado a usted participar en un estudio de investigación.

PROPÓSITO DEL ESTUDIO

El propósito del estudio es coleccionar información sobre el estrés de plazo corto y plazo largo y la relación de este a manierismos de comer en padres.

DESCRIPCIÓN DEL ESTUDIO DE INVESTIGACIÓN

Si usted decide participar, entonces medidas de su altura y peso se tomarán por una persona bien calificada. También le pedirán que participe en una entrevista realizada en español o ingles, dependiente de su preferencia. Las preguntas que se hacen en la encuesta incluirán preguntas sobre lo que come, la actividad física, la planificación y preparación de comidas, nivel del estrés, y su edad y sexo. Todo es voluntario. Usted puede saltar cualquier pregunta en cualquier tiempo. No le pedirán a usted proveer su nombre.

Si usted acede participar, la entrevista demorará por aproximadamente 20-30 minutos y se le pedirán participar en las medidas y preguntas listadas arriba.

RIESGOS

Los únicos riesgos identificados son que usted podrá sentirse incomodo(a) al proveer su altura y peso o en contestar unas de las preguntas de la encuesta. Sin embargo, en cualquiera investigación, hay la posibilidad de que usted puede estar sujeto(a) a riesgos que aun no han sido identificados.

BENEFICIOS

No hay beneficios directos por su participación. Beneficios indirectos incluyen ayudar a las investigadoras a entender la relación entre el estrés y los manierismos de comer. Información que se coleccionan se utilizará para desarrollar programas y intervenciones para disminuir el estrés en las familias de ingresos bajos.

LA CONFIDENCIALIDAD

Toda información obtenida en este estudio es rigurosamente confidencial. Los resultados de éste estudio de investigación se pueden usar en informes, presentaciones, y publicaciones, sin embargo su nombre o identidad no serán revelados. Con el fin de mantener la confidencialidad de sus registros, la Doctora Bruening y Christina Villanova asegurarán que su nombre se encontrarán en ésta forma de consentimiento y su nombre no estará relacionado con ninguna otra información proveída hoy. Los datos del estudio estarán guardados en un servidor protegido con clave seguro. A éstas medidas, la confidencialidad no es absoluta.

ASU IRB Approved	
Sign	SM
Date	13013 - 1/29/12

EL PRIVILEGIO DE RETIRARSE

La participación en éste estudio es completamente voluntario. Esta bien que usted niegue participar en cualquier tiempo. Aún si acede participar ahora, usted esta libre a negar su participación luego y retirarse del estudio en cualquier tiempo.

PRECIOS Y PAGOS

Usted recibirá una tarjeta de regalo de Walmart de \$10 por su participación.

CONSENTIMIENTO VOLUNTARIO

Cualquier pregunta que usted tenga concerniente a este estudio de investigación o sobre su participación en este estudio, antes o después de su consentimiento, se contestará por la Dra. Meg Bruening. Número telefónico: 602.827.2266

Si usted tiene preguntas sobre sus derechos como un sujeto/participante de la investigación, o si siente que ha sido colocado en peligro, puede ponerse en contacto con la cátedra de la Junta de Revisión Institucional de Sujetos Humanos, a través la Oficina de Conformidad en Investigaciones de ASU, 480-965-6788.

Ésta forma explica el genero, las demandas, los beneficios y cualquier riesgo del proyecto. En firmar ésta forma se accede a sabiendas a asumir cualquier riesgo implicado. Acuérdesse de que su participación es voluntario. Usted puede elegir no participar o retirar su consentimiento y discontinuar participación en cualquier tiempo sin sanción ni perdida de beneficio. En firmar ésta forma de consentimiento, usted no renuncia ninguna reclamación, derecho ni remedio legal. Una copia de esta forma de consentimiento le será dada a usted.

APPENDIX B
ENGLISH VERSION OF SURVEY

Thank you for agreeing to participate this survey!

The questions you are about to complete are very important. There are no right or wrong answers to these questions. Please be honest with your answers and know that your survey responses will be kept confidential, as your name will **not** appear on the survey.

If something is unclear or you have a question, please ask one of the research team members.

Thank you for taking the time to complete this survey, as these findings will help us to better understand eating and stress in families and will be used to develop programs for families like you.

The following are questions about your habits...

1. During the **past week**, how many servings of fruit did you usually eat on a typical day?
(A servings is $\frac{1}{2}$ a cup of fruit or 100% fruit juice or 1 medium piece of fruit).

- Zero servings per day
- less than one serving per day
- 1 serving per day
- 2 servings per day
- 3 servings per day
- 4 servings per day
- 5 or more servings per day

2. During the **past week**, how many servings of vegetables did you usually eat on a typical day? (A servings is $\frac{1}{2}$ a cup of cooked vegetables or 1 cup of raw vegetables).

- Zero servings per day
- less than one serving per day
- 1 serving per day
- 2 servings per day
- 3 servings per day
- 4 servings per day
- 5 or more servings per day

3. During the **past week**, how often did you eat something from a fast food restaurant (like McDonald's, Burger King, etc)?

	None	1 Time	2 Times	3 Times	4 Times	5 Times	6 Times	7 Times
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4. During the **past week**, how often did you drink sugar-sweetened beverages (e.g., regular soda pop, kool-aid, sports drinks, vitamin water)?

- less than once per week
- 1 drink per week
- 2-4 drinks per week
- 5-6 drinks per week
- 1 per day
- 2 or more per day

5. In a usual week, how many hours do you spend doing the following activities?

a. Strenuous exercise (heart beats rapidly)

Examples: biking fast, aerobic dancing, running, jogging, swimming laps, rollerblading, skating, lacrosse, tennis, soccer, basketball, football

- None
- Less than ½ hour a week
- ½ – 2 hours a week
- 2 ½ - 4 hours a week
- 4 ½ - 6 hours a week
- 6+ hours a week

b. Moderate exercise (not exhausting)

Examples: walking quickly, dancing, baseball/softball, easy bicycling, volleyball, strength training

- None
- Less than ½ hour a week
- ½ – 2 hours a week
- 2 ½ - 4 hours a week
- 4 ½ - 6 hours a week
- 6+ hours a week

c. Mild Exercise (little effort)

Examples: walking slowly, bowling, golf, fishing, yoga

- None
- Less than ½ hour a week
- ½ – 2 hours a week
- 2 ½ - 4 hours a week
- 4½ - 6 hours a week
- 6 + hours a week

6. In the <u>past week</u> ...	Never	Some- times	Usually	Always
a. Vegetables were available in my home	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Vegetables were served at meals in my home	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Fruit was available in my home	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Fruit was served at meals in my home	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. Regular soda pop or other sugar sweetened drinks were available in my home	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. Regular soda pop or other sugar sweetened drinks were served at meals in my home	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. Potato chips or other salty snacks were available in my home	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h. Candy was available in my home	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

The following questions are about meal preparation and shopping in your home.

7. In the past week, how often did you prepare and cook a main meal from basic ingredients?

- Never
- 1-2 times
- 3-4 times
- 5-6 times
- 7 times
- More than 7 times

8. In the past week, how often did you cook convenience foods and ready meals? (Such as frozen dinners, heat and serve meals from the deli, etc.)

- Never
- 1-2 times
- 3-4 times
- 5-6 times
- 7 times
- More than 7 times

9. At times when there is not enough food to eat, do you use any of the following to stretch your food further? (You may select more than one answer)

- Pasta
- Potatoes
- Rice
- Other (Please specify)_____

10. Please rate how strongly you agree or disagree with the following statements.

	Strongly Agree	Agree	Disagree	Strongly Disagree
a. I don't buy many fruits because they cost too much.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. I don't buy many vegetables because they cost too much.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. At the store where I buy my groceries, the variety of fresh fruits and vegetables is limited.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. At the store where I buy my groceries, the condition of fruits and vegetables is poor.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. My family has consistent access to adequate space to store food in my home.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. My family has consistent access to a refrigerator to store food.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. My family has consistent access to a stove to prepare food.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h. My family has consistent access to a hotplate or microwave to prepare food.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

11. How often do the following situations happen for you?

	Never	Rarely	Often	Always
a. I do not have enough time or energy to feed my children "right."	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. I find time to cook meals for my children even when I am busy or tired.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. I make whatever food is handy for my children.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. When I am tired or running late, I grab something quick for dinner because my children like fast food.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. I do not have enough time or energy to cook meals for my children.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. I plan meals for my children at least 1 day in advance.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. I plan meals for my children ahead of time when I know I am going to be busy.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h. I do not have enough time or energy to plan meals for my children.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
i. I "go with the flow" and do not plan meals for my children or family.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

The next section asks you to think about your thoughts and opinions about different situations. Please rate how much you agree with the following statements. Please choose a response that best expresses how well each statement describes you.

12.		Strongly disagree	Disagree	Agree	Strongly Agree
a.	I seek new challenges.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b.	I like new or intriguing things.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c.	I think I have a high level of interest and curiosity.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d.	I like to find out about things.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e.	I think difficulties form a part of life's valuable experiences.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f.	I don't like to do unfamiliar things.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g.	I find it bothersome to start new activities.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h.	I think I can control my emotions.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
j.	I can stay calm in tough circumstances.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
k.	I make an effort to always stay calm.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
l.	I think I have perseverance.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
m.	I find it difficult not to dwell on a negative experience.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
n.	I cannot endure adversity.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
o.	My behavior varies with my daily moods.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
p.	I lose interest quickly.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
q.	I have difficulty in controlling my anger.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
r.	I am sure that good things will happen in the future.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
s.	I think I have a bright future.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
t.	I feel positive about my future.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
u.	I have a clear goal for the future.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
v.	I am striving towards my future goals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

13. Please rate how strongly you well these statements describe you.

	Not at all	Slightly	More or Less	Pretty well	Completely
a. I tend to eat more when I am anxious, worried or tense.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. I count calories as a conscious means of controlling my weight.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. When I feel lonely I console myself by eating.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. I tend to eat more food than usual when I have more available places that serve or sell food.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. I tend to eat when I am disappointed or feel let down.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. If I see others eating, I have a strong desire to eat too.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. Some foods taste so good I eat more even when I am no longer hungry.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h. When I have eaten too much during the day, I often eat less than usual the following day.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
i. I often eat so quickly I don't notice I'm full until I've eaten too much.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
j. If I eat more than usual during a meal, I try to make up for it at another meal.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
k. When I'm offered delicious food, it's hard to resist eating it even if I've just eaten.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
l. I eat more when I'm having relationship problems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
m. When I'm under a lot of stress, I eat more than I usually do.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

14. In the past year, have you ever eaten so much food in a short time that you would be embarrassed if others saw you (binge eating)?

- Yes
 No (skip to question 18)

15. During the time when you ate this way, did you feel you couldn't stop eating or control what or how much you were eating?

- Yes
 No (skip to question 18)

16. How often, on average, did you have times when you ate this way – that is, large amounts of food plus the feeling that your eating was out of control?

- Nearly every day
- A few times a week
- A few times a month
- Less than once a month

17. In general, how upset were you by overeating (eating more than you think is best for you)?

- Not at all
- A little
- Some
- A lot

18. In each question below please share with us how you felt or thought a certain way over the last month...

	Never	Almost Never	Sometimes	Fairly Often	Very Often
a. In the last month, how often have you felt that you were unable to control the important things in your life?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. In the last month, how often have you felt confident about your ability to handle your personal problems?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. In the last month, how often have you felt that things were going your way?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

19. Please indicate how often each statement was true for your household in the last 12 months:

	Often true	Sometimes true	Never true
a. The food that we bought just didn't last, and we didn't have money to get more	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. We couldn't afford to eat balanced meals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

20. **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?**
- No
 - Yes, only 1 or 2 months
 - Yes, some months but not every month
 - Yes, almost every month
21. **In the last 12 months, did you ever eat less than you felt you should because there wasn't enough money for food?**
- No
 - Yes
 - Don't know
22. **In the last 12 months, were you ever hungry but didn't eat because there was not enough money for food?**
- No
 - Yes
 - Don't know
23. **What sources does your family receive food assistance from?**
- SNAP or food stamps (money on a credit card or EBT card to buy food at a grocery store)
 - WIC (paper coupons to buy specific food at a grocery store)
 - Food pantries or food banks
 - Food kitchens, kids café, or backpack programs
 - Friends and family
 - My family does not receive any food assistance

Please take a moment to answer a few final questions about yourself...

24. What is your gender?

- Female
- Male

25. In the past year, have you participated in a nutrition program at Golden Gate Community Center?

- Yes
- No

26. How many people live in your home? _____

27. How many children under the age of 18 live in your home _____?

28. Starting with the youngest, please list the age of all children living in your household.

29. What is your age? _____

30. What is the highest degree or level of school that you have completed?

- Less than high school
- High School Graduate (received Diploma or the equivalent, GED for example)
- Completed some college credit, but no degree
- Associate's degree
- Bachelor's degree
- Master's, Professional, or Doctoral Degree

31. Which of the following best describes you? (**Check all that apply**)

- American Indian or Alaskan Native
- Asian
- Black or African American
- Hispanic or Latino/Latina
- Native Hawaiian or Pacific Islander
- White
- Other: (please describe) _____

32. What is your current marital status?

- Married
- Not married, living with significant other
- Separated
- Divorced
- Widowed
- Single/Never Married

33. What is the total income for your household in the past year?

- Less than \$20,000
- \$20,000 - \$34,000
- \$35,000 - \$49,000
- \$50,000 - \$74,000
- \$75,000 - \$99,000
- \$100,000 or more

34. If you were born outside the United States, how long have you currently been living in the United States?

- Less than 1 year
- 1-2 years
- 3-5 years
- 5-7 years
- 8-10 years
- More than 10 years
- Does not apply to me

Participant Number: _____

Thank You for Completing this Survey!