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Examining the paradox of obesity among SNAP recipients in California

A dissertation submitted in partial satisfaction of the

requirements for the degree Doctor of Philosophy

in Social Welfare

by

Jazmin Inez Zane

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ABSTRACT OF THE DISSERTATION

Examining the paradox of obesity among SNAP recipients in California

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Supplemental Nutrition Assistance Program (SNAP), historically known as the Food Stamp Program (FSP), has been an important policy to reduce hunger; however, it has also been paradoxically linked to overweight and obesity. This dissertation study examined profiles of California Food Stamp Program recipients (FSPR) in comparison to eligible non-recipients (ENR), for sociodemographics and food consumption behaviors in relation to average body mass index. FSPR were hypothesized to have a higher average BMI when compared to ENR. Two samples of data were used from the California Health Interview Survey ([CHIS]; years 2001 and 2009). The analytical sample was restricted to participants whose incomes were at or below 130% of the FPL, in order to exclude adults who were not eligible for receiving FSP benefits. Bivariate and multivariate analyses were conducted, including factorial ANOVA and regression techniques. All analyses were weighted to account for the complex sampling design of the CHIS.

Results demonstrated that FSPR and ENR are similar on most sociodemographics measured. Main effects for White and Latino ethnicities were observed in both 2001 and 2009 waves, with Whites having lower mean BMIs, and Latino participants having higher mean BMIs, than the reference groups (non-White, and non-Latino). An interaction effect was observed for education and FSP participation in the 2009 wave, with ENR who had more than a high school education having the lowest mean BMI. FSP participation significantly predicted higher mean BMI in both 2001 and 2009, controlling for age, gender, ethnicity, citizenship, food insecurity, neighborhood safety, fruit/vegetable consumption, and physical activity. Overall, results from the present dissertation study revealed that FSPR do have higher mean BMIs than ENR, but this effect of FSP participation was small. Why this phenomenon is occurring among FSPR is unclear, and is likely due to variables not found in the present datasets. Results should be viewed cautiously and do not negate the importance of the FSP in reducing hunger.

The dissertation of Jazmin Inez Zane is approved.

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2013

This dissertation is dedicated to my amazing father.

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Stein, J. A., **Zane, J. I.,** & Grella, C. (2012). Impact of abstinence self-efficacy and treatment services on physical health-related behaviors and problems among dually diagnosed patients. *Journal of Dual Diagnosis, 8,* 64-73

Zane, J. I, Flynn, E., Nasser, E., & Toy, P. (2010). *ALERT: Assessment of Local Environmental Risk Training to Reduce Health Disparities Train the Trainer Curriculum.* Los Angeles, CA: UCLA Center for Health Policy Research, Health DATA Program, ALERT Project.

Dukes, R. L., Stein, J. A., & **Zane, J. I.** (2010). Gender differences in the relative impact of physical and relational bullying on adolescent injury and weapon carrying bully-victims. *Journal of School Psychology, 48,* 511-532.

Dukes, R. L., Stein, J. A., & **Zane, J. I.** (2009). Effect of relational bullying on attitudes, behavior and injury among adolescent bullies, victims and bully-victims. *The Social Science Journal, 46,* 671-688.

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Stein, J. A., Milburn, N. G., & **Zane, J. I., &** Rotheram-Borus, M. J. (2009). Paternal and maternal influences on problem behaviors among homeless and runaway youth. *American Journal of Orthopsychiatry, 79,* 39-50.

Stein, J. A., Nyamathi, A., **Zane, J. I.** (2009). Situational, psychosocial, and physical health-related correlates of HIV/AIDS risks behaviors in homeless men. *American Journal of Men's Health, 3,* 25-35.

Warren, J. I., Stein, J. A., & Grella, C. E. (2007). Role of social support and self-efficacy in treatment outcomes among clients with co-occurring disorders. *Drug and Alcohol Dependence, 89,* 267-274.

Stein, J. A., Dukes, R., & **Warren, J. I.** (2007). Adolescent male bullies, victims, and bully-victims: A comparison of psychosocial and behavioral characteristics. *Journal of Pediatric Psychology, 32,* 273-282.

PRESENTATIONS

Zane, J. I., & Schilling, R. F. To see or not to see: Do calorie postings at fast food establishments assist patrons in making healthy food choices? 140th American Public Health Association Annual Meeting, San Francisco. October 2012.

Zane, J. I., Toy, P., Parks, A., Johnson, P., Meng, Y-Y., Scully, J., Vinetz, R., Gracian, I., Nicholas, E., Luong, J., Ornelas, H., & Wallace, S. Diminishing the health burden caused by disproportionate exposure to air pollution through local community action to change policies and practices. 140th American Public Health Association Annual Meeting, San Francisco. October 2012.

Zane, J. I., Meng, Y-Y., Gracian, I., Ponce, J., Nasser, E., Toy, P., Wallace, S. Local community research capacity building to combat poor air quality and reduce barriers towards research partnerships. Community-Campus Partnerships as a Strategy for Social Justice: Where We've Been & Where We Need to Go; April 18-21, 2012, Houston, TX

Zane, J. I., Wallace, S., Toy, P., Parks, A., Johnson, P., Meng, Y-Y., Scully, J., Vinetz, R., Gracian, I., Nicholas, E., Luong, J., & Ornelas, H. From the ground up to the sky: Bringing aging and child advocates together to expand traditional air quality coalitions. 140th American Public Health Association Annual Meeting, San Francisco. October 2012.

Zane, J. I., & Schilling, R. F. Influence of Calorie Labeling On Patrons of Fast Food Restaurants In Los Angeles. 2012 Annual Conference of the Society for Social Work and Research. January 2012.

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Chapter 1: Introduction

The Problem

The Food Stamp Program (FSP) was created by the United States Department of Agriculture (USDA) in response to food surpluses that were aggravating unemployment and consumer purchasing, and also to help combat hunger and improve the nutrition quality and food purchasing power of individuals with low-income (Food Research and Action Center [FRAC], 2001, 2010a; USDA, 2012a). While this program has been an important policy to reduce hunger, it has been paradoxically linked to overweight and obesity (see Dinour, Begen, & Yeh, 2007, for a review). Given the high rates of overweight and obesity in the United States (U.S.), the notion that FSP may be exacerbating this epidemic is disconcerting.

Background

In 2003, Dr. Richard H. Carmona, U.S. Surgeon General at the time, addressed the U.S. House of Representatives regarding a health crisis that affects every state, city, and community across the nation (U.S. Department of Health and Human Services [USDHHS], 2003). On a separate occasion, Dr. Carmona referred to this problem as the "terror within" that will destroy American society unless something is done about it (Greenstreet, 2009). Cardiologists have referred to this problem as the most profound medical crisis that the U.S. has experienced for generations (Connolly, 2003). What is this problem? Obesity.

Within the past two decades, there has been an astonishing increase in the prevalence of obesity in the U.S. According to the Centers for Disease Control and Prevention ([CDC]; 2010b), in 1990, only ten states had a 10% (or less) prevalence rate of obesity, with no states having an obesity rate greater than 15%. In 2000, one state (Colorado) had an obesity prevalence rate between 10-14%, with the rest of the U.S. falling in the 15%-19%, and 20%-24% prevalence

categories. In 2009, only one state (again, Colorado) had an obesity prevalence between 15%-19%, with the rest of the U.S. exhibiting prevalence rates within the 20%-24% and 25%-29%. Furthermore, in 2009 there were nine states with prevalence *rates greater than or equal to 30%*.

The best science to date indicates that genetic and biological factors are almost certainly not the primary cause of such of dramatic rise—a period of just two decades—in the levels of obesity and overweight among Americans (Greenstreet, 2009). Changes in lifestyle and the environment may be a major contributor to the obesity crisis. Investigators are thus shifting their focus to environmental effects on obesity, not because individual factors are not important, but because individual-level interventions have failed to change behavior (Cummins & Macintyre, 2006). This notion does not negate the importance of diet and physical activity, but asserts that the obesity epidemic goes beyond eating well and increasing physical activity, to a much larger, systemic perspective that takes into account multiple factors (such as availability of fresh affordable food, community, culture, built environment, safety, and stress) that promote a healthy environment and lifestyle.

America is characterized by "obesogenic" environments, which is defined as "the sum of influences that the surroundings, opportunities or conditions of life have on promoting obesity in individuals or populations" (Swinburn & Egger, 2006, p. 292; Swinburn, Egger, & Raza, 1999, p. 564). That is, American society is characterized by environments that promote high food intake, unhealthy foods, and physical inactivity (CDC, 2011b). The World Health Organization (WHO) states that an individual's responsibility for personal health can only have its optimal impact if that person has access to a healthy lifestyle (WHO, 2012b).

If America is obesogenic, then individuals who lack the community and financial resources to maintain a healthy lifestyle will arguably have a difficult time maintaining a healthy

desirable body weight. Communities exist throughout the U.S. that lack alternatives to fast food, a safe means for physical activity, or walkability. These communities tend to be of lower socioeconomic status or in poverty, and are disproportionately impacted by obesity (Trust for America's Health, 2011). Considering this, addressing the obesity epidemic among individuals with fewer resources poses an interesting, and complicated, challenge for policymakers, social and public health workers, and medical professionals.

Thus, government assistance programs, such as the FSP, were created for multiple purposes, but one purpose was to help alleviate these disparities that occur among those with lower incomes and fewer resources (FRAC, 2001, 2010a). As mentioned earlier, this program has been paradoxically linked to overweight and obesity—a paradox when considering that individuals participating in FSP are low-income and do not have adequate monetary resources to purchase adequate food, yet are exhibiting elevated rates of overweight and obesity. One theory as to why this occurs may involve the types of foods that FSP recipients purchase, such that they are of poor nutritional quality (e.g., calorie-dense, high in fat, or highly processed), which subsequently leads to heavier body weights (Zagorsky & Smith, 2009). Also plausible, given that historically recipients tend to live in lower income communities, is that recipients live in neighborhoods that lack the systemic resources needed to maintain a healthy lifestyle or purchase healthy foods. Studies demonstrate how lower income and minority communities and neighborhoods tend to have fewer supermarkets and reduced access to healthy foods (Beaulac, Kristjansson, & Cummins, 2009, for a review; Bodor, Rice, Farley, Swalm, & Rose, 2012; Larson, Story, and Nelson, 2009, for a review; Treuhaft & Karpyn, 2010). Some research also shows that supermarket and grocery store availability is associated with healthier diets, lower rates of obesity, and a higher intake of fruits and vegetables (Morland, Diez Roux, & Wing,

2006). However, it is not only access to healthy foods for individuals living in lower income communities, but affordability as well (Story, Kaphingst, Robinson-O'Brien, & Glanz, 2008). Fresh and organic foods cost more than processed, pre-packed foods, and are often beyond the financial resources of individuals with lower incomes.

Thus, this dissertation study aims to examine the relation of body mass index (BMI), a widely accepted indicator of adiposity, based on a ratio of one's height to one's weight [weight (kg)/height $(m)^2$]), among a representative sample of Californian adults who are receiving food stamps (FSPR) in comparison to eligible non-recipients (ENR). It is vital to examine factors beyond food consumption as they pertain to FSP participation in order to better understand the paradoxical association of FSP participation with obesity. While food consumption is an important factor to consider, as one of purposes of the FSP is to improve the nutrition quality of those with lower income, there may be other factors contributing to the FSP-obesity paradox that warrants further investigation.

Obesity & Social Workers

Historically, overweight and obesity has been viewed as a health problem. However, social workers often work directly with individuals who are receiving government assistance, and with those who are of lower incomes and underserved. Many of these individuals are struggling with obesity. Social workers are thus in a prime position to help combat the obesity epidemic, particularly among individuals with fewer resources. The National Association of Social Workers, which is part of the steering committee for Strategies to Overcome and Prevent (STOP) Obesity Alliance (http://www.stopobesityalliance.org), released the following statement regarding their role in the obesity epidemic, "Our nation's obesity epidemic is taking a severe toll on the physical and mental health of many Americans. Social workers are responding to this

crisis with creative and effective solutions that address the treatment, research, environmental, and policy aspects of this complicated public health issue," (STOP Obesity Alliance, 2012).

The goal of STOP Obesity Alliance is to move past the notion of consumer education when combating obesity, and instead focus on addressing systemic and cultural barriers that are hindering individual success. Social workers are trained in such areas, and are taught to consider micro/macro, person-in-environment, strengths-based perspectives, and social justice issues. While these factors are not unique to social welfare, these factors are central to social work values. Therefore, more obesity research from a social work lens is needed, as social workers may have useful insights and methods of investigation with respect to helping those who may be underserved and struggling with obesity or overweight.

A Google search for social work-related scholarly articles using the key words "obesity 'social work'," does not reveal much: Eliadis, 2006, and Lawrence Hazlett & Hightower, 2010 (discussed in more depth below; note, the reason for including "social work" in the search engine is that the text "obesity" or "overweight" alone will yield publications, but these are not publications in social work journals; also, it is likely that social workers are publishing obesity-related articles in other non-social work journals, such public health and obesity-focused journals). Eliadis (2006) discusses the dramatic increases in childhood obesity, and the plethora of reasons that could have led to this increase. However, this article is not a research study, but more of a summary of information that is already available. But the article does make a valid point, in that it stresses the importance of looking at obesity from a social work perspective:

> "Some might say that with the medical health risks associated with childhood obesity and the known methods to combat it, treatment and prevention should be left to physicians, dieticians, and others in the medical field, right? Wrong! Treating childhood obesity needs to be a much more comprehensive intervention than strictly nutritional counseling and treatment of comorbidities… Many fundamental principles of social work are

> essential when working to treat childhood obesity, including family systems theory, advocacy, cultural competence, and strengths-based perspective," (Eliadis, 2006 p. 86).

One important factor missing from the Eliadis (2006) are systemic issues that occur at the community or policy level. The article also focuses solely on childhood obesity, and for the most part, ignores adults. Tackling the obesity epidemic needs to occur not just within the family system, but also at the community level (such as bringing healthy lifestyle resources directly into communities, or bolstering community assets), and policy level (such as creating policies that foster healthy lifestyles, working with community-based organizations, or funding obesity prevention and programs). Children are definitely a key demographic to target, as they are the future workforce, but given that approximately 66% of American adults are either overweight or obese, social workers must target the adult demographic as well.

Lawrence et al. (2010) also focus specifically on childhood obesity, and reiterates that the obesity epidemic is complicated and is impacted by various systems. In discussing social work practice and obesity, the authors do go beyond looking at just the family system:

> "Successful intervention and prevention measures must take into account the interaction of systems. The profession of social work seeks to engage in effective collaborative primary, secondary, and tertiary prevention interventions while simultaneously contributing to larger solutions within the family system and sociopolitical environment. *Implications particularly relevant to social work practice include those at the policy, community, school, and family levels"* (emphasis added, Lawrence et al., 2010).

The implications of these two articles are that a systems approach is vital in addressing the obesity epidemic. The obesity epidemic is a complicated phenomenon, and will require the collaborative efforts across disciplines, including social welfare, to help ameliorate the epidemic. As stated by Lawrence et al. (2010):

> "Social workers contribute to the solution of this public health crisis by helping the individual child, the family, and the community. To ensure the effectiveness of

interventions, at the individual, family, and community levels, it is important for social workers to educate themselves on current prevention campaigns and take steps to implement and expand on resulting recommendations in practice."

Chapter 2: Literature Review

The previous chapter highlighted the current problem of Food Stamp Program recipients (FSPR) having higher body mass index (BMI) scores, and the importance for social workers to prioritize combating obesity, given their training and background. The current chapter will examine the literature in more depth, specifically highlighting what is associated with higher BMIs, as well as the relationship between obesity and poverty. Next is an examination of the Food Stamp Program (FSP) and how it relates to obesity, which is followed by an examination of the role of food consumption and access to healthy foods. The chapter concludes with an evaluation of the Food Choice Process Model, and how that contributed to the development of the conceptual framework for this dissertation study.

Body Mass Index (BMI) & Obesity

BMI is a number that is derived from a calculation based on a person's weight and height ([weight (kg)/height (m^2)]; CDC, 2011b). BMI is used to categorize weight status into four main categories: "underweight" is equal to a BMI score below 18.5 kg/m^2, "healthy weight" is equal to a BMI score between 18.5 and 24.9 kg/m^2 , "overweight" is equal to a BMI score between 25.0 and 29.9 kg/m^2 , and "obese" is equal to a BMI score of 30 kg/m^2 or higher. Within the obese group, individuals with a BMI score greater than or equal to 40 are considered "morbidly obese", and individuals with a BMI score greater than or equal to 50 are classified as "super obese" (Sturm, 2007).

According to the CDC (2010b), BMI is often used in research because it is a correlate of adiposity/percentage of body weight that is fat. However, it is possible to have a higher BMI, and not be overweight or obese, which is often the case with athletes (CDC, 2010b), due to increased muscle mass. Thus, other measures such as skin fold techniques have been used to assess

adiposity. However, inter-rate error for skinfolds has been observed to be higher than for height and weight measurements. Therefore, BMI is the preferred indicator of adiposity. In surveys of adult, BMI may be based on self-reports rather than physical measurements of height and weight. Studies have shown that people tend to under-report their weight, and over-report their height (see Gorber, Tremblay, Moher, & Gorber, 2007, for a review). For example, a woman who is 5'3" and weighs 145 pounds (which would give her an overweight BMI of 25.7), may report that she is 5'4" and weighs 140 pounds (which would give her a healthy BMI of 24.0). The extensive literature on elevated BMIs is indeed sobering, given the "healthy bias" built into the BMIs reported in studies based on self-reports of height and weight (Nyholm et al., 2007). Prevalence of overweight/obesity from self-reports are underestimated.

Major factors associated with obesity include, genetics, energy balance, and the environment. Historically, obesity was primarily attributed to biology and behavior; that is, genetic components contribute to an individual becoming obese (biology), and a lack of energy balance (behavior). In addition, there are several other correlates of obesity, such as health conditions and chronic stress.

Obesity and Genetics

Genes/genetics may impact the amount of fat a person stores in their body (National Heart Lung and Blood Institute, 2010). In addition, genetics in combination with the social environment also contributes to obesity. A review conducted by Martinez-Hernandez, Enriquez, Moreno-Moreno and Marti (2007) highlights how obesity arises from a deregulation at the genetic level but also through environmental exposure, including diet and physical activity. Martinez-Hernandez and colleagues argue that studies of obesity in humans have failed to find a specific "obesity gene", but that obesity arises from complex interactions between genetics and

environment. Certain ethnic groups, particularly African Americans and Latinos, have higher obesity rates when compared to whites (CDC, 2010a). However, the CDC stresses that these differences among ethnic groups are likely due to differences in: behaviors that lead to weight gain, attitudes and cultural norms related to body weight, or access to affordable, healthful foods and safe environments for physically activity. All of these factors can negatively impact diet and physical activity and subsequently obesity.

Obesity and the "Big Two"

Managing weight is based on balance (CDC, 2011a). That is, an individual must balance the number of calories consumed with the number of calories burned off (such as through physical activity; National Heart Lung and Blood Institute, 2010). A person is considered to be "in balance" if that person is eating the same number of calories that is being burned off (CDC, 2011a). This person would maintain a stable weight. A person is considered to be "in caloric excess" if that person is consuming more calories than what is being burned off. These calories are stored as fat, and this person would gain weight over time. The same is true of the reverse, such that a person is considered to be "in caloric deficit" if that person is eating fewer calories than what is being burned off. This person would lose weight over time. This notion of balancing calories has been referred to as the "Big Two" (DeNoon, 2006; see Keith et al., 2006, for a review) because of the extensive amount of research conducted on these two factors (i.e., diet and physical activity). The amount of calories one consumes and burns off can be impacted by the environment (discussed below).

Obesity and the Environment

Environmental factors are also highly associated with obesity, particularly in regards to the obesogenic environments of modern America. Investigators posit that obesogenic

environments make unhealthy choices easy, such as with high promotion and concentrations of fast food venues; high availability of energy dense foods, sugar drinks, and soda; low cost/high portion sizes of energy dense foods; and, transport systems and urban planning that inhibits physical activity or active transport and recreation (Swinburn & Egger, 2004) .

In fact, Swinburn and Egger (2004) state that obesity is perpetrated not only by obesogenic environments, but also by a series of vicious cycles that accelerate weight gain and are a major barrier to weight management. Swinburn and Egger coined this phenomenon as the "runway weight gain train" in which there are too many accelerators (e.g., obesity promoting factors) and not enough brakes (i.e., obesity prohibiting factors).

Other Contributors & Correlates to Obesity

According to the National Heart Lung and Blood Institute (2010) there are a plethora of additional factors that can contribute to overweight or obesity. Factors include health conditions, such as hypothyroidism; age, such that as one gets older they tend to gain weight; pregnancy, especially losing weight after giving birth; and emotional factors, such as overeating due to anxiety, depression, or stress. Stress, and in particular prolonged or chronic stress, elevates levels of cortisol in the body, which is associated with increased obesity (Björntorp & Rosmon, 2000; Dallman, Pecoraro, & la Fleur, 2005).

Keith and colleagues (2006) provide a review of other additional contributors to obesity, besides the Big Two, including: sleep debt (less sleep can lead to increased body weight), endocrine disruptors (these are associated with increased adiposity/fat), exposure to air pollution (may impact hormones that control body weight), decreased smoking (people tend to gain weight when quitting, because nicotine raises the rate in which the body burns calories), and medications (certain medications may have unwanted side effects including weight gain). Note

that these contributors are newer, and in some cases controversial, in association with obesity, and research on these contributors are still growing.

Some of these associations suffer from the chicken-or-the-egg argument; that is, which came first, obesity or the correlate? Or, is there another variable that is causing both? What is evident is that reversing the obesity epidemic requires a consistent and substantial reduction in caloric intake, or a considerable increase in physical activity (Alston, Mullally, Sumner, Townsend, & Vosti, 2009).

Poverty & Obesity

In contrasts to past eras, obesity is disproportionately associated with poverty and lower incomes (Molarius, Seidell, Sans, Tuomilehto, & Kuulasmaa, 2009; Townsend, 2006), and for the first time in history, more deaths are associated with being overweight rather than underweight (WHO, 2012b). Studies show that individuals from households with lower socioeconomic status tend to consume diets that are of low cost/high-fat foods, as well as sugar, potatoes, unhealthy cereals, fatty meats, and fewer whole grains, fish, vegetables, and fruit (Dittus, Hillers, & Beerman, 1995; Townsend, 2006). Furthermore, individuals with low-incomes often live in areas that contain a high number of fast food establishments and less physical access to healthier food (Larson et al., 2009; Drewnowski 2007; Drewnoski & Specter, 2004). Fast food, moreover, can be detrimental to body weight because fast food products tend to be very high in calories.

Alston and colleagues (2009) stress that food consumption is determined and impacted by preferences, product availability, prices, and income. This may make it more difficult for individuals with a lower socioeconomic status to maintain a healthy body weight. A range of studies have found that social class is associated with diet quality (see Darmon & Drewnowski

2008 for a review), specifically that lower quality diets are often consumed by groups with limited economic means, thus leading to obesity becoming a "toxic consequence" of this economic insecurity (Drewnowski, 2009). Townsend (2006) argues that it is "easier" to be overweight if an individual has a low-income, and provides two reasons for why this occurs. First, those of lower income are consuming higher energy dense foods (higher in calories and fat). Second, individuals of lower income are often food insecure (that is they lack access to access to sufficient, safe, nutritious food to maintain a healthy and active life, see WHO, 2012a), which has been shown to be positively associated with overweight (Townsend, Peerson, Love, Achterberg, & Murphy, 2001). The food insecurity obesity paradox has been extensively researched (see Dinour et al., 2007).

Federal food assistance programs, such as the FSP, are designed to help protect Americans against hunger and help combat food insecurity among individuals with low-incomes (Harrison, Sharp, Manalo-LeClair, Ramirez, & McGarvey, 2007). Jones and Frongillo (2006) examined FSP participation in relation to food insecurity and weight change among a sample of over 5000 adult women. The researchers found that among women who were persistently food insecure, a $2000 yearly increase in FSP benefits was associated with an annual weight gain of approximately 17 pounds. However, it is unclear whether this weight gain resulted in participants moving from an underweight BMI to normal, normal to overweight, or overweight to obese. Jones and Frongillo argue that it is likely that the FSP is contributing to the observed weight gain through addressing food insecurity; but the authors stress that they cannot causally conclude that this additional weight gain would eventually, over time, lead to obesity.

Regardless if the FSP contributes to obesity, the program arguably creates an opportunity for improving the nutrition of Americans (Snap to Health, 2010), and it is also an important

safety net for those who are struggling with hunger and food insecurity. Particularly in California, the FSP may help reduce high rates of food insecurity (Chaparro, Langellier, Birnbach, Sharp, & Harrison,2012).

Food Stamp Program (FSP)

In the 1920s, the U.S. was experiencing food surpluses that were exacerbating unemployment and consumer purchasing (USDA, 2012a). This resulted in the formation of the Food Surplus Commodities Corporation, which dispensed commodities by fostering domestic consumption of surpluses instead of unemployment. However, problems were found with this commodity program, and in the late 1930s, an experimental FSP began in the state of New York, in which participants were provided with stamps in order to purchase foods. Due to fraud and a lack of surplus commodities, the FSP was terminated in the 1940s. In the early 1960s, the FSP was reinstated, and in 1964, the Food Stamp Act was established, which included the goal of helping lower-income households obtain a nutritionally adequate diet. The FSP became a national program, and it is completely funded by the federal government.

The FSP is based on the assumption that "without food stamps, low-income households skimp on purchasing foods necessary for a nutritious diet in order to obtain other necessities," (Rossi, 1998, p.3). Thus, the main purpose of the FSP is to help low-income households "obtain adequate and nutritious diets by providing food coupons, which can be used only to purchase food," (Rossi, 1998, p.3). Monetary allotments given under the FSP are based on the Thrifty Food Plan (FRAC, 2012).

With the passage of the Farm Bill in 2008, the FSP was renamed "Supplemental Nutrition Assistance Program" or "SNAP." The name change reflects key changes made to the program, including optional nutrition education, which the USDA states is to "help clients learn

to make healthy eating and active lifestyle choices" (USDA, 2008). An evaluation of the original objectives of the FSP, show successful outcomes such as increased food spending and a reduction in food insecurity, (Le Blanc, Lin, & Smallwood, 2007).

States could choose to use the name SNAP or adopt a new name. In 2010, California opted to use its own name; thus the FSP became "CalFresh – Better Foods for Better Living," (California Department of Public Health, 2011; California Department of Social Services [CDSS], 2007a). The name change is meant to "capture the essence" of California, and to "bring to mind the essentials for a successful food assistance program: accessibility, simplicity, freshness, and empowerment," (California Department of Public Health, 2011, p. 1). The new name is also meant to reflect that "stamps" are no longer used, and that the program supports healthy living and California agriculture.

According to the California Department of Public Health (2011), over three million Californians receive CalFresh benefits (note 2011 Census population estimates for the state of California are around 37,600,000). Studies suggest that the CalFresh program is underutilized in California (Harrison et al., 2005; Harrison, DiSogra, Manalo-LeClair, Aguayo, & Yen, 2002) and that many eligible low-income adults who may need food assistance are not receiving benefits (DiSogra, Yen, Ramirez, & Aguayo, 2003; Harrison et al, 2007). The California Food Policy Advocates (2011) state that there was a 93% statewide increase in CalFresh utilization between the years of 2006 and 2011. Despite this increase, the USDA (2011, 2012b) ranks California *last* in participation rates when compared to all other 49 states. Possible reasons for the underutilization are that households are not aware of their eligibility, language barriers, stigma with being associated with receiving benefits, difficulties getting to benefit offices, and deterrent effects from required verifications (Chaparro et al., 2012; FRAC, 2011).

In order to qualify for benefits, the maximum gross household income cannot exceed 130% of the Federal Poverty Level ([FPL]; Rossi, 1998). Eligibility is also dependent on household size. The recipient must be a resident of the state, and either have a current bank balance (including both savings and checking) of $2,001, or a current bank balance under $3,001 if the individuals shares their household with a person over the age of 60, or with a person of any age (including the participant) that has a disability (GovBenefits.gov, 2010). The annual household income, furthermore, must be less than $14,079 for a single-person household, or less than $23,803 for a two-person household. If there are two or more people living in the household, the income cannot exceed a range from $28,665 for three-person households, to $48,113 for eight person households. If the household exceeds more than three people, there are calculations to help determine income qualifications. Table 1 summarizes the "typical" characteristics of households receiving CalFresh Benefits.

DiSogra et al. (2003) examined differences between FSPR versus ENR among Californian adults. ENR adults had slightly higher incomes, were more likely to be working, less likely to live in households with children, more likely to live in urban areas, and less likely to participate in other public assistance programs when compared with adults who were receiving benefits. This comparison was based on data from the 2001 California Health Interview Survey. But how do these two groups compare with more recent data, and has there been any differences observed over time that may help illuminate a potential pathway to explore that will help explain CalFresh underutilization? Taking all this into account, the first proposed research question is:

1. Among Californian adults eligible for receiving benefits, how do FSPR demographically (e.g., age, ethnicity, gender, citizenship) compare with ENR, between the years 2001 and 2009?

As stated earlier, beginning in 2001, FSPR no longer receive the traditional "stamps," or coupons, but obtain a benefits card (known as electronic benefits transfer [EBT]), which works in a similar fashion as a debit card (FRAC, 2010a). Recipients receive their benefits monthly, sometime between the first and tenth day of the month, with any monies left at the end of the month rolling over into the next month (CDSS, 2009). In California, EBT is accepted at most grocery stores and some farmers' markets, with more than 100 farmers' markets in California accepting EBT (California Department of Public Health, 2011). The amount each family receives differs, as monies are distributed based on income minus deductions for expenses and utilities. An average California family receives about $110 per month per person. EBT can be used to purchase food for consumption, and seeds and plants to use to grow household food (CDSS, 2007b). EBT cannot be used to purchase any non-food items (e.g., pet food, paper products, household items), alcohol or tobacco products, vitamins, medications, foods that will be eaten at the store, and foods marketed to be heated in the store.

Food Stamps & Obesity

Ver Ploeg, Mancino, and Lin, (2006) discuss the association of food stamps with obesity and BMI, highlighting the complexity of this relationship. The authors stress that food stamps could have a positive effect on weight if recipients purchase healthy foods; consequently, food stamps could contribute to weight gain if participants purchase less healthful foods. The authors also claim that individuals who receive food stamps tend to consume more meat, added sugars, and total fats, but not more fruits, vegetables, grains, and dairy products.

Ver Ploeg et al. (2006) further stress that there does not appear to be a clear causal link between food stamps and weight gain. However, more recent studies do suggest that there is a direct link between FSP participation and weight gain. Zagorsky and Smith (2009), for example,

examined BMI scores among a nationally representative sample from the National Longitudinal Survey of Youth. The National Longitudinal Survey of Youth is a longitudinal study that interviews baby boomers born between 1957 and 1964. The study examined data taken at 13 different time points between 1981 and 2002, specifically looking at BMI among those who ever received food stamp benefits versus those who never received benefits. At all 13 collection periods, obesity was more prevalent among individuals who ever received food stamps.

In a separate study, Ver Ploeg, Mancino, Lin, and Wang (2007) contend that research on the link between the FSP and BMI have relied too heavily on cross-sectional data, and again stress that there is no direct link between receiving food stamps and higher BMIs. However, Zargorsky and Smith's (2009) study does show support for a link between food stamps and higher BMIs using longitudinal data from a nationally representative sample. Even more compelling, Zargorsky and Smith also explored BMI changes before, during, and after the participant received food stamps, in order to examine if BMI increased more dramatically during FSP participation. Their results showed that BMI increased most during periods of food assistance, suggesting that receiving food stamps contributes to overweight and obesity. The authors stress that the FSP definitely reduces the problem of food insecurity, but it also inadvertently exacerbates the problem of obesity.

While results from Zargorsky and Smith (2009) are persuasive and seem to imply a direct link between food stamps and heavier body weights, the study had a small r-sqaure (0.07) and the study did not control for, or examine, diet intake or other mechanisms as to why this is occurring. Leung and Villamor (2011) did take diet into account when examining BMI and obesity among a sample of low-income adults using the 2007 California Health Interview Survey. Results from this study found that the prevalence of obesity was 30% higher among

FSPR when compared with ENR, and the phenomenon was more pronounced among men. However, they also failed to control for diet or physical activity, the most salient factors in obesity. But Leung and Villamor did examine diet with respect to program participation (FSP, SSI, and TANF), and they found that FSPR consumed significant more amounts of soda when compared with ENR of any program. Taking this study into account, the second and third research questions are:

2. Among Californian adults eligible for receiving benefits, how do selected sociodemographic variables of FSPR affect BMI between the years 2001 and 2009?
3. Among Californian adults eligible for receiving benefits, does receiving FSP benefits predict higher BMI when controlling for sociodemographics, food consumption, and physical activity?

Overall, the literature is mixed with respect to receiving food stamps and BMIs. Some research supports a link between higher BMIs and receiving food stamps (Zargorsky & Smith, 2009), other research suggests this link is vanishing (Ver Ploeg et al., 2007), a review argues that this link is flawed due to study limitations (Frongillo, 2003), other studies state that this link occurs among women but not men (Gibson, 2003, 2006), and some research suggests that this link is more pronounced among men (Leung & Villamor, 2011). Regardless, Ver Ploeg et al. (2006, 2007) raise important concerns regarding research on the relationship between FSP participation and body weight. The most common concern given is that it is dangerous to draw causal conclusions about food stamps and body weight using data from a single point in time. Given the increases in obesity and overweight within recent decades, it is important to examine if similar trends in BMI were observed among FSPR, especially when considering the argument that the FSP may be exacerbating obesity.

Therefore, the present dissertation study attempts to address these concerns by examining trend data between 2001 and 2009, and also looking at in-depth profiles and analysis of FSPR versus ENR, building off of Leung and Villmor's (2011) investigation, and by examining more interactions between sociodemographic variables and its relation to BMI and FSP while controlling for diet *and* physical activity across the different waves of data. This dissertation study will not be able to establish a causal or direct link between FSP and BMI; but, findings may help support or refute the argument that obesity is associated with FSP participation in California, and results could point to directions for future research and policy adjustments.

The Role of Diet

Earlier studies demonstrate that receiving food stamp benefits is associated with a higher nutrient intake among participants (see Butler & Raymond, 2007 for a review). Consuming nutrient dense foods (i.e., foods high in nutrients but lower in calories, such as fruits and vegetables) are associated with healthy body weights. In a study examining the effects of dietary intake on waist circumference and BMI among a sample of 459 healthy men and women, individuals who consumed high intakes of fruits, vegetables, reduced-fat dairy, and whole grains, as well as low intakes of red meat, soda, and fast food (i.e., a nutrient-dense diet), had smaller increases in BMI and waist circumference when compared with individuals who consumed high intakes of meat and potatoes, or high intakes of white bread and refined grains (Newby, et al, 2003).

According to the USDA and USDHHS (2010), the average amount of calories an individual should consume daily is dependent on their gender, physical activity level, and age. In summary, adult women should consume between 1,600 and 2,400 calories, and men should consume between 2,000 and 3,000 calories per day. As stated earlier, weight gain occurs when

people consume more calories than they can burn in a day, usually due to an energy-dense diet, rather than a diet that is lower in energy density (such as higher consumption of fruits and vegetables). Research shows that lower energy density diets, if maintained over time, reduces the prevalence of overweight and obesity (Darmon, Briend, & Drewnowski, 2004; Devitt & Matters, 2004; Rolls, Roe, Beach, & Kris-Etherton, 2005).

Despite the conflicting evidence regarding the link between the FSP and BMIs, some researchers claim that this association is due to diet intake (Kennedy, Ohls, Carlson, & Felming, 1995), arguing that programs such as the FSP have allowed recipients to spend money on foods that have little nutritional values, ultimately leading to increased obesity among the poor (Alston et al., 2009). Recent research conducted by Cole and Fox (2008) seem to support this argument. Cole and Fox examined the diet quality of Americans by FSP status using data from the National Health and Nutrition Examination Survey. Results showed that FSPR have very low intakes of nutritious vegetables and whole grains, and high intakes of saturated fat, sodium, alcoholic beverages, and added sugar. FSPR and ENR consumed diets that were significantly lower in nutrient density (i.e., they were more unhealthy, and lacked the recommended daily nutrients), when compared with higher-income non-recipients. Furthermore, FSPR were more likely than either comparison group (ENR and higher-income non-recipients) to consume foods for occasional consumption (such as cakes, pastries, sodas, pizzas; over 50% of the foods FSPR consumed were from this group) and less likely to consume foods recommended for frequent consumption (such as whole grains, raw vegetables, low-fat dairy).

What is missing from the above literature is the reason why FSPR, and in most cases their ENR, have less healthy diets when compared to higher-income non-recipients? A case could be made for food access or neighborhood safety, but what is the driving force behind

FSPR food choices? Is it merely an issue of food access, preference, or some other sociodemographic factor? The Food Choice Process Model (Sobal, Bisogni, Deving, & Jastran, 2006) provides a framework for understanding why and how people select their foods.

Food Choice Process Model

Based on in-depth qualitative interviews with adults in the U.S., and in accord with the biopsychosocial perspective (see Engel 1980), the Food Choice Process Model assumes that there are physiological, cognitive, and sociocultural influences that are involved in an individual's food choice, which influence what, when, where, with whom, and how to eat (Sobal, et al., 2006). There are three major components that interact when people create their food choice. These three components are: life course, influences, and personal food systems.

Life course refers to the notion that as people grow and develop, their environments play a key role in shaping how and what they eat (Sobal et al., 2006). Life course involves four sub-components: trajectories, transitions, timing, and contexts. A person's history, for example, affects the type of food they eat. A woman who grew up with a family tradition of eating a salad with every dinner will likely continue that in her adult life. A teenage boy who gets violently ill after eating avocado may decide to avoid that food for the rest his life. Both are examples of trajectories, i.e., thoughts, feelings, and actions that occur throughout one's life. Food choice trajectories are the driving force behind food habits and food selection. A boy who grew up in a family that is overweight and obese is arguably likely to mature into an overweight or obese adult, because this boy's food choice trajectory leads him to consume a similar diet as an adult.

Hence, one's life course can both contribute to, and hinder maintenance of, a healthy body weight. Consider two people who want to lose weight and thus decide to switch all their lunch time meals to salads. One of them grew up regularly eating salads and vegetables, and the

other grew up eating mostly carbohydrates and few salads. Switching their lunch time meals will probably be easier for the person who grew up eating salads than the person who grew up eating carbohydrates.

The second and third sub-components of life course are transitions and timing. These refer to lifestyle changes that either change, or solidify, food choice patterns (Sobal et al., 2006). For example, starting college, entering a new job, getting married, relocating, developing an illness, or becoming pregnant all can impact an individual's food choice. A mother may decide to eat healthier for her unborn baby, whereas a new college student may start to eat out more frequently.

The last sub-component of life course is context, or a person's environment including social, economical, historical, and physical environment, and how that shapes food choice (Sobal et al., 2006). A woman who grew up during the great depression arguably has a different food trajectory than her grandchildren, such that she never wastes food, but her grandchildren do not have an issue with throwing non-spoiled food away. In the present day, and amidst busy schedules and chaotic lifestyles, growing and preparing one's food is more of an anomaly, whereas this was not the case a century ago. People who immigrate to the U.S. often have a much different diet than Americans, at least initially (some researchers argue that it takes about 15 years for an immigrant's waistline to catch up to the larger American waistline; Goel, McCarthy, Phillips, & Wee, 2004).

Influences, which is the second component of the Food Choice Process Model, is the notion that an individual's ideals, personal factors, resources, social factors, and context all shape and contribute to food choice (Sobal et al., 2006). Ideals refer to the norms that people have learned through socialization, such as which foods are culturally acceptable to eat. Personal

factors are individual characteristics, such as genetics, phobias, moods, personalities, identities, sensory mechanisms, that are developed and learned overtime and help construct one's food choice. Resources refer to the assets that are available to people with respect to food choice, such as money or transportation. Social factors are the relationships that people have in place, such as family or spouse roles, which can impact food choice, for example a married couple may elect to eat all their dinners together at home. Last are contexts, which refer to the broader environment where people make their food choices, such as policies, physical surroundings, and even the climate.

Personal food system is the last component of the Food Choice Process Model, and refers to the cognitive process that people use in order to understand how different influences affect how and what they eat (Sobal et al., 2006). There are five sub-components to the personal food system, which are: taste, convenience, cost, health, and managing relationships.

One cannot negate the importance of taste with respect to food choice. People tend to eat foods that taste good. Coupled with taste is convenience, or the time and effort put into obtaining food, such as preparing food, cleaning up, transportation, and cooking skills (Sobal et al. 2006). Taste and convenience are primary reasons for why people eat fast food (Glanz, Basil, Maibach, Goldberg, & Snyder, 1998), as the food tastes goods, it is quick, and they do not have to clean up afterwards.

Cost is another key factor, as the type of food a person purchases is related to how much monetary resources are at their disposal (Sobal et al., 2006), and even if someone desires to eat fresh produce or organic foods, they may not have the monetary resources to do so. (e.g., the cost of a bundle of celery is $2.49 at Whole Foods Market, compared to McDonald's dollar menu in which one could get a hamburger and French fries for $2.00).

Health also impacts one's food choice (Sobal et al. 2006). An athlete may have a special diet to help boost performance, a person with celiac disease has to avoid foods that have gluten, some people have food allergies, and others prefer to eat a certain way to maintain good health.

Last is managing relationships, which refers to how a person considers the well-being of others when providing, sharing, or receiving food (Sobal et al., 2006). This could refer to a parent making food decisions for their children, a husband taking into account his wife's lactose intolerance, or even friends sharing a meal together and deciding on a restaurant. All of these, as well as other relationships, impact how people choose food.

In summary, food choice is an important factor with respect to maintaining a healthy desirable body weight, and many factors contribute to how a person chooses food. The notion of context, highlighted in both the life course and influences components, is extremely important. Although policies and programs, such as the FSP, may be in place to help circumvent and ameliorate some of the contextual barriers among those with lower incomes, the question remains if it is enough to foster an environment that promotes a permanent change in an individual's BMI.

Conceptual Framework

As stated earlier, the Food Choice Process Model (Sobal et al., 2006) claims that there are four major components that interact when people construct their food choice: life course, influences, and personal food systems. The conceptual framework in *Figure 1* was adapted from the Food Choice Process Model, specifically highlighting the importance of contexts, resources, and personal factors and how that impacts food consumption, and subsequently BMI. The conceptual framework presented includes variables that are available/will be examined in the

present dissertation study, and is not an exhaustive listing of factors that could contribute to increased BMI. Each piece of the conceptual framework will be discussed in more depth below.

Food Consumption – Considerable research demonstrates the importance of food consumption and body weight. As stated earlier, maintaining or losing body weight is associated with the basic principle of calories in (through eating food) must be equal to, or less than (if trying to lose weight) calories out (such as through physical activity). Nutrients (i.e., substances obtained from food such as fiber, water, good carbohydrates/sugars—those that are unprocessed, whole, naturally occurring—protein, calcium, vitamins) play an important role in health and promote growth, maintenance, and physical repair in the body (USDHHS, 2005; Boyle & Long, 2007). More than 40 different nutrients (known as essential nutrients) must be obtained from food because the body cannot make them (Boyle & Long, 2007). In general, nutrients include the following six categories: carbohydrates, fat, protein, vitamins, minerals, and water. It is important to state that calories *are not* nutrients. A calorie is simply a measurement of energy. Nutrients use energy in the body, and that is measured in calories (for example, one gram of carbohydrates=4 calories; for more information on calories and nutrition see Boyle & Long, 2007). Fruits, vegetables, lean meats, and legumes are examples of foods that are high in nutrients but low in calories.

Soda, or sugar-sweetened beverages lack nutrients and can be harmful to health and body weight, as the human body processes liquid calories differently than calories consumed in the form of solid food, which is likely due to the low satiety quality of liquids (DiMeglio & Mattes, 2000; Mattes, 1996; Vartanian, Schwartz, & Brownell, 2007). A study looking at changes in beverage intake among over 70,000 individuals using nationally representative data between the years of 1977 and 2001 found that sugar-sweetened beverages consumption increased 135%

(Nielsen & Popkin, 2001). Furthermore, in the USDA and USDHHS's (2010) *Top 25 sources of Calories among Americans*, soda is ranked fourth.

Contexts – The external environment shapes an individual's diet and lifestyle. For example, a woman may have a park in her community, but she is unable to engage in physical activity or walking outside due to neighborhood safety. Among a sample of approximately 2500 women living in 20 large U.S. cities, obesity prevalence increased as neighborhood safety decreased (Burdette, Wadden, & Whitaker, 2006). As stated earlier, access to food is also an important context for health, as well as built environments that promote physical activity and walkability, and neighborhood social support and trust (see Black & Macinko, 2008 for a review; Lake & Townshend, 2006).

Personal factors – Being human means being unique; hence, there are various individual factors that could impact diet and BMI. For example, a person who is regularly physically active may eat more fruits and vegetables to stay trim; or, an individual with a physical disability that makes it difficult to travel may elect to eat certain foods based on geographical convenience. Someone who is food insecure will likely eat fewer meals than someone who is food secure.

Resources – Expectedly, individual resources, such as income, impacts food consumption and BMI. A person who has a higher income may not have a restricted food budget, and can afford to purchase organic foods. An individual who receives FSP benefits, moreover, has more food purchasing power than an individual with the same income, but is not receiving benefits and has no extra monetary support.

Overall, food choice is not a straightforward process, and may be even more complicated for FSPR, particularly if they lack not only financial resources, but other sociodemographic resources, such as safe neighborhoods and food access. As stated early, there are mixed findings

on the relationship between FSP and BMI. Although there is evidence for low-quality diets among FSP participants when compared to ENR (Cole & Fox, 2008), and higher BMIs among FSP recipients (Zargorsky & Smith, 2009) including adults in California (Leung & Villamor, 2011), examining these factors in more depth may provide a deeper understanding and potential pathway for why this is occurring among FSPR, especially when controlling for important obesity-related correlates, such as food consumption and physical activity.

Chapter 3: Methods

This dissertation study used secondary data from the California Health Interview Survey (CHIS) to investigate the three research questions posited. CHIS (2011a) is a representative statewide random-digit-dial telephone health survey that is conducted every two years in all 58 counties of California. In order to help reduce coverage bias, and beginning in 2007, sampling included cellular phones. CHIS surveys more than 50,000 Californians, making it the largest health survey conducted in the state of California. CHIS utilizes a complex multi-stage sampling design, which is designed to meet two sampling objectives: (1) provide estimates for most counties and groups of counties with small populations; and (2) provide estimates for California's overall population, major racial and ethnic groups, and for several smaller ethnic subgroups as well (CHIS, 2011a). For the 2009 sample, Koreans and Vietnamese were oversampled, and for the 2001 sample, South Asian, Cambodian, Japanese, Korean, Vietnamese, American Indian, Alaska Natives, and selected Latinos were oversampled (CHIS, 2008, 2011a).

Once a household is selected, one adult (age 18 and over) is randomly selected to complete the survey. In households that have children (under age 12) or adolescents (ages 12-17) in residence, one adolescent and/or one child are randomly selected to complete the child and/or adolescent CHIS survey. Adolescents are interviewed directly by CHIS staff, but for children, the adult with the most knowledge about the child's health completes the survey.

Detailed information on the methodology employed by CHIS is reported elsewhere (CHIS, 2011a-b). All public data are based on self-report. UCLA Institutional Review Board (IRB) determined that this dissertation study does not meet the definition of Human Subject Research and thus does not require IRB review or approval.

This dissertation study used data from the 2001 and 2009 adult-only CHIS datasets in order to examine FSP trends over time. Few studies exist in the literature that examines the relation of BMI and receiving FSP benefits at multiple time-points. As stated earlier, obesity and overweight prevalence has increased within recent decades. Some research suggests that the FSP is exacerbating obesity. Thus, examining trends over time will help discern if obesity and overweight are also increasing among FSPR, and will also help to examine changing profiles of FSPR over time. The analytical sample was restricted to participants whose incomes were at or below 130% of the FPL (of the respective year), in order to exclude adults who were not eligible for receiving CalFresh benefits. This allowed the opportunity to examine a group of Californian adults who were currently receiving benefits with a group of ENR. Initially, the 2001 sample had 56,270 cases, which was reduced to 8,191 cases. The 2009 sample had 47,614 cases, which was reduced to 6,600 cases.

Measures

Demographics

This dissertation study examined the following demographic variables: age, gender, ethnicity, citizenship status, years in the U.S. (for non-residents), marital status, urban/rural residence, and educational attainment. Race/ethnicity consists of seven distinct ethnic groups: White, African American, Latino/Hispanic, Asian, Pacific Islander, American-Indian/Alaskan Native, and Other ethnicity/Multiple race. Pacific Islander, American-Indian/Alaskan Native, and Other Ethnicity/Multiple race were combined into one "other" group. Citizenship status was based on responses to the following question "In what country were your born?" Years in U.S. was assessed of participants who were not born in the U.S., Samoa, Guam, Puerto Rico, or the Virgin Islands. There were five categories: less than or equal to one year, two-four years, five-

nine years, 10-14 years, and greater than 15 years. Marital status was derived from the question, "Are you now married, living with a partner in a marriage-like relationship, widowed, divorced, separated, or never married?" Urban vs. rural was calculated by CHIS using the participant's zip code. Education was derived from the question "What is the highest level of education you have completed and received credit for?" There were six response categories for this variable: no formal education, less than high school, high school diploma/GED, some college/vocational/community college, college degree (4 year), and beyond college. A binary variable with "less than high school education" and "greater than high school education" was created for modeling purposes.

Socioeconomics

This dissertation study examined the following socioeconomics: household's annual income, household size, working status, medical insurance status, poverty status, food security, ability to afford balanced meals, WIC benefit status, TANF benefit status, SSI status, and FSP benefit status. Household's annual income and household size were the only continuous variables, with the exception of household's annual income in the 2001 sample. For comparison purposes, household income in 2009 was categorized into similar categories as 2001. Working status was based on responses to the following questions: "How many hours per week do you usually work?", "Which of the following were you doing last week?", "What is the main reason you did not work last week?", and "Do you usually work?" Currently insured was based on responses to various questions regarding medical insurance, such as the respondent indicating they are covered by Medicare, medi-cal, employee-based plan, plans purchased on own, through other government insurance plans, or spouse insurance.

Food security was based on the participant's poverty level (i.e., less than 200%FPL) and responses to questions, "'The food that {I/we} bought just didn't last, and {I/we} didn't have money to get more.' Was that often true, sometimes true, or never true for you and your household in the last 12 months?", "Please tell me yes or no. 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?", "In the last 12 months, did you ever eat less than you felt you should because there wasn't enough money to buy food?" and "In the last 12 months, were you ever hungry but didn't eat because you couldn't afford enough food?" Balanced meals were also based on participant's poverty level (i.e., less than 200%FPL) and response to the question, "'{I/We} couldn't afford to eat balanced meals.' Was that often true, sometimes true, or never true for you and your household in the last 12 months?"

FSP benefits, WIC, TANF, and SSI were derived from the questions: "Are you currently receiving Food Stamp benefits?", "Are you on WIC?", "Are you receiving TANF or CALWORKS?" and "Are you receiving SSI?" Note, WIC status was assessed only on adults whose total annual household income was equal to or less than 300%, and who had a child under the age of 7, or was pregnant.

Neighborhood Resources (CHIS 2009)

This dissertation study examined the following neighborhood variables: people in neighborhood willing to help each other, people in neighborhood do not get along with each other, people in neighborhood can be trusted, neighborhood watches out for children's safety, and neighborhood safety. All neighborhood items were asked of only adults who had a child under the age of 18 in their household, with the exception of neighborhood safety, which was asked of all adults. Items were assessed with the following statements: "People in my

neighborhood are willing to help each other", "People in this neighborhood generally do NOT get along with each other", "People in this neighborhood can be trusted", and "Do you feel safe in your neighborhood?" All items, except neighborhood safety, contained four response categories: strongly agree, agree, disagree, strongly disagree. Neighborhood safety response categories were: all of the time, most of the time, some of the time, and none of the time. These items were only available in the 2009 sample.

Health and Health Behaviors

This dissertation study examined the following health and health behavior variables: BMI, general health condition, smoking status, diabetes, high blood pressure, psychological distress, and disability status. BMI scores were calculated by CHIS using participant self-reported weight and height. General health was derived from the question, "Would you say that in general your health is excellent, very good, good, fair or poor?" Smoking status was based on responses to the following questions, "Altogether, have you smoked at least 100 or more cigarettes in your entire lifetime?" with response categories yes, no, refused, don't know, and the question, "Do you now smoke cigarettes every day, some days, or not at all?" with response categories every day, some days, not at all, refused, don't know. Diabetes was derived from the question, "Other than during pregnancy, has a doctor ever told you that you have diabetes or sugar diabetes?" High-blood pressure was derived from the question, "Has a doctor ever told you that you have high blood pressure?" Emotional/mental health problems within the past year (2001 sample only) were assessed with the question, "During the past 12 months, did you think you needed help for emotional or mental health problems, such as feeling sad, blue, anxious or nervous? Serious psychological distress (2009 sample only) was based on Kessler K6 scale (Kessler et al., 2002). Scores were based on responses to the following questions: "About how

often during the past 30 days did you feel nervous?", "During the past 30 days, about how often did you feel hopeless?", "During the past 30 days, about how often did you feel restless or fidgety?" , "How often did you feel so depressed that nothing could cheer you up?", "During the past 30 days, about how often did you feel that everything was an effort?" and "During the past 30 days, about how often did you feel worthless?" with response categories of all of the time, most of the time, some of the time, a little of the time, none of the time, refused, and don't know, for all of the above questions. Disability status (2009 sample only) includes mental, emotional, and physical conditions. This variable takes into account the participant's age, as well as responses to following questions: "Are you blind or deaf, or do you have a severe vision or hearing problem?", "Any difficulty learning, remembering, or concentrating?", "Any difficulty dressing, bathing, or getting around inside the home?"

Food Consumption

This dissertation examined the following food consumption variables: fruit, vegetables, fried potatoes, soda, and fast food. All food consumption variables were continuous. Participants were asked to think about the foods they ate or drank, including meals and snacks, and estimate the number of times (i.e., frequency) per day, week, and month they consumed the food item. Fruit consumption was derived from the item, "[During the past month,] how many times did you eat fruit? Do not count juices." In the 2001 sample, this item was phrased, "Not counting any juices, how often did you eat any fresh, frozen or canned fruit?" Vegetable consumption was derived from the item, "[During the past month,] how many times did you eat any *other* vegetables like green salad, green beans, or potatoes? Do not include fried potatoes." In the 2001 sample, this item was phrased, "[Over the past month,] Not counting the lettuce salads, potatoes or beans <you> told me about, and not counting rice, how often did you have any other kind of

raw, cooked, canned or frozen vegetables?" Fried potatoes was derived from the item, "[During the past month,] how many times did you eat any kind of fried potatoes, including French fries, home fries, or hash browns?" This item excludes potato chips. The 2001 sample omitted the words "any kind of fried potatoes." Soda consumption (2009 sample only) was derived from the item, "[During the past month,] how often did you drink regular soda or pop that contains sugar? Do not include diet soda." Fast food consumption (2009 sample only) was derived from the item, "Now think about the past week. In the past 7 days, how many times did you eat fast food? Include fast food meals eaten at work, at home, or at fast-food restaurants, carryout or drive through."

Physical activity

This dissertation study examined the following physical activity (PA) variables: moderate PA, vigorous PA, number of times moderately physically active, number of times vigorously physically active, number of days moderately active, and number of days vigorously active. For all PA items, participants were instructed to only include physical activities done in their free time, including exercise, sports and physically active hobbies. Moderate PA was derived from the following question: "During the last 7 days, did you do any moderate physical activities in your free time for at least 10 minutes? On how many days did you do this?" for the 2009 sample, and "Over the past 30 days, did you do any moderate activities in your free time for at least 10 minutes that caused only light sweating or a slight to moderate increase in breathing or heart rate?" for the 2001 sample. Vigorous PA was derived from the item "During the last 7 days, did you do any vigorous physical activities in your free time? On how many days did you do this?" for the 2009 sample, and "Over the past 30 days, did you do any hard or vigorous activities in your free time for at least 10 minutes that caused heavy sweating or large increases in your

breathing or heart rate?" for the 2001 sample. Number of times engaging in moderate or vigorous PA (2001 sample only) was derived from the item, "How many times per day, per week or per month did you do this over the past 30 days?" Number of days moderately or vigorously active (2009 sample only) was assessed of only adults who engaged in PA, and was based on responses to the follow-up question "On how many days did you do this?" A binary variable for engaging in any PA versus no PA was created for modeling purposes.

Data Analysis

The first research question, "Among Californian adults eligible for receiving benefits, how do FSPR demographically compare with ENR, between the years 2001 and 2009?" was examined with descriptives (means, proportions, standard errors, frequencies), *t* tests, and chi-squares.

The second research question, "Among Californian adults eligible for receiving benefits, how do selected sociodemographic variables of FSPR affect BMI between the years 2001 and 2009?" was examined with *t* tests and factorial ANOVAs. Factorial ANOVAs provided the opportunity to examine the main effects and interactions of *more than one variable* with the FSP. ANOVA testing was used to select control variables for a final regression model to test *only the FSP variable*. Thus, salient main effects and interactions will be discussed in the results chapter.

Building off of the ANOVA modeling, the third research question, "Among Californian adults eligible for receiving benefits, does receiving FSP benefits predict higher BMI when controlling for demographics, food security, poverty, food consumption, and physical activity?" was examined with a linear regression model predicting mean BMI. Residual normality was checked with a kernel density plot. Residuals appeared to be normal in both waves. All analyses were weighted to account for the complex sampling methodology of CHIS.

The CHIS Public Use Files include sample weights (see CHIS, 2010). There are 80 replicate weights (raked1-raked80) and one final weight (rakedw0), which are provided in order to make valid estimations of variance, to account for differences in sampling probabilities, and to adjust for non-response bias. The final weight accounts for the sample selection probabilities and statistical adjustments for potential undercoverage and nonresponse biases, whereas the 80 replicate weights ensure valid variance estimation in the absence of the geographical sample design information in the public use files. Using the replicate and final weight together provides estimations and variances that are unbiased and representative of the entire statewide population of adults living in households.

All analyses were conducted in STATA IC 12 statistical package (Stata Corporation, 2011), and were weighted to account for the CHIS sampling and methodology described earlier. In STATA, the dataset was survey set prior to any analyses being conducted, and all subsequent analyses were conducted with the "svy" command.[1] Cohort analyses were conducted on both waves. In addition, the two waves of CHIS data were stacked in order to examine significance among trends.

[1] The dataset was survey set with the following: "svyset [pw=rakedw0], jkrw(rakedw1-rakedw80, multiplier(1)) vce (jack) mse". For stacked analyses, the sampling weight was divided by two.

Chapter 4: Results

Demographics

CHIS 2001. Table 2 summarizes sample demographics. The mean age of the 2001 participants was 40.0 years (*SE*=0.2). Over half of the sample was between the ages of 18-24 (22.9%) and 25-44 (43.7%). Approximately 58.6% were women and 41.4% were men. The most dominant ethnic group was Latino/Hispanic (55.4%) which was followed by White (22.1%) and Asian (10.7%). Most of the participants were not born in the U.S. (60.8%), and over half of the participants had less than a high-school education. For a summary of additional demographics, see Table 13 in Appendix A.

Table 3 summarizes sample socioeconomics. Most of the 2001 sample had an annual income between $10,001 and $20,000 (50.3%), and 47.7% of the sample had incomes less than or equal to $10,000. No participant in the 2001 sample had an annual income greater than $30,000. The mean household size was 4.3 (*SE*=0.03). Most participants were unemployed (52.4%) and living in poverty (77.6%). Approximately 35.1% of participants were food insecure, and 37.2% of participants could not afford to eat balanced meals. With respect to FSP participation, 12.6% of participants were FSPR. For a summary of additional socioeconomics, see Table 13 in Appendix A.

CHIS 2009. The mean age of the 2009 participants was 41.0 (SE=0.4; see Table 2). Women comprised approximately 53.5% of the sample, whereas 46.5% were men. The most dominant ethnic group was Latino/Hispanic (47.4%), which was followed by White (20.1%) and other ethnicity/multiple race (14.4%). Most of the participants were not born in the U.S. (53.8%) and had less than a high school education (40.4%). For a summary of additional demographics, see Table 13 in Appendix A.

The mean annual household income of participants was approximately $13,000 (*SE*=235.4), with most of the sample consisting of incomes between $10,001 and $20,000 (46.7%; see Table 3). The mean household size was 4.3 (*SE*=0.1). Participants were mostly unemployed (59.6%) and living in poverty (81.6%). Approximately 47.1% of participants were food insecure, and 49.0% of participants could not afford to eat balanced meals. With respect to FSP participation, 17.8% of participants were FSPR. In regards to neighborhood safety (unique to the 2009 sample) participants reported feeling safe in their neighborhoods most of the time (30.3%) or all of the time (49.8%). See Appendix A, Tables 13-14, for a summary of additional socioeconomics and neighborhood resources.

Sociodemographic Comparison of 2001 and 2009. With respect to sociodemographics, the samples were similar. Some noteworthy differences were an increase in the proportion of participants with incomes between $20,000 and $40,000 between 2001 (in which there were only 2%) to 2009 (15%; $p<.001$). FSP participation increased approximately 5% between the two waves ($p<.001$). Food insecurity rates increased over 10% from 2001 and 2009 ($p<.001$) as well as inability to afford balanced meals between 2001 and 2009 (49.0%). Unemployment and poverty rates also increased ($p<.001$).

Health & Health Behaviors

CHIS 2001. Table 4 summarizes selected health and health behaviors. The average BMI of the 2001 participants was 27.5 (*SE*=0.1), which falls within the overweight category. Participants were either overweight or obese (52.8%), and of those who were obese, 12.3% were morbidly obese and 9.0% were super obese. Approximately 47.9% of the sample reported engaging in moderate or vigorous physical activity in the past month, an average of three times per week within the past month. Participants were predominately non-smokers (81.0%). Most

participants did not experience emotional problems within the past year (81.0%). See Table 15 in Appendix A for a summary of additional health and health behaviors.

CHIS 2009. The average BMI of the 2009 participants was 27.4 (*SE* = 0.1), which falls within the overweight category (see Table 4). Participants were either overweight or obese (59.8%). Among participants who were obese, 12.9% were morbidly obese and 4.7% were super obese. Physical activity variables were assessed differently by CHIS in 2009 (within past week versus within past month; number of days versus number of times physically active within the past week). Approximately 57.5% of the sample reported engaging in moderate or vigorous physical activity within the past week, an average of three days per week. Most of the participants were non-smokers (82.6%). Only 9.0% of participants reported experiencing serious psychological distress in the past year. See Table 15 in Appendix A for a summary of additional health and health behaviors.

Health and Health Behavior Comparison of 2001 and 2009. Although the average BMI between 2001 and 2009 was approximately the same, a greater proportion (59.8%) of participants in the 2009 sample fell within the overweight or obese category versus the 2001 sample (52.8%), and a fewer proportion of participants fell within the underweight category (see Figures 2 and 3). Despite these few differences with respect to BMI, the health and health behaviors between 2001 and 2009 participants was comparable.

Food Consumption

CHIS 2001. Figure 4 summarizes food consumption (i.e., number of times consuming) in the past month. Participants consumed fruits approximately five times, vegetables three times, and fried potatoes once per week within the past month.

CHIS 2009. Participants consumed fruits approximately seven times, vegetables six times, fried potatoes once, and soda three times per week within the past month (see Figure 4). Participants also consumed fast food once within the past week. Overweight/obese participants consumed fewer vegetables (M=4.9, SE=6.6, p<.001) and greater amounts of soda (M=4.03, SE=0.6, p<.05) per week within the past month when compared to participants who were not overweight/obese (M=6.6, SE=0.4, for vegetables; M=2.5, SE=0.1, for soda).

Food Consumption Comparison of 2001 and 2009. With respect to the food variables assessed at both waves, fruit and vegetable consumption increased slightly per week within the past month, whereas fried potatoes consumption decreased between 2001 and 2009. Participants in the 2009 sample significantly consumed more vegetables per week within the past month (M=5.6, SE=0.2) when compared to the 2001 participants (M=3.2, SE=0.04; p<.001). The 2009 participants also consumed significantly fewer fried potatoes (M=1.0, SE=0.01) per week within the past month when compared to the 2001 participants (M=1.2, SE=0.03; p <.05).

Research Question 1 Analyses

This section includes results for the first research question, "Among Californian adults eligible for receiving benefits, how do FSPR demographically compare with ENR, between the years 2001 and 2009?"

CHIS 2001. Table 5 summarizes demographic comparisons between FSPR and ENR. In the 2001 sample, there were 1,268 FSPR and 6,815 ENR. FSPR were approximately five years younger (M=35.1, SE=0.4) when compared to ENR (M=40.8, SE=0.2; p<.001). Most FSPR were between 25 and 44 years old (66.9%), with few FSPR above age 65 (1.3%). FSPR were predominantly female (75.1%), whereas ENR were more evenly distributed (males=43.8%, females=56.2%; p<.001). With respect to ethnicity, both FSPR and ENR were mostly composed

of Latino/Hispanic individuals; however, African American FSPR (14.7%) were almost double the proportion of ENR (7.1%), and White FSPR (12.7%) were approximately half the rate of ENR (23.6%; $p<.001$). FSPR and ENR consisted of roughly the same proportion for the rest of the ethnic groups. FSPR had a greater proportion of participants with less than a high-school education (63.4%) when compared to ENR (52.1%), and there were fewer participants who were college educated and beyond among the FSPR ($p<.001$). See Table 16 in Appendix A for a comparison of additional demographics between FSPR and ENR.

With respect to socioeconomics (see Table 6), most FSPR households earned less than $10,000 per year, whereas ENR households earned between $10,000 and $20,000 (NS). Household size for FSPR ($M=4.8$, $SE=0.1$) was significantly slightly higher than ENR ($M=4.2$, $SE=0.04$; $p<.001$). FSPR had a greater proportion of individuals who were unemployed (66.2%) when compared to ENR (50.6%; $p<.001$). Over 90% of FSPR and 75% of ENR were living in poverty ($p<.001$). Although both groups reported higher proportions of food insecurity, FSPR (49.1%) had a more pronounced rate when compared to ENR (33.1%; $p<.001$). FSPR (50.2%) had a greater proportion of participants who could not afford to eat balanced meals than ENR (35.3%; $p<.001$). See Table 16 in Appendix A for a comparison of additional socioeconomics between FSPR and ENR.

With respect to health and health behaviors among the CHIS 2001 sample (see Table 6; Figure 5), a greater proportion of participants who were normal weight or overweight was observed among the ENR; however, FSPR had a greater proportion of individuals who were underweight or obese ($p<.001$). FSPR had significantly higher mean BMIs ($M=29.4$, $SE=0.5$) when compared to ENR ($M=27.2$, $SE=0.1$; $p<.001$). Among participants who engaged in PA, FSPR and ENR were moderately or vigorously physically active approximately 3 times per week

within the past month (NS). FSPR had more smokers (22.8%) when compared to ENR (18.6%; $p<.05$). FSPR experienced a greater proportion of emotional problems within the past year (23.6%) when compared to ENR (18.6%; $p<.01$). FSPR engaged in a slightly lower proportion of PA in the past month (48.2%) when compared to ENR (52.6; $p<.05$). See Table 17 in Appendix A for a comparison of additional health and health behaviors between FSPR and ENR.

In regards to food consumption (see Figure 6), FSPR consumed slightly fewer fruits within the past month ($M=4.7$, $SE=0.1$) when compared to ENR ($M=5.1$, $SE=0.1$; $p<.05$). No significant difference in vegetable consumption or fried potato consumption between FSPR and ENR was observed.

CHIS 2009. Table 7 summarizes demographic comparisons between FSPR and ENR. In the 2009 sample, there were 1,216 FSPR and 5,383 ENR (note – one missing case). FSPR were approximately six years younger ($M=36.3$, $SE=0.6$) when compared to ENR ($M=42.1$, $SE=0.4$; $p<.001$). FSPR were predominantly female (63.0%), whereas ENR were more evenly distributed (males=48.6%, females=51.4%; $p<.01$). With respect to ethnicity, both FSPR and ENR were mostly composed of Latinos/Hispanics. FSPR had more African Americans and fewer Whites than ENR ($p<.01$). FSPR (49.5%) had a greater proportion of individuals with less than high school education when compared to ENR (38.4%), and there were fewer FSPR who were college educated and beyond ($p<.001$). Proportions of citizenship status were approximately the same between FSPR and ENR (NS). See Table 18 in Appendix A for a comparison of additional demographics between FSPR and ENR.

With respect to socioeconomics (see Table 8), FSPR annual income was approximately $13,000 ($SE=611.0$), and ENR annual income was also approximately $13,000 ($SE=234.2$; NS). Household size for FSPR ($M=5.1$, $SE=0.2$) was significantly slightly higher than ENR ($M=4.1$,

SE=0.1; $p<.001$). Over 90% of FSPR and 78.8% of ENR were living in poverty ($p<.001$). ENR reported greater proportions of neighborhood safety when compared to FSPR ($p<.01$). Proportions of work status, food insecurity, and ability to afford balanced meals were approximately the same between FSPR and ENR (NS). See Tables 18-19 in Appendix A for a comparison of additional socioeconomics and neighborhood resources between FSPR and ENR.

In regards to health and health behaviors (see Table 8; Figure 5), FSPR had significantly higher mean BMIs (*M*=28.1, *SE*=0.4) when compared to ENR (*M*=27.2, *SE*=0.1; $p<.05$). FSPR and ENR engaged in roughly the same proportion of physical activity within the past week (NS). FSPR had more smokers (22.1%) when compared to ENR (16.4%; $p<.05$). FSPR experienced serious psychological distress within the past year at a greater proportion (13.8%) when compared to ENR (7.7%; $p<.01$). See Table 20 in Appendix A for a comparison of additional health and health behaviors between FSPR and ENR.

With respect to food consumption among the 2009 sample, no significant differences were observed between the FSPR and ENR (see Figure 6).

FSPR and ENR Comparison, 2001 and 2009. In the 2009 sample, FSPR had a greater proportion of individuals with less than a high school education when compared to ENR, and there were fewer FSPR who were college educated and beyond; however these differences were not as pronounced as the CHIS 2001sample. Poverty proportions increased about 2% for both FSPR and ENR. Food insecurity decreased among ENR but stayed the same for FSPR between 2001 and 2009. Inability to afford balanced meals increased among ENR between 2001 and 2009, but stayed the same for FSPR.

In addition, both samples demonstrated significantly higher mean BMIs among the FSPR when compared to ENR, although this difference was not as pronounced in the 2009 sample.

ENR mean BMI (M=27.2) stayed approximately the same between 2001 and 2009. For BMI groups, both FSPR and ENR had increases in the normal and overweight categories, and decreases in the underweight category between 2001 and 2009 (Figure 5). FSPR also experienced either greater proportions of emotional problems (2001) or serious psychological distress (2009) within the past year when compared to ENR. FSPR and ENR have similar food consumption and physical activity behaviors.

Research Question 1 Summary. Figure 7 provides a summary of the FSPR and ENR profiles based on the above results. Overall, FSPR and ENR are similar on most of the items measured. Salient differences between the groups were observed for age, gender, and household size in both 2001 and 2009. FSPR and ENR displayed more differences among items measured in 2001; however, these differences were either reduced or were non-significant in 2009. No significant differences were observed between FSPR and ENR with respect to food consumption (except for fruit consumption in 2001), or physical activity.

Research Question 2 Analyses

This section includes results for the second research question, "Among Californian adults eligible for receiving benefits, how do selected sociodemographic variables of FSPR affect BMI between the years 2001 and 2009?" As mentioned in the methods chapter, only salient main effects and interactions will be presented.

CHIS 2001. Bivariate analyses revealed significant differences in mean BMI between FSPR and ENR for the age group 25-44 years, with FSPR (M=30.1, SE=0.6) demonstrating a higher/obese BMI when compared to ENR (M=27.7, SE=0.2; p<.01) who had a lower/overweight BMI. Female FSPR had significantly higher BMIs (M=29.7, SE=0.6) than female ENR (M=27.2, SE=0.2; p<.001), and White FSPR (M=27.8, SE=0.7) had BMIs

significantly higher than White ENR (M=26.2, SE=0.2; p<.05); however, all groups were within the overweight BMI category. Latino FSPR had significantly higher/obese BMIs (M=30.6, SE=0.7) when compared to Latino ENR (M=28.2, SE=0.2; p<.01) who had overweight BMIs. FSPR with no formal education had mean BMIs in the super obesity category (M=52.4, SE=9.0), which were significantly higher than ENR with no formal education (M=32.8, SE=3.8; p<.05); however, crude n=27 for this subgroup. Food insecure FSPR were obese (M=30.0, SE=0.7), which was significantly different from food insecure ENR who were overweight (M=27.8, SE=0.2; p<.01). FSPR who experienced emotional problems in the past year were also obese (M=31.3, SE=1.3), which was significantly differently from ENR who experienced emotional problems in the past year, demonstrating an overweight BMI (M=27.7, SE=0.3; p<.01). With the exception of age group greater than 65 years, mean BMI was higher among FSPR for all sociodemographics measured (see Table 21 in Appendix A for a summary of bivariate analyses).

Table 9 summarizes factorial ANOVA results of FSP participation with selected demographics, predicting mean BMI. Significant main effects were observed for age (reference=18-24 years), White ethnicity (reference=non-White), Latino ethnicity (reference=non-Latino), and education (reference=less than high school education). Mean BMI was lower for the reference group for Latino and African ethnicity, and higher for the reference groups of White and education. A significant interaction with FSP participation occurred for Asian ethnicity. Asian FSPR (M=23.7, SE=0.8) and ENR (M=23.5, SE=0.4) had lower mean BMIs when compared to non-Asian FSPR (M=30.2, SE=0.5) and ENR (M=27.7, SE=0.1; p<.05).

In regards to food consumption, a main effect of fruit consumption per week within the past month was observed, with mean BMI decreasing approximately 0.1 for every one unit increase in fruit consumption increased ($p<.05$). A similar trend was observed for vegetable consumption per week within the past month, with mean BMI decreasing approximately 0.2 for every one unit increase in vegetable consumption.

No significant main effects or interactions were observed for gender, citizenship status, poverty, experiencing emotional problems in the past year, fried potato consumption, and physical activity in the past month. All models examining main effects and interactions were controlled for age, gender, food insecurity, fruit consumption per week within past month, vegetable consumption per week within past month, and any physical activity within the past month.

CHIS 2009. Bivariate analyses revealed significant differences in mean BMI between FSPR and ENR for the age group 18-24 years, with FSPR ($M=26.6$, $SE=0.6$) demonstrating a higher/overweight BMI when compared to ENR ($M=24.9$, $SE=0.4$; $p<.05$) who had a lower/normal BMI. FSPR with some college education had significantly higher BMIs ($M=29.7$, $SE=0.6$), than ENR with college education ($M=26.0$, $SE=0.3$; $p<.001$); however, both groups had overweight BMIs. With the exception of Asian FSPR and FSPR with less than high school education, mean BMI was higher among FSPR for all sociodemographics measured (see Table 22 in Appendix A for a summary of bivariate analyses).

Table 10 summarizes factorial ANOVA results of FSP participation with selected demographics, predicting mean BMI. Significant main effects were observed for age (reference=18-24 years), White ethnicity (reference=non-White), Latino ethnicity (reference=non-Latino), and Asian ethnicity (reference=non-Asian). Participants who were

White or Asian had lower mean BMIs, and participants who were Latino had higher mean BMIs when compared to the reference group. For age groups, participants who were 18-24 years old had lower BMIs than all other age groups. A significant interaction with FSP participation occurred for education and neighborhood safety. FSPR who had greater than a high school education (M=25.7, SE=0.5) or less than a high school education (M=28.3, SE=0.6) had higher mean BMIs when compared to ENR with greater than a high school education (M=26.5, SE=0.2) and less than a high school education (M=28.2, SE=0.3; p<.05). For neighborhood safety, a significant interaction occurred for FSPR who feel safe in their neighborhoods "all of the time" (M=27.8, SE=27.5; p<.05) and for FSPR who feel safe in their neighborhoods "some of the time" (M=28.4, SE=0.8; p<.05).

In regards to food consumption, a significant main effect of vegetable consumption per week within the past month revealed a lower mean BMI of 0.1 for every one unit increase in vegetables.

No significant main effects or interactions were observed for gender, African American ethnicity, citizenship status, poverty, food insecurity, experiencing serious psychological distress in the past year, fruit consumption, fried potato consumption, and physical activity in the past month. All models examining main effects and interactions were controlled for age, gender, food insecurity, fruit consumption per week within past month, vegetable consumption per week within past month, and any physical activity within the past month.

Research Question 2 Summary. Most of the main effects observed in 2001 were still present in the 2009 sample, with the exception of African American ethnicity and food insecurity. The interaction of Asian ethnicity with FSP participation in 2001 was not present in 2009, and the interaction of education with FSP participation in 2009 was not present in 2001.

Other than these stated differences, and neighborhood safety for 2009, results were similar between the two waves.

Results from factorial ANOVAs were used to build a final regression model for the third research question. Several models had significant main effects of FSP participation, demonstrating that FSPR had higher mean BMIs when compared to ENR (see Tables 9-10). Based on salient main effects and interaction, regression models for 2001 and 2009 will control for age, food insecurity, fruit/vegetable consumption per week within past month, and any physical activity within the past month. Although the effects of gender and citizenship were not significant, the regression models will control for these variables as well. In addition, the 2009 model will control for neighborhood safety.

Research Question 3 Analyses

This section includes results for the third research question, "Among Californian adults eligible for receiving benefits, does receiving FSP benefits predict higher BMI when controlling for sociodemographics, food consumption, and physical activity?"

CHIS 2001. Table 11 shows ordinary least square regression analysis for the 2001 sample, entering FSP participation status last (see Table 23, in Appendix A for models entering FSP participation first). FSP participation significantly predicted a higher mean BMI (B=2.0, p<.001) when controlling for age, gender, ethnicity, education, citizenship status, food insecurity, poverty, fruit/vegetable consumption per week within past month, and any physical activity within the past month.

CHIS 2009. Table 12 shows ordinary least square regression analysis for the 2001 sample, entering FSP participation status last (see Table 24, in Appendix A for models entering FSP participation first). FSP participation significantly predicted a higher mean BMI (B=0.9,

$p<.05$) when controlling for age, gender, ethnicity, education, citizenship status, food insecurity, poverty, neighborhood safety, fruit/vegetable consumption per week within past month, and any physical activity within the past month.

Research Question 3 Summary. FSP participation significantly predicted higher mean BMI in both the 2001 and 2009 samples, although the effect was not as pronounced in 2009. When pooled over year, the effect of FSP on mean BMI in 2009 was statistically different from 2001 ($B=1.4$, $p<.001$; see Table 25, in Appendix A).

Chapter 5: Discussion

Research Question 1

With respect to the first research question, "Among Californian adults eligible for receiving benefits, how do FSPR demographically compare with ENR, between the years 2001 and 2009?" results demonstrate that FSPR and ENR are similar on most sociodemographics. Even though there were some differences observed in the 2001 wave with respect to age, gender, household size, these differences were either reduced or were non-significant in 2009. ENR feel safer in their neighborhoods when compared to FSPR, and half of FSPR and ENR report that they are food insecure and cannot afford to eat balanced meals, although the findings for food insecurity and balanced meals was not significant in 2009. FSPR also experienced more serious psychological distress when compared to ENR.

Approximately 95% of FSPR in the 2009 sample indicated that they were living below 99% of the FPL. The California Food Policy Advocates (2010) and the California Budget Project (2009) found similar poverty results among both the ENR and FSPR when examining household profiles. The California Budget Project also found that FSPR were more likely to live in deep poverty (i.e., below half the poverty line) when compared to the rest of the U.S.

The FSPR and ENR profiles resulting from this dissertation study, specifically the 2009 wave, have some notable differences from the California Department of Social Services (CDSS) profiles presented in chapter two of this dissertation (see Table 1). First, the education level was lower among the CHIS 2009 dataset, with most FSPR having less than a high school education, compared to CDSS profiles showing a higher proportion of FSPR household completing 12 years of education. Second, the FSPR household size (from CHIS 2009) was larger with FSPR living in a five-person household, whereas the CDSS profiles reflect a 2.5-person household.

Age and ethnicity were similar between CDSS and CHIS. These differences observed between CDSS and CHIS suggest that the FSP may not be providing enough financial resources to meet the food demands of a larger household size. Perhaps results were different due to the method in which CHIS collects FSP participation rates. CHIS assesses whether the participant is *currently participating* in the FSP, but does not determine if the participant had ever received FSP benefits, or received benefits within the past year. In regards to differences between FSPR and ENR examined by DiSogra et al. (2003), which used CHIS 2001 data, the 2009 profile from the present dissertation study was similar.

Furthermore, no significant differences were observed between FSPR and ENR with respect to food consumption (except for fruit consumption in 2001), or physical activity, which is not in alliance with the Cole and Fox (2008) study mentioned in Chapter 2. Cole and Fox state that FSPR and ENR consume diets that are low in nutrient density. In the present dissertation study, FSPR and ENR were eating fruits and vegetables a combined 14 times per week in the 2009 sample, fried potatoes once, soda three-to-four times, and fast food one-to-two times per week. While "times per week" is not the same as measuring actual servings, the present sample is consuming fruits and vegetables in greater amounts than fried potatoes, soda, or fast food. However, healthy versus unhealthy food choices were limited in the CHIS datasets, and the present investigation did not compare results to higher incomes as was done in the Cole and Fox (2008) study.

The differences between FSPR and ENR found in the present investigation do not clarify why CalFresh (FSP) is underutilized in California when compared to the rest of the U.S. (see Chaparro et al., 2012; DiSogra et al., 2003; FRAC, 2011; Harrison et al., 2007; Harrison et al., 2005; Harrison, et al., 2002; USDA, 2011, 2012b). Reasons for underutilization may go beyond

items measured in this dissertation study, such as households being unaware of their eligibility, self-selection into the FSP, stigma associated with receiving benefits, pride, cultural factors, transportation, or paperwork requirements. Furthermore, rates of utilization in the present study were lower than USDA (2012b) reported rates of 55% among eligible Californians (based on 2010 data). As stated earlier, the lower rates may be the result of the item CHIS used for collection FSP participation. Future studies should compare California profiles with other low utilization states, such as Nevada, New Jersey, or Wyoming, in order to observe if similar profiles are found. In addition, comparison to high utilization states, such as Maine, Oregon, or Vermont, should also be conducted in order to examine similarities and differences with low utilization states.

Research Question 2

For the second research question, "Among Californian adults eligible for receiving benefits, how do selected sociodemographic variables of FSPR affect BMI between the years 2001 and 2009?" again, results were similar between the two waves of data. ANOVA testing did reveal higher mean BMIs for FSPR when compared to ENR on most sociodemographic variables measured, such as age (except for greater than 65 years), White ethnicity, Latino ethnicity, African American ethnicity, education, food insecurity, and neighborhood safety.

Main effects for White and Latino ethnicities were observed in both 2001 and 2009 waves, with Whites having lower mean BMIs, and Latino participants having higher mean BMIs than the reference group. These trends are similar to other reports in the literature, as Latinos have been observed to having higher rates of obesity when compared to Whites (CDC, 2010a). However, Zhang and Wang (2004) argue that ethnic disparities found in BMI might be partially explained by confounding factors, including SES and education. In the present dissertation study,

an interaction effect was observed for education and FSP participation in the 2009 wave, with ENR who had more than a high school education having the lowest mean BMI, lending some support to Zhang and Wang's assertions.

While an in-depth analysis of FSP participation in relation to education has yet to be added to the literature, the examination of BMIs among socially disadvantaged groups (such as those with lower incomes and education) has been explored. A 15-year longitudinal study of study of non-institutionalized U.S. adults found that low-educated and low-income African American women experienced the greatest increases in BMI, when compared to high-income and high-educated white men (Ailshire & House, 2011). Results from Ailshire and House's study suggest that socially disadvantaged groups (i.e., low-income, uneducated) tend to have worse health outcomes and experience more weight gain when compared to the advantage groups. Other studies suggest that persistent exposure to chronic psychosocial stressors, especially stressors experienced by socially disadvantaged groups such as low socioeconomic status, balancing professional and personal lives, lack of social support, relationship conflicts, or stressful work environments, can impact a person's food intake, food preference, and body composition and adiposity (Das, 2013; Scott, Melhorn, & Sakai, 2012).

Additionally, there was an interaction between neighborhood safety and FSP participation, with FSPR who feel safe in their neighborhoods "all of the time" having the lowest mean BMI. Although FSP participation and neighborhood safety have not been researched extensively, considerable evidence points to higher BMIs among low-income underserved communities (Fish et al., 2010; Mobley et al., 2006; Robert & Reither, 2004). In a CDC study of approximately 2,700 low-income women screened for cardiovascular risk, crime was positively associated with higher BMIs (Mobley et al., 2006). Fish et al. (2010) examined perceived

neighborhood safety among approximately 2,600 adults with data from the Los Angeles Family and Neighborhood Survey and the U.S. Census. When compared to participants who perceived their neighborhoods as safe, those who perceived their neighborhoods as unsafe had a 2.81kg/m^2 higher BMI—roughly a 17 pound increase for a 5'4" woman.

Gender was not a significant variable in the present study, in contrast to previous research on the FSP. The present study found neither an interaction of gender with FSP for BMI, nor a significant main effect of gender for BMI. Past studies have documented overweight and obesity among female FSPR (Chen, Yen, & Eastwood, 2005; Gibson 2003, 2006; Meyerhoefer & Pylypchuk, 2008). Why gender effects were observed in the national but not California data is unknown.

Food consumption of the FSPR and ENR groups was similar; there were no significant differences in consumption for both waves, with the exception of ENR consuming more fruit in the 2001 sample. In the 2009 sample, FSPR consumed slightly more food overall than ENR. This overall larger consumption includes the unhealthy foods (i.e., soda, fast food, and fried potatoes) that were examined by CHIS. Breunig and Dasgupta (2005) suggest that FSPR may be consuming greater amounts of food in order to meet the demands of multiple-adult households. This dissertation study was not able to determine the household breakdown (e.g., number of adults versus children); however, FSPR did have approximately one more person living in their households when compared to ENR (five- versus a four-person household). The slightly larger consumption of food observed among the FSPR in the present study may be due to the extra person living in their household.

Another possible explanation for the higher food consumption among FSPR is that they are consuming greater amounts of foods in order to not "waste" their food stamp benefits for the

month. This argument, that food stamps encourage recipients to buy more food than they otherwise would not consume, has not gone unnoticed. In a testimony given to the Committee on Agriculture, Nutrition, and Forestry, Besharov (2003, p. 5), a professor from the University of Maryland, stated that, "Few experts are willing to say that federal feeding programs are making the poor fat, although the evidence points in that direction…If we want the poor to consume less food, the remedy seems simple enough: give them cash instead of food stamps, and let the make their own decision about how much to consume." In an economic analysis conducted by Whitemore (2002) using FSP data from USDA, results showed that one-half billion of the 17 billion dollars of annual food stamp spending was a "deadweight loss," an economical term used when supply and demand are not in equilibrium. Whitemore argues that providing cash instead of food stamps would be a more sensible public policy. Providing cash instead of food stamps in Whitemore's study did not negatively impact nutrition, and resulted in some participants spending less money on soda and juice.

However, the monetary allotments given under the FSP are based on the Thrifty Food Plan (FRAC, 2012, 2013). These allotments, according to USDA, are the *minimum amount* needed for a nutritious diet. But given the increasing costs of healthier foods (e.g., fresh, organic, unprocessed), the FSP arguably is not providing enough money to purchase balanced meals. In both waves of the present dissertation investigation, FSPR indicated that they were unable to afford balanced meals. Thus, providing cash may not be the best approach if the allotment in cash only matches, and does not exceed, the amount provided in the FSP.

Revisiting the conceptual framework guiding this dissertation study, results from the present investigation suggests that contexts are an important factor impacting obesity among FSPR, particularly with respect to neighborhood safety. Personal factors, resources, food

consumption, and demographics were not as strongly supported in having an impact on obesity for FSPR versus ENR, with the exception of Asian ethnicity. Asian FSPR and ENR both demonstrated lower mean BMIs when compared to all non-Asian participants. There may be an interaction occurring among Asian with other resource factors and contexts (e.g., access to healthier foods) that were not available in the present study. Future studies should examine this in more depth.

Research Question 3

Concerning the last research question, "Among Californian adults eligible for receiving benefits, does receiving FSP benefits predict higher BMI when controlling for sociodemographics, food consumption, and physical activity?", FSP participation significantly predicted higher mean BMI in both 2001 and 2009, which is in congruence with Zargorsky and Smith's (2009) investigation. However, the r-squared values of both waves were small, although higher than Zargorsky and Smith's study which reported a r-square value of 0.07. Studies conducted by Gibson (2003, 2006), in which several regression models were conducted specifically for FSP and gender, r-square values ranged from 0.077 to 0.736 (Gibson, 2003) and 0.648 to 0.805 (Gibson, 2006). Thus, even though there was a significant effect of FSP on BMI in the present dissertation study, approximately 90% of the variation was not due to participation.

Plausible alternative explanations for the higher BMIs observed among FSPR recipients could be chronic stress, culture/poverty, or the feast-famine cycle. As stated earlier, ENR feel safer in their neighborhoods when compared to FSPR, and both FSPR and ENR reported similar rates of food insecurity and inability to afford to balanced meals. FSPR also experienced more serious psychological distress than ENR. These findings, coupled with the higher rates of poverty among the FSPR, may help explain why FSPR BMI scores are higher than ENR. In a

nine-year longitudinal study examining diverse measures of psychosocial stress among 2,500 adults under the age of 65, psychosocial stress related to difficulty paying bills was associated with greater weight gain among both men and women (Block, He, Zaslavsky, Ding, & Ayanian 2009.

Those who are chronically poor arguably experience greater amounts of stress, which may explain why FSPR are somewhat heavier than ENR given their higher rates of poverty. Although food stamps should reduce some of the stress associated with finances and food insecurity, it may be that the long-term experience of poverty and its associated stressors has damaged or hindered one's ability to maintain a healthy desirable body weight. Physiological reasons for why this occurs is beyond the scope of this dissertation study, but some examples (most from animal models) for why stress leads to greater body weights include higher levels of cortisol being associated with abdominal obesity (Pasquali, Vicennati, Cacciari, & Pagotto, 2006), a complex interplay of hormones (Michel, Levin, & Dunn-Meynell, 2003), chronic inflammation (Das, 2013), and stress eating (Dallman et al., 2003; Scott et al., 2012). Psychosocial stressors experienced in childhood can also be a determinant of adult obesity (see Vámosi1, Heitmann, & Kyvik, 2010, for a review), and experiencing chronic psychosocial stress can impact food preference/consumption and adiposity (Scott et al., 2012).

Results from the present study revealed that FSPR experienced either more emotional problems (2001) or serious psychological distress (2009) within the past year when compared to ENR; however, differences in BMI between FSPR and ENR were only significant in the 2001 wave. FSPR who experienced emotional problems in the 2001 wave, moreover, had an obese mean BMI, whereas ENR had an overweight mean BMI. However, these differences were not significant in the ANOVA modeling, which may be due in part to a lack of a CHIS variable that

accurately measures chronic stress or psychosocial stressors. Future studies should examine the main effects of stress, and its interaction with FSP participation, on BMI, using a better data indictor for stress.

Another possible explanation for the higher BMI observed among FSPR is the interaction of poverty and ethnicity. Chang and Lauderdale (2005) found that income gradients in health and weight status are highly dependent on sex and ethnicity. Using four successive waves of data from National Health and Nutrition Examination Survey of adults aged 18-64 years, results from Chang and Lauderdale's study revealed that White and black women have a strong consistent inverse association between income and BMI throughout all waves, and Mexican American women had a weaker inverse relationship. Black and Mexican American men exhibited a positive relationship between income and weight status, in contrast to white men and all groups of women. Further, the authors' stress that despite the large increases in weight status among white and black women at all incomes, participants with higher incomes still maintained a distinct health advantage in terms of weight. Future studies should examine the three-way interaction of poverty, ethnicity, and FSP participation and how the interactions relate to BMI.

A third explanation for why BMI was higher among FSPR is the feast-famine cycle. Researchers posit that obesity may develop as an adaptive physiological response to cycles of binge eating when food is plentiful, with cycles of food restriction when food is less plentiful and sparse (Dinour et al., 2007; Townsend et al., 2001), a cycle referred to as the "feast-famine cycle." The feast-famine cycle has been associated with the food stamp cycle in that FSPR, especially those who are food insecure, binge eat when they receive their benefits (usually at the beginning of the month; corresponding to the "feast" portion of the cycle), which is followed by a period of food restriction once benefits run out (corresponding to the "famine" portion of the

cycle; Townsend et al., 2001). Weight gain is believed to be related to changing metabolic rates that promote fat storage, due to cycles of binge eating and restricting (Dinour et al., 2007; Dietz, 1995; Polivy, 1996). Further, binge eating tends to occur with foods that are unhealthy (i.e., "junk foods") particularly among individuals with lower incomes (Drewnowski, 2009; Drewnowski & Specter, 2004).

The Food Choice Process Model discussed in Chapter 2, highlights how life transitions and timing can impact an individual's food choice. Selecting oneself into the FSP is a new life transition, and purchasing food is dependent upon the timing of receiving benefits, as well as the amount of benefits. Therefore, a FSPR who had never participated in the FSP may purchase food items not previously considered, or may purchase more food items in order to utilize all benefits received.

In an extensive review conducted by Meyerhoefar and Yang (2011) examining food consumption patterns among FSPR, findings indicated that individuals with greater preferences for food (i.e., stronger preferences for food in general or more biological needs for food) self-select into the FSP. Once this selection is accounted for, differences in food stamp spending (versus cash income) diminish. The authors suggest that it is likely the effects of the monthly nature of benefit allocation, or the unequal distribution of benefits and cash within the recipient's household, that impact the consumption patterns of FSPR. Other investigators support this assertion, claiming that the timing of benefits leads to food shopping peaking within the first three days after reception (Wilde & Ranney, 2000), lending further support to the feast-famine cycle.

Unfortunately, data indicators in the present dissertation study did not provide the opportunity to ascertain when participants received benefits. Although the literature indicates

that the feast-famine cycle may be more pronounced among individuals experiencing food insecurity, the present dissertation investigation did not support this notion in the ANOVA or regression modeling (a main effect of food insecurity was found in the 2001 sample, but not in the 2009 sample). However, results from this dissertation study revealed that FSPR who were food insecure were also obese. Future studies should examine the food stamp benefit cycle in more depth among Californian recipients, taking into account the ethnic and poverty factors discussed above.

Policy Implications

The FSP has done much to assist with reducing hunger; however, policy changes may be needed to further reduce food insecurity and improve health overall. FRAC (2013) outlines strategies to promote healthy eating and reduce obesity among FSPR. First, FRAC suggests that an overall goal of the FSP should be to increase participation. Only three in ten people eligible for the FSP (nationally) utilize the program, and as stated earlier, California has the lowest utilization rates in the nation. FRAC suggests streamlining the application process by reducing paperwork and barriers to applying (e.g., finger imaging requirement). FRAC also recommends increasing monthly benefits, to help account for the increased cost of healthy food items, and to meet the limitations of the Thrifty Food Plan as discussed earlier. Research suggests that even FSPR who are receiving the maximum amount of benefits still cannot afford to consume adequate diets (Davis & You, 2010: Gans et al., 2010; Thayer et al., 2008). FRAC also suggests the FSP should provide incentives for purchasing fruits and vegetables, such as crediting money back to the EBT for every dollar spent on produce. However, providing incentives are not enough, as food access must also increase for this to have a long-term positive impact on health.

Finally, FRAC suggests enhancing the nutrition education component of the FSP in order to increase knowledge of healthy foods and portion sizes.

Social Work Implications

Moving forward, social workers should increase their involvement in efforts to combat obesity and overweight. Increasing healthy food access to individuals with lower-income and/or living in poverty is not enough. Social workers need to collaborate with other disciplines in order to *increase affordability* of healthy foods for FSPR, and for individuals from all income groups. Social workers can play a vital role in advocating for policy changes to the FSP, such as those suggested in the section above. Social workers are in a prime position to help improve the FSP given their training, experience, and clientele. Given their clientele, social workers are also in a leading position to help understand why ENR are not utilizing the FSP, perhaps through a qualitative study or survey of the clients that they serve. Gaining a deeper understanding of why ENR are not receiving benefits may help increase participation rates in California, and may help improve the diets of ENR and their families. The multi-disciplinary training of social workers gives them a common ground in working with individuals from medical, public health, education, psychology, urban planning, and sociological backgrounds. All these areas are needed to help combat obesity and overweight.

Limitations

This dissertation study has several limitations. First, there were a limited number of food consumption variables, and no measures to determine actual foods purchased with food stamps. The dataset did provide the opportunity to examine some foods associated with overweight and obesity, such as soda, fast food, fruits, and vegetables, but the dataset did not contain other variables to allow for a more in-depth analysis of diet. Second, the dataset did not provide a

variable or indicator to ascertain how long the participant had been in the FSP, and whether or not they participated in the nutritional education component. Third, there were a limited number of neighborhood variables. It would be ideal to examine zip codes with grocery store availability, or to use mapping to examine systemic resources, such as areas for physical activity, green space, crime, transportation, or FSP food vendors, that could be contributing to the differences observed in BMI between the FSPR and ENR. Fourth, CHIS lacked consistency in variables measured across the waves (for example, the 2001 wave lacked a physical activity variables that match later waves), and there was a lack of indicators, such as chronic stress, that could assist with understanding the higher BMI observed among FSPR. Fifth, the present study used trend data. A future investigation should use longitudinal data, following FSPR over time in order to capture data before, during, and after participation in the FSP if possible.

Finally, the FSP utilization rates were much lower in the present dissertation study than what is reported by the USDA for California FSPR, and results may not generalize to the larger population. These lower rates observed with the CHIS data may be the result of how CHIS collects data for this item, as it only assesses current utilization, and not utilization in the past year. Perhaps CHIS should consider rephrasing this item to "Have you received FSP/SNAP benefits in the past year?" with follow-up questions to assess if the participant is still currently receiving benefits, and how long the participants has received benefits.

Summary

Overall, results revealed that FSPR have higher mean BMIs than ENR, but this effect of FSP participation was small in the regression models, and differences were less pronounced over time. Stacked analysis revealed no time effect, despite general increases in obesity. ANOVA testing showed higher mean BMIs for FSPR across most sociodemographic variables, mildly

suggesting that there may in fact be something about receiving, or *choosing* to receive, benefits that contribute to higher BMIs among recipients. Why this phenomenon is occurring among FSPR is unclear, and is likely due to variables unavailable in the present datasets. Results should be viewed cautiously given the limitations to the present study and small r-square values. Study findings focused on BMI as an outcome, without regard to the obvious importance of the FSP in reducing hunger.

Chapter 6: Conclusions

The previous chapter highlighted that FSPR and ENR are similar on most sociodemographics. Some notable differences were that ENR feel safer in their neighborhoods, have lower proportions of poverty and psychological distress, and have lower mean BMIs when compared to FSPR. But, results from this dissertation do not strongly support the assertion that there is a direct link between the FSP and obesity or overweight, which is similar to assertions made by Ver Ploeg et al. (2006, 2007).

Thus the question remains—is there really something about receiving, or choosing to receive, food stamps that leads to obesity? FSPR are self-selected. The process of self-selecting into the FSP may help explain the BMI differences observed between FSPR and ENR. However, FSPR self-selection is not fully understood, nor why ENR choose not to receive to benefits, besides the barriers to utilization discussed earlier. Plausibly, the stigma associated with receiving benefits or unknown cultural factors may prevent individuals from participating in the FSP. Arguably, the obesity/FSP phenomenon is as complex as the obesity epidemic, in that there is no one clear factor to explain obesity and overweight among FSPR.

Perhaps poverty, and the disproportionate exposure to stressors that individuals living in poverty experience, is the driving factor. A vicious cycle may be occurring, in which the systemic and micro stressors associated with poverty, such as not knowing how or when to pay bills, or exposure to crime, litter, air pollution, and violence, could impact an individual's ability and internal mechanism to maintain a healthy body weight. These social environmental factors might have a more profound effect on body weight than solely individual socioeconomic status (Wang & Beydoun, 2007). Exposure to chronic social environmental stressors could also impact the individual's food choices, as found in the Food Choice Process Model discussed in Chapter

2. Various contexts, resources, and personal factors may all interact with one another, thus impacting one's food choices or the food one purchases with food stamps.

The Food Research and Action Center ([FRAC], 2010b) gives six reasons for why low-income and food insecure people are vulnerable to being overweight or obese: 1) limited resources and lack of access to healthy, affordable foods; 2) fewer opportunities for physical activity; 3) cycles of food deprivation and overeating; 4) higher levels of stress; 5) greater exposure to marketing of obesity promoting products; and 6) limited access to health care. FRAC (2010b) also stresses that obesity occurs among food insecure and low-income people, in part, for the exact same reasons that it occurs among all Americans; that is, Americans have a sedentary lifestyle, low quality diets, and increased portions. Hence, what is needed to combat this trend in obesity, according to Sturm (2007) are interventions to counter obesogenic environments.

Efforts to help "explain" the obesity/FSP paradox should arguably focus on ameliorating the obesity epidemic overall, and the social disparities associated with the epidemic. Link and Phelan (1995) have argued that there are "fundamental causes" that are persistent and maintain overtime despite efforts to eliminate them, because the individual lacks the resources needed to avoid the negative consequences of the disease, which in this case is obesity. Research on the obesity/FSP paradox is not in vain, per se, but could the focus be shifting away from the "fundamental cause" of obesity in America? As Link and Phelan (1995, p. 81) stated,

> "Even if one effectively modifies intervening mechanisms or eradicates some diseases, an association between a fundamental cause and disease will reemerge. As such, fundamental causes can defy efforts to eliminate their effects when attempts to do so focus solely on the mechanisms that happen to link them to disease in a particular situation."

Even if the FSP is a "linking mechanism" that is contributing to obesity, the FSP has done much to reduce hunger, and should not be discredited. The FSP has provided access to additional nutritional or economic resources for those who select into the program (Krueger, Rogers, Ridao-Cano, Hummer, 2004). Policy adjustments may be needed in order to continue to reduce hunger, *and* improve health as well. As Besharov (2003, p. 9) stated, "Federal feeding programs may be only a small part of the cause of America's growing weight problem, but they urgently need to be part of the cure."

Figure 1

Conceptual framework of the relationship between food stamps, contexts, resources, and personal factors on food consumption and BMI

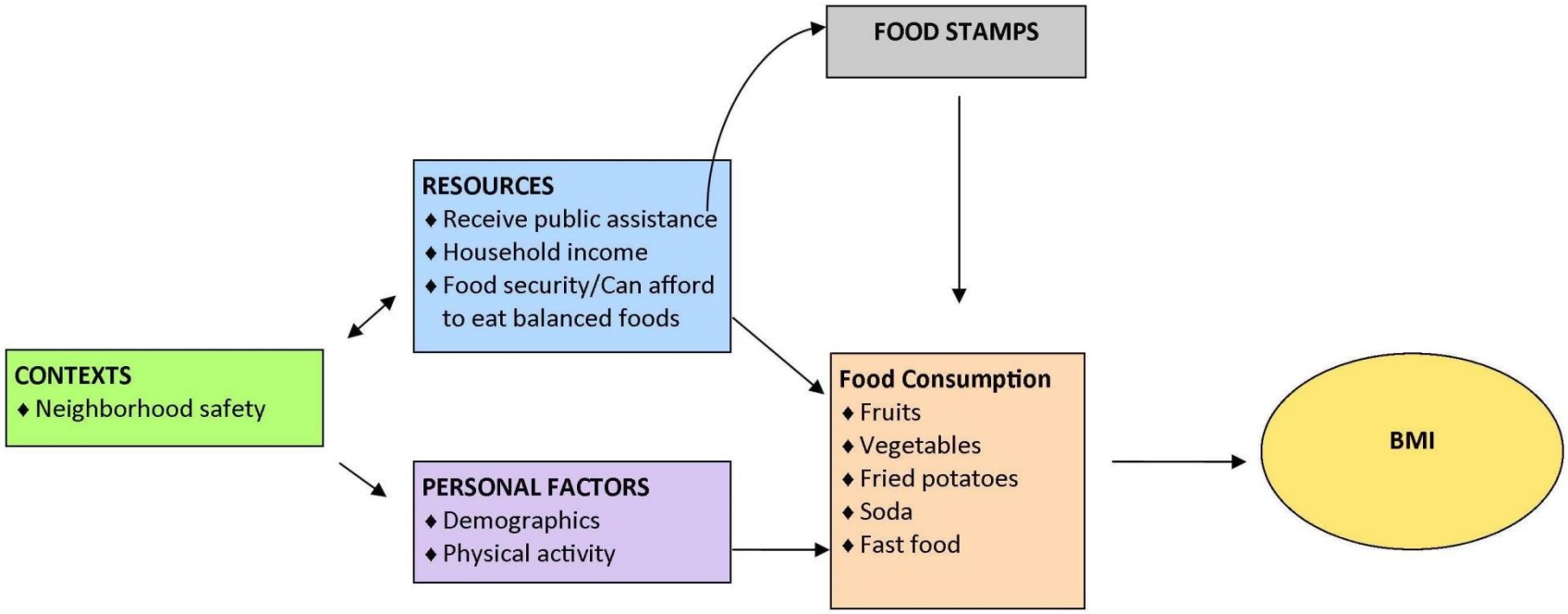
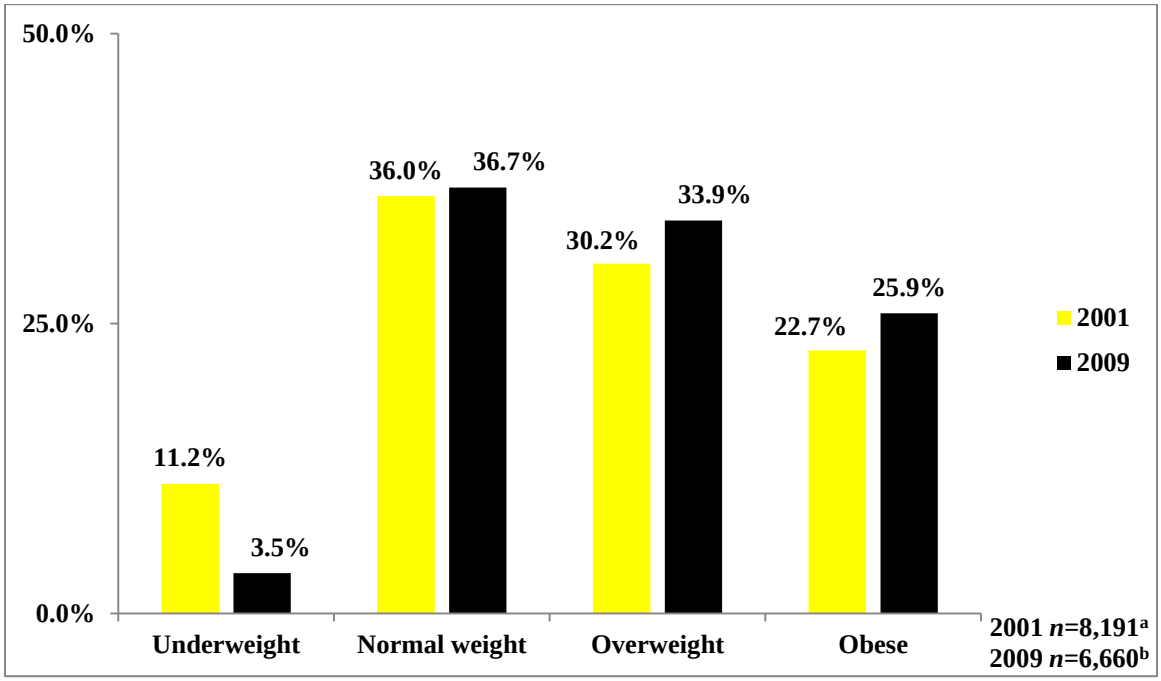


Figure 2

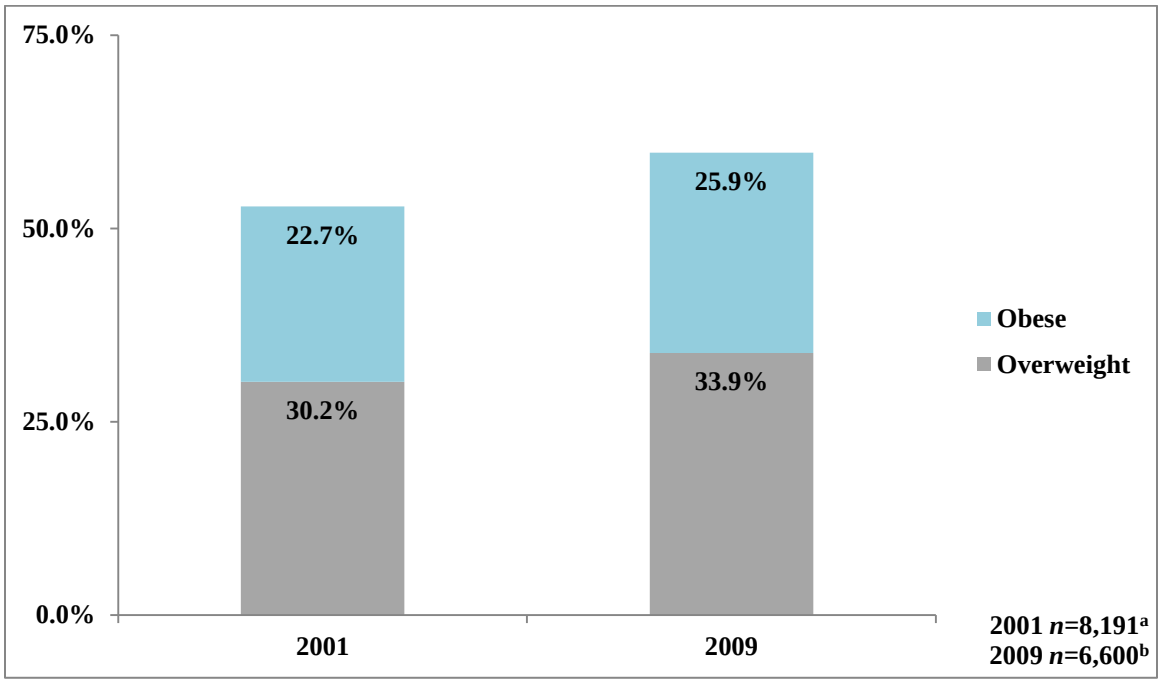
Weighted proportions of body mass index (BMI) category by year, 2001 and 2009 samples



BMI: Body mass index.
[a]Crude *n:* 8,191; weighted *n:* 4,546,963.
[b]Crude *n:* 6,600; weighted *n:* 5,258,228.
Data source: California Health Interview Survey 2001, 2009. All proportions are weighted. Chi-square analyses revealed a significant difference between years (2001 and 2009) and BMI group ($p<.001$). Underweight represents participants with a BMI<18.49; normal weight represents participants with a BMI between 18.50-24.99; overweight represents participants with a BMI between 25.0-29.99; and, obese represents participants with a BMI>30.0.

Figure 3

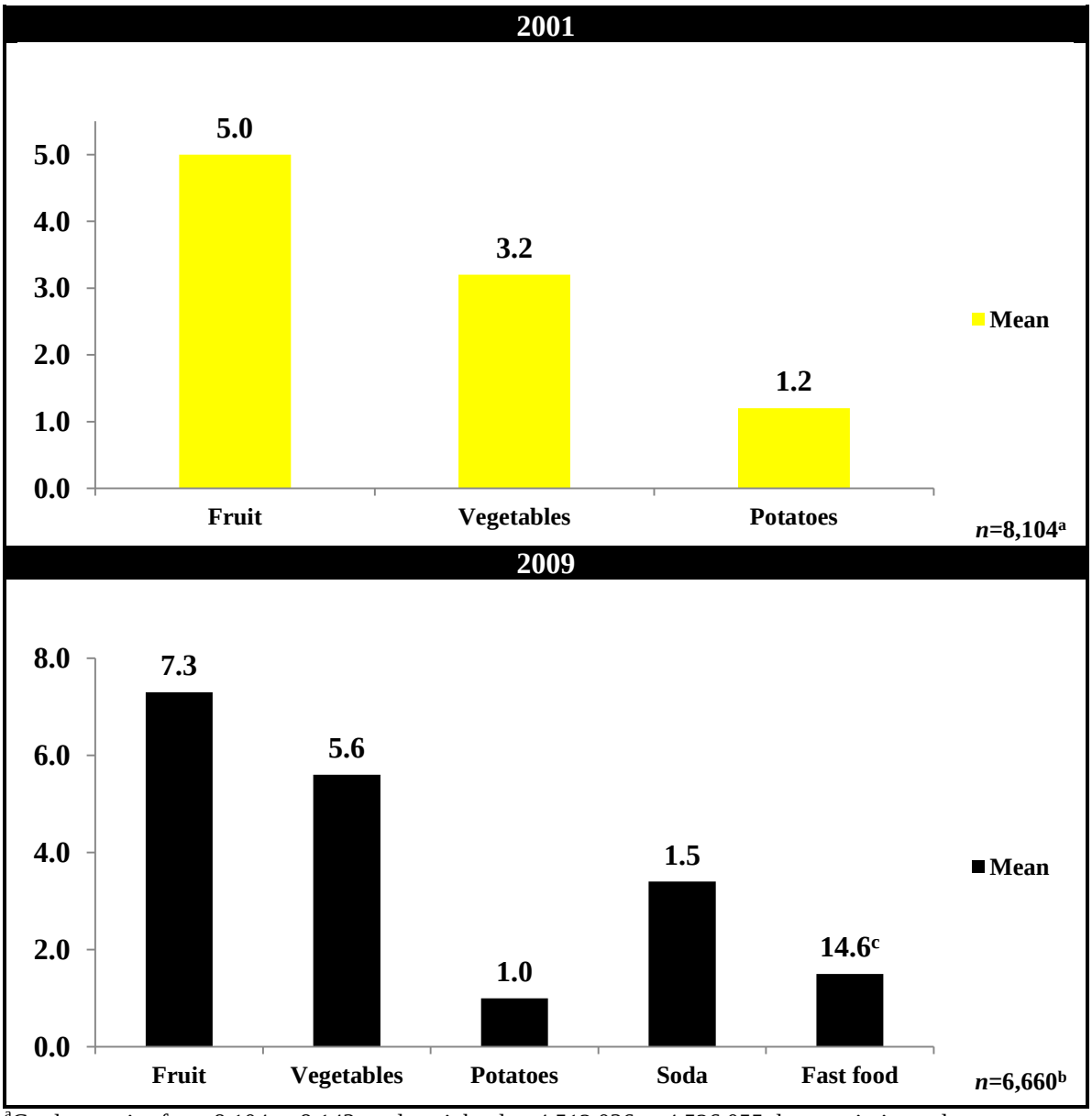
Weighted proportions of participants with an overweight or obese body mass index (BMI) by year, 2001 and 2009 samples



BMI: Body mass index.
[a]Crude *n:* 8,191; weighted *n:* 4,546,963.
[b]Crude *n:* 6,600; weighted *n:* 5,258,228.
Data source: California Health Interview Survey 2001, 2009. All proportions are weighted. Chi-square analysis revealed no significant difference between groups. Overweight represents participants with a BMI between 25.0-29.99; and, obese represents participants with a BMI>30.0.

Figure 4

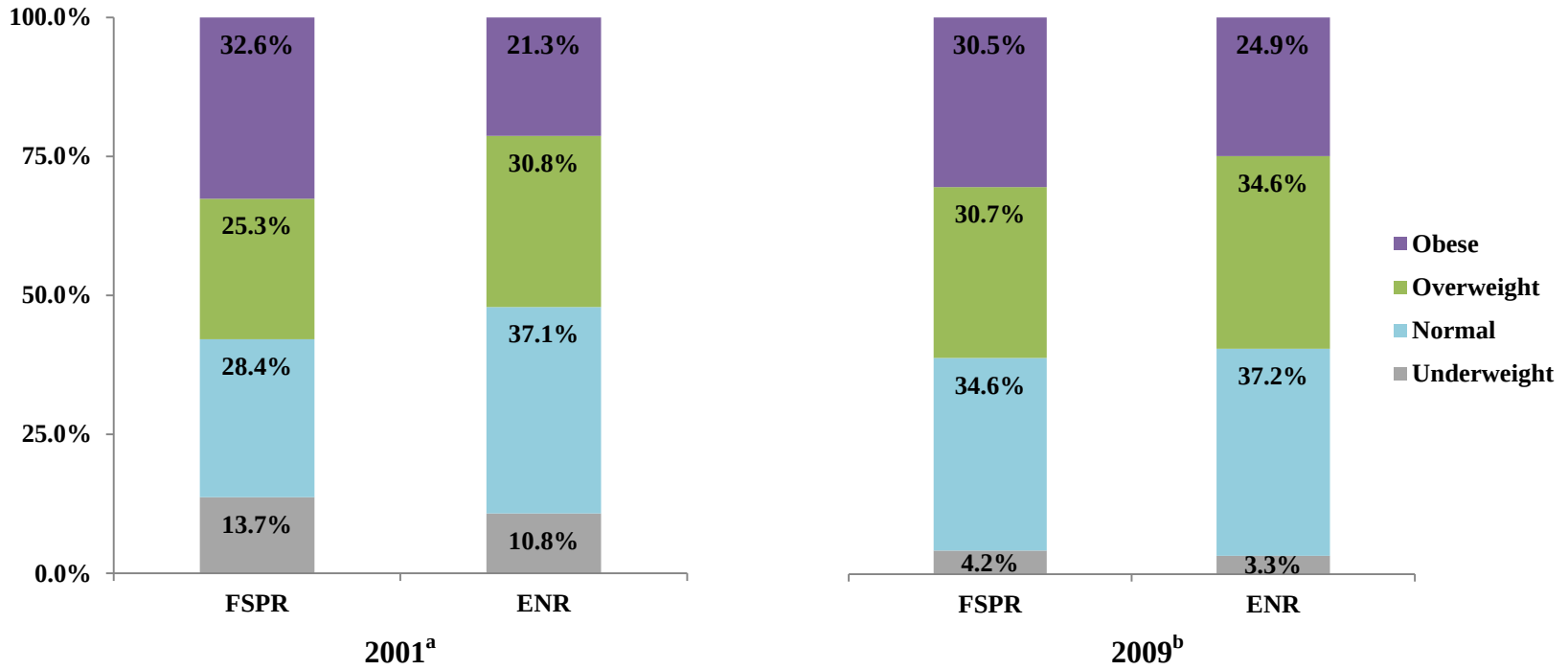
Summary of mean number of times consuming food item per week within the past month, 2001 and 2009 samples



[a]Crude *n* varies from 8,104 to 8,143; and, weighted *n*: 4,512,036 to 4,526,055 due to missing values..
[b]Crude *n:* 6,600; weighted *n*: 5,258,228.
[c]Number of times consuming within the past week only.
Data source: California Health Interview Survey 2001, 2009. All means are weighted. *p* values from *t* tests. The effect of year was significant for vegetable ($p<.001$) and fried potato ($p<.05$) consumption. Fruit includes fresh, frozen or canned fruit. Vegetables includes green salad, green beans, or potatoes (excludes fried potatoes). Fried potatoes includes any kind of fried potatoes, French fries, home fries, and hash browns (excludes potato chips). Soda refers to only soda sweetened with sugar (excludes diet soda). Fast food refers to fast food meals eaten at work, at home, or at fast-food restaurants, carryout or drive through.

Figure 5

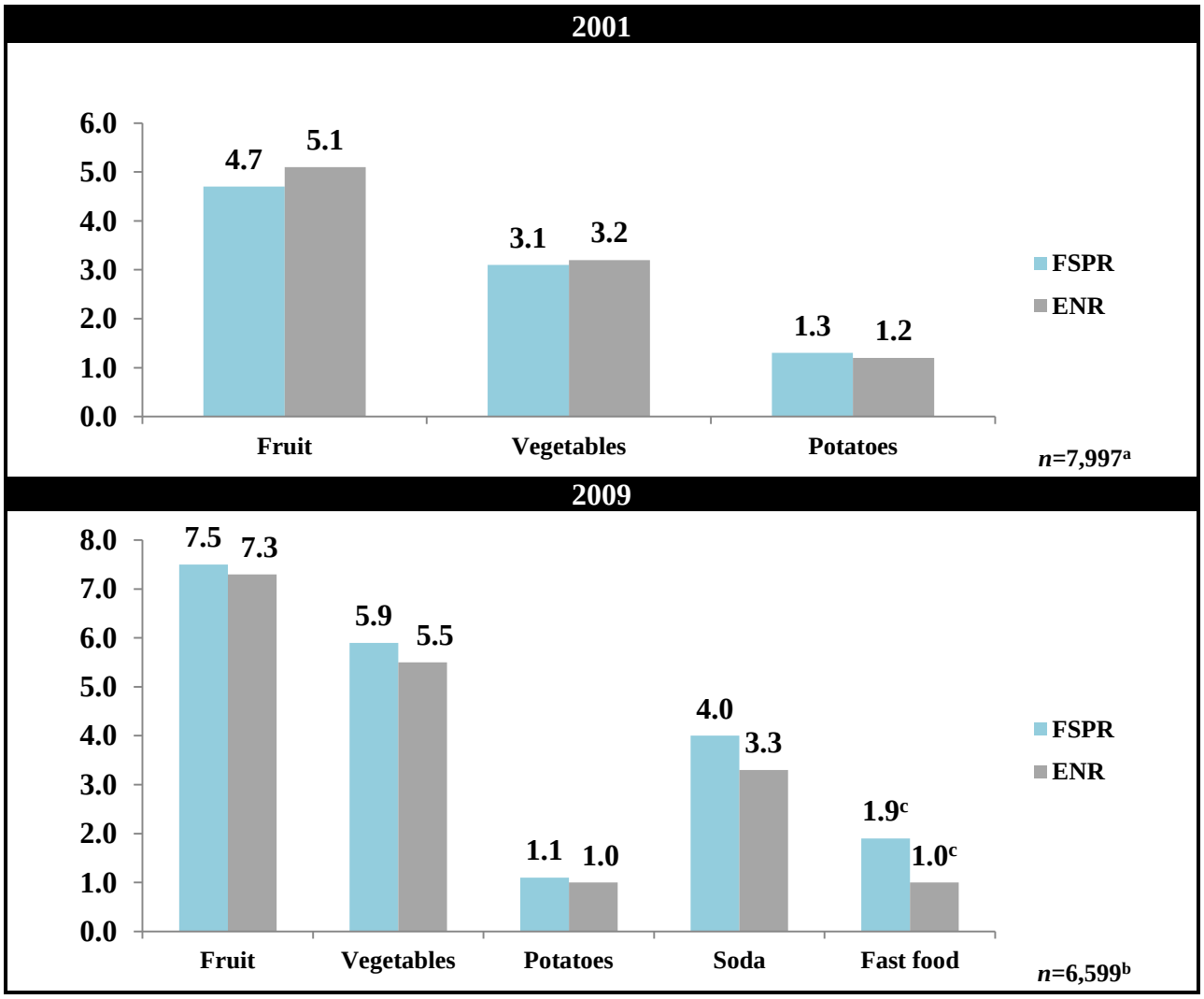
Weighted proportions of body mass index (BMI) group of Food Stamp Program recipients (FSPR) and eligible non-recipients (ENR), 2001 sample



FSPR: Food Stamp Program recipients. ENR: eligibly non-recipients. BMI: Body mass index.
[a]Crude *n:* 8,083; weighted *n*: 4,476,690.
[b]Crude *n:* 6,599; weighted *n*: 5,257,724.
Data source: California Health Interview Survey 2001, 2009. All proportions are weighted. Differences between FSPR and ENR were tested with chi-square analyses, and were significantly different for the 2001 sample only ($p<.001$). Underweight represents participants with a BMI<18.49; normal weight represents participants with a BMI between 18.50-24.99; overweight represents participants with a BMI between 25.0-29.99; and, obese represents participants with a BMI>30.0.

Figure 6

Weighted mean comparison of Food Stamp Program recipients (FSPR) and eligible non-recipients (ENR) number of times consuming food item per week within past month, 2001 and 2009 samples



FSPR: Food Stamp Program recipients. ENR: eligibly non-recipients.
[a]Crude *n* varies from 7,997 to 8,037; and, weighted *n* 4,442,664 to 4,456,073 due to missing values.
[b]Crude *n* 6,599; weighted *n*: 2,653,117.
[c]Number of times consuming within the past week only.
Data source: California Health Interview Survey 2001, 2009. All means are weighted. *p* values from *t* tests. Significant differences between FSPR and ENR were observed only for fruit consumption per week within the past month for the 2001 sample ($p<.05$). All other food consumption items in both waves were not significantly different between FSPR and ENR. Fruit includes fresh, frozen or canned fruit. Vegetables includes green salad, green beans, or potatoes (excludes fried potatoes). Fried potatoes includes any kind of fried potatoes, French fries, home fries, and hash browns (excludes potato chips). Soda refers to only soda sweetened with sugar (excludes diet soda). Fast food refers to fast food meals eaten at work, at home, or at fast-food restaurants, carryout or drive through.

Figure 7

Comparison profiles of FSPR and ENR, 2001 and 2009 samples

	FSPR	ENR
2001 participants	Mean age 35 (most between 25-44 years)	Mean age 40 (most between 25-44 years)
	Most are female	Male/female equally represented
	Latino, African American (top two)	Latino, White (top two)
	Less than high school education	Less than high school education
	Most are not born in the U.S.	Most are not born in the U.S.
	Annual income less than $10,000 per year	Annual income between $10,000-$30,000
	Most are unemployed	Employed/unemployed equally represented
	Lives in a 5 person household	Lives in a 4 person household
	Most live below 99% FPL	Most live below 99% FPL
	Most are food secure	Most are food secure
	BMI=obese and normal (top two)	BMI=normal and overweight (top two)
	Eats fruit 5 times per week	Eats fruit 5 times per week
	Eats vegetables 3 times per week	Eats vegetables 3 times per week
	Engages in moderate PA 3 times per week	Engages in moderate PA 3 times per week
	FSPR	**ENR**
2009 participants	Mean age 36 (most between 25-44 years)	Mean age 42 (most between 25-44 years)
	Most are female	Most are female
	Latino, White (top two ethnic groups)	Latino, White (top two ethnic groups)
	Less than high school education	Less than high school education
	Most are not born in the U.S.	Most are not born in the U.S.
	Annual income $13,100	Annual income $13,300
	Most are unemployed	Most are unemployed
	Lives in a 5 person household	Lives in a 4 person household
	Most live below 99% FPL	Most live below 99% FPL
	Food secure/insecure equally represented	Food secure/insecure equally represented
	Most feel safe in their neighborhoods	Most feel safe in their neighborhoods
	BMI=normal and overweight (top two)	BMI=normal and overweight (top two)
	Eats fruit 8 times per week	East fruit 7 times per week
	Eats vegetables 6 times per week	Eats vegetables 6 times per week
	Eats fast food 2 times per week	Eats fast food once per week
	Drinks soda 4 times per week	Drinks soda 3 times per week
	Engages in moderate PA 3 times per week	Engages in moderate PA 3 times per week

FSPR: Food Stamp Program recipients. ENR: eligibly non-recipients. BMI: Body mass index. PA: physical activity. Data source: California Health Interview Survey 2001, 2009. Differences between FSPR and ENR were tested with chi-squares and *t* tests. For 2001 participants, significant differences were observed between FSPR and ENR for age, gender, ethnicity, education, income, household size, poverty, work status, food security, and fruit consumption ($p<.05$). For 2009 participants, significant differences were observed between FSPR and ENR for, age, education, household size, poverty ($p<.001$); gender, and ethnicity ($p<.01$).

Table 1

CalFresh household profile

Characteristic	*M*	%
Average age of head of household	37.2 years	-
Average age of child	8.1 years	-
Average number of persons per household	2.5	-
Recipients who are U.S. citizens	-	92.3%
Household completing at least 12 years of education	-	59.4%
Single-person CalFresh only households	-	40.9%
CalFresh households with earnings	-	17.4%
Average CalFresh allotment per household	$259	-
Ethnicity of head of household	-	-
White	-	29%
Black	-	24%
Hispanic	-	21%
Mixed Race	-	15%
Other	-	11%
Ethnicity of the CalFresh recipients:	-	-
Hispanic	-	31%
Mixed Race	-	21%
White	-	20%
Black	-	17%
Other	-	11%

Source: http://www.dss.cahwnet.gov/foodstamps/PG844.htm; based on 2007 data

Table 2

Weighted proportions of selected demographics, 2001 and 2009 samples

	Weighted %		*p*
	2001 (*n*=8,191)[a]	2009 (*n*=6,600)[b]	
Age			<.01
18-24 years	22.9	20.0	
25-44 years	43.7	44.1	
45-64 years	19.9	23.6	
> 65 years	13.5	12.3	
Gender			<.001
Male	41.4	46.5	
Female	58.6	53.5	
Race/Ethnicity			<.001
White	22.1	20.1	
African American	8.0	7.1	
Latino/Hispanic	55.4	47.4	
Asian	10.7	11.1	
Other ethnicity/Multiple race	3.9	14.4	
Born in the U.S.			<.01
Yes	39.2	43.2	
No	60.8	53.8	
Years living in the U.S. for non-citizens[c]			<.001
<=1 year	4.9	1.6	
2-4 years	11.0	9.6	
5-9 years	19.0	15.8	
10-14 years	25.7	17.4	
15+ years	39.4	55.7	
Education			<.001
No formal education	0.8	2.1	
Less than high school	53.7	40.4	
High school diploma/GED	23.6	29.2	
Some college/vocational/community college	16.4	19.0	
College degree (4 year degree)	4.3	7.0	
Beyond college (graduate degree)	1.3	2.3	

[a]Crude *n:* 8,191; weighted *n:* 4,546,963.
[b]Crude *n:* 6,600; weighted *n:* 5,258,228.
[c]Crude *n* for non-citizens in 2001 sample: 3,809; weighted *n:* 2,751,109. Crude *n* for non-citizens in 2009 sample: 3,241; weighted *n:* 2,988,656.
Data source: California Health Interview Survey 2001, 2009. *p* values from chi-squares. NS=not significant. Other ethnicity includes Pacific Islander, American-Indian/Alaskan Native, and Other race/Multiple race.

Table 3

Weighted proportions of selected socioeconomics, 2001 and 2009 samples

	Weighted %		*p*
	2001 (*n*=8,013)[a]	2009 (*n*=6,561)[b]	
Household annual income			<.001
$0-$10,000	47.7	38.5	
$10,001-$20,000	50.3	46.7	
$20,001-$30,000	2.0	13.4	
$30,001-$40,000	0.0	1.4	
Working status			<.001
Employed	47.6	40.5	
Unemployed	52.4	59.6	
Currently living in poverty			<.001
Yes	77.6	81.6	
No	22.5	18.4	
Food insecure			<.001
Yes	35.1	47.1	
No	64.9	52.9	
Cannot afford to eat balanced meals			<.001
Yes	37.2	49.0	
No	62.8	51.0	
Currently receiving food stamps			<.001
Yes	12.6	17.8	
No	87.4	82.2	
How often feel safe in neighborhood[c]			-
None of the time	-	3.7	
Some of the time	-	16.2	
Most of the time	-	30.3	
All of the time	-	49.8	

[a]Crude *n* varies from 8,013 to 8,191; and, weighted *n*: 4,430,543 to 4,546,963 due to missing values.
[b]Crude *n* varies from 6,561 to 6,600; and, weighted *n*: 5,233,820 to 5,258,228 due to missing values.
[c]Neighborhood safety available only in the 2009 sample.
Data source: California Health Interview Survey 2001, 2009. *p* values from chi-squares. NS=not significant.

Table 4

Weighted proportions of selected health and health behaviors, 2001 and 2009 samples

	Weighted %		*p*
	2001 (*n*=8,141)[a]	2009 (*n*=6,561)[b]	
BMI by category			<.001
Underweight 0-18.49	11.2	3.5	
Normal 18.5-24.99	36.0	36.7	
Overweight 25.0-29.99	30.2	33.9	
Obese ≥30.0	22.7	25.9	
Obesity by group[c]			<.01
Obese 30.0-39.99	78.8	82.5	
Morbidly obese ≥40.0	12.3	12.9	
Super obese ≥50.0	8.9	4.6	
Moderate or vigorous physical activity in past week[d]			<.01
Yes	47.9	57.5	
No	52.1	42.5	
Smoking status			NS
Currently smokes	19.1	17.4	
Does not currently smoke	81.0	82.6	
Emotional problems in past year[c]			-
Yes	19.0	-	
No	81.0	-	
Serious psychological distress in past year[c]			-
Yes	-	9.0	
No	-	91.0	

BMI: Body mass index.
[a]Crude *n* varies from 8,141 to 8,191; and, weighted *n*: 4,517,857 to 4,546,963 due to missing values.
[b]Crude *n* varies from 6,561 to 6,600; and, weighted *n*: 5,233,820 to 5,258,228 due to missing values.
[c]Crude *n* for obesity by group for 2001 sample: 1,951; weighted *n:* 1,031,718. For 2009 sample, crude *n:* 1,827; weighted *n:* 1,361,450.
[d]Item refers to any moderate or vigorous psychical activity within the past month for the 2001sample.
Data source: California Health Interview Survey 2001, 2009. *p* values from chi-squares. NS=not significant.

Table 5

Weighted proportion comparison of Food Stamp Program recipients (FSPR) and eligible non-recipients (ENR) for selected demographics, 2001 sample

	Weighted %		*p*
	FSPR (*n*=1,268)[a]	ENR (*n*=6,815)[b]	
Age			<.001
18-24 years	14.6	24.2	
25-44 years	66.9	40.1	
45-64 years	17.2	20.3	
> 65 years	1.3	15.3	
Gender			<.001
Male	24.9	43.8	
Female	75.1	56.2	
Race/Ethnicity			<.001
White	12.7	23.6	
African American	14.7	7.1	
Latino/Hispanic	58.6	54.8	
Asian	10.4	10.6	
Other ethnicity/Multiple race	3.7	3.9	
Born in the U.S.			NS
Yes	40.3	39.2	
No	59.7	60.8	
Education			<.001
No formal education	0.7	0.8	
Less than high school	63.4	52.1	
High school diploma/GED	22.4	23.8	
Some college/vocational/community college	10.8	17.3	
College degree (4 year degree)	2.3	4.5	
Beyond college (graduate degree)	0.5	1.5	

FSPR: Food Stamp Program recipients. ENR: eligibly non-recipients.
[a]Crude *n*: 1,268; weighted *n:* 564,306.
[b]Crude *n*: 6,815; weighted *n*: 3,912,384.
Data source: California Health Interview Survey 2001. *p* values from chi-square analyses. NS=not significant. Other ethnicity includes Pacific Islander, American-Indian/Alaskan Native, and Other race/Multiple race.

Table 6

Weighted proportion comparison of Food Stamp Program recipients (FSPR) and eligible non-recipients (ENR) for selected socioeconomics, health, and health behaviors, 2001 sample

	Weighted %		*p*
	FSPR (n=1,254)[a]	ENR (n=6,745)[b]	
Household annual income			NS
$0-$10,000	52.2	47.2	
$10,001-$20,000	46.8	50.7	
$20,001-$30,000	1.0	2.1	
Working status			<.001
Employed	33.8	49.4	
Unemployed	66.2	50.6	
Currently living in poverty			<.001
Yes	92.3	75.1	
No	7.8	24.9	
Food insecure			<.001
Yes	49.1	33.1	
No	50.9	66.9	
Cannot afford to eat balanced meals			<.001
Yes	50.2	35.3	
No	49.8	64.7	
Moderate or vigorous physical activity in past month			<.05
Yes	48.2	52.6	
No	51.8	47.4	
Smoking status			<.05
Currently smokes	22.8	18.6	
Does not currently smoke	77.2	81.5	
Emotional problems in past year			<.01
Yes	76.4	81.6	
No	23.6	18.4	

FSPR: Food Stamp Program recipients. ENR: eligibly non-recipients. BMI: body mass index.
[a]Crude *n* varies from 1,254 to1,268; and, weighted *n* 554,593 to 564,306 due to missing values.
[b]Crude *n* varies from 6,745 to 6,815; and, weighted *n* 3,866,997 to 3,912,384 due to missing values.
Data source: California Health Interview Survey 2001. *p* values from chi-square analyses. NS=not significant.

Table 7

Weighted proportion comparison of Food Stamp Program recipients (FSPR) and eligible non-recipients (ENR) for selected demographics, 2009 sample

	Weighted %		*p*
	FSPR (*n*=1,216)[a]	ENR (*n*=5,383)[b]	
Age			<.001
18-24 years	15.9	20.9	
25-44 years	61.6	40.3	
45-64 years	20.2	24.3	
> 65 years	2.2	14.4	
Gender			<.01
Male	37.0	48.6	
Female	63.0	51.4	
Race/Ethnicity			<.01
White	16.2	20.9	
African American	10.6	6.4	
Latino/Hispanic	52.2	46.4	
Asian	6.3	12.1	
Other ethnicity/Multiple race	14.8	14.2	
Born in the U.S.			NS
Yes	39.7	43.9	
No	60.3	56.1	
Education			<.001
No formal education	1.3	2.3	
Less than high school	49.5	38.4	
High school diploma/GED	30.9	28.9	
Some college/vocational/community college	15.6	19.7	
College degree (4 year degree)	2.3	8.1	
Beyond college (graduate degree)	0.4	2.7	

FSPR: Food Stamp Program recipients. ENR: eligibly non-recipients.
[a]Crude *n:* 1,216; weighted *n*: 935,331.
[b]Crude *n:* 5,383; weighted *n*: 4,322,393.
Data source: California Health Interview Survey 2009. *p* values from chi-square analyses. NS=not significant. Other ethnicity includes Pacific Islander, American-Indian/Alaskan Native, and Other race/Multiple race.

Table 8

Weighted proportion comparison of Food Stamp Program recipients (FSPR) and eligible non-recipients (ENR) for selected socioeconomics, health, and health behaviors, 2009 sample

	Weighted %		*p*
	FSPR (*n*=1,215)[a]	ENR (*n*=5,345)[b]	
Household annual income			<.05
$0-$10,000	34.2	39.4	
$10,001-$20,000	54.9	44.9	
$20,001-$30,000	7.9	14.6	
$30,001-$40,000	3.0	1.1	
Working status	-	-	NS
Employed	35.9	41.4	
Unemployed	64.1	58.6	
Currently living in poverty	-	-	<.001
Yes	94.2	78.8	
No	5.8	21.2	
Food insecure	-	-	NS
Yes	50.2	46.4	
No	49.8	53.6	
Cannot afford to eat balanced meals	-	-	NS
Yes	50.6	48.7	
No	49.4	51.3	
How often feel safe in neighborhood			<.01
None of the time	4.1	3.6	
Some of the time	24.7	14.4	
Most of the time	25.8	31.3	
All of the time	45.5	50.7	
Moderate or vigorous physical activity in past month			NS
Yes	58.0	57.3	
No	42.0	42.7	
Smoking status			<.05
Currently smokes	22.1	16.4	
Does not currently smoke	77.9	83.6	
Serious psychological distress in past year			<.01
Yes	13.8	8.0	
No	86.2	92.0	

FSPR: Food Stamp Program recipients. ENR: eligibly non-recipients. BMI: body mass index.
[a]Crude *n* varies from 1,215 to 1,216; and, weighted *n* 935,200 to 935,331 due to missing values.
[b]Crude *n* varies from 5,345 to 5,383; and, weighted *n* 4,298,116 to 4,322,393 due to missing values.
Data source: California Health Interview Survey 2009. *p* values from chi-square analyses. NS=not significant.

Table 9

Factorial analysis of variance of Food Stamp Program participation with selected sociodemographics for mean BMI, 2001 sample

	BMI weighted mean (*SE)* (*n*=7,388[a])		ANOVA *F*		
	FSPR	ENR	FSP	D	FSPxD
Demographic (D)					
Age			11.3**	41.4***	1.9
18-24 years	26.6 (0.6)	24.9 (0.3)			
25-44 years	29.5 (0.5)	27.8 (0.2)			
45-64 years	31.0 (0.6)	29.3 (0.3)			
> 65 years	28.7 (0.5)	27.0 (0.3)			
Gender			19.6***	0.3	2.6
Male	29.4 (0.5)	27.2 (0.2)			
Female	29.5 (0.5)	27.3 (0.2)			
White			17.8***	32.6***	0.1
Yes	28.1 (0.5)	26.0 (0.2)			
No	29.7 (0.5)	27.6 (0.2)			
African American			17.7***	8.8**	0.04
Yes	30.7 (0.6)	28.5 (0.5)			
No	29.3 (0.5)	27.1 (0.1)			
Latino			20.1***	76.5***	0.02
Yes	30.7 (0.5)	28.4 (0.2)			
No	28.1 (0.5)	25.9 (0.2)			
Asian			6.4*	138.1***	6.3*
Yes	23.7 (0.8)	23.5 (0.4)			
No	30.2 (0.5)	27.7 (0.1)			
Education			16.9***	31.7***	0.9
Less than high school	30.1 (0.5)	28.0 (0.2)			
Greater than high school	28.5 (0.5)	26.4 (0.2)			
Food insecurity			19.8***	9.8**	0.1
Food insecure	30.0 (0.5)	27.7 (0.2)			
Food secure	29.2 (0.5)	27.0 (0.1)			

FSPR: Food Stamp Program recipients. ENR: eligibly non-recipients. BMI: body mass index. FSP: Food Stamp Program participation (reference group: does not participate in program).
*p< .05 **p<.01 ***p<.001.
[a]Crude *n:* 7,388; weighted *n:* 4,019,253.
Data source: California Health Interview Survey 2001. *p* values from adjusted Wald test. *df*=79. Each model controls for age, gender, food insecurity, fruit consumption per week within past month, vegetable consumption per week within past month, and any physical activity within the past month.

Table 10

Factorial analysis of variance of Food Stamp Program participation with selected sociodemographics for mean BMI, 2009 sample

	BMI weighted mean (*SE)* (*n*=6,560[a])		ANOVA *F*		
	FSPR	ENR	FSP	D	FSPxD
Demographic (D)					
Age			4.9*	25.4***	1.2
18-24 years	26.0 (0.5)	25.1 (0.3)			
25-44 years	28.3 (0.4)	27.4 (0.2)			
45-64 years	29.4 (0.5)	28.5 (0.2)			
> 65 years	29.0 (0.5)	28.1 (0.3)			
Gender			9.4**	0.1	1.7
Male	28.5 (0.4)	27.3 (0.2)			
Female	28.4 (0.4)	27.1 (0.2)			
White					
Yes	27.7 (0.4)	26.5 (0.3)	8.8**	9.9**	0.01
No	28.6 (0.4)	27.4 (0.2)			
African American					
Yes	28.5 (0.7)	27.3 (0.6)	9.5**	0.04	0.00
No	28.4 (0.4)	27.2 (0.1)			
Latino			7.8**	36.7***	0.2
Yes	29.2 (0.4)	28.1 (0.2)			
No	27.6 (0.4)	26.4 (0.2)			
Asian			6.4*	62.1***	1.5
Yes	25.0 (0.5)	24.0 (0.5)			
No	28.7 (0.4)	27.6 (0.1)			
Education			6.4*	2.6	5.9*
Less than high school	28.3 (0.6)	28.2 (0.3)			
Greater than high school	28.5 (0.5)	26.5 (0.2)			
How often feel safe in neighborhood			12.8***	0.3	3.8*
None of the time	30.3 (1.3)	26.0 (1.0)			
Some of the time	28.4 (0.8)	27.6 (0.4)			
Most of the time	29.2 (0.7)	26.6 (0.2)			
All of the time	27.8 (0.5)	27.5 (0.2)			

FSPR: Food Stamp Program recipients. ENR: eligibly non-recipients. BMI: body mass index. FSP: Food Stamp Program participation (reference group: does not participate in program).
*p< .05 **p<.01 ***p<.001.
[a]Crude *n:* 6,560; weighted *n:* 5,233,316.
Data source: California Health Interview Survey 2009. *p* values from adjusted Wald test. *df*=79. Each model controls for age, gender, food insecurity, fruit consumption per week within past month, vegetable consumption per week within past month, and any physical activity within the past month.

Table 11

Ordinary least square regression of Food Stamp Program participation predicting mean body mass index (BMI) and controlling for selected sociodemographics, 2001 sample

	Model 1		Model 2		Model 3		Model 4	
	β	*SE*	*β*	*SE*	*β*	*SE*	*β*	*SE*
Age	0.04***	0.01	0.04***	0.01	0.05***	0.01	0.1***	0.01
Gender (reference=male)	0.2	0.3	0.2	0.3	0.4	0.3	0.2	0.3
African-American (reference=White)	2.7***	0.5	2.6***	0.5	2.5***	0.5	2.3***	0.5
Latino/Hispanic (reference=White)	2.5***	0.4	2.5***	0.4	2.4***	0.4	2.4***	0.4
Asian (reference=White)	-2.6***	0.5	-2.6***	0.5	-2.5***	0.5	-2.6***	0.5
Education (reference=less than high school)	-1.2***	0.3	-1.2***	0.3	-1.1***	0.3	-1.0***	0.3
U.S. born (reference=not born in U.S.)	0.9**	0.3	0.9**	0.3	0.7*	0.3	0.7*	0.3
Food insecurity (reference=food secure)	-	-	0.7**	0.2	0.6*	0.2	0.5	0.2
Poverty (reference=not living in poverty)			-0.2	0.4	-0.2	0.4	-0.4	0.4
Fruit consumption per week in past month	-	-	-	-	-0.1**	0.1	-0.1**	0.04
Vegetable consumption per week in past month	-	-	-	-	-0.1	0.05	-0.1	0.05
Physical activity (PA) in past month (reference=no PA)	-	-	-	-	-0.03	0.3	0.001	0.3
Receiving food stamps (reference=not receiving)	-	-	-	-	-	-	2.0***	0.5
Constant	24.5***	0.5	24.4***	0.7	25.3***	0.8	25.1***	0.8
R-squared	0.07		0.07		0.08		0.09	

BMI: Body mass index. PA: physical activity.
*p< .05 **p<.01 ***p <.001.
Crude *n:* 7,388; weighted *n:* 4,019,253 for all models.
Data source: California Health Interview Survey 2001. *df*=79 for all models. Model 1 controls for age (continuous), gender, ethnicity, education, and citizenship. Model 2 adds food insecurity and poverty. Model 3 adds food consumption (continuous) and physical activity. Model 4 adds the Food Stamp Program.
Unweighted eta squared=0.007 for the FSP.

Table 12

Ordinary least square regression of Food Stamp Program participation predicting mean body mass index (BMI) and controlling for selected sociodemographics, 2009 sample

	Model 1		Model 2		Model 3		Model 4	
	β	*SE*	*β*	*SE*	*β*	*SE*	*β*	*SE*
Age	0.1***	0.01	0.1***	0.01	0.1***	0.01	0.1***	0.01
Gender (reference=male)	-0.1	0.3	-0.1	0.3	-0.1	0.3	-0.1	0.3
African-American (reference=White)	0.3	0.6	0.3	0.6	0.2	0.6	0.1	0.6
Latino/Hispanic (reference=White)	1.1**	0.3	1.1**	0.3	1.0**	0.3	1.0**	0.3
Asian (reference=White)	-3.0***	0.5	-3.0***	0.5	-2.9***	0.5	-2.9***	0.5
Education (reference=less than high school)	-1.1**	0.3	-1.0**	0.4	-0.9*	0.4	-0.9*	0.4
U.S. born (reference=not born in U.S.)	0.5	0.3	0.6*	0.3	0.5	0.3	0.6*	0.3
Food insecurity (reference=food secure)	-	-	0.4	0.3	0.3	0.3	0.3	0.3
Poverty (reference=not living in poverty)	-	-	0.04	0.4	-0.02	0.4	-0.1	0.4
Neighborhood safety (reference=none/some of the time)	-	-	-0.5	0.4	-0.4	0.4	-0.3	0.3
Fruit consumption per week in past month	-	-	-	-	0.01	0.02	0.01	0.02
Vegetable consumption per week in past month	-	-	-	-	-0.1**	0.02	-0.1**	0.02
Physical activity (PA) in past month (reference=no PA)	-	-	-	-	-0.6	0.3	-0.6	0.3
Receiving food stamps (reference=not receiving)	-	-	-	-	-	-	0.9*	0.4
Constant	25.2***	0.5	25.2***	0.7	26.1***	0.9	25.8***	0.9
R-squared	0.07		0.07		0.08		0.08	

BMI: Body mass index. PA: physical activity.
*p< .05 **p<.01 ***p <.001.
Crude *n:* 6,560; weighted *n:* 5,233,316 for all models.
Data source: California Health Interview Survey 2009. *df*=79 for all models. Model 1 controls for age (continuous), gender, ethnicity, education, and citizenship. Model 2 adds food insecurity, poverty, and neighborhood safety (participant feels safe in their neighborhood most/all of the time versus none/some of the time).Model 3 adds food consumption (continuous) and physical activity. Model 4 adds the Food Stamp Program. Unweighted eta squared=0.004 for the FSP.

Appendix A: Additional Tables

Table 13

Weighted proportions of additional sociodemographics, 2001 and 2009 samples

	Weighted %		*p*
	2001 (*n*=8,025)[a]	2009 (*n*=6,599)[b]	
Years living in the U.S. for non-citizens[c]			<.001
<=1 year	4.9	1.6	
2-4 years	11.0	9.6	
5-9 years	19.0	15.8	
10-14 years	25.7	17.4	
15+ years	39.4	55.7	
Marital status			NS
Married	37.7	36.6	
Not currently married	62.3	63.4	
Lives in urban (vs. rural) area			<.001
Yes	88.1	91.5	
No (lives in rural area)	11.9	8.5	
Currently insured			NS
No	35.2	36.7	
Yes	64.9	63.3	
Currently receiving WIC[d]			<.001
No	79.3	38.0	
Yes	20.7	62.0	
Currently receiving TANF			<.01
No	90.6	92.8	
Yes	9.4	7.2	
Currently receiving SSI			<.01
No	86.5	89.4	
Yes	13.5	10.6	

[a]Crude *n* varies from 8,025 to 8,191; and, weighted *n*: 4,415,208 to 4,546,963 due to missing values.
[b]Crude *n* varies from 6,599 to 6,600; and, weighted *n*: 5,233,820 to 5,257,724 due to missing values.
[c]Crude *n* for non-citizens for 2001 sample: 3,809; weighted *n:* 2,751,109. Crude *n* for 2009 sample: 3,241; weighted *n:* 2,988,656.
[d]WIC crude *n* represents only women who have a child under the age of 7 or are pregnant, with 875cases in 2001 and 551 cases in 2009.

Table 14

Weighted proportions of additional neighborhood resources, 2009 sample

	Weighted % (n=2,947)[a]
People in neighborhood willing to help each other	
Strongly disagree	4.0
Disagree	24.5
Agree	62.4
Strongly agree	9.1
People in neighborhood do not get along with each other	
Strongly disagree	10.0
Disagree	65.4
Agree	22.4
Strongly agree	2.2
People in neighborhood can be trusted	
Strongly disagree	5.2
Disagree	25.0
Agree	62.0
Strongly agree	7.8

[a]Crude *n*: 2,947; and, weighted *n*: 2,982,871.

Data source: California Health Interview Survey 2009. Items were asked only of adults with a child in the household who was under 18.

Table 15

Weighted proportions of additional health and health behaviors, 2001 and 2009 samples

	Weighted %		*p*
	2001 (*n*=8,169)[a]	2009 (*n*=6,600)[b]	
General health condition			NS
Excellent	10.0	10.3	
Very good	17.2	18.1	
Good	35.5	36.1	
Fair	29.9	28.0	
Poor	8.4	7.5	
Diagnosed with diabetes			<.001
No	91.8	87.2	
Yes	8.2	12.8	
High blood pressure			<.01
No	77.4	74.0	
Yes	22.6	26.0	
Disability[d]			-
No	-	64.9	
Yes	-	35.1	

[a]Crude *n* varies from 8,169 to 8,189; and, weighted *n*: 4,537,024 to 4,546,027 due to missing values.
[b]Crude *n*: 6,600; and, weighted *n*: 5,258,228.
[d]Disability not available in the 2001 sample.
Data source: California Health Interview Survey 2001, 2009. *p* values from chi-squares. NS=not significant.

Table 16

Weighted proportion comparison of Food Stamp Program recipients (FSPR) and eligible non-recipients (ENR) for additional sociodemographics, 2001 sample

	Weighted %		*p*
	FSPR (*n*=1,250)[a]	ENR (*n*=6,768)[b]	
Years living in the U.S. for non-citizens[c]			NS
<=1 year	2.0	5.3	
2-4 years	11.4	10.9	
5-9 years	17.9	19.2	
10-14 years	31.0	25.1	
15+ years	37.7	39.5	
Marital status			NS
Married	40.7	37.1	
Not currently married	59.3	62.9	
Lives in urban (vs. rural) area			<.01
Yes	84.6	88.5	
No (lives in rural area)	15.4	11.5	
Currently insured			<.001
Yes	86.7	61.6	
No	13.3	38.4	
Currently receiving WIC[d]			<.001
Yes	43.8	16.2	
No	56.2	83.8	
Currently receiving TANF			<.001
Yes	55.4	2.7	
No	44.6	97.3	
Currently receiving SSI			NS
Yes	11.2	13.8	
No	88.8	86.2	

FSPR: Food Stamp Program recipients. ENR: eligibly non-recipients.
[a]Crude *n* varies from 1,250 to1,268; and, weighted *n* 556,954 to 564,306 due to missing values.
[b]Crude *n* varies from 6,768 to 6,815; and, weighted *n* 3,855,199 to 3,912,384due to missing values.
[c]Crude *n* for non-citizen FSPR: 623; weighted *n:* 335,530. Crude *n* for ENR: 3,108; weighted *n:* 2,362,932.
[d]WIC crude *n* represents only women who have a child under the age of 7 or are pregnant, with 344 cases for FSPR and 530 cases for ENR.

Table 17

Weighted proportion comparison of Food Stamp Program recipients (FSPR) and eligible non-recipients (ENR) for additional health and health behaviors, 2001 sample

	Weighted %		*p*
	FSPR (*n*=1,260)[a]	ENR (*n*=6,779)[b]	
Obesity by group[c]			NS
Obese 30.0-39.99	74.3	79.6	
Morbidly obese ≥ 40.0	14.2	12.0	
Super obese ≥ 50.0	11.5	8.4	
General health condition			NS
Excellent	9.5	10.1	
Very good	13.4	16.6	
Good	36.0	35.4	
Fair	30.5	29.8	
Poor	10.7	8.1	
Diagnosed with diabetes			NS
Yes	7.3	8.4	
No	92.7	91.6	
High blood pressure			<.05
Yes	19.2	23.1	
No	80.9	76.9	

FSPR: Food Stamp Program recipients. ENR: eligibly non-recipients. BMI: Body mass index.
[a]Crude *n* varies from 1,260 to1,268; and, weighted *n* varies from 561,585 to 564,306 due to missing values.
[b]Crude *n* varies from 6,783 to 6,815; and, weighted *n* varies from 3,889,700 to 3,912,384.
[c]Crude *n* for FSPR obese groups: 411; weighted *n:* 183,856. For ENR, crude *n:* 1,524; and, weighed *n:* 833,216.
Data source: California Health Interview Survey 2001. *p* values from chi-square analyses. NS=not significant.

Table 18

Weighted proportion comparison of Food Stamp Program recipients (FSPR) and eligible non-recipients (ENR) for additional sociodemographics, 2009 sample

	Weighted %		*p*
	FSPR (*n*=1,216)[a]	ENR (*n*=5,383)[b]	
Years living in the U.S. for non-citizens[c]			NS
<=1 year	1.4	1.6	
2-4 years	6.8	10.2	
5-9 years	18.4	15.2	
10-14 years	22.3	16.2	
15+ years	51.2	56.7	
Marital status			NS
Married	37.6	36.4	
Not currently married	62.4	63.6	
Lives in urban (vs. rural) area			NS
Yes	89.8	91.8	
No (lives in rural area)	10.2	8.2	
Currently insured	-	-	<.001
No	77.7	60.3	
Yes	22.3	39.8	
Currently receiving WIC[d]	-	-	NS
No	35.2	39.8	
Yes	64.8	60.2	
Currently receiving TANF	-	-	<.001
No	64.5	99.0	
Yes	35.5	1.0	
Currently receiving SSI	-	-	<.05
No	92.7	88.7	
Yes	7.3	11.3	

FSPR: Food Stamp Program recipients. ENR: eligibly non-recipients.
[a]Crude *n:* 1,216; weighted *n*: 935,331.
[b]Crude *n:* 5,383; weighted *n*: 4,322,393.
[c]Crude *n* for non-citizen FSPR: 684; weighted *n:* 563,621. Crude *n* for ENR: 2,556; weighted *n:* 2,424,531.
[d]WIC crude *n* represents only women who have a child under the age of 7 or are pregnant, with 263 cases for FSPR and 288 cases for ENR.
Data source: California Health Interview Survey 2009. *p* values from chi-square analyses. NS=not significant.

Table 19

Weighted proportion comparison of Food Stamp Program recipients (FSPR) and eligible non-recipients (ENR) for additional neighborhood resources, 2009 sample

	Weighted %		*p*
	FSPR (*n*=960)[a]	ENR (*n*=1,987)[b]	
People in neighborhood willing to help each other			<.05
Strongly disagree	6.4	3.1	
Disagree	22.4	25.3	
Agree	59.1	63.6	
Strongly agree	12.1	8.0	
People in neighborhood do not get along with each other			NS
Strongly disagree	8.0	10.7	
Disagree	65.2	65.5	
Agree	23.5	22.0	
Strongly agree	3.4	1.7	
People in neighborhood can be trusted			NS
Strongly disagree	7.6	4.3	
Disagree	26.2	24.6	
Agree	58.6	63.3	
Strongly agree	7.6	7.9	

FSPR: Food Stamp Program recipients. ENR: eligibly non-recipients.
[a]Crude *n:* 960; and, weighted *n:* 815,475.
[b]Crude *n:* 1,987; and, weighted *n:* 2,167,396.
Data source: California Health Interview Survey 2009. *p* values from chi-square analyses. NS=not significant. All items were asked only of adults with a child in the household who was under 18.

Table 20

Weighted proportion comparison of Food Stamp Program recipients (FSPR) and eligible non-recipients (ENR) for additional health and health behaviors, 2009 sample

	Weighted %		*p*
	FSPR (*n*=1,216)[a]	ENR (*n*=5,383)[b]	
Obesity by group[c]			NS
Obese 30.0-39.9	78.1	83.7	
Morbidly obese ≥ 40.0	15.0	12.3	
Super obese ≥ 50.0	6.9	4.0	
General health condition			<.05
Excellent	12.5	9.8	
Very good	13.7	19.1	
Good	41.7	34.9	
Fair	25.3	28.6	
Poor	6.7	7.7	
Diagnosed with diabetes			<.001
Yes	7.6	14.0	
No	92.4	86.0	
High blood pressure			<.01
Yes	19.8	27.3	
No	80.2	72.7	
Disabled			NS
Yes	67.3	64.4	
No	32.7	35.6	

FSPR: Food Stamp Program recipients. ENR: eligibly non-recipients. BMI: Body mass index.
[a]Crude *n:* 1,216; weighted *n*: 935,331.
[b]Crude *n:* 5,383; weighted *n*: 4,322,393.
[c]Crude *n* for FSPR obese groups: 410; and, weighted *n:* 285,315. For ENR, crude *n:* 1,416; and, weighted *n:* 1,075,631.
Data source: California Health Interview Survey 2009. *p* values from chi-square analyses. NS=not significant.

Table 21

Weighted mean body mass index (BMI) comparison of Food Stamp Program recipients (FSPR) and eligible non-recipients (ENR) for selected sociodemographics, 2001 sample

	BMI weighted *M(SE)* (*n*=7,494[a])		*p*
	FSPR	ENR	
Age			
18-24 years	26.4 (1.1)	24.9 (0.3)	NS
25-44 years	30.1 (0.6)	27.7 (0.2)	<.01
45-64 years	29.6 (0.9)	29.4 (0.3)	NS
> 65 years	26.2 (0.9)	26.8 (0.3)	NS
Gender			
Male	28.4 (0.8)	27.3 (0.2)	NS
Female	29.7 (0.6)	27.2 (0.2)	<.001
White			
Yes	27.8 (0.7)	26.2 (0.2)	<.05
No	29.7 (0.6)	27.6 (0.2)	<.001
African American			
Yes	30.6 (1.1)	28.9 (0.5)	NS
No	29.2 (0.6)	27.1 (0.1)	<.001
Latino			
Yes	30.6 (0.7)	28.2 (0.2)	<.01
No	28.0 (0.6)	26.1 (0.2)	<.01
Asian			
Yes	23.5 (0.7)	23.4 (0.3)	NS
No	30.2 (0.5)	27.7 (0.1)	<.001
Education			
No formal education	52.4 (9.0)	32.8 (3.8)	<.05
Less than high school	29.6 (0.7)	28.2 (0.2)	NS
High school diploma/GED	28.8 (0.8)	26.4 (0.3)	<.01
Some college/vocational/community college	29.6 (1.4)	26.4 (0.3)	<.05
College degree (4 year degree)	28.4 (1.8)	24.8 (0.3)	NS
Beyond college (graduate degree)	25.9 (2.6)	24.9 (0.6)	NS
Food insecure			
Yes	30.0 (0.7)	27.8 (0.2)	<.01
No	28.8 (0.5)	27.0 (0.2)	<.01
Emotional problems in past year			
Yes	31.3 (1.3)	27.7 (0.3)	<.01
No	28.8 (0.5)	27.1 (0.1)	<.01

FSPR: Food Stamp Program recipients. ENR: eligibly non-recipients. BMI: Body mass index.
[a]Crude *n* varies from 7,494 to 7,532; and; weighted *n*: 4,066,105 to 4,076,859 due to missing values.
Data source: California Health Interview Survey 2001. All means are weighted. *p* values from *t* tests.

Table 22

Weighted mean body mass index (BMI) comparison of Food Stamp Program recipients (FSPR) and eligible non-recipients (ENR) for selected sociodemographics, 2009 sample

	BMI weighted *M(SE)* (*n*=6,560[a])		*p*
	FSPR	ENR	
Age			
18-24 years	26.6 (0.6)	24.9 (0.4)	<.05
25-44 years	27.9 (0.5)	27.5 (0.2)	NS
45-64 years	29.7 (0.9)	28.4 (0.3)	NS
> 65 years	31.4 (3.4)	27.8 (0.3)	NS
Gender			
Male	27.9 (0.6)	27.3 (0.2)	NS
Female	28.3 (0.5)	27.2 (0.2)	NS
White			
Yes	27.3 (0.6)	26.5 (0.3)	NS
No	28.3 (0.4)	27.4 (0.2)	NS
African American			
Yes	28.5 (1.4)	27.4 (0.6)	NS
No	28.1 (0.4)	27.2 (0.2)	<.05
Latino			
Yes	28.8 (0.6)	28.1 (0.3)	NS
No	27.4 (0.5)	26.5 (0.2)	NS
Asian			
Yes	23.4 (1.2)	24.2 (0.5)	NS
No	28.5 (0.4)	27.7 (0.2)	NS
Education			
No formal education	33.3 (4.4)	31.2 (1.3)	NS
Less than high school	28.1 (0.6)	28.4 (0.2)	NS
High school diploma/GED	27.2 (0.7)	27.0 (0.2)	NS
Some college/vocational/community college	29.7 (0.6)	26.0 (0.3)	<.001
College degree (4 year degree)	28.1 (2.4)	24.7 (0.4)	NS
Beyond college (graduate degree)	27.5 (1.7)	25.5 (0.5)	NS
Food insecure			
Yes	28.2 (0.5)	27.7 (0.2)	NS
No	28.0 (0.6)	26.9 (0.2)	NS
Serious psychological distress in past year			
Yes	28.7 (0.9)	28.5 (0.5)	NS
No	28.1 (0.4)	27.2 (0.2)	<.05

FSPR: Food Stamp Program recipients. ENR: eligibly non-recipients. BMI: Body mass index.
[a]Crude *n* varies from 6,560 to 6,599; weighted *n*: 5,233,316 to 5,257.724 due to missing values.
Data source: California Health Interview Survey 2009. All means are weighted. *p* values from *t* tests.

Table 23

Ordinary least square regression of Food Stamp Program participation (entering first) predicting mean body mass index (BMI) and controlling for selected sociodemographics, 2001 sample

	Model 1		Model 2		Model 3		Model 4	
	β	*SE*	*β*	*SE*	*β*	*SE*	*β*	*SE*
Receiving food stamps (reference=not receiving)	2.2***	0.5	2.1***	0.5	2.0***	0.5	2.0***	0.5
Fruit consumption per week in past month	-	-	-0.1*	0.1	-0.1*	0.1	-0.1**	0.05
Vegetable consumption per week in past month	-	-	-0.2**	0.04	-0.2***	0.04	-0.1	0.05
Physical activity (PA) in past month (reference=no PA)	-	-	-0.9**	0.2	-0.9**	0.2	0.001	0.3
Food insecurity (reference=food secure)	-	-	-	-	0.8**	0.3	0.5	0.2
Poverty (reference=not living in poverty)	-	-	-	-	-0.2	0.4	-0.4	0.4
Age	-	-	-	-	-	-	0.1***	0.01
Gender (reference=male)	-	-	-	-	-	-	0.2	0.3
African-American (reference=White)	-	-	-	-	-	-	2.3***	0.5
Latino/Hispanic (reference=White)	-	-	-	-	-	-	2.4***	0.4
Asian (reference=White)	-	-	-	-	-	-	-2.6***	0.5
Education (reference=less than high school)	-	-	-	-	-	-	-1.0***	0.3
U.S. born (reference=not born in U.S.)	-	-	-	-	-	-	0.7*	0.3
Constant	27.2***	0.1	28.9***	0.4	28.7***	0.6	25.1***	0.8
R-squared	0.01		0.02		0.02		0.09	

BMI: Body mass index. PA: physical activity *p< .05 **p<.01 ***p <.001.

Crude *n:* 7,388; weighted *n:* 4,019,253 for all models.

Data source: California Health Interview Survey 2001. *df*=79 for all models. Model 1 examines the bivariate Food Stamp Program effect. Model 2 adds food consumption (continuous) and physical activity. Model 3 adds food insecurity and poverty. Model 4 adds age, gender, ethnicity, education, and citizenship. Unweighted eta squared=0.007 for the FSP.

Table 24

Ordinary least square regression of Food Stamp Program participation (entering first) predicting mean body mass index (BMI) and controlling for selected sociodemographics, 2009 sample

	Model 1		Model 2		Model 3		Model 4	
	β	*SE*	*β*	*SE*	*β*	*SE*	*β*	*SE*
Receiving food stamps (reference=not receiving)	0.9*	0.4	0.9*	0.4	1.0*	0.4	0.9*	0.4
Fruit consumption per week in past month	-	-	0.02	0.02	0.02	0.02	0.01	0.02
Vegetable consumption per week in past month	-	-	-0.1***	0.03	-0.1***	0.03	-0.1**	0.02
Physical activity (PA) in past month (reference=no PA)	-	-	-0.9**	0.3	-0.9**	0.3	-0.6	0.3
Food insecurity (reference=food secure)	-	-	-	-	0.6	0.3	0.3	0.3
Poverty (reference=not living in poverty)	-	-	-	-	-0.3	0.4	-0.1	0.4
Neighborhood safety (reference=none/some of the time)	-	-	-	-	0.1	0.4	-0.3	0.3
Age	-	-	-	-	-	-	0.1***	0.01
Gender (reference=male)	-	-	-	-	-	-	-0.1	0.3
African-American (reference=White)	-	-	-	-	-	-	0.1	0.6
Latino/Hispanic (reference=White)	-	-	-	-	-	-	1.0**	0.3
Asian (reference=White)	-	-	-	-	-	-	-2.9***	0.5
Education (reference=less than high school)	-	-	-	-	-	-	-0.9*	0.4
U.S. born (reference=not born in U.S.)	-	-	-	-	-	-	0.6*	0.3
Constant	27.3***	0.1	28.3***	0.3	28.2***	0.6	25.8***	0.9
R-squared	0.003		0.02		0.02		0.08	

BMI: Body mass index. PA: physical activity *p< .05 **p<.01 ***p <.001.
Crude *n:* 6,560; weighted *n:* 5,233,316 for all models.
Data source: California Health Interview Survey 2009. *df*=79 for all models. Model 1 examines the bivariate Food Stamp Program effect. Model 2 adds food consumption (continuous) and physical activity. Model 3 adds food insecurity, poverty, and neighborhood safety (participant feels safe in their neighborhood most/all of the time versus none/some of the time). Model 4 adds age, gender, ethnicity, education, and citizenship. Unweighted eta squared=0.004 for the FSP.

Table 25

Ordinary least square regression of Food Stamp Program participation predicting mean body mass index (BMI) and controlling for selected sociodemographics, stacked 2001 and 2009 samples

	β	*SE*
Year (reference=2001)	0.1	0.2
Age	0.1***	0.01
Gender (reference=male)	0.01	0.2
African-American (reference=White)	1.1**	0.4
Latino/Hispanic (reference=White)	1.5***	0.2
Asian (reference=White)	-2.8***	0.4
Education (reference=less than high school)	-0.9***	0.2
U.S. born (reference=not born in U.S.)	0.6**	0.2
Food insecurity (reference=food secure)	0.5*	0.2
Poverty (reference=not living in poverty)	-0.2	0.3
Fruit consumption per week in past month	-0.01	0.01
Vegetable consumption per week in past month	-0.1**	0.02
Physical activity (PA) in past month (reference=no PA)	-0.4	0.2
Receiving food stamps (reference=not receiving)	1.4***	0.3
Constant	25.2***	0.5
R-squared	0.08	

BMI: Body mass index. PA: physical activity *p< .05 **p<.01 ***p <.001.
Crude *n:* 6,560; weighted *n:* 5,233,316 for all models.
Data source: California Health Interview Survey 2001, 2009. *df*=79. Unweighted eta squared=0.005 for the FSP.

References

Ailshire, J. A., & House, J. S. (2011). The unequal burden of weight gain: An intersectional approach to understanding social disparities in BMI trajectories from 1986 to 2001/2002. *Social Forces, 90,* 397-423.

Alston, J. M., Mullally, C. C., Sumner, D. A., Townsend, M., & Vosti, S. A. (2009). Likely effects on obesity from proposed changes to the US Food stamp program. *Food Policy, 34,* 176-184.

Beaulac, J., Kristjansson, E., & Cummins, S. (2009). A systematic review of food deserts, 1966-2007. *Preventing Chronic Disease, 6(3),* A105.

Beharov, D. J. (2003). Growing overweight and obesity in America: The potential role of federal nutrition programs. Retrieved March 28, 2013, from http://welfareacademy.org/pubs/foodassist/testimony-040303.pdf.

Björntorp, P., & Rosmond, R. (2000). Obesity and cortisol. *Nutrition, 16,*924-936.

Black, J. L., & Macinko, J. (2008). Neighborhoods and obesity. *Nutrition Reviews, 66,* 2-20.

Block, J. P., He, Y., Zaslavsky, A. M., Ding, L., & Ayanian, J. Z. (2009). Psychosocial stress and change in weight among US adults. *American Journal of Epidemiology, 170,* 181-192.

Bodor, J.N., Rice, J.C., Farley, T.A., Swalm, C.M., & Rose, D. (2010). The association between obesity and urban food environments. *Journal of Urban Health, 87,* 771-781.

Boyle, M. A., & Long, S. L. (2007). *Personal Nutrition* 6th ed. Thompson Wadsworth Publishing. Burdette, H. L., Wadden, T. A., Whitaker, R. C. (2006). Neighborhood safety, collective efficacy, and obesity in women with young children. *Obesity, 14,* 518–525.

Breunig, R., & Dasgupta, I. (2005). Do intra-houshold effects generate the food stamp cash-out puzzle? *American Journal of Agricultural Economics, 87,* 552-568.

Butler, J. S., & Raymond, J. E. (2007). The effect of the Food Stamp Program on nutrient intake. *Economic Inquiry, 34,* 781-798.

California Budget Project. (2009). Food within reach: Strategies for increasing participation in the Food Stamp Program in California. Retrieved March 28, 2013, from http://www.cbp.org/pdfs/2009/091221_Food_Stamps.pdf.

California Department of Public Health. (2011). Frequently asked questions about CALFresh. Retrieved July 11, 2012, from http://www.cdph.ca.gov/programs/cpns/Documents/CalFreshOR-%20Frequently%20Asked%20Questions.pdf.

California Department of Social Services. (2009). California electronic benefit transfer (EBT) card. Retrieved July 24, 2012, from http://www.cdss.ca.gov/cdssweb/entres/forms/English/PUB387_2Col.pdf.

California Department of Social Services. (2007a). Eligibility and issuance requirements. Retrieved April 27, 2011, from http://www.dss.cahwnet.gov/foodstamps/PG841.htm#citizen.

California Department of Social Services. (2007b). Frequently asked questions. Retrieved July 11, 2012, from http://www.dss.cahwnet.gov/foodstamps/PG846.htm.

California Food Policy Advocates. (2011). CalFresh increases by county in California from 2006-2011. Retrieved July 14, 2012, from http://cfpa.net/CalFresh/CFPAPublications/CalFreshIncreasesByCountyFrom2006-2011.pdf .

California Food Policy Advocates. (2010). California food stamps characteristics report. Retrieved March 28, 2013, from http://cfpa.net/CalFresh/CFPAPublications/CalFresh-Characteristics-2010.pdf.

California Health Interview Survey. (2011a) *CHIS 2009 adult survey*. UCLA Center for Health Policy Research. Los Angeles, CA.

California Health Interview Survey (2011b). *CHIS 2009 methodology report series: Report 1 – sample design*. Los Angeles, CA: UCLA Center for Health Policy Research.

California Health Interview Survey (2010). Weighting and variance estimation in the public use files. Retrieved June 23, 2011, from http://healthpolicy.ucla.edu/chis/design/Documents/Weighting_Var_chis_03192010.pdf.

California Health Interview Survey. (2008). *CHIS 2001 adult public use file, release 4 [computer readable file]*. Los Angeles, CA: UCLA Center for Health Policy Research.

Centers for Disease Control and Prevention. (2011a). Balancing calories. Retrieved May 17, 2013, from http://www.cdc.gov/healthyweight/calories.

Centers for Disease Control and Prevention. (2011b). Body mass index. Retrieved June 18, 2011, from http://www.cdc.gov/healthyweight/assessing/bmi/index.html.

Centers for Disease Control and Prevention. (2010a). Compared with whites, Blacks had 51% higher and Hispanics had 21% higher obesity rates. Retrieved March 26, 2013, from http://www.cdc.gov/features/dsobesityadults/index.html.

Centers for Disease Control and Prevention. (2010b). Defining overweight and obesity. Retrieved January 7, 2011, from http://www.cdc.gov/obesity/defining.html.

Chang, V. W., & Lauderdale, D. S. (2005). Income disparities in body mass index and obesity in the United States, 1971-2002. *Archives of Internal Medicine, 165,* 2122-2128.

Chaparro, M. P., Langellier, B., Birnbach, K., Sharp, M., & Harrison, G. (2012). *Nearly four million Californians are food insecure*. Los Angeles, CA: UCLA Center for Health Policy Research.

Chen, Z., Yen, S. T., & Eastwood, D. B. (2005). Effect of food stamp participation on body weight and obesity. *American Journal of Agricultural Economics, 87*, 1167-1173.

Cole, N., & Fox, M. K. (2008). Diet quality of Americans by food stamp participation status: Data from the National Health and Nutrition Examination Survey, 1999–2004. USDA-ERS Report. Project Officer: Genser JL.

Connolly, C. (2003, August 10). Public policy targeting obesity. June 22, 2010, from http://www.washingtonpost.com/ac2/wp-dyn/A39239-2003Aug9?language=printer.

Cummins, S., & Macintyre, S. (2006). Food environments and obesity-neighborhood or nation? *International Journal of Epidemiology, 35,* 100-104.

Dallman, M. F., Pecoraro, N.C., & la Fleur, S.E. (2005). Chronic stress and comfort foods: Self-medication and abdominal obesity. *Brain Behavior & Immunity, 19(4),* 275-280.

Dallman, M. F., Pecoraro, N., Akana, S. F., la Fleur, S. E., Gomez, F., Houshyar, H., & et al. (2003). Chronic stress and obesity: A new view of "comfort food". *Proceedings of the National Academy of Sciences, 100,* 11696–11701

Darmon, N., Briend, A., & Drewnowski, A. (2004). Energy-dense diets are associated with lower diet costs: A community study of French adults. *Public Health Nutrition, 7,* 21-27.

Darmon, N., & Drewnowski, A. (2008). Does social class predict diet quality? *The American Journal of Clinical Nutrition, 87,* 1107-1117.

Das, A. (2013). How does race get "under the skin"?: Inflammation, weathering, and metabolic problems in late life. *Social Science & Medicine, 77,* 75-83.

Davis, G. C., & You, W. (2010). The Thrifty Food Plan is not thrifty when labor cost is considered. *Journal of Nutrition, 140,* 854-857.

DeNoon, D. J. (2006, June 27). Study suggests 10 new obesity causes. *CBS News.* Retrieved July 9, 2010, from http://www.cbsnews.com/2100-500368_162-1757772.html.

Devitt, A. A., & Mattes, R. D. (2004). Effects of food unit size and energy density on intake in humans. *Appetite, 42,* 213-200.

Dietz, W. H. (1995). Does hunger cause obesity? *Pediatrics, 95,* 766-767.

DiMeglio, D. P., & Mattes, R. D. (2000). Liquid versus solid carbohydrate: Effects on food intake and body weight. *International Journal of Obesity, 24,* 794-800.

Dinour, L. M., Bergen, D., & Yeh. (2007). The food insecurity-obesity paradox: A review of the literature and the role food stamps may paly. *Journal of the American Dietetic Association, 107,* 1952-1961.

DiSogra, C. A., Yen, W., Ramirez, A., & Aguayo, J. (2003). Only 12% of California's poorest adults receive food stamps, one million lack adequate food. Retrieved July 13, 2012, from http://www.healthpolicy.ucla.edu/pubs/files/FoodStamps.pdf.

Dittus, K. L., Hillers, V. N., & Beerman, K. A. (1995). Benefits and barriers to fruit and vegetable intake: Relationship between attitudes and consumption. *Journal of Nutrition Education, 27,*120-126.

Drewnowski, A. (2009). Obesity, diets, and social inequalities. *Nutrition Reviews, 67,* s36-s39.

Drewnowski, A. (2007). The real contribution of added sugars and fats to obesity. *Epidemiologic Reviews, 29,* 160-171.

Drewnowski A., & Specter, S.E. (2004). Poverty and obesity: The role of energy density and energy costs. *The American Journal of Clinical Nutrition, 79,* 6–16.

Eliadis, E. E. (2006). The role of social work in the childhood obesity epidemic. *Social Work, 51,* 86-88.

Engel, G. (1980). The clinical application of the biopsychosoical model. *American Journal of Psychiatry, 137,* 535-544.

Fish, J. S., Ettner, S., Ang, A., & Brown, A. F. (2010). Association of perceived neighborhood safety on body mass index. *American Journal of Public Health, 100,* 2296-2303.

Food Research and Action Center. (2013). A review of strategies to bolster SNAP's role in improving nutrition as well as food security. Retrieved May 20, 2013, from http://frac.org/wp-content/uploads/2011/06/SNAPstrategies.pdf.

Food Research and Action Center. (2012). Replacing the Thrifty Food Plan in order to provide adequate allotments for SNAP beneficiaries. Retrieved May 18, 2013, from http://frac.org/pdf/thrifty_food_plan_2012.pdf.

Food Research and Action Center. (2011). SNAP access in urban America: A city-by-city snapshot. Retrieved July 13, 2012 from http://frac.org/wp-content/uploads/2011/01/urbansnapreport_jan2011.pdf.

Food Research and Action Center. (2010a). Federal food programs: SNAP/Food Stamp Program. Retrieved June 14, 2010, from http://www.frac.org/html/federal_food_programs/programs/fsp.html.

Food Research and Action Center (2010b). Why low income and food insecure people are vulnerable to overweight and obesity. Retrieved March 28, 2013, from http://frac.org/initiatives/hunger-and-obesity/why-are-low-income-and-food-insecure-people-vulnerable-to-obesity.

Food Research and Action Center. (2001). Food stamps program: Frequently asked questions. Retrieved June 14, 2010, from http://www.frac.org/html/federal_food_programs/programs/fsp_faq.html.

Frongillo, E. A. (2003). Understanding obesity and program participation in the context of poverty and food insecurity. *The Journal of Nutrition, 133*, 2225-2231.

Gans, K. M., Sheldon, M., Tai, R., George, T., Pearlman, D. N., & Lawson, E. Availability, affordability, and accessibility of a healthful diet in a low-income community, Central Falls, Rhode Island, 2007-2008. *Preventing Chronic Disease, 7,* A43-A49.

Gibson, D. (2006). Long-term food stamp program participation is positively related to simultaneous overweight in young daughters and obesity in mothers. *Journal of Nutrition, 136,* 1081-1085.

Gibson, D. (2003). Food stamp program participation is positively related to obesity in low income women. *Journal of Nutrition, 133*, 2117-2118.

Glanz, K., Basil, M., Maibach, E., Goldberg, J., & Snyder, D. (1998). Why Americans eat what they do: Taste, nutrition, cost, convenience, and weight control concerns as influences on food consumption. *Journal of the American Dietetic Association, 98,* 1118-1126.

Goel, M. S., McCarthy, E. P., Phillips, R. S., & Wee, C. C. (2004). Obesity among US immigrant subgroups by duration of residence. *The Journal of the American Medical Association, 292*, 2860-2867.

Gorber, S. C., Tremblay, M., Moher, D., & Gober, B. (2007). A comparison of direct vs. self-report measures for assessing height, weight, and body mass index: A systematic review. *Obesity Reviews, 8*, 307-326.

GovBenefits.gov. (2010). California food stamp program. Retrieved June 14, 2010, from

http://www.govbenefits.gov/govbenefits_en.portal?_nfpb=true&quickSearchPageFlow_1_actionOverride=%2FBenefitsQuickSearchPageFlow%2Freport&_windowLabel=quickSearchPageFlow_1&quickSearchPageFlow_1bid=1228&_pageLabel=gbcc_page_quicksearch.

Greenstreet, S. (Director). (2009). *Killer at large: Why obesity is America's greatest threat* [DVD]. Available from http://killeratlarge.com/.

Harrison, G. G., Sharp, M., Manalo-LeClair, G., Ramirez, A., & McGarvey, N. (2007). Food security among California's low-income adults improves, but most severely affected do not share in improvement. Los Angeles: UCLA Center for Health Policy Research.

Harrison, G. G., Manalo-LeClair, G., Ramirez, A., Chia, Y. J., Kurata, J., McGarvey, N., & et al. (2005). *More than 2.9 million Californians now food insecure –one in three low-income, an increase in just two years*. Los Angeles: UCLA Center for Health Policy Research.

Harrison, G. G., DiSogra, C. A., Manalo-LeClair, G., Aguayo, J., & Yen, W. (2002). Over 2.2 million low-income California adults are food insecure; 658,000 suffer hunger. Retrieved July 13, 2012, from http://www.healthpolicy.ucla.edu/pubs/files/FoodInsecurity.pdf .

Jones, S. J., & Frongillo, E. A. (2006). The modifying effects of Food Stamp Program participation on the relation between food insecurity and weight change in women. *The Journal of Nutrition, 136,* 1091-1094.

Keith, S.W., Redden, D. T., Katzmarzyk, P. T., Boggiano, M. M., Hanlon, E. C., Benca, R. M., & et al. (2006). Putative contributors to the secular increase in obesity: Exploring the roads less traveled. *International Journal of Obesity, 30,* 1585–1594

Kennedy, E. T., Ohls, J., Carlson, S., & Fleming, K. (1995). The healthy eating index: Design and applications. *Journal of the American Dietetic Association, 95,* 1103-1109.

Kessler, R. C., Andres, G., Colpe, L. J., Hiripi, E., Mroczek, D. K., Norman, S-L. T., & et al. (2002). Short screening scales to monitor population prevalences and trends in non-specific psychological distress. *Psychological Medicine, 32,* 959-976

Krueger, P. M., Rogers, R. G., Ridao-Cano, C. & Hummer, R. A. (2004). To help or to harm? Food stamp receipt and mortality risk prior to the 1996 Welfare Reform Act. *Social Forces, 82,* 1573-1599.

Lake, A., & Townshend, T. (2006). Obesogenic environments: Exploring the built and food environments. *The Journal of The Royal Society for the Promotion of Health, 126,* 262-267.

Lawrence, S., Hazlett, R., & Hightower, P. (2010). Understanding and acting on the growing childhood and adolescent weight crisis: A role for social work. *Health & Social Work, 35,* 147-153.

Larson, N. I., Story, M. T., & Nelson, M. C. (2009). Neighborhood environments: Disparities in access to healthy foods in the U.S. *American Journal of Preventive Medicine, 36,* 74-81.

Le Blanc, M., Lin, B. H., & Smallwood, D. (2007). Food assistance: How strong is the safety net? *Amber Wave, 5,* 40-45.

Leung, C. W., & Villamor, E. (2011). Is participation in food and income assistance programmes associated with obesity in California adults? Results from a state-wide survey. *Public Health Nutrition, 14,* 645-652.

Link, B. G., & Phelan, J. (1995). Social conditions as fundamental causes of disease. *Journal of Health and Social Behavior, Extra Issue,* 80-94.

Martinez-Hernandez, A., Enriquez, L., Moreno-Moreno, M. J., & Marti, A. (2007). Genetics of obesity. *Public Health Nutrition, 10,* 1138-1144.

Mattes, R. D. (1996). Dietary compensation by humans for supplemental energy provided as ethanol or carbohydrate in fluids. *Physiology & Behavior, 59,* 179 – 187.

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,* 287-305.

Meyerhoefer, C. D., & Yang, M. (2011). The relationship between food assistance and health: A review of the literature and empirical strategies for identifying program effects. *Applied Economic Perspectives and Policy, 33,* 304-344.

Michel, C., Levin, B.E., & Dunn-Meynell, A. A. (2003). Stress facilitates body weight gain in genetically predisposed rats on medium-fat diet. *American Journal of Physiology - Regulatory, Integrative and Comparative Physiology, 285,* 791-799.

Mobley, L. R., Root, E. D., Finkelstein, E. A., Khavjou, O., Farris, R. P., & Will, J. C. (2006). Environment, obesity, cardiovascular disease risk in low-income women. *American Journal of Preventive Medicine, 30,* 327-332.

Molarius, A., Seidell, J.C., Sans, S., Tuomilehto, J., Kuulasmaa, K. (2000). Educational level, relative body weight, and changes in their association over 10 years: An international perspective from the WHO, MONICA project. *American Journal of Public Health, 90,* 1260-1268.

Moreland, K., Diez Roux, A., & Wing, S. (2006). Supermarkets, other food stores and obesity: The atherosclerosis risk in communities study. *American Journal of Preventive Medicine, 30,* 333-339.

National Heart Lung and Blood Institute. (2010). What causes obesity and overweight. Retrieved July 9, 2012, from http://www.nhlbi.nih.gov/health/health-topics/topics/obe/causes.html .

Nielsen, S. J., & Popkin, B. M. (2001). Changes in beverage intake between 1977 and 2001. *American Journal of Preventive Medicine, 27,* 205–210.

Newby, P. K., Muller, D., Hallfrish, J., Qiao, N., Andres, R., & Tucker, K. L. (2003). Dietary patterns and changes in body mass index and waist circumference in adults. *The American Journal of Clinical Nutrition, 77,* 1417-1425.

Nyholm, M., Gullberg, B., Merlo, J., Lundqvist-Persson, C., Råstam, L., & Lindblad, U. (2007). The validity of obesity based on self-reported weight and height: Implications for population studies. *Obesity, 15,* 197-208.

Pasquali, R., Vicennati, V., Cacciari, M., & Pagotto, U. (2006). The hypothalamic-pituitary-adrenal axis activity in obesity and the metabolic syndrome. *Annals of the New York Academy of Science*s, *1083,* 111-128.

Polivy, J. (1996). Psychological consequences of food restriction. *Journal of the American Dietetic Association, 96,* 589-592.

Robert, S. A., & Reither, E. N. (2004). A multilevel analysis of race, community disadvantage, and body mass index among adults in the US. *Social Science & Medicine, 59,* 2421-2434.

Rolls, B. J., Roe, L. S., Beach, A. M., & Kris-Etherton, P. M. (2005). Provision of foods differing in energy density affects long-term weight loss. *Obesity Research, 13,* 1052-1060.

Rossi, P. H. (1998). *Feeding the poor: Assessing federal food aid.* The AEI Press: Washington, D. C.

Scott, K. A., Melhorn, S. J., & Sakai, R. R. (2012). Effects of chronic social stress on obesity. *Current Obesity Reports, 1,* 16-25.

SNAP to Health. (2010). SNAP and obesity: The facts and the fictions of SNAP nutrition. Retrieved July 15, 2012, from http://www.snaptohealth.org/snap/snap-and-obesity-the-facts-and-fictions-of-snap-nutrition/.

Sobal, J., Bisogni, C. A., Devine, C. M., & Jastran, M. (2006). A conceptual model of the food choice process over the life course. In R. Shepherd & M. Raats (Eds.), *The Psychology of Food Choice* (pp. 1-18), Cambridge, MA: CABI.

Stata Corporation. (2011). *STATA release 12.0.* College Station, TX: Stata Press.

Story, M., Kaphingst, K. M., Robinson-O'Brien, R., & Glanz, K. (2008). Creating healthy food and eating environments: Policy and environmental approaches. *Annual Review of Public Health, 29,* 253–272.

Strategies to Overcome and Prevent (STOP) Obesity Alliance. (2012). National Association of Social Workers. Retrieved June 3, 2012, from http://www.stopobesityalliance.org/steering-committee/national-association-of-social-workers-nasw).

Sturm, R. (2007). Increases in morbid obesity in the USA: 2000-2005. *Public Health, 121(7),* 492-496.

Swinburn, B., & Egger, G. (2006). Preventive strategies against weight gain and obesity. *Obesity Reviews, 3(4),*289–301.

Swinburn, B., & Egger, G. (2004). The runaway weight gain train: Too many accelerators, not enough brakes. *British Medical Journal, 329,* 736-739.

Swinburn, B., Egger, G., & Raza, F. (1999). Dissecting obesogenic environments: the development and application of a framework for identifying and prioritizing environmental interventions for obesity. *Preventive Medicine, 29,* 563–570.

Thayer, J., Murphy, C., Cook, J., Ettinger de Cuba, S., DaCosta, R., & Chilton, M. (2008). Coming Up Short: High Food Costs Outstrip Food Stamp Benefits. Retrieved May 20, 2013, from http://www.childrenshealthwatch.org/upload/resource/RCOHD_Report_Final.pdf.

Townsend, M. S. (2006). Obesity in low income communities: Prevalence, effects, a place to begin. *Journal of the American Dietetic Association, 106,* 34-37.

Townsend, M. S., Peerson, J., Love, B., Achterberg, C., & Murphy, S. P. (2001). Food insecurity is positively related to overweight in women. *The Journal of Nutrition, 131,* 1738-1745.

Treuhaft, S., & Karpyn, A. (2010). The grocery gap: Who has access to healthy foods and why it matters. Retrieved July 15, 2012, from http://www.policylink.org/atf/cf/%7B97C6D565-BB43-406D-A6D5-ECA3BBF35AF0%7D/FINALGroceryGap.pdf.

Trust for America's Health. (2011). F as in fat 2011: How obesity threatens America's future. Retrieved July 24, 2012, from http://healthyamericans.org/reports/obesity2011/Obesity2011Report.pdf.

United States Department of Agriculture. (2012a). Supplemental Nutrition Assistance Program: Legislative history. Retrieved, May 17, 2013, from http://www.fns.usda.gov/snap/rules/Legislation/history/legislative-early.htm

United States Department of Agriculture. (2012b). Reaching those in need: State supplemental nutrition assistance program participation rates in 2010. Retrieved March 28, 2013, from http://www.fns.usda.gov/ora/MENU/Published/snap/FILES/Participation/Reaching2010.pdf.

United States Department of Agriculture. (2011). State supplemental nutrition assistance program participation rates in 2009. Retrieved July 14, 2012, from http://www.fns.usda.gov/ora/menu/Published/snap/FILES/Participation/Reaching2009.pdf .

United States Department of Agriculture. (2008). Supplemental Nutrition Assistance Program fact sheet. Retrieved April 19, 2011, from http://www.fns.usda.gov/snap/roll-out/snap-fact-sheet.pdf.

United States Department of Agriculture and U.S. Department of Health & Human Services. (2010). Dietary guidelines for Americans, 2010. 7th Edition, Washington, DC: U.S. Government Printing Office.

United States Department of Health & Human Services. (2005). Chapter 6: Calories + nutrition = food. Retrieved October 3, 2011, from http://www.health.gov/dietaryguidelines/dga2005/healthieryou/html/chapter6.html.

United States Department of Health & Human Services. (2003). The obesity crisis in America. Retrieved June 22, 2010, from http://www.surgeongeneral.gov/news/testimony/obesity07162003.htm.

Vámosi1, M., Heitmann, B. L., & Kyvik, K. O. (2010). The relation between an adverse psychological and social environment in childhood and the development of adult obesity: a systematic literature review. *Obesity Reviews, 11,* 177-184.

Vartanian, L. R., Schwartz, M. B., & Brownell, K. D. (2007). Effects of soft drink consumption on nutrition and health: A systematic review and meta-analysis. *American Journal of Public Health, 97,* 667-675.

Ver Ploeg, M., Mancino, L., Lin, B., & Wang, C. (2007). The vanishing weight gap: Trends in obesity among adult food stamp participants (UC) (1976-2002). *Economics and Human Biology, 5*, 20-36.

Ver Ploeg, M., Mancino, L., & Lin, B. (2006). Food stamps and obesity: Ironic twist or complex puzzle? Retrieved May 10, 2010, from http://www.ers.usda.gov/amberwaves/february06/features/feature4.htm.

Wang, Y., & Beydoun, M. A. (2007). The obesity epidemic in the United States—gender, age, socioeconomic, racial/ethnic, and geographic characteristics: A systematic review and meta-regression analysis. *Epidemiologic Reviews, 29*, 6-28.

Whitemore, D. (2002). What are food stamps worth? Retrieved March 28, 2013, from https://www.msu.edu/~dickertc/301f06/whatarefoodstampsworth.pdf.

Wilde, P. E., & Ranney, C. K. (2000). The monthly food stamp cycle: Shopping frequency and food intake decisions in an endogenous switching regression framework. *American Journal of Agricultural Economics, 82*, 200-213.

World Health Organization. (2012a). Food security. Retrieved July 11, 2012, from http://www.who.int/trade/glossary/story028/en/.

World Health Organization. (2012b). Obesity and overweight. Retrieved July 11, 2012, from http://www.who.int/mediacentre/factsheets/fs311/en/index.html.

Zagorsky, J. L., & Smith, P. L. (2009). Does the U.S. Food Stamp Program contribute to adult weight gain? *Economics and Human Biology*, *7*, 246-258.

Zhang, Q., & Wang, Y. (2004). Socioeconomic inequality of obesity in the United States: do gender, age, and ethnicity matter? *Social Science & Medicine, 58*, 1171–1180.