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## Exploring the Relationship of Healthy Lifestyle Characteristics with Food Behaviors of Low-Income, Food Insecure Women in the United States (US)

Kimberly Ann Wollard

University of South Florida, kimberly.wollard@surgery.ufl.edu

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Exploring the Relationship of Healthy Lifestyle Characteristics with Food Behaviors of Low-  
Income, Food Insecure Women in the United States (US)

by

Kimberly Wollard

A dissertation submitted in fulfillment  
of the requirement for the degree of  
Doctor of Philosophy  
School of Social Work  
College of Behavioral and Community Sciences  
University of South Florida

Major Professor: Sondra J. Fogel, Ph.D., LCSW  
Roger Boothroyd, Ph.D.  
Nan Sook Park, Ph.D., MSW  
Alison Salloum, Ph.D., LCSW  
Mary Armstrong, Ph.D.

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## **Dedication**

This dissertation is dedicated to my Dad, Gene Snyder, who always believed in me and encouraged me to follow my heart. I miss you every day. And to my mom, whose love and support has guided me through life and made me who I am today.

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## **Abstract**

Using data from the National Health and Nutrition Examination Survey (NHANES) self-reported surveys from 2007-2012, this research explored the relationship between four healthy lifestyle characteristics - healthy weight, adequate daily fruit and vegetable intake, regular moderate to vigorous physical activity and not smoking - with food behaviors of low-income, food insecure women. The study examined three specific food behaviors (the use of SNAP, consumption of fast foods, and the utilization of community emergency food programs) to determine if these behaviors had a significant impact on low-income, food insecure women to follow healthy lifestyle characteristics.

A secondary data analysis was conducted using binary logistic regression for the analysis. The study sample included low-income, food insecure women ages 18 and above. Once missing data were removed, the total sample size was 589. Results of this study indicate there are no significant relationships between adherence to two or more of the four healthy lifestyle characteristics with: (1) the use of SNAP, (2) the consumption of fast foods or (3) the utilization of community emergency food programs. This study illustrates the importance of understanding the food behaviors of low-income, food insecure woman in order to aid in the prevention of diseases caused by obesity. Although the research results from this study were not significant, it was clearly demonstrated that most Americans do not adhere to the four healthy lifestyle characteristics. The implications of this research enable social workers and other health professionals to understand how food behaviors may be a key factor in reducing or eliminating food insecurity and obesity of low-income, food insecure women in the US.

## **Chapter One: Introduction**

Using data from the National Health and Nutrition Examination Survey (NHANES), this research explored the relationship between four healthy lifestyle characteristics (HLCs) - healthy weight, adequate daily fruit and vegetable intake, regular moderate to vigorous physical activity and not smoking - with food behaviors of low-income, food insecure women. The study examined three specific food behaviors (the use of SNAP, consumption of fast foods, and the utilization of community emergency food programs) to determine if these behaviors had a significant impact on low-income, food insecure women to follow healthy lifestyle characteristics.

Health promotion is the process of enabling people to increase control over, and to improve their health (World Health Organization (WHO), 2005). Health promotion action aims at reducing differences in current health status and ensuring equal opportunities and resources, enabling all people to achieve their fullest health potential (Mahler, Epp, Franklin, & Kickbusch, 1986). This includes a secure foundation in a supportive environment, access to information, life skills, and opportunities for making healthy choices. Social work involvement in health promotion started over a century ago when settlement house workers provided education to community members on ways to reduce the spread of disease and promote healthy lifestyles habits such as proper diet, exercise, and hygiene (Bracht, 1987).

Social workers play a vital role in advocating for equal, adequate health and well-being for all members of society. Based on the National Association of Social Workers (NASW) Code of Ethics (2004), social justice is a core ethical value of practice. Whether concerned about an individual's needs or social policy reform, social workers are most frequently the voice for change

and social justice (NASW, 2016a). The lack of access to healthy and affordable food to all Americans serves as an example of the social injustice that food insecurity presents. Too often, low-income individuals are more likely to suffer from preventable diseases because of a combination of social and health disparities. Narrowing these disparities in health and health care has been the goal of many public and private efforts since the early 1990s (Bahls, 2011). Although some progress has occurred, there are still many areas that must be explored. One area of needed attention is the association between healthy habits and well-being for vulnerable populations.

### **Purpose of the Study**

The overall purpose of the study was to investigate the healthy lifestyle characteristics and food behaviors of low-income, food insecure women. The specific aim of this study was to examine the relationship between the four healthy lifestyle characteristics (healthy weight, adequate daily fruit and vegetable intake, regular moderate to vigorous physical activity, and not smoking) with food behaviors of low-income, food insecure women. According to the National Health and Nutrition Examination Survey III Mortality Study, people live longer if they practice one or more of the healthy lifestyle characteristics (Ford, Zhao, Tsai, & Li, 2011). The three specific food behaviors examined were the use of SNAP, consumption of fast foods, and utilization of community emergency food programs.

As the obesity epidemic has grown, researchers and public health advocates have been calling for public policy efforts to address the toxic food environment (Battle & Brownwell, 1996). Factors influencing food choice are not only based upon individual preferences, but are constrained by circumstances that are social, cultural and economic. A disconnect between diet and health among low-income women calls for nutrition interventions that educate low-income families on inexpensive, healthful eating in a structured environment, and diet-disease relationships

(Dammann & Smith, 2009).

Lifestyle behaviors lie at the root of many chronic diseases (Ford, Zhao, Tsai, & Li, 2011). In a recent study, researchers examined data on 16,958 people who took part in the NHANES III Mortality Study from 1988 to 2006. All of them were aged 17 years and above and were considered to be a representative sample of people living in the US (Ford et al.). The results indicated that individuals who follow healthy diets, regular exercise and refrained from smoking not only decrease the likelihood of chronic health problems, but live longer. Understanding lifestyle behaviors may be a key factor in reducing or eliminating food insecurity and obesity in the US. Identifying both positive and negative health behaviors of vulnerable populations is vital in order to reduce mortality rates and improve overall health of these underserved populations.

### **Research Questions**

This study aimed to determine the relationship between four healthy lifestyle characteristics and food behaviors of low-income, food insecure women by investigating the three following research questions:

1. To what extent is adherence to healthy lifestyle characteristics (i.e. healthy weight, adequate daily fruit and vegetable intake, regular moderate to vigorous physical activity, and not smoking) among low-income, food insecure women associated with their use of the federally funded food assistance program, SNAP?
2. To what extent is adherence to healthy lifestyle characteristics among low-income, food insecure women associated with the consumption of fast foods?
3. To what extent is adherence to healthy lifestyle characteristics among low-income, food insecure women associated with their utilization of community emergency food programs?

## **Research Hypotheses**

Hypothesis 1: Low-income, food insecure women who participated in SNAP will be significantly more likely to adhere to at least two or more of the four healthy lifestyle characteristics compared to low-income, food insecure women who did not.

Null Hypothesis 1: There will be no significant difference between low-income, food insecure women who participate in SNAP and those who do not in terms of their adherence to the four healthy lifestyle characteristics.

Hypothesis 2: Low-income, food insecure women who consume fast foods two or more times per week will be significantly less likely to adhere to at least two or more of the four healthy lifestyle characteristics compared to low-income, food insecure women who consume fast foods one time or less per week.

Null Hypothesis 2: There will be no significant difference between low-income, food insecure women who consume fast foods two or more times per week and those who do not regarding their adherence to the four healthy lifestyle characteristics.

Hypothesis 3: Low-income, food insecure women who utilize community emergency food programs will be significantly less likely to adhere to at least two or more of the four healthy lifestyle characteristics compared to low-income, food insecure women who did not utilize community programs that provide emergency foods.

Null Hypothesis 3: There will be no significant difference between low-income, food insecure women who utilize community emergency food programs and those who do not regarding their adherence to the four healthy lifestyle characteristics.

## **Research Design**

To answer the research questions, a secondary data analysis using the National Health and

Nutrition Examination Survey (NHANES) was conducted using binary logistic regression for the analysis. NHANES is a program of studies designed to assess the health and nutritional status of adults and children in the US (CDC, 2014a). The research specifically focused on NHANES self-reported surveys conducted from 2007 through 2012. The study sample included low-income, food insecure women ages 18 and above. One categorical outcome variable was created by recoding four dichotomous variables (healthy weight, adequate daily fruit and vegetable intake, regular moderate to vigorous physical activity, and not smoking) into one categorical variable, healthy lifestyle characteristics, also known as HLCs. A comparison of the association between adherence to two or more of the HLCs with food behaviors of low-income, food insecure women; specifically the use of SNAP, consumption of fast foods and the utilization of community emergency food, was conducted.

### **Overview of the Problem**

The following section will provide a brief background on the social determinants of health with a specific focus on the “place-based” organizing framework developed by Healthy People 2020. This section will then examine the significance of low-income women in discussions of food insecurity. Finally, because food insecurity and obesity often co-exist, an explanation of the importance of examining obesity in relation to low-income, food insecure women will be provided.

**Health Disparities and Social Determinants of Health.** According to the Center for Disease Control (CDC), life expectancy at birth for the US population reached a record high of 78.8 years in 2012, and the age-adjusted death rate for the US decreased 1.1% from 2011 to 2012 to a record low of 732.8 per 100,000 standard population (Xu, Kochanek, Murphy, & Arias, 2014). Although significant improvements in the overall health of the US population have been realized over the past few decades, this improved health status is not equally distributed amongst all

members of society. Well-educated, upper class women have lower rates of several chronic diseases; such as obesity, compared to women with lower education and income levels (Issacs & Schroeder, 2004).

In addition, morbidity and mortality rates in industrialized societies follow a socioeconomic gradient (Darmon & Drewnowski, 2008). Socioeconomic status (SES), whether assessed by income, education, or occupation, is linked to a wide range of health problems, including low birthweight, cardiovascular disease, hypertension, arthritis, diabetes, and cancer (National Center for Health Statistics, 2012). Additional research indicates SES is a key factor in determining the quality of life for women, with resulting effects on the lives of children and families (American Psychological Association, 2011).

Health disparities are defined in the US Department of Health and Human Services (USDHHS) Action Plan to Reduce Racial and Ethnic Health Disparities (2011) as “differences in health outcomes that are closely linked with social, economic, and environmental disadvantages” (p. 1). Health disparities negatively affect groups of people who have systematically experienced greater social or economic obstacles to good health, such as race, gender or socioeconomic status (USDHHS, 2010a). Over the years, efforts to eliminate health disparities and achieve health equity have focused primarily on disease and health care services. However, the absence of disease does not automatically equate to good health (Healthy People, 2014).

To a greater extent, factors such as housing and neighborhoods, the state of the environment, genetics, financial status, education level, and relationships with friends and family have a considerably larger impact on health, whereas the more commonly considered factors such as access and use of health care services often have less of an impact (WHO, 2015a). These conditions, such as where one lives, income, job opportunities, etcetera, are examples of social



determinants of health. In social work, these important conditions are often assessed as part of a macro environmental scan of the life space of the client or consumer of services.

The WHO defines social determinants of health as economic and social conditions that influence the health of people and communities (CDC, 2014a). These circumstances are shaped by the distribution of money, power and resources at global, national and local levels (WHO, 2015b). Healthy People 2020 is a national health promotion and disease prevention initiative bringing together many individuals and agencies to improve the health of all Americans, eliminate disparities in health, and improve years and quality of healthy life (Healthy People, 2014). A “place-based” organizing framework, reflecting five key areas of social determinants of health (SDOH), was developed by Healthy People 2020. These five key domains are: (1) Economic Stability, (2) Education, (3) Health and Health Care, (4) Neighborhood and Built Environment, and (5) Social and Community Context (Healthy People, 2014)<sup>1</sup>. Each of the five domains contains a number of critical components/key issues that identify the underlying factors related to health outcomes.

This study focused on one of the critical components related to health outcomes for women under the Economic Stability domain -- having food or being able to access food, also known as food security (Healthy People, 2014). Generally, the concept of food security includes both physical and economic access to food that meets women's dietary needs as well as their food preferences (WHO, 2015a). Common household responses to inadequate food supplies include food budget adjustments, reduced food intake, and alterations in types of food served (Kendall, Olson, & Frongillo, 1996).

Dietary variety decreases and consumption of energy-dense foods increases in food

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<sup>1</sup>Additional information on the Healthy People 2020 SDOH framework can be found at [http:// www . healthypeople.gov/2020/topics-objectives/topic/social-determinants-health](http://www.healthypeople.gov/2020/topics-objectives/topic/social-determinants-health).

insecure households (Seligman, Laraia, & Kushel, 2010). These energy-dense foods, which include refined grains, added sugars, and added saturated/trans-fats, tend to be of poor nutritional quality and less expensive calorie-for-calorie than alternatives (Drewnowski & Darmon, 2005). Women living in food-insecure households consume fewer weekly servings of fruits, vegetables, and dairy, as well as lower levels of micronutrients, including the B complex vitamins, magnesium, iron, zinc, and calcium (Lee & Frongillo, 2001). Micronutrients are dietary components, often referred to as vitamins and minerals, which although only required by the body in small amounts, are vital to development, disease prevention, and well-being (CDC, 2015a). Micronutrients are not produced in the body and must be derived from the diet.

**Obesity and Low-Income, Food Insecure Women.** Obesity is defined as abnormal or excessive fat accumulation that may impair health (WHO, 2015b). Body mass index (BMI) is a simple index of weight-for-height that is commonly used to classify overweight and obesity in adults. It is defined as a person's weight in pounds divided by the square of his/her height in inches. BMI is calculated using height and weight. For an adult woman, obesity is defined as a BMI of 30 or above. For example, a 5-foot, 6-inch adult female who weighs 186 pounds would have a BMI of 30, thus putting this woman into the obese category (CDC, 2015b). According to the American Heart Association, obesity is a public health problem throughout the population (Go et. al., 2013). If current trends in the growth of obesity continue, total healthcare costs attributable to obesity could reach \$861 to \$957 billion by 2030, which would account for 16% to 18% of US health expenditures.

Women ages 20 and over have higher rates of obesity and extreme obesity (36.1% and 8.3%) than men (33.5% and 4.4%) (Ogden, Carroll, Kit, & Flegal, 2014). Although all women are at risk of obesity, minority women, low-income women, and women who live in certain

geographic regions, are at a particularly high risk of obesity (Raghuwanshi, Kirschner, Xenachis, Ediale, & Amir, 2001).

Food insecurity is complex, and the paradox is that not only can it lead to under-nutrition and recurring hunger, but also to over-nutrition, which can lead to overweight and obesity (Tanumihardjo et al., 2007). Researchers are recognizing that obesity and food insecurity co-exist in the same families, communities, and even the same individuals (Food Research and Action Center (FRAC), 2015). It is important to examine obesity and low-income, food insecure women for three primary reasons.

First, according to the Center for Disease Control (2010a), higher income women are less likely to experience obesity than low-income women. Pooling national data from more than 30 years, white and black women consistently experienced higher BMI at lower income levels. Overall, 29% of women who live in households with income at or above the federal poverty level (\$24,300 or more for a family of four) are obese; however, 42% of women with income below the federal poverty level are obese (Chang & Lauderdale, 2005).

Second, food insecurity has a counter-intuitive association with overweight status in women, meaning there is a higher occurrence of being overweight among food insecure women (Tipper, 2010). The link between obesity among women and food insecurity is now well supported in the literature (Crawford & Webb, 2011). Current evidence documents an excess burden of food insecurity and an excess burden of obesity among households living in poverty (Ball & Crawford, 2006).

Third, research indicates medical expenditures associated with obesity are higher for women than men. According to a study by Cawley and Meyerhoefer (2012), the impact of obesity on annual medical costs (in 2005 dollars) is estimated to be \$3,613 for women and \$1,152 for men.

For obese women, the total incremental costs are more than nine times higher than those for overweight women (Dor, Ferguson, Langwith, & Tan, 2010). Furthermore, the per capita costs of obesity are as high as \$16,900 for obese women with a BMI over 40 (roughly 100 pounds overweight) and \$15,500 for obese men in the same BMI class (Finkelstein, DiBonaventura, Burgess, & Hale, 2010).

**Food Insecurity and the Impact on Low-Income Women.** Women need special consideration in discussions of food insecurity and its effect on health, nutrition, and behavior (Ivers & Cullen, 2011). There are several reasons for this. First, women play a significant role in food provision and preparation. In many cultures and countries, women have the main responsibility for the provision of food—if not by producing it, then by earning income to purchase it (Karl, 2009). This applies to urban and non-farming women as well as women farmers, and is not limited to the large percentage of female-headed households in the world. Women are occupied in and preoccupied with food on a daily basis, irrespective of class, culture or ethnicity (Allen & Sachs, 2013).

Women also have a major role in society as child bearers and caregivers (Ivers & Cullen, 2011). Most scholars agree that in virtually all societies women are responsible for most of the child care and cooking (Olson, 2005). Women's traditional role in society as caregivers and preparers of food for the family, as well as an increasing recognition of their role as heads of households, further support the consideration of women as a special group to evaluate the effect, consequences, and areas for intervention in terms of food insecurity.

Finally, women have a disproportionately poor economic status. For women on lower incomes, the perceived high cost of healthy foods is a contributing factor to food insecurity (Jilcott, Laraia, Evenson, & Ammerman, 2009). Women living in low-income neighborhoods frequently

lack access to affordable, nutritious food. One of the most comprehensive reviews of US studies examining neighborhood disparities in food access found that neighborhood residents with better access to supermarkets and limited access to convenience stores tend to have healthier diets and reduced risk for obesity (Larson & Story, 2009).

Furthermore, the “feast or famine” situation is especially a problem for low-income parents, particularly mothers, who often restrict their food intake and sacrifice their own nutrition in order to protect their children from hunger (Basiotis & Lino, 2002). Households with limited resources to buy enough food often try to stretch their food budgets by purchasing cheap, energy-dense foods that are filling – that is; they try to maximize their calories per dollar in order to stave off hunger (FRAC, 2015). Such a coping mechanism puts women at risk for obesity (Markowitz, Friedman, & Arent, 2008).

## **Conclusion**

Social work has a long history of helping prevent food insecurity by supporting programs that supplement diet and nutritional needs of low-income families (Pace, 2016). This tradition continues today, as social workers remain involved in various research and health promotion programs to encourage positive lifestyles and increase community health and individual well-being (Hurdle, 2001). Given the profession's historic commitment to the health and well-being of persons worldwide, prevention and health promotion are critical to social work's efforts to reduce health inequalities and to promote social justice (Bethke, 2006). As social workers advocating for social justice, it is time to address obesity and food insecurity in the US, not as a matter of charity, but as a fundamental human right necessary to ensure the dignity and well-being of all individuals.

## Chapter Two: Literature Review

The US has witnessed a surge in poverty since the Great Recession of 2007-09. This period of decline in the national economy resulted in rising unemployment rates and an increase in home foreclosures (Hoefler & Curry, 2012). As a result of the Great Recession of 2007-08, food insecurity, defined by the online Oxford Dictionary as “the state of being without reliable access to a sufficient quantity of affordable, nutritious food, has continued to persist at high levels in the US since this financial crisis” (Food Insecurity, 2016). The most recent government statistics collected indicate in 2014, an estimated that 14% of US households (17.4 million Americans) experienced food insecurity at some point during the past year (Coleman-Jensen, Gregory, & Singh, 2014). In addition to worrying about having consistent access to food, most adults living in food-insecure households also report being unable to afford balanced meals and often cut the size of meals or skip meals in order to ensure there is enough food for themselves and their families (Seligman et al., 2010).

Food insecurity is not a new or unfamiliar phenomenon in the US. In 1939, Secretary of Agriculture Henry Wallace created the first Food Stamp Program in the US (SNAP to Health, 2016). The pilot operated from 1939-1943, and was seen as an innovative way to respond to severe hunger caused by the Depression while also supporting farmers (Partners for a Hunger-Free Oregon, 2016). Then in 1961, the program was reintroduced by President John F. Kennedy through food stamp pilot programs in several states, and in 1964, The Food Stamp Act (P.L. 88-525) was passed as a part of President Lyndon Johnson’s Great Society Program. By 1965, participation in the food stamp program topped a half a million participants, increasing to 15

million by 1975 (USDA, 2014a). Although food insecurity and food stamp programs have played a significant role in US history, the recent rise in levels of food insecurity in the US is the largest faced in decades, and many previously food secure families are now facing hunger for the first time (Hoeffler & Curry, 2012). In December 2015, SNAP participants averaged 45,188,655 persons; three times the number in 1975 (FRAC, 2015).

A number of research studies in the US and abroad have found positive associations between food insecurity and overweight or obesity (FRAC, 2015). Both food insecurity and obesity can be independent consequences of low-income and lack of access to enough nutritious food or stresses of poverty. Although obesity among food insecure, low-income individuals occurs in part because they are subject to the same often challenging cultural changes as other Americans (e.g., more sedentary lifestyles, increased portion sizes), this group also faces unique challenges in adopting and maintaining healthful behaviors.

According to the Food Research and Action Center (2015), the challenges faced by low-income, food insecure individuals include the following: limited resources and lack of access to healthy, affordable foods, cycles of food deprivation and over-eating, high levels of stress, anxiety and depression, fewer opportunities for physical activity, greater exposure to marketing of obesity-promoting products, and limited access to health care. Given women's contribution to food production and preparation, their role in society as child bearers and caregivers, the increasing number of female-headed households worldwide, and their disproportionately poor economic status, women need special consideration in discussions of food insecurity and its effect on health, nutrition, and behavior (Ivers & Cullen, 2011).

### **Understanding the Significance of this Study**

This study examines the relationship between adherence to the four healthy lifestyle

characteristics (HLCs) - healthy weight, adequate daily fruit and vegetable intake, regular moderate to vigorous physical activity and not smoking - with three specific food behaviors (the use of SNAP, consumption of fast foods, and the utilization of community emergency food programs) of low-income, food insecure women in the US. By examining food behaviors to determine what influences positive healthy lifestyle characteristics for low-income, food insecure women, social workers and policy advocates can create policies and programs that not only help reduce health disparities for low-income, food insecure women, but can also build a foundation for these women to make positive lifestyle choices that can potentially break the cycle of adult and childhood obesity.

**Health Disparities and Low-income Women.** As defined previously, health disparities are defined in the US Department of Health and Human Services Action Plan to Reduce Racial and Ethnic Health Disparities (2011) as “differences in health outcomes that are closely linked with social, economic, and environmental disadvantages” (p. 1). In the US, there is a growing awareness that medical care alone cannot adequately improve overall health or reduce health disparities without also addressing where and how people live (Braveman, Egerter, & Williams, 2011).

According to the Robert Wood Johnson Foundation (RWJF) (2011), an individual’s opportunity for health starts long before his/her need for medical care. Although an individual’s health is largely influenced by one’s family, the conditions in the communities where Americans live, learn, work and spend their free time also play an important role in people’s ability to make those healthy choices (RWJF). For example, low-income neighborhoods offer greater access to food sources that promote unhealthy eating (Hilmers, Hilmers & Dave, 2012). Proximity to supermarkets (which typically sell fresh produce) has been linked to decreased obesity, while



proximity to small convenience stores (which generally do not sell fresh produce) has been linked to increased obesity and smoking (Cubbin, Pedregon, Egerter, & Braveman, 2008).

Health disparities also show up among those living in rural areas compared to those in urban areas. One major factor relating to rural health disparities are food deserts. Food deserts are areas that lack access to affordable fruits, vegetables, whole grains, low fat milk, and other foods that make up the full range of a healthy diet (CDC, 2013). Individuals living in food deserts must rely on small grocery stores or convenience stores, which carry few – if any – fresh fruits and vegetables (Center for Medicare Advocacy, 2016). Rates of food insecurity among rural households are generally higher than urban households (Feeding America, 2014). Women living in areas likely to be food deserts are living at a crossroads of disadvantage, as they are more likely to be women of color, and living in poverty (Smith, 2012).

Studies examining the role of social and biological stress on health suggest a link between socioeconomic status and ethnic disparities in stress and health (Warnecke et. al., 2008). Chronic stress related to poverty or hardship translates into high levels of the stress-related hormones cortisol and epinephrine, which may in turn influence other body processes such as inflammation or the performance of the immune system. Research shows that communities with smoke-free air laws, access to healthy foods, quality affordable housing, good schools and safe places to play are healthier than those that don't (RWJF, 2011).

In the last two decades, there has been a continued and dramatic increase in our understanding of social environments, such as workplace and neighborhood characteristics, people's experiences of discrimination and racism; the relationship between economic disparities/inequities and lack of social cohesion in all-cause mortality and morbidity; and policies which shape national and local environments (Wallerstein, 2002). Women in the poorest or least

educated groups typically experience the poorest health; however, even Americans who by most standards considered “middle-class” are on average less healthy than Americans with greater SES advantages (Braveman et al., 2011).

**Obesity and Low-income Women.** Obesity can be defined simply as a disease in which excess body fat has accumulated to an extent that health may be adversely affected (WHO, 2015b). BMI, a measure of body fat calculated by dividing weight in pounds by height in inches squared, is the standard measure for classifying overweight and obesity in adults (National Institute of Health (NIH), 2015). The World Health Organization (WHO) classification is based primarily on the association between BMI and mortality. A BMI of 30 or more is now widely accepted as denoting the classification of obesity (Burns, 2004). BMI does not measure body fat directly, but research has shown that BMI is moderately correlated with more direct measures of body fat obtained from skinfold thickness measurements, bioelectrical impedance, densitometry (underwater weighing), dual energy x-ray absorptiometry (DXA) and other methods (Freedman, Horlick, & Berenson, 2013).

In 2014, the prevalence of obesity was just over 36% in adults, and was higher in women (38.3%) than men (34.3%) (Ogden et al., 2014). According to the most recent data released by the CDC in September 2015, rates of obesity now exceed 20% in every state in the US (State of Obesity, 2016). The estimated annual cost of treating obesity in the US adult non-institutionalized population is \$168.4 billion or 16.5% of national spending on medical care (Cawley & Meyerhoefer, 2012). Obesity-related conditions include heart disease, stroke, type 2 diabetes and certain types of cancer; some of the leading causes of preventable death.

There are observed links between obesity and socioeconomic position which may be related to dietary energy density and energy cost (Drewnowski & Darmon, 2005). Energy density

is the amount of energy or calories in a particular weight of food and is generally presented as the number of calories in a gram (kcal/g) (CDC, 2016). The number of calories in a particular amount or weight of food (i.e., the food's energy density) affects the total number of calories a person consumes. Foods with a lower energy density provide fewer calories per gram than foods with a higher energy density. The energy density of a food is essentially a function of water content. Foods with high water content, such as fruits and vegetables, have a low energy density. Foods containing little water, such as butter or chocolate, have a high energy density.

High energy-dense foods are known to be more palatable, largely because they are high in fat and sugar for which humans have a taste preference (Drewnowski & Specter, 2004). The inverse relation between energy density and energy costs would indicate that "obesity-promoting" foods simply offer the most dietary energy at the lowest cost. They are more satiating and less expensive. Given the differential in energy costs between energy-dense and energy dilute foods, the advice to replace fat and sweets with fresh fruits and vegetables may have adverse economic consequences for low-income consumers.

Although all segments of the population are affected, food insecure and low-income women are especially vulnerable to obesity due to the additional risk factors associated with poverty. Low-income, ethnic minority and female-headed households exhibit the greatest risk for food insecurity, which often results in higher prevalence of diet-related disease (Franklin et al., 2012). Pooling national data from more than 30 years, white and black women consistently experienced higher BMI at lower income levels, although this association was more modest at some time points than others (Chang & Lauderdale, 2005). Overall, food insecure women are at a higher risk for overweight/obesity (Hartline-Grafton, 2011).

## **Research Variables**

The following section examines the variables selected for this study. This overview provides rationale for why these variables were selected for the study. First, a description of the sample selection is provided. Next, a review of the independent variable is presented. Finally, a discussion of the dependent variables is presented, detailing the four variables that were transformed to create the single dependent variable, Healthy Lifestyle Characteristics. A detailed description of the NHANES survey as well as data accomplishments are discussed in the methodology section.

**Study Sample - Low-income, Food Insecure Women in the US.** The following section examines low-income, food insecure women. A review of income and health disparities is examined. This will include an overview of health disparities and poverty for women in the US. Food insecurity and low-income women will also be discussed. This summary provides an understanding of food insecurity as well as why it is important to examine women in this discussion.

*Low-income women in the US.* The official poverty threshold of the US was developed in the early 1960s and adopted as an "official" measurement of this status in 1969. The poverty threshold is determined to be the dollar value of a minimum adequate diet for one times three. The multiplier of three was used because 1955 Food Consumption Survey data showed that food expenditures accounted for one-third of after-tax income for the average family with children (Bureau of Labor Statistics, 2014). The poverty threshold is updated annually by the US Census Bureau, and used primarily for statistical purposes such as preparing estimates of the number of Americans in poverty each year (USDHHS, 2015). This measure of poverty is an important social indicator that affects not only public perceptions of well-being in America, but the measure is also

widely used for policy formation, program administration, analytical research and general public understanding of this state (Michael & Citro, 1995).

The poverty guidelines are a simplification of the poverty thresholds for use for administrative purposes - for instance, determining financial eligibility for certain federal programs (Institute for Research on Poverty (IRP), 2014). The guidelines are derived from the Census Bureau's current official year of the poverty threshold, and the figures reflect annual income (National Conference of State Legislatures, 2016). These guidelines are issued each year in the Federal Register by the Department of Health and Human Services. The federal poverty guideline in 2016 for an individual is \$11,880, and for a family of four is \$24,300 (Federal Register, 2016). In 2014, the official poverty rate was 14.8% (DeNavas-Walt & Proctor, 2015). There were 46.7 million people in poverty which was up from 37.3 million in 2007.

The Great Recession at the end of the 2000s resulted in high unemployment and housing foreclosures, which increased the level of insecurity for millions of Americans (Hoefler & Curry, 2012). Families once considered 'middle class' continue to struggle from falling into poverty. Economic security is a vital component to women's overall well-being. Yet, a substantial number of women in the US face economic hardship: approximately one in six adult women have family incomes below the federal poverty line (Hess, 2016).

Multiple factors contribute to poverty among women, including lower earnings, lack of work-family supports, and disability (Hess, 2016). Nearly 666,000 single women with children (14%) who worked full time, year round in 2014 lived in poverty (Eichner, Gallagher- Robbins, 2015). In 2015, female full-time workers made only 79 cents for every dollar earned by men, a gender wage gap of 21% (Hess, 2016). For the 40% of mothers with children under the age of 18 who are their families' sole or primary breadwinner, the gender pay gap can contribute to poor

living conditions, poor nutrition, and fewer opportunities for their children (Hill, 2016). Poor women are particularly vulnerable to food insecurity (Smith, 2012). Often, they experience many of the key risk factors for food insecurity simultaneously. For example, poor women are more likely to live in neighborhoods with restricted access to food, as well as have high risk family structures, such as being single parents (Smith, 2012).

***Food insecure women in the US.*** Food security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life (WHO, 2015c). Household food security is the application of this concept to the family level, with individuals within households as the focus of concern. The World Health Organization has determined that food security exists based on three standards. These are: (a) food availability, defined as sufficient quantities of food available on a consistent basis, (b) food access, defined as having sufficient resources to obtain appropriate foods for a nutritious diet, and (c) food use, defined as appropriate use based on knowledge of basic nutrition and care, as well as adequate water and sanitation (Hoefer & Curry, 2012).

In 2006, the US Department of Agriculture introduced new language to describe ranges of severity of food insecurity (USDA, 2015a). The food security status of each household lies somewhere along a continuum extending from high food security to very low food security. According to the USDA (2015a), this continuum is divided into four ranges, characterized as follows: (1) high food security—Households had no problems, or anxiety about, consistently accessing adequate food; (2) marginal food security—Households had problems at times, or anxiety about, accessing adequate food, but the quality, variety, and quantity of their food intake were not substantially reduced; (3) low food security—Households reduced the quality, variety,

and desirability of their diets, but the quantity of food intake and normal eating patterns were not substantially disrupted; (4) very low food security—At times during the year, eating patterns of one or more household members were disrupted and food intake reduced because the household lacked money and other resources for food.

In 2014, more than 48.1 million Americans lived in food-insecure households (USDA, 2015a). Poor, single women with children are the most disadvantaged group, with the highest rates above the national average for household food insecurity, food insecure children and very low household food security (Smith, 2012). The Economic Research Service (ERS), using data from the Current Population Survey Food Security Supplement, indicates rates of food insecurity were higher than the national average for households with children, households with children headed by a single parent (male or female), black, non-Hispanic households, Hispanic households, and low-income households (Coleman-Jensen et al., 2014).

The list of causes of food insecurity is long and multifaceted. In the US, they range from poverty, population growth, gender inequality, inadequate education, and poor health. All, however, can be related in some fashion to two basic causes: insufficient national food availability and insufficient access to food by households and individuals (Smith, El Obeid, & Jensen, 2000). Access to food may be gained through (a) production or gathering of food, (b) purchase of food on the market with cash income, and/or (c) receipts of in-kind transfers of food (whether from other private citizens, national or foreign governments, or international institutions). Within households, individual food access is influenced by intra-household food distribution decisions. This is represented by the daily exchanges family members make within the unit to share or access food.

The dietary changes associated with food insecurity may persist over extended periods

because food-insecure households often experience repeated food budget shortages. On average, households that report being food insecure experienced the condition during seven months of the year (Seligman et al., 2010). Reasons for the association between food insecurity and obesity are not clear but seem to relate, in part, to low-income families' efforts to stave off hunger while coping with limited resources to buy food (Parker, 2007).

Those who are eating less or skipping meals to stretch food budgets may overeat when food does become available, resulting in chronic ups and downs in food intake that can contribute to weight gain (Bruening, MacLehose, Loth, Story, & Neumark-Sztainer, 2012). The “feast or famine” situation is especially a problem for low-income parents, particularly mothers, who often restrict their food intake and sacrifice their own nutrition in order to protect their children from hunger (Dammann & Smith, 2009). Regrettably, this behavior puts them at risk for obesity.

The food environment is the physical and social surroundings that influence what we eat. What makes up the food environment is vast and varied, ranging from broad federal issues—like agricultural and communication policy—to very local issues—like worksite policies and permits for farmers’ markets (Obesity Prevention Source, 2015). Some food environments make it more difficult to choose healthy foods, and all too easy to choose unhealthy foods. This type of food environment is often called “toxic” because of the way it corrodes healthy lifestyles and promotes obesity. Factors that affect an individual’s food environment include families, work sites, schools neighborhoods, food marketing, and government food policy and pricing.

Low-income women and families face additional barriers to healthy eating that may contribute to the higher rates of obesity seen in lower-income groups (Singh, Siahpush, Hiatt, & Timsina, 2010). One reason for this is the fact that that healthy foods, such as vegetables, fruits, and whole grains, are more expensive than less healthful foods, such as refined grains and sweets,



and may be too expensive for low-income families (Darmon & Drewnowski, 2008). Another factor is time. It takes longer to prepare healthy meals than to buy convenience foods or fast food. Therefore, people in lower-income households, often single parents working full time and taking care of children, may have less time for meal preparation and other household chores (Obesity Prevention Source, 2015).

### **Independent Variables**

The following section examines the three independent variables for this study, SNAP, the consumption on fast foods, and the utilization of community emergency food programs. A background is provided for each variable, followed by a discussion of the role of each variable in this study.

**Supplemental Nutrition Assistance Program (SNAP).** The foundation for SNAP was first built in 1933 as part of the Agricultural Adjustment Act (AAA). The program, referred to as the Federal Surplus Relief Corporation, was established in the midst of the Great Depression, when prices for crops fell dramatically and farms across America were struggling to deal with the excess supply (SNAP to Health, 2016). To support farmers, the Federal government bought basic farm commodities at discount prices and distributed them among hunger relief agencies in states and local communities. In 1939, Secretary of Agriculture Henry Wallace, created the Food Stamp Program in the US. The program was initiated to align growing food surpluses with a concern for the needs of the poor as the country emerged from the Great Depression (Food Nutrition Service (FNS), 2012).

By 1943, however, the program was terminated because of reduced availability of surpluses due to the American World War II effort and a decline in unemployment levels. In 1961, President John F. Kennedy first Executive Order called for expanded food distribution and, on

February 2, 1961, he announced that food stamp pilot programs would be initiated (USDA, 2014a). The pilot programs would retain the requirement that the food stamps be purchased, but eliminated the concept of special stamps for surplus foods. In 1964, the Food Stamp Act (P.L. 88-525) was passed as a part of President Lyndon Johnson's Great Society Program.

The program provided nutrition assistance benefits to low-income families in an effort to reduce hunger and improve health and well-being (Mabli & Ohls, 2015). As of October 1, 2008, name for the federal Food Stamp Program was changed to the Supplemental Nutrition Assistance Program (SNAP). In fiscal year 2014, federal expenditures for SNAP were \$74 billion and participation in the program was the highest in the history of the program (USDA, 2015b). According to the USDA (2016), SNAP has long been recognized as a critically important cornerstone in America's system for providing assistance to low-income households.

The federal government pays the full cost of SNAP benefits and splits the costs of overseeing the program about equally with the states. At the federal level, SNAP is managed by the Food and Nutrition Service (FNS), an arm of the Department of Agriculture. In fiscal year 2011, the federal government spent \$76 billion on SNAP (USDA, 2016). The SNAP program is run by the states which have considerable discretion to adapt the program to best meet the needs of their residents. At the same time, federal oversight ensures that SNAP is accountable to the taxpayer and that benefits are administered accurately. SNAP has low administrative overhead and one of the highest payment accuracy rates of any federal government program (Feeding America, 2015).

The program is large, both in terms of benefit size and in number of people served. In terms of number of people served, the program reached about 46.5 million individuals in each month in 2014, with an annual benefit distribution of about \$69.9 billion (Feeding America, 2015).

In 2015, the average monthly benefit was \$464 per month for a family of four, with the maximum benefit for a family of this size being \$649. These benefits can represent a substantial component of low-income households' total income.

One of the objectives of the program is to alleviate hunger among eligible households or individuals by distributing benefits that can be used to purchase food. The original Food Stamp Program benefit had been in the format of food coupons before it was transformed into electronic benefit transfer as a debit card. Technically, SNAP is not an entitlement program. However, since Congress has always allocated sufficient funds SNAP, it is a de facto entitlement program, which means that all eligible households or individuals receive benefits if they apply (Kuhn et al., 1996).

Another objective to the program is to educate the recipients on the link between nutrition, physical activity and well-being. The Supplemental Nutrition Assistance Program – Education (SNAP-Ed) is a federally funded grant program that supports evidence-based nutrition education and obesity prevention interventions and projects for persons eligible for the Supplemental Nutrition Assistance Program (SNAP) through complementary direct education, multi-level interventions, and community and public health approaches to improve nutrition (USDA, 2016). The first food stamps education programs were held in seven states in 1992 at a cost of \$661,000 to the federal government (SNAP to Health, 2016). By 2007, nutrition education had expanded to all 52 states and territories participating in food stamps.

The eligibility for SNAP benefits is determined on the basis of household size, household assets, and gross (and net) household income. The income test for households of any size is that the household should receive gross monthly income of less than 130% of the federal poverty lines. An eligible household can have less than \$2,000 of countable resources such as bank account and certain type of vehicles (Ver Ploeg, Mancino, & Lin, 2007).

Broad-based categorical eligibility (BBCE) is a policy that makes most households categorically eligible for SNAP because they qualify for a non-cash Temporary Assistance for Needy Families (TANF) or State maintenance of effort (MOE) funded benefit (USDA, 2015b). Categorical eligibility eliminated the requirement that households who already met financial eligibility rules in one specified low-income program go through another financial eligibility determination in SNAP (USDA, 2016). There are varying income eligibility thresholds within states that convey “broad-based” categorical eligibility, though no state has a gross income limit above 200% of the federal poverty guidelines.

Federal SNAP law provides two basic pathways for financial eligibility to the program: (1) meeting program-specific federal eligibility requirements; or (2) being automatically or “categorically” eligible for SNAP based on being eligible for or receiving benefits from other specified low-income assistance programs. As of July 21, 2014, 43 jurisdictions have implemented what the US Department of Agriculture has called “broad-based” categorical eligibility (Falk & Aussenberg, 2012).

**Consumption on Fast Foods.** Fast foods is defined as commercially available, ready-to-eat meals (such as hamburgers, hot dogs, pizza, fried chicken, or french fries) with a high fat content, little fiber, and minimal quantities of vitamins or calcium (Fast foods, 2009). As lifestyles become more hectic, fast-food consumption has become a growing part of the American diet (Bowman & Vingard, 2004). In 2012, fast food restaurants spent \$4.6 billion in total on all advertising, an 8% increase over 2009 (Federal Trade Commission, 2008). More than one-third of US adults are obese, and frequent fast-food consumption has been shown to contribute to weight gain (Fryer & Ervin, 2013).

According to the Obesity Prevention Source (2015), the scientific case for "fast food"

restaurants as a causal factor in obesity is based on several observations. First, time trends in eating away from home roughly parallel the national time trends in obesity prevalence (Lovasi, Hutson, Guerra, & Neckerman, 2009). Since 1970, the amount of fast food restaurants in business doubled, which equates to about 300,000 establishments in the US (Muntel, 2016). Coincidentally, 33.8% of the US population is affected by obesity and 19 percent of children and adolescents are also affected.

Second, although there is no clearly agreed upon definition of the concept, "fast food" outlets have been by far the most rapidly expanding sector of the US food distribution system (Larson, Neumark-Sztainer, Jannan, & Story, 2007). In urban neighborhoods, "fast food" outlets can be found on almost every corner. These restaurants are quick and inexpensive, thus convenience is a major factor in consumption.

Finally, cross-sectional and longitudinal data on self-reported "fast food" restaurant use and consumption of foods frequently sold at "fast food" restaurants (i.e., hamburgers and french fries) have been shown to be positively associated with body weight (Fulkerson, Neumark-Sztainer, Hannan, & Story, 2008). Nutritional analysis of products sold in "fast food" restaurants indicates that they are typically high in energy density, which provides a plausible mechanism through which they might promote excess energy intake (Shimotsu, French, Gerlach, & Hannan, 2007). There is convincing evidence that a high intake of energy-dense foods promotes weight gain (Nishida, Uauy, Kumanyika, & Shetty, 2004). For the same amount of calories, a person can consume a larger portion of a food lower in energy density than a food higher in energy density (CDC, 2016).

**Utilization of Community Emergency Food Programs.** Food banks are nonprofit, community-based warehouses that solicit, store, and distribute food from local producers, retail

food sources, the federal food industry. Households with limited resources employ a variety of methods to help meet their food needs (Coleman-Jensen, Nord, Andrews, & Carlson, 2011). A food bank distributes donated food to charitable social-service agencies, which provide the products directly to clients through various programs. Some food banks also distribute food directly to clients in need (Feeding America, 2014).

The assistance provided by food banks is largely contingent upon the quality and quantity of donations from the public and from producers, processors and retailers. When funding permits, food banks may purchase foods to augment the nutritional quality of the donations (Villalon, 1998). Food banks serve as central collection centers for canned, fresh, and frozen food and beverage donations. These items are distributed to food-insecure households through partner agencies (e.g. soup kitchens and food pantries) (Cotugna & Beebe, 2002). Research on food pantry clients is not extensive, but researchers consistently find that clients tend to be women with very low-incomes, low educational attainment, and high levels of self-reported food insecurity (Daponte, Lewis, Sanders, & Taylor, 1998).

Feeding America is a nationwide network of 200 food banks and 60,000 food pantries and meal programs that provides food and services to people each year (Feeding America, 2016). Partner agencies act as the mechanism for the distribution of food directly to clients through food programs that provide either meals or groceries (Feeding America, 2014). The majority of partner agencies identify as faith-based (62%), while the remaining balances are governmental agencies, Community Action Programs (CAP), or other nonprofit or private organizations. Hunger in America is a series of quadrennial studies that provide comprehensive demographic profiles of people seeking food assistance through the charitable sector and an in-depth analysis of the partner charities in the Feeding America Network that provide assistance (Feeding America, 2014). The

2014 Hunger in America report reveals that each year, 46.5 million unduplicated individuals receive charitable food assistance through the Feeding America network. This translates to an estimated 15.5 million households served by the network each year. Each week, 5.4 million unduplicated individuals receive charitable food assistance through the Feeding America network (Feeding America, 2014).

### **Dependent Variable: Healthy Lifestyle Characteristics**

The Healthy Lifestyle Characteristics variable is a combination of four variables – smoking, healthy weight, regular physical activity and healthy diet with adequate fruit and vegetable intake. In the US, chronic diseases account for the greatest overall population disease burden in terms of mortality, morbidity, and decreased quality of life. Most people with major chronic diseases share multiple common lifestyle characteristics or behaviors, particularly smoking, poor diet, physical inactivity, and obesity (Remington, Brownson, & Wegner, 2010). Communities shape opportunities to adopt and maintain healthy behaviors (Pampel, Krueger, & Denney, 2010).

For example, an individual's ability and motivation to exercise and avoid smoking and excessive drinking can be constrained by living in a neighborhood that lacks safe areas for exercise, where tobacco and alcohol advertising is intensive, liquor stores are plentiful, and where healthy role models are scarce (Cubbin et al., 2008). In an effort to reduce premature morbidity and mortality, public health officials and health care providers have stressed the critical importance of adherence to a healthy lifestyle that includes maintaining a healthy weight (BMI 18.5-25), eating a diet high in fruits and vegetables, exercising regularly, and avoiding or quitting smoking (Matheson, King, & Everett, 2012). The following section discusses these healthy lifestyle factors.

**Healthy Weight.** Obesity rates have more than doubled in adults and children since the 1970's (National Center for Health Statistics, 2009). More than two-thirds of US adults are overweight or obese (Hartline-Grafton, 2011). Inequities in obesity rates are related to income and education, with poorer and less educated Americans experiencing higher rates of obesity than more affluent and higher educated populations (RWJF, 2015). Studies have shown that BMI levels correlate with body fat and with future health risks. High BMI predicts future morbidity and death. Therefore, BMI is an appropriate measure for screening for obesity and its health risks in women (CDC, 2015b).

According to the World Health Organization (2015b), being overweight or obese can have a serious impact on health. Carrying extra fat leads to serious health consequences such as cardiovascular disease (mainly heart disease and stroke), type 2 diabetes, musculoskeletal disorders like osteoarthritis, and some cancers (endometrial, breast and colon). These conditions cause premature death and substantial disability. As discussed above, BMI is used as a screening tool to identify whether a woman is at a healthy weight. A BMI below 25 indicates a woman is not overweight or obese. Reaching and maintaining a healthy weight is important for overall health and can help women prevent and control many diseases and conditions.

The key to achieving and maintaining a healthy weight is not about short-term dietary changes (CDC, 2015b). It's about a lifestyle that includes healthy eating, regular physical activity, and balancing the number of calories an individual consumes with the number of calories your body uses. Energy balance is important for maintaining a healthy weight. The amount of energy or calories an individual gets from food and drinks (energy in) is balanced with the energy your body uses for things like breathing, digesting, and being physically active, (energy out) (NIH, 2015). To maintain a healthy weight, an individual's energy in and out don't have to balance



exactly every day. It's the balance over time that helps a person maintain a healthy weight.

**Healthy Diet with Adequate Fruit and Vegetable Consumption.** Recommendations for the consumption of fruits and vegetables have been issued by most national and international health agencies. The health benefits of a diet rich in fruits, vegetables, and legumes have been recognized for some time. Fruit and vegetable consumption has been associated with decreased incidence of and mortality from a variety of chronic diseases: cardiovascular diseases, stroke, hypertension, diabetes, obesity, and certain types of cancer, to name a few (Bazzano, 2006).

The National 5 A Day for Better Health Program was developed in 1991 by the National Cancer Institute and the Produce for Better Health Foundation to encourage the consumption of at least five or more fruits and vegetables per day (CDC, 2005). In 2001, the US Department of Health and Human Services, Center for Disease Control and Prevention assumed leadership for the 5 A Day program, and in 2005, became the lead federal agency and health authority for the program.

There is evidence that a diet rich in fruits and vegetables can lower the risk of heart disease and stroke. The largest and longest study to date, done as part of the Harvard-based Nurses' Health Study and Health Professionals Follow-up Study, included almost 110,000 men and women whose health and dietary habits were followed for 14 years (Harvard School of Public Health, 2016). Results of this study indicate the higher the average daily intake of fruits and vegetables, the lower the chances of developing cardiovascular disease. Compared with those in the lowest category of fruit and vegetable intake (less than 1.5 servings a day), those who averaged 8 or more servings a day were 30% less likely to have had a heart attack or stroke (Hung et al., 2004).

The US farm policy for commodity crops has made sugars and fats some of the most inexpensive food substances to produce and may have indirectly influenced food processors and

manufacturers to expand their product lines to include more fats and sweeteners in their products (Story, Kaphingst, Robinson-O'Brien, & Glanz, 2008). High fructose corn syrup and hydrogenated vegetable oils (high in trans fats)—products that did not even exist a generation ago—are now prevalent in foods, likely owing to the availability of inexpensive corn and soybeans (Story, Kaphingst, O'Brien, & Glanz). Healthy fruits, vegetables, and other specialty crops (i.e., nuts) receive little government support.

This lack of government support may be reflected in the higher cost of fruits and vegetables (Drewnowski & Specter, 2004). The cost of food is the second most important factor affecting food decisions, behind taste. Government regulations that affect price are consistent influences on the purchase of fresh fruits, vegetables, and meats. The current structure of food prices is that high sugar and high-fat foods provide calories, also known as energy, at the lowest cost (Drewnowski & Darmon, 2005). Thus individuals and families with limited resources may select energy dense foods high in refined grains, added sugars, and fats as a way to save money. Fresh fruits and vegetables are more expensive on a per calorie basis than are fats and sugars.

A review of the literature relating fruit and vegetable intake to weight management suggested that fruits and vegetables may play an important role in dietary strategies to manage weight and prevent obesity (Tohill, Seymour, Serdula, Kettel-Khan, & Rolls, 2004). Fruit and vegetable consumption may affect energy intake and body weight because these foods are high in water and fiber and low in energy density. Energy density refers to the amount of energy per unit of food weight (i.e., calories per gram).

Substituting fruits and vegetables for foods with higher energy densities can be an effective weight-management strategy, as evidenced in short-term clinical studies in which reductions in energy density were associated with increased satiety, reduced hunger, and lower energy intake

(Rolls, Ello-Martin, & Tohill, 2004). Therefore, the intake of fruit and vegetables is widely examined in major health studies in order to assess healthy lifestyles among respondents.

As a member of the 5 A Day public-private partnership, the USDA partners with other government agencies and private sector groups to promote the health benefits of fruits and vegetable. Yet consumption of these healthy foods still remains low (Guthrie, 2013). For example, from 2007–2010, half of the total US population consumed less than one cup of fruit and less than one and one half cups of vegetables daily; 76% of the population did not meet fruit intake recommendations, and 87% of the population did not meet vegetable intake recommendations (National Cancer Institute (NCI), 2010).

The US government has been working in increase the number of fruits and vegetables consumed by Americans. For example, the MyPlate food guidance system is available from the USDA and emphasizes the need to “focus on fruits” and “vary your veggies” as building blocks for a healthy diet (USDA, 2016). The program includes information and healthy eating and physical activity, as well as online tools to track diet and physical activity and determine appropriate proportions.

Additionally, many states are attempting to increase fruit and vegetable consumption by improving access and establishing policies that make it easier to get fruits and vegetables in communities, schools, and child care (McGuire, 2013). According to the CDC, 28 states now have a farm to school/ preschool policy and 27 states have created state-level food policy councils - coalitions of private and public partners working together to improve access to healthy food (McGuire, 2013).

**Regular Physical Activity.** Regular physical activity helps improve your overall health and fitness, and reduces your risk for many chronic diseases (CDC, 2014c). Research has

demonstrated that virtually all individuals can benefit from regular physical activity, whether they participate in vigorous exercise or some type of moderate health-enhancing physical activity (USDHHS, 2002). Physical inactivity and its associated health problems have substantial economic consequences for the US health care system. A physically inactive population is at both medical and financial risk for many chronic diseases and conditions including heart disease, stroke, colon cancer, diabetes, obesity, and osteoporosis (CDC).

The increasing prevalence of chronic medical conditions and diseases related to physical inactivity are associated with two types of costs. First, there are health care costs for preventative, diagnostic, and treatment services related to these chronic conditions. These costs may include expenditures for physician visits, pharmaceuticals, ambulance services, rehabilitation services and hospital and nursing home care. In addition, there are other costs associated with the value of lost wages by people unable to work because of illness and disability, as well as the value of future earnings lost by premature death. (USDHHS, 2002).

Participation in regular moderate to vigorous physical activity is critical to sustaining good health (USDHHS, 2002). According to USDHHS (2002), “regular physical activity has beneficial effects on most (if not all) organ systems, and consequently it helps to prevent a broad range of health problems and diseases. People of all ages, both male and female, derive substantial health benefits from physical activity” (p. 8). Some research finds that low-SES neighborhoods have greater or equal access to gyms, parks, or recreation centers than high-SES neighborhoods, although others find that high-SES neighborhoods have more attractive open spaces and free recreation facilities, and greater access to beaches, rivers, golf courses, tennis courts, and bike trails (Powell, Slater, Chaloupka, & Harper, 2006). Even when residents in low-SES neighborhoods have access to more recreational resources than residents in high-SES

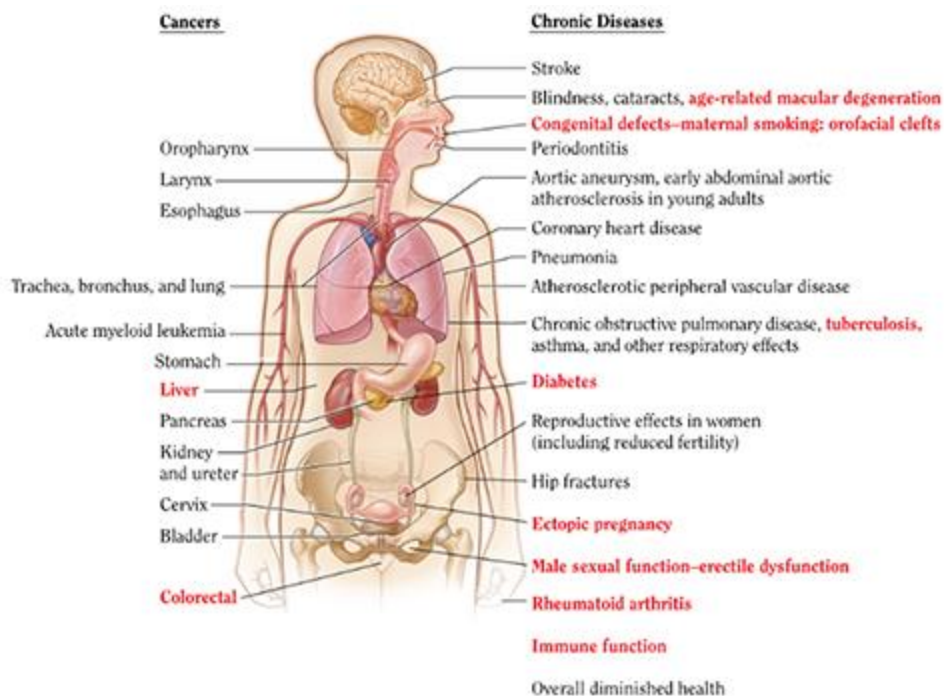
neighborhoods, they tend to report lower perceived access to recreational facilities (Giles-Corti & Donovan, 2002).

Work environments can also play a role in physical activity. Since the 1950s, many workers have moved into occupations that are traditionally sedentary, whereas strenuous occupations have become less so due to technological changes, leading to lower levels of physical activity and higher levels of obesity (Brownson, Boehmer, & Luke, 2005). Researchers have found that blue-collar workers who have more physically demanding jobs are more likely to undertake more vigorous activity in their spare time (Wu & Porell, 2000). Furthermore, white-collar workers with the least strenuous jobs are more likely to participate in vigorous activity outside of the workplace and, as such, are more likely to retain their higher levels of activity even after retirement (Berger, Der, Mutrie, & Hannah, 2005).

**Not Smoking.** Tobacco smoke contains chemicals that are harmful to both smokers and nonsmokers. Breathing even a little tobacco smoke can be harmful. Of the more than 7,000 chemicals in tobacco smoke, at least 250 are known to be harmful, including hydrogen cyanide, carbon monoxide and ammonia (USDHHS, 2010b). Among the 250 known harmful chemicals in tobacco smoke, at least 69 can cause cancer.

Smoking harms nearly every organ of the body and diminishes a person's overall health. Smoking is a leading cause of cancer and death from cancer. It causes cancers of the lung, esophagus, larynx, mouth, throat, kidney, bladder, pancreas, stomach, and cervix, as well as acute myeloid leukemia. Cigarette smoke harms nearly every organ of the body. See figure 1 below. According to the 2014 Surgeons General report, disease risks from smoking by women have risen sharply over the last 50 years and are now equal to those for men for lung cancer, chronic

obstructive pulmonary disease, and cardiovascular diseases (Surgeon General, 2014). The US now has more than 20 million women and girls who currently smoke cigarettes.



Center for Disease Control (2015). Health Effects of Cigarette Smoking. Retrieved from: [http://www.cdc.gov/tobacco/data\\_statistics/fact\\_sheets/health\\_effects/effects\\_cig\\_smoking/](http://www.cdc.gov/tobacco/data_statistics/fact_sheets/health_effects/effects_cig_smoking/)

Figure 1. Health Effects of Cigarette Smoking

People who stop smoking greatly reduce their risk for disease and early death. Although the health benefits are greater for people who stop at earlier ages, there are benefits at any age. Cessation of smoking or not smoking is associated with the following health benefits: lowered risk of lung cancer and other types of cancer, reduced risk of heart disease, stroke, and peripheral vascular disease, reduced risk of developing some lung diseases (such as chronic obstructive pulmonary disease, also known as COPD, one of the leading causes of death in the US), and reduced risk for infertility in women of childbearing age (CDC, 2015c).

Smoking prevalence is higher among disadvantaged groups, and disadvantaged smokers

may face higher exposure to tobacco's harms (Hiscock, Bauld, Amos, Fidler, & Munafò, 2012). Studies have suggested that quit attempts are less likely to be successful. This may be the result of reduced social support for quitting, low motivation to quit, stronger addiction to tobacco, increased likelihood of not completing courses of pharmacotherapy or behavioral support sessions, psychological differences such as lack of self-efficacy.

In addition, poor communities and neighborhoods are targeted by tobacco companies for outdoor advertising (Barbeau, Krieger, & Soobader, 2004) and have weaker enforcement of restrictions on sales of cigarettes to minors (Gemson et al., 1998). Research from multiple cities showed that tobacco outlets and tobacco advertising are concentrated in low-income and racial/ethnic minority areas and near child-serving institutions (Siahpush, Jones, Singh, Timsina, & Martin, 2010).

### **Theoretical Perspective**

This research will use the NHANES survey data to examine the relationship between healthy lifestyle characteristics (healthy weight, consuming 5 or more fruits and vegetables per day, regular moderate to vigorous physical activity and not smoking) with food behaviors of low-income, food insecure women, specifically the use of SNAP, consumption of fast foods and the utilization of community programs that provide prepared meals. To provide a rationale behind the research questions, the following is presented about social cognitive theory as a way to understand how food behaviors may result from the social cognitive approach, or lack thereof.

**Social Cognitive Theory.** Social cognitive theory was introduced in 1963 by Albert Bandura (Pervin, 2001). This theory stemmed from Social Learning theory, which was developed by Miller and Dollard in 1941. In addition to the cognitive thought processes that influence human behavior and functioning, social cognitive theory emphasizes the social origins of behavior. The

social-cognitive approach represents a break from traditional theories by proposing that cognitive factors are central to human functioning, and that learning can occur in the absence of direct reinforcement. That is, learning can occur simply through observation of models and in the absence of reinforcement (Pervin, 2001). Social cognitive theory is one of the most frequently used and robust health behavior theories (Wilson, 2012). This theory has been used successfully as the underlying theory for behavior change in areas ranging from dietary change to pain control (NCI, 2005).

According Bandura (1986), social cognitive theory explains psychosocial functioning in terms of reciprocal determinism, a model composed of mutual influence between three sets of factors: (1) the environment (physical surroundings, family and friends, and other social influences); (2) the individual (cognitive abilities, physical characteristics, and beliefs and attitudes); (3) behavior (motor responses, verbal responses, and social interactions). In the model of reciprocal determinism, internal personal factors, behavioral patterns, and environmental events all operate as interacting determinants that influence one another bi-directionally.

Environmental factors influence individuals and groups, but individuals and groups can also influence his/her environments and regulate their own behavior (McAlister, Perry, & Parcel, 2008). In addition to a person's individual capacity to interact with their environment, social cognitive theory emphasizes the human capacity for collective action, thus enabling individuals to work together in social systems to achieve environmental changes that benefit the entire group. Planned protection and promotion of public health can be viewed as illustrations of this kind of reciprocal determinism, as societies seek to control the environmental and social factors that influence health behaviors and health outcomes (Bandura, 1997).

According to Bandura (2004), a comprehensive approach to health promotion requires



changing the practices of social systems that have widespread effects on human health the core determinants. First, knowledge of health risks and benefits of different health practices. If people lack knowledge about how their lifestyle habits affect their health, they have little reason to put themselves through the effort of changing the detrimental habits they enjoy. Unless people believe they can produce desired effects by their actions, they have little incentive to act or to persevere in the face of difficulties. Second, perceived self-efficacy that one can exercise control over one's health habits. Self-efficacy is a focal determinant because it affects health behavior both directly and by its influence on the other determinants. The stronger the perceived self-efficacy, the higher the goals people set for themselves and the firmer their commitment to them.

Third, outcome expectations about the expected costs and benefits for different health habits Health behavior is also affected by the outcomes people expect their actions to produce. Fourth, goals people set for themselves and the concrete plans and strategies for realizing them. Personal goals, rooted in a value system, provide further self-incentives and guides for health habits. And finally, perceived facilitators and social and structural impediments to the changes they seek. The perceived facilitators and obstacles are another determinant of health habits.

As shown in the conceptual model below (Figure 2), it is hypothesized that food insecure women will demonstrate a decreased prevalence of healthy lifestyle behaviors compared to non-food insecure women when consuming fast foods or utilizing community emergency food programs, but an increased prevalence of healthy lifestyle characteristics when enrolled in the SNAP program. The self-efficacy belief system operates as a common mechanism through which diverse modes of interventions affect different types of health outcomes. The stronger the instilled perceived self-efficacy, the more likely are people to enlist and sustain the effort needed to adopt and maintain health-promoting behavior (Bandura, 2001).

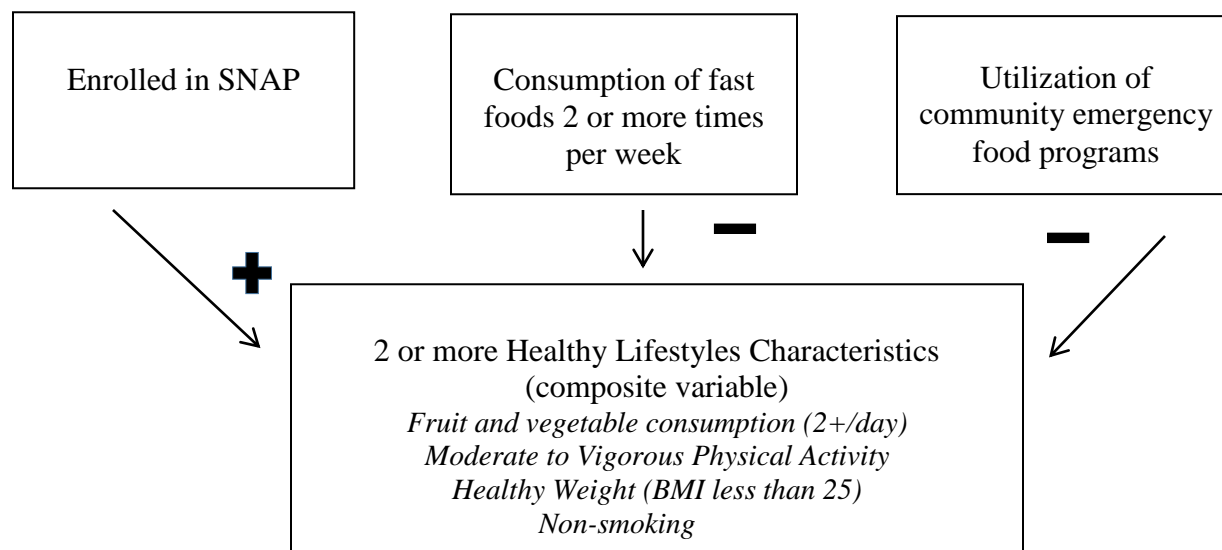


Figure 2: Conceptual Model for the Investigation of the Healthy Lifestyle Characteristics with Food Behaviors of Low-Income, Food Insecure Women in the US

As discussed previously, SNAP has a specific educational component called SNAP-Ed. SNAP-Ed's effectiveness stems largely from its community-based orientation (USDA, 2016). Land-grant institutions work closely with state and local public and private entities to strategically deliver SNAP-Ed using methods and locations that are most favorable to SNAP-eligible populations. Local offices refer clients to the program and other local partners support the program by providing meeting space, child care, food demonstrations, etc. Relative to low-income, food insecure women, social cognitive theory through observational learning would explain how SNAP-Ed provides individuals with knowledge of positive healthy behaviors and helps them gain a better understanding of how healthy, balanced food choices provided through SNAP have the potential to increase healthy lifestyle behaviors and thus reduce the risk for obesity in low-income, food insecure women.

Fast food and community emergency food programs have some educational components

either in place or on the horizon. For example, in November, 2014, the US Food and Drug Administration (FDA) finalized two rules requiring that calorie information be listed on menus and menu boards in chain restaurants, similar retail food establishments and vending machines with 20 or more locations to provide consumers with more nutritional information about the foods they eat outside of the home (United States Food and Drug Administration (USFDA, 2015). The menu labeling final rule applies to restaurants and similar retail food establishments if they are part of a chain of 20 or more locations, doing business under the same name and offering for sale substantially the same menu items. The bill was enacted on December 18, 2015; however, the FDA has delayed enforcement indefinitely.

Additionally, some food banks employ nutritionists who provide nutrition education to individuals who are participating in the program; however, this is not the case for many food banks which may be administered by local churches or organizations that may not have the resources to employ professionals. Therefore, although the potential is there, consumption of fast foods and utilization of community emergency food programs primarily do not have the observational learning component that SNAP does. Therefore, by not having this observational, low-income, food insecure women would be less likely to adhere to the healthy lifestyle behaviors.

Theories are tools that can help guide research. One theory may not explain a social problem completely, but can provide insight into the issues and determine possible interventions that resolve some of the critical problems associated with those issues. The social cognitive theory is relevant for designing health education and health behavior programs. This theory explains how people acquire and maintain certain behavioral patterns, while also providing the basis for intervention strategies (Bandura, 1997).

Overall, this theory has exceptional explanatory power of the social problem. A

comprehensive approach to health must provide people with the knowledge, skills and sense of collective efficacy to mount social and policy initiatives that affect human health (Bandura, 2001). Such social efforts are aimed at raising public awareness of health hazards, educating and influencing policymakers, mobilizing public support for policy initiatives, and devising effective strategies for improving health conditions.

### **Conclusion**

In summary, the federal government has supported research to confirm the benefits of these healthy lifestyles and provides information to the population to demonstrate the benefits and provide advice and information for individuals to adhere to the guidelines. However, as discussed in this chapter, there are many barriers for low-income, food insecure women, thus decreasing their ability to follow the healthy lifestyle characteristics and increasing their risk for chronic diseases such as obesity.

This study examined the relationship between adherence to healthy lifestyle characteristics with three specific food behaviors of low-income, food insecure women in the US. National health recommendations and clinical guidelines emphasize the importance of these four healthy lifestyle behaviors; therefore, investigating the prevalence of these behaviors in low-income, food insecure women may be helpful in designing and determining which assistance programs are most effective at increasing an individual's use of healthy lifestyle behaviors, thus potentially decreasing obesity rates for this population and improving the health of other family members such as children.

Social workers have long been involved in public health activities promoting positive health and preventing disease (Hurdle, 2001). Obesity is a social problem that can negatively affect a woman's life in a variety of ways. Social cognitive theory helps to explain some of the underlying causes of this problem, which is why this theory is often used in health prevention

models. There are numerous aspects relative to health disparities of low-income women; however, as social workers, our goal is to help empower clients and work together within the community to promote positive health advancements, which may in turn prevent obesity for low-income women in the US.

### **Chapter Three: Methodology**

A secondary data analysis was conducted using NHANES. The NHANES is a program of studies designed to assess the health and nutritional status of adults and children in the US (CDC, 2015d). Data from 2009-12 were selected and re-categorized for this analysis. As defined at 45 CFR 46.102, this study was exempt from IRB review since it examined de-identified, publicly available.

#### **Research Questions**

This study seeks to determine the relationship between four healthy lifestyle characteristics and food behaviors of low-income, food insecure women by investigating the three following research questions:

1. To what extent is adherence to healthy lifestyle characteristics (healthy weight [body mass index 18.5-25]), adequate daily fruit and vegetable intake, regular moderate to vigorous physical activity and not smoking) among low-income, food insecure women associated with their use of the federally funded food assistance program, Supplemental Nutrition Assistance Program (SNAP)?
2. To what extent is adherence to healthy lifestyle characteristics (healthy weight [body mass index 18.5-25]), adequate daily fruit and vegetable intake, regular moderate to vigorous physical activity and not smoking) among low-income, food insecure women associated with the consumption of fast foods?
3. To what extent is adherence to healthy lifestyle characteristics (healthy weight [body mass index 18.5-25]), adequate daily fruit and vegetable intake, regular moderate to vigorous

physical activity and not smoking) among low-income, food insecure women associated with their utilization of community emergency foods programs?

### **Research Hypotheses**

Hypothesis 1: Low-income, food insecure women who participated in SNAP will be significantly more likely to adhere to the healthy lifestyle characteristics compared to low-income, food insecure women who did not participate in SNAP. Null Hypothesis 1: There will be no significant difference between low-income, food insecure women who participate in SNAP and those who do not in terms of their adherence to the healthy lifestyle characteristics.

The dependent variable for this hypothesis was created by recoding four dichotomous variables (fruit and vegetable intake, physical activity, BMI and smoking) into one categorical variable, healthy lifestyle characteristics. The two categories were coded as: (1) Followed zero or one of the healthy lifestyle characteristics and (2) Followed two or more healthy lifestyle characteristics. The independent dichotomous variable for this hypothesis was participation in SNAP (coded 0 = no, did not participate in SNAP and 1 = yes, participated in SNAP). The logistic regression model for this hypothesis analyzed the relationship between the dependent variable, healthy lifestyle characteristics, and the independent variable, participation in SNAP.

Hypothesis 2: Low-income, food insecure women who consume fast foods two or more times per week will be significantly less likely to adhere to the healthy lifestyle characteristics compared to low-income, food insecure women who consume fast foods one time or less per week. Null Hypothesis 2: There will be no significant difference between low-income, food insecure women who utilize convenience foods and those who do not regarding their adherence to the healthy lifestyle characteristics.

The dependent variable for this hypothesis was created by recoding four dichotomous

variables (fruit and vegetable intake, physical activity, BMI, and smoking) into one categorical variable, healthy lifestyle characteristics. The two categories were coded: (1) Followed zero or one of the healthy lifestyle characteristics, and (2) Followed two or more healthy lifestyle characteristics. The independent dichotomous variable for this hypothesis was consumption of fast foods (coded 0 = eats fast food once or less per week and 1 = eats fast food two or more times per week). The logistic regression model for this hypothesis analyzed the relationship between the dependent variable, healthy lifestyle characteristics, and the independent variable, consumption of fast foods.

Hypothesis 3: Low-income, food insecure women who utilize community emergency food programs will be significantly less likely to adhere to the healthy lifestyle characteristics compared to low-income, food insecure women who did not utilize community emergency food programs.

Null Hypothesis 3: There will be no significant difference between low-income, food insecure women who utilize community emergency food programs and those who do not regarding their adherence to the healthy lifestyle characteristics.

The dependent variable for this hypothesis was created by recoding four dichotomous variables (fruit and vegetable intake, physical activity, BMI and smoking) into one categorical variable, healthy lifestyle characteristics. The two categories were coded as: (1) Followed zero or one of the healthy lifestyle characteristics, and (2) Followed two or more healthy lifestyle characteristics. The independent dichotomous variable for this hypothesis was utilization of community emergency food programs (coded 0 = no, did not use emergency foods and 1 = yes, used emergency foods). The logistic regression model for this hypothesis analyzed the relationship between the dependent variable, healthy lifestyle characteristics, and the independent variable, utilization of community emergency food programs.



## **Methodology**

A secondary data analysis using NHANES was conducted. NHANES is a program of studies designed to assess the health and nutritional status of adults and children in the US (CDC, 2014a). The NHANES program began in the early 1960s and has been conducted as a series of surveys focusing on different population groups and health topics. The responsibility for survey development and data collection is with the National Center for Health Statistics (NCHS), a research oriented statistical organization housed with the Health Services and Mental Health Administration (HSMHA) of the Department of Health and Human Services. The NHANES interview includes demographic, socioeconomic, dietary, and health-related questions. In addition, there is an in-person examination component which consists of medical, dental, and physiological measurements, as well as laboratory tests administered by highly trained medical personnel.

**Data Accomplishments of the NHANES Survey.** Results of NHANES benefit people in the US in important ways. By identifying the health care needs of the population, government agencies and private sector organizations can establish policies and plan research, education, and health promotion programs that help improve present health status and will prevent future health problems (CDC, 2014a). Furthermore, data from NHANES has been instrumental in the development and implementation of a number of health-related guidelines, reforms, and public-policy initiatives.

According to the CDC (2015d), the following are just a few examples of how the US has benefited from NHANES data: (1) the Pediatric Growth charts found on the walls of pediatricians' offices and clinics across the US were developed using NHANES data; (2) NHANES weight and height data is used for federal nutrition recommendations, dietary programs and policy. Some of

these programs and policies include: USDA School Lunch and Breakfast programs, Dietary Guidelines for Americans, Obesity Education Initiative, the Shape-Up America program and WIC program eligibility; (3) Earlier NHANES demonstrated low iron levels were a serious problem for many individuals in the US, including women of childbearing age, preschool children, and the elderly. As a result, the government decided to fortify grain and cereal with iron to correct this deficiency; (4) NHANES surveys presented the need for folate to eliminate another deficiency and prevent birth defects. Better food labeling is now available in order for consumers to make better health choices.

**NHANES Data Collection.** NHANES data are derived by two primary sources: (1) direct interview: directly interviewing the survey participants and those within their household about health, and (2) direct examination: conducting clinical tests, anthropometric, biochemical, and radiological measurements, and physical examinations (CDC, 2014a). Data are collected on the prevalence of chronic conditions in the population. Estimates for previously undiagnosed conditions, as well as those known to and reported by respondents, are produced through the survey. Risk factors, those aspects of a person's lifestyle, constitution, heredity, or environment that may increase the chances of developing a certain disease or condition, are examined as well as smoking, alcohol consumption, sexual practices, drug use, physical fitness and activity, weight, and dietary intake.

After the initial in-home interview, an appointment is made for the participant at a Mobile Examination Center (MEC) in order for the survey team to collect the necessary data (CDC, 2014a). The MECs consist of four large trailers that contain all of the diagnostic equipment and personnel necessary to conduct a wide range of both simple and complex physical and biochemical evaluations. Four types of data collection are used, a physical exam, a dental exam, specimen

collection and a personal interview. There is a nutritional assessment included in the personal interview, as well. This assessment includes a variety of data sources, including the following: dietary intake interviews, nutrition-related interviews, anthropometric data, hematological and nutritional biochemistries, and nutrition-related clinical assessments.

Beginning in 1999, the NHANES became a continuous, annual survey rather than the periodic survey that it had been in the past (CDC, 2014a). For a variety of reasons, including disclosure and reliability issues, the survey data are released on public use data files every two years. Thus, the data release cycle for the ongoing (and continuous) NHANES is described as NHANES 1999-2000, NHANES 2001-2002, NHANES 2003-2004, and so on. The continuous survey as well as special data release/data access procedures were developed and used for selected survey content collected in “other than two-year” intervals (CDC).

In addition to the analysis of data from any two year cycle, it is possible to combine two or more “cycles” (e.g. 1999-2000 and 2001-2002) to create NHANES 1999-2002, thus increasing sample size and analytic options. The NHANES public use data set for this study was downloaded free of charge from the Centers for Disease Control and Prevention, National Center for Health Statistics online (<http://www.cdc.gov/nchs/nhanes.htm>). No application or registration was required. The data presented was de-identified; therefore, there was no risk for a breach in confidentiality.

**NHANES Participants/Sampling.** The goal of the NHANES is to obtain a nationally “representative” yet manageable sample of non-institutionalized persons residing in the US (CDC, 2014a). To achieve this goal, the US is divided into geographic areas, also known as primary sampling units (PSUs). The PSUs are then combined to form strata that are then divided into a series of neighborhoods. Households are then randomly selected from these neighborhoods, and

household occupants are then interviewed to determine if they are eligible to participate in the survey.

Eligibility is determined by the collective responses of two in-depth questionnaires (the NHANES household adult (or youth) questionnaire and the family questionnaire) and from a series of blood pressure measurements. Theoretically, each selected survey participant represents approximately 50,000 US residents. The sample for the survey is selected to represent the US population of all ages. To produce reliable statistics, NHANES over-samples persons 60 and older, African Americans, and Hispanics.

**NHANES Limitations.** A major limitation of NHANES is that it is not geographically representative of the US (Lopez, 2012). The sample selected to be demographically representative, but because the two teams could only visit a total of 16 locations per year, is impossible to achieve a representative geographic area. Therefore, the survey is best used to inform national trends for very large states or groups of states. A second limitation of NHANES is missing data. A number of variables in NHANES contain missing values; that is data for some individuals that are unavailable for analysis (CDC, 2015d). Because these missing values may distort the results, researchers must evaluate the extent of missing data in the dataset to determine whether the data are useable without additional reweighting for item non-response.

### **Current Study**

This study combined three 2-year cycles, 2007-08, 2009-10, and 2011-12. These specific years have been selected for three reasons. First, data collection for food insecurity first began in the 2007-2008 two year cycle of the NHANES study. Second, combining two or more 2-year cycles was strongly recommended by the National Center for Health Statistics (NCHS) in order to produce estimates with greater statistical reliability. Third, data were collected after the Great

Recession of the late 2000's, which caused high unemployment and housing foreclosures, which in turn lead to poverty and food insecurity for millions of Americans.

**Study Sample – Low-Income, Food Insecure Women.** The study sample was comprised of low-income (categorized in the data set as less than 185% of the poverty level), food insecure (categorized as 3 = low food security and 4 = very low food security on the food security question) women. This population was selected for two reasons. First, risk of obesity is 20 to 40 percent higher in women who are food insecure than the greater population (Burns, 2004). Second, among women, obesity is indeed most prevalent at lower income levels: 42% of women living in households with income below 130% of the poverty level were obese, compared with 29% of women in households at or above 350% of poverty (DeSilver, 2013). The data were downloaded from the website in SAS format and converted to SPSS by the researcher. The data file contained responses from 30,442 participants; however, only 2,798 met the inclusion criteria. Subjects were excluded from the study if they had missing data on any of the variables of interest using listwise deletion. Once missing data were removed, the total sample size was 589.

**Income.** The eligibility for SNAP benefits was determined on the basis of household size, household assets, and gross (and net) household income (Chen & Zhang, 2011). Federal SNAP law provides two basic pathways for financial eligibility to the program: (1) Meeting program-specific federal eligibility or requirements; (2) being automatically or “categorically” eligible for SNAP based on being eligible for or receiving benefits from other specified low-income assistance programs (Falk & Aussenberg, 2012). This study examined number two above; individuals who are qualified for the “broad-based” categorical eligibility using the average percentage of states who participate in this program, or a monthly poverty level index less than or equal to 1.85.

For NHANES participants who reported their family monthly income in dollar amounts,

the NHANES researchers calculated their family monthly poverty level index (CDC, 2015d). This variable is an index for the ratio of monthly income to poverty. The NHANES researchers used the Department of Health and Human Services' (HHS) poverty guidelines to calculate this index. The monthly poverty level index was calculated by dividing family income by the poverty guidelines, specific to family size, as well as the appropriate year and state. Values at or above 5.00 were recoded as 5.00 or more in order to minimize disclosure risk (CDC, 2015d). The index was then grouped into three categories: (1) Monthly poverty level index  $< 1.30$ , (2)  $1.30 < \text{monthly poverty level index} \leq 1.85$ , and (3)  $> 1.85$ ) and reported in this variable (CDC, 2015d). These categories were chosen because they represented commonly used percentages of the poverty guidelines (i.e., 130% and 185% of the guidelines), by federal programs, in determining eligibility.

If a participant refused to answer the family monthly income question or did not know the total combined family income, a monthly income screener question was asked (question INQ238) to query whether the monthly family income was below 185% of the HHS poverty guidelines (CDC, 2015d). If the response was positive, a follow-up question (INQ241) was asked to see whether the family's monthly income was more or less than 130% of the HHS poverty guidelines. For these respondents, answers to INQ238 and INQ241 were used to derive variable INDFMMPC. This study included participants who were categorized as 1 or 2, less than or equal to 1.85.

***Food insecure.*** Food security was a self-reported variable which was included in the food security family questionnaire. In the household interview, an adult responded to the US Food Security Survey Module (US FSSM) questions (Bickel, Nord, Price, Hamilton, & Cook, 2000). Questions refer to all household members, not just NHANES participants. The automated interview systems used in NHANES are programmed with built-in consistency checks to reduce data entry errors (CDC, 2015d).

Incoming food security questionnaire data were reviewed for accuracy and completeness. NHANES staff reviewed taped interviews, traveled to field sites to observe interviews, read interviewer comments, and attended training and re-training sessions to maintain the high quality data. Eighteen FSSM questions were asked of households with children under the age of 18. Ten questions were asked of households without children.

The household food security variable has four response levels and was created based on the number of affirmative responses for those questions. This categorical variable was used to characterize the overall food security status for the entire household. The algorithms used to derive this variable was to count affirmative responses to 18 items on the NHANES questionnaire, then derive the following codes: 1. Household full food security; no affirmative responses to any of the items, 2. Household marginal food security: 1-2 affirmative responses, 3. Household low food security; 3-5 affirmative responses for household without children under the age of 18; 3-7 affirmative responses for household with children, 4. Household very low food security; 6-10 affirmative responses for household without children under the age of 18; 8-18 affirmative responses for household with children. This study included participants who were categorized as 3 or 4, low food security and very low food security.

**Women.** Gender was a self-reported variable included in the demographics section of the NHANES survey. Demographic information was provided in this section, including the gender of the participant, male or female. This study included participants who were categorized as female, age 18 or above.

### **Independent Variables**

An independent variable, sometimes called the experimental or predictor variable, is the presumed cause of the dependent variable, or something the researcher would like to evaluate to

determine how it affects something else (Lee, 2007). Independent variables for this study included the following predictors listed below. These variables are all dichotomous, categorical variables.

**Supplemental Nutrition Assistance Program (SNAP).** SNAP refers to the Supplemental Nutrition Program, formerly called the Food Stamp Program. The program provides monthly benefits for eligible low-income households to purchase approved food items at authorized food stores. Clients qualify for the program based on available household income, assets, and certain basic expenses. The use of SNAP was a self-reported variable which was included in the Flexible Consumer Behavior Survey Module in 2007-08 and in the Food Security section in 2009-10 and 2011-12.

Respondents were asked “In the last 12 months, did (you/you or anyone who lives here) receive SNAP or Food Stamp benefits? (Here is the list of people who live here, let me read it to you)?” Responses include the following: yes, no, refused, don’t know. SNAP was coded into a dichotomous variable with 0 = did not receive SNAP and 1 = received SNAP. Participants who answered refused or don’t know were re-coded as missing data and removed from the dataset.

**Consumption on Fast Foods.** The dietary behavior section of the questionnaire was used for this variable. For the purpose of this study, fast foods is defined as commercially available, ready-to-eat meals (such as hamburgers, hot dogs, pizza, fried chicken, or french fries) with a high fat content, little fiber, and minimal quantities of vitamins or calcium (Fast foods, 2009). The questions were part of household interview for participants 16 or more years of age.

Respondents were asked how many times they had gotten meals from fast food or pizza places in the past 7 days. If the frequency was reported as "never," the value was re-coded as zero (CDC, 2015d). If the frequency was reported more than 21 times per week, the value was re-coded as “5555.” There were only 3 participants of 30,442 who answered this question as more than 21



times per week. It was assumed these responses were due to incorrectly entered or measured data, and were therefore dropped from the dataset. Participants coded 0 and “don’t know” were re-coded as missing. All missing data were removed from the dataset. Consumption of fast foods was transformed into a dichotomous variable, 0 = once or less per week and 1 = two or more times per week.

**Utilization of Community Emergency Food Programs.** Utilization of community emergency food programs was a self-reported variable which is included in the food security section of the questionnaire. This section provides individual level information on all NHANES participants. For the purpose of this study, an emergency food program was defined as any food item received from a community program.

Respondents were asked “In the past 12 months, did (you or any member of your household) ever get emergency food from a church, a food pantry, or a food bank, or eat in a soup kitchen? Responses included the following: yes, no, refused, and don’t know. Participants coded refused or don’t know were re-coded as missing. All missing data were removed from the dataset. Utilization of community emergency food programs was transformed into a dichotomous variable, 0 = did not use emergency foods and 1 = used emergency food.

### **Dependent Variable: Healthy Lifestyle Characteristics**

The dependent variable is the variable that measures a behavior or attribute of participants that we expect will be influenced by the independent variable (Heiman, 2014). The Healthy Lifestyle Characteristics variable is a combination of four variables – smoking, healthy weight, regular physical activity and healthy diet with adequate fruit and vegetable intake. The final transformed variable is one dichotomous, categorical variable.

**Healthy Weight.** Healthy weight was a self-reported variable which is included in the

body measures section of the personal questionnaire. This section provides individual level information on all NHANES participants. The body measures data were collected, in the Mobile Examination Center (MEC), by trained health technicians (CDC, 2015d). The NHANES health technicians completed a 2-day training program with survey staff and an expert anthropometrist. The training included an overview of the component, using the NHANES III anthropometry video, and demonstrations conducted by the expert examiner with volunteer subjects.

The expert examiner reviewed and demonstrated the proper technique to use for each measurement. Supervised practice exercises followed, conducted with several volunteer subjects, including infants, children, and adults (CDC). The chief health technician, at each of the MEC, monitored staff performance in the field. Health technician performance was also monitored using direct observation, data reviews, and periodic expert examiner (gold standard comparison) evaluations.

BMI was calculated as weight in pounds divided by height in inches squared, and then rounded to one decimal place (CDC, 2015d). For example: weight = 150 lbs., height = 65", calculation:  $[150 \div (65)^2] \times 703 = 24.96$  (CDC, 2015d). An adult female who has a BMI between 25 and 29.9 is considered overweight. An adult female who has a BMI of 30 or higher is considered obese. The variable was transformed into an ordinal variable grouping 24.9 and below as normal or underweight, and 25 and above as overweight or obese. Healthy weight were coded into a dichotomous variable, 0 = normal to underweight and 1 = overweight or obese. Missing data were removed from the dataset.

**Fruit and Vegetable Consumption.** All NHANES participants were eligible for two 24-hour dietary recall interviews. The first dietary recall interview was collected in-person in the Mobile Examination Center (MEC) and the second interview was collected by telephone 3 to 10

days later (CDC, 2014a). The objective of the dietary interview component was to obtain detailed dietary intake information from NHANES participants. The dietary intake data were used to estimate the types and amounts of foods and beverages (including all types of water) consumed during the 24-hour period prior to the interview (midnight to midnight), and to estimate intakes of energy, nutrients, and other food components from those foods and beverages.

Fruits and vegetables supply dietary fiber, and fiber intake is linked to lower incidence of cardiovascular disease and obesity (Slavin & Lloyd, 2012). Fruits and vegetables also supply vitamins and minerals to the diet and are sources of phytochemicals that function as antioxidants, phytoestrogens, and anti-inflammatory agents and through other protective mechanisms. Eating more fruits and vegetables adds nutrients to diets, reduces the risk for heart disease, stroke, and some cancers, and helps manage body weight when consumed in place of more energy-dense foods (Moore & Thompson, 2015). Adults who engage in less than 30 minutes of moderate physical activity daily should consume 1.5–2.0 cup equivalents of fruit and 2–3 cups of vegetables daily (CDC, 2015d).

However, CDC analyzed median daily frequency of fruit and vegetable intake based on 2013 Behavioral Risk Factor Surveillance System (BRFSS) data for the 50 states and the District of Columbia (DC) and applied newly developed prediction equations to BRFSS to calculate the percentage of each state's population meeting fruit and vegetable intake recommendations (Moore & Thompson, 2015). Overall, only 13.1% of respondents met fruit intake recommendations, ranging from 7.5% in Tennessee to 17.7% in California, and only 8.9% met vegetable recommendations, ranging from 5.5% in Mississippi to 13.0% in California.

A comparison was made to determine if there was a significant difference between the average consumption of fruits and vegetables for all respondents of the NHANES survey compared

with the selected sample. Descriptive statistics were run on all NHANES survey respondents. The missing data were removed from the total cases, leaving 19,364 respondents. Of those respondents, only 3,380 (17%) ate 5 or more servings of fruits and vegetables per day, and the mean average was two fruits or vegetables per day.

Results from this analysis support the literature that most Americans do not eat the daily recommended allowance of 5 or more fruits or vegetables per day, and most consume 2-3 per day. Therefore, based on this analysis, it was determined to examine participants who consumed the average of two or more fruits or vegetables per day. Dietary intakes from the two day 24 hour recall were averaged to estimate fruit and vegetable intake. These averages were then transformed into a dichotomous variable, 1= consumes the average of two or more servings of fruits and vegetables per day, and 0= consumes zero or one serving(s) of fruits and vegetables per day. Missing data were removed from the dataset.

**Physical Activity.** Physical activity was a combination of two self-reported variables which were included in the physical activity section of the personal questionnaire. The physical activity questionnaire (variable name prefix PAQ) is based on the Global Physical Activity Questionnaire (GPAQ) and includes questions related to daily activities, leisure time activities, and sedentary activities (CDC, 2015d). For participants 16 years and older, the questions were asked before the physical examination in the home using the Computer-Assisted Personal Interviewing (CAPI) interviewer administered system.

According to the 2015 Physical Activity Guidelines for American, to stay healthy, adults aged 19-64 should try to be active daily and should do: at least 150 minutes of moderate-intensity aerobic activity such as cycling or fast walking every week, and muscle-strengthening activities on 2 or more days a week that work all major muscle groups, including legs, hips, back, abdomen,

chest, shoulders and arms (USDHHS, 2015). However, less than 5% of adults participate in 30 minutes of physical activity each day, and only one in three adults receive the recommended amount of physical activity each week (President's Council on Fitness, Sports and Nutrition, 2016).

Therefore, based on the literature, this study examined whether or not participants performed any moderate to vigorous recreational activity daily for at least 10 minutes continuously, causing a small increase in heart rate. Participants were asked "Do you do any moderate-intensity sports, fitness, or recreational activities that cause a small increase in breathing or heart rate such as brisk walking, bicycling, swimming, or golf for at least 10 minutes continuously?" Answers were recorded yes, no, refused or don't know. Participants were also asked "Do you do any moderate-intensity sports, fitness, or recreational activities that cause a small increase in breathing or heart rate such as brisk walking, bicycling, swimming, or golf for at least 10 minutes continuously?"

Answers were re-coded yes, no, refused or don't know. The two variables were then transformed into the dichotomous physical activity variable, 0 = does not perform moderate to vigorous activity and 1 = performs moderate to vigorous activity. Participants coded refused or don't know were then recoded as missing. All missing data were removed from the dataset.

**Not Smoking.** Tobacco is a leafy plant grown around the world. In 2007, four countries (China, Brazil, India, and the US) produced two-thirds of the world's tobacco (USDHHS, 2016). Dried tobacco leaves can be: shredded and smoked in cigarettes, cigars and pipes, shredded into snuff, cured and made into chewing tobacco and added to other chemicals to turn into a vapor known as electronic cigarettes (e-cigarettes). Tobacco is an addictive substance because it contains the chemical nicotine.

Tobacco use is a self-reported variable which is included in the smoking and tobacco use section of the personal questionnaire. The recent tobacco use data set provides details on use of cigarettes, pipes, cigars and other forms of tobacco as well as nicotine replacement therapies (e.g., nicotine patches), in the past 5 days (CDC, 2015c). These questions were asked at the Mobile Examination Center (MEC) during the MEC Interview. For adults 20 years and older, questions were asked by trained interviewers using the Computer-Assisted Personal Interviewing (CAPI) system. For youths 12-19 years, questions were self-administered using the Audio Computer-Assisted Self-Interviewing (ACASI) system, in English and Spanish only.

Respondents were asked “During the past 5 days, did (you/he/she) use any product containing nicotine including cigarettes, pipes, cigars, chewing tobacco, snuff, nicotine patches, nicotine gum, or any other product containing nicotine? Responses included the following: yes, no, refused, don’t know. The variable was transformed to a binary categorical variable, 0 = Used nicotine/tobacco within the past 5 days and 1 = did not use nicotine/tobacco within the past 5 days. Participants coded refused or don’t know were re-coded as missing. All missing data were removed from the dataset.

### **Covariates**

A covariate is a secondary variable that can affect the relationship between the dependent variable and other independent variables of primary interest (Everitt & Skrondal, 2010). Race/ethnicity and marital status were examined as potential covariates to be included in the logistic regression analysis based on the literature, which suggests higher rates of food insecurity include households with children, especially households with children headed by single women or single men, black non-Hispanic households and Hispanic households (Coleman-Jensen et al., 2014).

According to the USDA Economic Research Report (2015a), households with children had a substantially higher rate of food insecurity (19.5%) than those without children (11.9%). Among households with children, married-couple families had the lowest rate of food insecurity (12.8%). Very low food security was more prevalent than the national average (5.6%) for the households with children headed by a single woman (10.8%), women living alone (7.4%) and men living alone (7.6%), Black, non-Hispanic households (10.1%), and Hispanic households (6.7%) (Coleman-Jensen et al., 2014).

**Marital Status.** Marital status was a self-reported variable which was included in the demographics section use of the personal questionnaire. This section provides individual level information on all NHANES participants. Respondents were asked “Are you now married, widowed, divorced, separated, never married or living with a partner?” Responses included the following: married, widowed, divorced, separated, never married, living with partner, refused, and don’t know. The categories will be collapsed into the following: (1) married or living with a partner, never married, (2) never married, (3) widowed, divorced or separated, and (4) refused/don’t know. Any responses of refused/don’t know were coded missing. All missing data were removed from the dataset.

**Race.** Race was a self-reported variable which was included in the demographics section of the personal questionnaire. This section provides individual level information on all NHANES participants. Respondents were asked “Please look at the categories on this card. What race or races do you consider yourself to be? Responses included the following: American Indian or Alaska Native, Asian, Black or African American, Native Hawaiian or Pacific Islander, White, Other, refused, and don’t know. Missing data were removed from the dataset.

## **Analysis of Data**

**Statistical Method.** SPSS Version 23 was used for statistical analysis. Because NHANES uses SAS, the SAS file was converted to SPSS. For the analysis, descriptive statistics were initially run in order to provide simple summaries about the sample and the measures. Next, bivariate logistic regression analysis was performed in order to determine the empirical relationship between marital status and the four healthy lifestyle characteristics, then race and HLCs. Both variables were not significant; therefore, they were not included in the analysis as covariates.

Logistic regression, also called a logit model, is used to model dichotomous outcome variables. In the logit model the log odds of the outcome is modeled as a linear combination of the dependent variables (UCLA Statistical Consulting Group, 2007). A binary logistic regression was used to determine the relationship between the three independent variables (i.e. SNAP, consumption of fast foods, and utilization of community emergency food programs) and healthy lifestyle characteristics. For this study, binary logistic regression was used with a dichotomous dependent variable and categorical independent variables.

**Assumptions of Binary Logistic Regression.** Prior to conducting the primary analysis, the assumptions of binary logistic regression were tested. Logistic regression does not assume a linear relationship between the dependent and independent variables (Burns & Burns, 2009). Furthermore, the independent variables need not be interval, nor normally distributed, nor linearly related, nor of equal variance within each group. The dependent variable must be dichotomous (categorical) and the independent variables must be interval or categorical. In this study, the dependent variable was a dichotomous categorical variable, and all independent variables were categorical variables. In addition, the categories for all variables were both mutually exclusive and exhaustive.



Another assumption of binary logistic regression is that there is a sufficient sample size with enough cases in each category to allow for necessary calculations and comparisons between groups, especially in studies with numerous independent variables (Pallant, 2007). In this study, the initial sample size was large; therefore, an assumption was made indicating enough cases would remain after the missing data was removed. To test this assumption, a power analysis was run to ensure the samples size was sufficient for the study.

Binary logistic regression also requires no multicollinearity between independent variables. Multicollinearity is a statistical phenomenon in which the independent variables in a logistic regression model are highly correlated. The underlying problem with multicollinearity is that if two variables are highly correlated, they are essentially containing the same, or at least much of the same, information and are therefore measuring the same thing (Sprinthall, 2000). In order to test for multicollinearity, the tolerance and variance inflation factor were examined to assess the multivariate association of each independent variable with the set of the others.

Finally, binary logistic regression is sensitive to outliers. Cases with unusual or extreme values at both ends of a sample distribution are known as outliers (Mertler & Vannatta, 2005). Using the NHANES dataset, two of the independent variables, SNAP and the utilization of community emergency foods, were dichotomous variables; therefore, outliers were not an issue. For the third independent variable, consumption of fast foods, respondents were asked how many times they had gotten meals from fast food or pizza places in the past 7 days. If the frequency was reported more than 21 times per week, the value was re-coded as “5555.” There were only 3 participants of 30,442 who answered this question as more than 21 times per week. It was assumed these responses were due to incorrectly entered or measured data, and were therefore dropped from the dataset. Therefore, the remaining data was transformed into a dichotomous variable. Outliers

were not an issue because extreme variability was eliminated.

**Binary Logistic Regression Analysis.** A binary logistic regression analysis using the forced entry method was conducted using SPSS Version 23 software to test the three hypotheses in this study. Binary logistic regression was conducted in preference to linear regression based on the crucial limitation that linear regression is not intended to be used with dependent variables that are dichotomous and categorical (Burns & Burns, 2009). Furthermore, binary logistic regression was used rather than discriminant analysis (DA) because binary logistic regression requires fewer assumptions and is more flexible. Finally, DA strictly requires the use of continuous independent variables; thus, in instances such as this where the independent variables are categorical and the dependent variable is categorical, logistic regression is necessary.

The binary logistic regression analysis was used to determine the relationship between the three independent variables (SNAP, consumption of fast foods, and utilization of community emergency food programs) and the composite healthy lifestyle characteristics variable. Participants who had zero or one of the healthy lifestyle characteristics were coded 0 and participants who had two or more of the healthy lifestyle characteristics were coded 1. Because the dependent variables in this study consisted of only two categories, logistic regression estimates the odds probability of the dependent variables occurring as the values of the independent variables change.

## **Conclusion**

Although there has been a great deal of research on negative factors that are linked to obesity in low income, food secure women, there has been very little research examining the relationship between consumer behaviors of low income, food secure women and healthy lifestyle characteristics that may decrease the likelihood of obesity. This study conducted a secondary data

analysis using the NHANES to examine the relationship between healthy lifestyle characteristics with food behaviors of low-income, food insecure women in the US. National health recommendations and clinical guidelines emphasize the importance of these four healthy lifestyle behaviors. Factors influencing food choice are not only based upon individual preferences, but are constrained by circumstances that are social, cultural and economic.

Low-income groups face specific challenges when attempting dietary change and solutions need to be specifically targeted (European Food Information Council, 2004). Understanding the food behaviors of this group is fundamental to creating a strategy to help educate individuals to make healthy choices to prevent diseases caused by obesity. As social workers advocating for social justice, it is time to address hunger and food insecurity, not as a matter of charity, but as a fundamental human right necessary to ensure the dignity and well-being of all individuals.

## Chapter Four: Results

Using binary logistic regression, this research examined the relationship between adherence to two or more of the four healthy lifestyle characteristics (healthy weight, adequate daily fruit and vegetable intake, regular moderate to vigorous physical activity and not smoking) with three specific food behaviors among a sample of low-income, food insecure women. The three specific food behaviors were: (1) the use of SNAP, (2) the consumption of fast foods and (3) the utilization of community emergency food programs. The sample for this study was 589 low-income, food insecure women who participated in the NHANES survey from years 2009-12.

Preliminary data analyses were conducted to test for the assumptions of binary logistic regression. First, descriptive analyses on demographic characteristics and independent variables were performed. Next, missing data analyses were conducted to determine the representative-ness of the sample and the potential impact of missing data on the study conclusion. Finally, three separate binary logistic regression analyses were performed to assess the extent to which use of SNAP was associated with adherence to two or more of the four healthy lifestyle characteristics, the consumption of fast foods was associated with adherence to two or more of the four healthy lifestyle characteristics, and utilization of community emergency food programs was associated with adherence to two of the four healthy lifestyle characteristics.

### Preliminary Analyses

**Sample Characteristics.** Descriptive statistics for all variables are presented in Table 1 and 2. All variables were dichotomous categorical variables; therefore, characteristics are presented in a frequency distribution table. The sample for this study included 589 low-income,

food insecure women who participated in the NHANES in one of the three 2-year cycles, 2007-08, 2009-10, and 2011-12. The data file contained responses from 30,442 participants; however, only 2,798 met the inclusion criteria. Inclusion criteria included the following: low-income (categorized in the data set as less than 185% of the poverty level), food insecure (categorized as 3 = low food security and 4 = very low food security on the food security question) and women.

Table 1

*Descriptive Statistics of Variables (n = 589)*

Variable	n	%
Gender		
Female	589	100
Household Income		
Below or equal to 185% poverty level	589	100
Food Insecurity		
Food insecure	589	100
SNAP		
Not receiving SNAP	111	18.8
Receives SNAP	478	81.2
Fast food		
Consumes fast food = 0 - 1 times/week	277	47
Consumes fast food = 2 or more times/week	312	53
Emergency food		
Did not use emergency food	341	57.9
Used emergency food	248	42.1
Adherence to Healthy Lifestyle Characteristics		
Healthy lifestyle characteristics = 0 - 1	338	57.4
Healthy lifestyle characteristics = 2 or more	251	42.6

Table 2  
*Descriptive Statistics Associated with the Logistic Regression Analyses*

Predictor Variables	Dependent Variable Adhere to 2 or More Healthy Lifestyles	
	N	%
Use of SNAP		
Yes	202	34%
No	49	8%
Consumption of fast foods		
Yes	123	20%
No	128	22%
Utilization of community emergency food programs		
Yes	99	17%
No	152	26%

**Missing Data.** Subjects were excluded from the study if they had missing data on any of the variables of interest using listwise deletion. Listwise deletion (complete case analysis) removes all data for a case that has one or more missing values (Peugh & Enders, 2004). Listwise deletion can be advantageous as it can be used with any type of statistical analysis and no special computational methods are required (Soley-Bori, 2013). However, listwise deletion has some limitations.

First, this method may affect the statistical power of tests conducted as a result of the reduced sample size. To verify the sample size was adequate, a post-hoc power analysis was conducted for the binary logistic regression analysis using the software package G\*Power 3.1 (Faul & Erdfelder, 1992). A power analysis determines the likelihood that the null hypothesis would be correctly rejected. Cohen (1988) developed guidelines that many researchers still use

today to interpret effect size estimates. For dichotomous outcomes, the standard conventions define the following as cutoff points for odds ratios: 1.5 (small effect size); 2.5 (medium effect size); and 4.3 (large effect size) (USDHHS, 2014). A power analysis was conducted for the binary logistic regression analysis using G\*Power 3.1 (Faul, Erdfelder, Georg-Lang, & Buchner, 2007). This analysis revealed that with a sample of 589 survey respondents there would be 84% power to detect an odds ratio of 1.60 or larger with a single predictor using a two tailed test at the  $p = .05$  level.

A second limitation of listwise deletion occurs when excluding data from analysis may not be representative of the population. One method used to ensure the sample is representative of the population is to compare the missing and non-missing cases on variables where information is not missing. To assess the impact on the representativeness of the study sample associated with excluding from the analysis the low-income, food insecure women whose responses contained missing data, the characteristics of the women retained in the analysis were compared to those of the low-income, food insecure women who were excluded from the analysis.

A bivariate analytic approach was taken to examine this limitation. A dummy variable to code for missingness of each variable with missing data (0 = cases excluded because of missing data and 1 = cases included in the study sample). Of the 2,798 met the inclusion criteria, 2,209 were eliminated due to missing data. The missing and non-missing cases were compared using chi-square analysis. For the dependent variable, exclusion of cases with missing data did not have a significant impact on the representativeness of sample. The results of the chi-square analysis “sample by healthy lifestyle characteristics” were  $\chi^2(1) = 2.389, p = .122$ ; Cramer’s  $V = .030$ .

For the independent variables, excluding cases containing missing data had a significant impact on the representativeness of the sample. Standards for interpreting Cramer’s  $V$  as proposed

by Cohen (1988) are the following:  $df = 1$  (0.10 = small effect) (0.30 = medium effect) (0.50 = large effect). Therefore, as noted by Cohen's (1988) recommendations for interpreting Cramer's V, the relationships were weak; Chi-square "sample by SNAP"  $\chi^2(1) = 12.760, p = .000$ ; Cramer's V = .082; Chi-square "sample by fast foods"  $\chi^2(1) = 7.608, p = .006$ ; Cramer's V = .067; Chi-square "sample by emergency foods"  $\chi^2(1) = 17.856, p = .000$ ; Cramer's V = .080. (See Table 3 below')

In summary, the missing data for the dependent variable (Healthy Lifestyle Characteristics) did not have a significant impact on the representativeness of the sample. Although the missing data had a significant impact on the representativeness of the sample for the three independent variables, the associations were weak. Therefore, it was concluded to only include cases with complete data in the primary analysis.

Table 3

*Cross-Tabulation of Sample by Healthy Lifestyle Characteristics*

	Sample		$\chi^2$	$p$	Cramer's V
	Missing	Non-Missing			
Healthy lifestyle characteristics	2154	589	2.389	0.122	0.030
SNAP	1295	589	12.760	0.000	0.082
Consumption of fast foods	2209	589	7.608	0.006	0.067
Utilization of community emergency food programs	1127	589	17.856	0.000	0.080

*Note:  $p = .05$*

**Multicollinearity.** Multicollinearity occurs when independent variables are highly correlated in some way (Spicer, 2005). The existence of collinearity inflates the variances of the parameter estimates, and consequently produces incorrect inferences about relationships between



explanatory and response variables (Midi, Sarkar, & Rana, 2010). In order to test for multicollinearity, two methods were taken.

First, the correlation matrix among the predictor variables was examined to identify the presence of any moderate to high inter-correlations. As noted by Tasbachnick and Fidell (2007), multicollinearity causes statistical problems when correlations among the predictor variables exceed .90. Given that the variables had been dichotomized, the Phi correlation coefficients were examined. (See Table 4 below.) The analysis indicated the correlations between SNAP and Fast food  $\phi = -.045$ ; SNAP and emergency foods  $\phi = .059$ ; Fast foods and emergency foods  $\phi = -.018$ . Given that all of the correlations among the predictors were both small and non-significant, there is no concern regarding multicollinearity in this sample.

Table 4

*Correlation Matrix Between Independent Variables (n = 589)*

Variable	SNAP	Consumption of 2 or more fast foods	Utilization of community emergency food programs
SNAP	1.0		
Consumption of 2 or more fast foods	-0.045	1.0	
Utilization of community emergency food programs	0.059	0.018	1.0

*Correlation is significant (r > .80)*

Second, an examination of the tolerance and variance of inflation factor (VIF) statistics were examined. In the article entitled “Collinearity diagnostics of binary logistic regression model,” Midi, Sarkar, and Rana (2010) recommended using a binary logistic regression model to test for multicollinearity where the dependent variable is dichotomous and the independent

variables are categorical because better diagnostics are produced by examining tolerance and VIF. The tolerance and VIF statistics assess the multivariate association of each independent variable with the set of the others (Spicer, 2005).

According to Mertler and Vannatta (2010) “the tolerance value for a variable exceeds .10 then multicollinearity is not an issue for that variable” (p. 296). The VIF is a measure of the extent to which there exists multicollinearity relationships for given independent variables. As reported in tables 5, 6 and 7, the tolerance value statistics are consistently more than the common threshold of .10 and also the VIF in relation to all the variables considered are consistently less than 10. These results also confirm the absence of multicollinearity between the independent variables.

Table 5

*Multicollinearity 1*

Independent Variable	<u>Collinearity Statistics</u>	
	Tolerance	VIF
SNAP	1.000	1.000
Fast foods	1.000	1.000

Dependent Variable: Emergency Foods

Table 6

*Multicollinearity 2*

Independent Variable	<u>Collinearity Statistics</u>	
	Tolerance	VIF
SNAP	0.987	1.013
Emergency Foods	0.987	1.013

Dependent Variable: Fast Foods

Table 7

*Multicollinearity 3*

Independent Variable	<u>Collinearity Statistics</u>	
	Tolerance	VIF
Emergency Foods	1.000	1.000
Fast foods	1.000	1.000

Dependent Variable: SNAP

**Covariates.** The literature suggests higher rates of food insecurity include households with children, especially households with children headed by single women or single men, black non-Hispanic households and Hispanic households (Coleman-Jensen et al., 2014). To determine if there was a significant association between the covariates and the dependent variable, two chi-square tests of independence examining: (1) the dependent variable (healthy lifestyle characteristics) with (2) the two possible covariates (marital status and race) were performed.

Statistical significance was set at .05. There was no significant relationship between the dependent variable (healthy lifestyle characteristics) and race or marital status (see Table 8). Adherence to healthy lifestyle characteristics was not associated with race or marital status; therefore, the covariates initially examined for this study were not included in the primary analysis.

Table 8

*Cross-Tabulation of Healthy Lifestyle Characteristics by Covariates (Race/Ethnicity and Marital Status)*

	Healthy lifestyle characteristics		$\chi^2$	$p$	Cramer's $V$
	1 or less	2 or more			
Race	338	251	5.649	0.227	0.098
Marital Status	338	251	7.914	0.161	0.116

*Note:  $p = .05$*

### Primary Analyses

**Binary Logistic Regression Model.** Three binary logistic regression analyses were used to test the hypotheses of this study. The basic concepts fundamental to multiple regression analysis are the same for binary logistic regression analysis, although the meaning of the resultant regression equation is considerably different (George & Mallery, 2000). A standard regression equation is made up of the sum of the products of weights and actual values on several independent variables in order to predict the values on the dependent variable (Mertler & Vannatta, 2005). In contrast, the value that is being predicted in logistic regression is a probability that ranges from 1 to 0. Logistic regression analysis produces a regression equation that predicts the probability associated with the likelihood that an individual will fall into one category or another (Tate, 1992).

**Hypotheses.** Hypothesis 1: Low-income, food insecure women who participated in SNAP

will be significantly more likely to adhere to at least two or more of the four healthy lifestyle characteristics compared to low-income, food insecure women who did not participate in SNAP.

Null Hypothesis 1: There will be no significant difference between low-income, food insecure women who participate in SNAP and those who do not in terms of their adherence to at least two or more of the four healthy lifestyle characteristics.

A binary logistic regression analysis was conducted to determine if low-income, food insecure women who participated in SNAP were significantly more likely to adhere to at least two or more of the four healthy lifestyle characteristics compared those who did not. The -2 Log Likelihood provides an index model of fit (Mertler & Vannatta, 2005). A perfect model fit would have a -2 Log Likelihood of 0; consequently, the lower this value, the better the model fits the data and the higher the value, the poorer the fit. The Cox & Snell R-squared and the Nagelkerke's  $R^2$  represent two different estimates of the amount of variance in the dependent variable accounted for in the model. Regression results indicated the overall model fit of the independent variable (SNAP) was poor (-2 log Likelihood of 803.499, Cox & Snell of .000 and Nagelkerke's  $R^2$  of .000). The model correctly classified 57.4% of the cases (100% for 1 or less healthy lifestyle characteristics and 0% for two or more healthy lifestyle characteristics).

Regression coefficients are presented in Table 9. A test of the full model against a constant only model was not statistically significant, indicating SNAP was not a predictor for low-income, food insecure women to adhere to two or more of the healthy lifestyle characteristics ( $X^2 = .131$ ,  $p = .718$ ). Wald statistics indicated SNAP did not make a significant contribution to the prediction of adherence to healthy lifestyle characteristics ( $p = .718$ ). The odds ratio for SNAP was .926. Low-income, food insecure women who participated in SNAP are 7% less likely to adhere to the healthy lifestyle characteristics.

Table 9

*Logistic Regression Model for SNAP Predicting Healthy Lifestyle Characteristics (n = 589)*

Variable	$\beta$	S.E.	Wald	df	p	Exp(B)	95% CI	
							Lower	Upper
SNAP	-0.077	.212	0.131	1	0.718	0.926	0.611	1.404
Constant	-0.298	.083	1.516	1	0.218	0.790		

Hypothesis 2: Low-income, food insecure women who consume fast foods two or more times per week will be significantly less likely to adhere to at least two or more of the four healthy lifestyle characteristics compared to low-income, food insecure women who consume fast foods one time or less per week. Null Hypothesis 2: There will be no significant difference between low-income, food insecure women who consume fast foods two or more times per week and those who do not regarding their adherence to at least two or more of the four healthy lifestyle characteristics.

A binary logistic regression analysis was conducted to determine if low-income, food insecure women who consumed fast foods were significantly more likely to adhere to at least two or more of the four healthy lifestyle characteristics compared to those who did not. Regression results indicated the overall model fit of the independent variable (consumption of fast foods) was poor (-2 log Likelihood of 800.866, Cox & Snell  $R^2$  of .005, and Nagelkerke's  $R^2$  of .006). The model correctly classified only 57.4% of the cases (100% for 1 or less healthy lifestyle characteristics and 0% for two or more healthy lifestyle characteristics).

Regression coefficients are presented in Table 10. A test of the full model against a constant only model was not statistically significant, indicating the consumption of fast foods was not a predictor for low-income, food insecure women to adhere to two or more of the healthy

lifestyle characteristics ( $X^2 = 2.759, p = .097$ ). Wald statistics indicated the consumption of fast foods did not make a significant contribution to the prediction of adherence to healthy lifestyle characteristics ( $p = .097$ ). The odds ratio for the consumption of fast foods was .758. Low-income, food insecure women who consume fast foods are 24% less likely to adhere to the healthy lifestyle characteristics.

Table 10

*Logistic Regression Model for Consumption of Fast Foods Predicting Healthy Lifestyle Characteristics (n = 589)*

Variable	$\beta$	S.E.	Wald	df	p	Exp(B)	95% CI	
							Lower	Upper
Fast Foods (2 or more times per week)	-0.278	0.167	2.759	1	0.097	0.758	0.546	1.051
Constant	-0.152	0.121	1.589	1	0.207	0.859		

Hypothesis 3: Low-income, food insecure women who utilize community emergency food programs will be significantly less likely to adhere to at least two or more of the four healthy lifestyle characteristics compared to low-income, food insecure women who did not utilize community programs that provide emergency food. Null Hypothesis 3: There will be no significant difference between low-income, food insecure women who utilize community emergency food programs and those who do not regarding their adherence to at least two or more of the four healthy lifestyle characteristics.

A binary logistic regression analysis was conducted to determine if low-income, food insecure women who utilized community emergency food programs were significantly more likely to adhere to at least two or more of the four healthy lifestyle characteristics compared to those who did not. Regression results indicated the overall model fit of the independent variable (utilization

of community foods) was poor (-2 log Likelihood of 802.355, Cox & Snell  $R^2$  of .002 and Nagelkerke's  $R^2$  of .003). The model correctly classified only 57.4% of the cases (100% for 1 or less healthy lifestyle characteristics and 0% for two or more healthy lifestyle characteristics).

Regression coefficients are presented in Table 11. A test of the full model against a constant only model was not statistically significant, indicating the utilization of community emergency food programs was not a predictor for low-income, food insecure women to adhere to two or more of the healthy lifestyle characteristics ( $X^2 = 1.275$ ,  $p = .259$ ). Wald statistics indicated the utilization of community food programs did not make a significant contribution to the prediction of adherence to healthy lifestyle characteristics ( $p = .260$ ). The odds ratio for the utilization of community emergency food programs was .826. Low-income, food insecure women who utilize community emergency food programs are 17% less likely to adhere to the healthy lifestyle characteristics.

Table 11

*Logistic Regression Model for Utilization of Community Emergency Food Programs Predicting Healthy Lifestyle Characteristics (n = 589)*

Variable	$\beta$	S.E.	Wald	df	$p$	Exp(B)	95% CI	
							Lower	Upper
Emergency foods	-0.191	0.169	1.271	1	0.260	0.826	0.593	1.151
Constant	-0.218	0.109	3.999	1	0.046	0.804		

### Summary of Statistical Results

Hypothesis 1: Low-income, food insecure women who participated in SNAP will be significantly more likely to adhere to at least two or more of the four healthy lifestyle characteristics compared to low-income, food insecure women who did not participate in SNAP. **Not supported.**



Null Hypothesis 1: There will be no significant difference between low-income, food insecure women who participate in SNAP and those who do not in terms of their adherence to the four healthy lifestyle characteristics.

Hypothesis 2: Low-income, food insecure women who consume fast foods two or more times per week will be significantly less likely to adhere to at least two or more of the four healthy lifestyle characteristics compared to low-income, food insecure women who consume fast foods one time or less per week. **Not supported.**

Null Hypothesis 2: There will be no significant difference between low-income, food insecure women who consume fast foods two or more times per week and those who do not regarding their adherence to the four healthy lifestyle characteristics.

Hypothesis 3: Low-income, food insecure women who utilize community emergency food programs will be significantly less likely to adhere to at least two or more of the four healthy lifestyle characteristics compared to low-income, food insecure women who did not utilize community programs that provide emergency food. **Not supported.**

Null Hypothesis 3: There will be no significant difference between low-income, food insecure women who utilize community emergency food programs and those who do not regarding their adherence to the four healthy lifestyle characteristics.

In summary, three binary logistic regression analyses were performed to test the hypotheses of this study. Results of this study indicate there are no significant relationships between adherence to two or more of the four healthy lifestyle characteristics (healthy weight, adequate daily fruit and vegetable intake, regular moderate to vigorous physical activity and not smoking) with: (1) the use of SNAP, (2) the consumption of fast foods or (3) the utilization of community emergency food programs. The following chapter discusses the results of this analysis. Each hypothesis is

examined, providing implications for social workers and public health providers. A discussion of the limitations of this study will be provided. Finally, recommendations for future research based on these findings are provided.

## **Chapter Five: Discussion**

In the US, awareness is increasing that medical care alone cannot adequately improve health overall or reduce health disparities without also addressing where and how people live (Braveman et al., 2011). Biological, socioeconomic, psychosocial, behavioral and social factors all contribute to an individual's current state of health (CDC, 2014b). This may explain why some Americans are healthier than others. For women, particularly low-income, numerous studies demonstrate a greater risk for food insecurity, which often results in higher prevalence of obesity and diet-related disease (Franklin et al., 2012).

Obesity is a serious concern for women as it is associated with poorer mental health outcomes, reduced quality of life, and is a leading cause of death in the US, being linked to increased risk for diabetes, heart disease, stroke, and some types of cancer (CDC, 2015b). The relationship between food insecurity and obesity is a complicated one (Hou, 2013). According to the American Heart Association, adopting a healthy lifestyle is imperative to normalizing critical health numbers, including weight, blood sugar, blood pressure, and blood cholesterol (AHA, 2015). The Center for Disease Control, through its Behavioral Risk Factor Surveillance System, says that controlling for four healthy lifestyle characteristics (not smoking, maintaining a healthy weight, eating the recommended number of servings of fruits and vegetables per day, and engaging in regular physical activity) is fundamental to a healthy lifestyle.

The primary mission of the social work profession is to enhance human well-being and help meet the basic human needs of all people, with particular attention to the needs and empowerment of people who are vulnerable, oppressed, and living in poverty (NASW, 2004).

Social workers and public health professionals have focused on disease and health care services in order to alleviate or eliminate disparities in health. In doing so, researchers have revealed the significant role that the social determinants of health have in achieving health equity. Understanding the existence of certain negative health outcomes that stem from food insecurity is of direct importance to health care professionals and to the policy makers and program administrators charged with reducing the cost of health care and improving health and well-being for all Americans (Gundersen & Ziliak, 2015).

This study examined the relationship between adherence to two or more of the four healthy lifestyle characteristics (healthy weight, adequate daily fruit and vegetable intake, regular moderate to vigorous physical activity and not smoking) with three specific food behaviors of low-income, food insecure women; the use of SNAP, the consumption of fast foods and the utilization of community emergency food programs. It was hypothesized that low-income, food insecure women who participated in SNAP would be significantly more likely to adhere to at least two or more of the four healthy lifestyle characteristics compared to low-income, food insecure women who did not.

In addition, it was hypothesized that low-income, food insecure women who either consumed fast foods or utilized emergency food programs would be significantly less likely to adhere to at least two or more of the four healthy lifestyle characteristics compared to low-income, food insecure women who did not. The following will discuss the results from three binary logistic regression analyses. The results will include a review of the hypotheses in relation to social cognitive theory. Study limitations and areas for future research will be discussed.

### **Discussion of Hypotheses**

**Hypothesis One.** Using NHANES data, a binary logistic regression analysis was

performed. Regression results indicated the overall model fit of the independent variable (SNAP) was poor. Results of this analysis failed to support the hypothesis that low-income, food insecure women who participated in SNAP will be significantly more likely to adhere to at least two or more of the four healthy lifestyle characteristics compared to low-income, food insecure women who did not participate in SNAP. Binary logistic regression analysis demonstrated participation of SNAP was not a significant predictor for low-income, food insecure women to adhere to two or more of the healthy lifestyle characteristics.

Studies have been performed to determine if SNAP and obesity are linked; however, the results are not conclusive. Therefore, further exploration of SNAP in relation to adherence to healthy lifestyle characteristics of low-income women should be examined. The nutritional education component of food stamps (called SNAP-Ed) is still a crucial part of SNAP (Snap to Health, 2016). The goal of SNAP-Ed is to improve the likelihood that persons eligible for SNAP will make healthy choices within a limited budget and choose active lifestyles consistent with the current Dietary Guidelines for Americans and MyPlate (USDA, 2014a). SNAP-Ed is designed to provide online resources and learning tools for participants of the program, such as meal planning, recipes and budgeting tips. Furthermore, the program offers classes and consultations with professional nutritionists or trained paraprofessionals in order for participants to have hands on experiences.

Using social cognitive theory, this study hypothesized low-income, food insecure women who participated in SNAP would be significantly more likely to adhere to at least two or more of the four healthy lifestyle characteristics compared to those who did not. According to Bandura (1977), social cognitive theory explains human behavior in terms of continuous reciprocal interaction between cognitive, behavioral and environmental influences. Necessary conditions for

effective modeling include: (1) Attention – various factors increase or decrease the amount of attention paid; (2) Retention – remembering what an individual paid attention to; (3) Reproduction – reproducing the image; and (4) Motivation – having a good reason to imitate. It was hypothesized that the educational component that is available through SNAP would provide access to the necessary conditions for effective modeling, thus increasing the likelihood of adherence.

If SNAP is not a significant predictor for low-income, food insecure women to adhere to two or more of the healthy lifestyle characteristics, there may be a component to the online resources or in person classes and consultations that may not demonstrate effective modeling. From a social cognitive perspective, it may be beneficial for social workers and public health advocates to examine the use of the SNAP-Ed program by participants to determine if that may have an effect on the outcome. If individuals have access to the program, but are not participating, the knowledge presented cannot be gained. Knowledge of health risks and benefits creates the precondition for change (Bandura, 2004). According to Bandura (2004), if people lack knowledge about how their lifestyle habits affect their health, they have little reason to put themselves through the travail of changing the detrimental habits they enjoy.

**Hypothesis Two.** Using NHANES data, a binary logistic regression analysis was performed. Regression results indicated the overall model fit of the independent variable (consumption of fast foods) was poor. Results of this analysis failed to support the hypothesis that low-income, food insecure women who consume fast foods two or more times per week will be significantly less likely to adhere to at least two or more of the four healthy lifestyle characteristics compared to low-income, food insecure women who consume fast foods one time or less per week.

The results do not support previous literature in relation to fast foods and health. In addition, the model was not a good fit. Therefore, further exploration of the consumption of fast

foods in relation to adherence to healthy lifestyle characteristics of low-income women should be examined. Consumption of fast foods has become a growing part of the American lifestyle. Women who are considered low-income and food insecure often live in neighborhoods that lack full-service grocery stores and greater availability to fast food restaurants (FRAC, 2015). Bowman and Vinyard (2004) have reported that more frequent fast-food consumption is associated with higher energy and fat intake and lower intake of healthful nutrients (Fryer & Ervin, 2013).

Many low-income women are overscheduled and overcommitted, running from activity to activity without making time to plan or prepare meals (Muntel, 2016). Low-income women also face high levels of stress due to financial and emotional pressures of food insecurity, low wage work, lack of access to health care, inadequate transportation, poor housing, neighborhood violence, and other factors (FRAC, 2015). Fast food is quick, convenient and inexpensive.

Although there are healthy options at fast food restaurants, the USDA Economic Research Service (ERS) has found a positive association between dietary patterns and body weight (USDA, 2014b). Meals and snacks based on food prepared away from home contained more calories per eating occasion than those based on at-home food. Away-from-home food was also higher in nutrients that Americans overconsume (such as fat and saturated fat) and lower in nutrients that Americans under-consume (calcium, fiber, and iron). Low-income, food insecure women with limited resources tend to spend less on food overall and, more specifically, less on healthy foods that are lower in energy but more costly, such as fruits and vegetables (Drewnoski & Specter, 2004).

One possible rationale for why the consumption of fast foods was not a significant indicator of healthy lifestyle characteristics may be the notion that nutritional labeling on fast food has become mandatory. As required by statute, FDA's final rule for nutrition labeling in chain

restaurants and similar retail food establishments will provide consumers with clear and consistent nutrition information in a direct and accessible manner for the foods they eat and buy for their families (USFDA, 2015). The absence of individual guidance places limits on the power of one-way mass communication (Bandura, 2004).

Current nutrition labeling law exempts much of the food-away-from-home sector from mandatory labeling regulations (USDA, 2014b). Because consumers are less likely to be aware of the ingredients and nutrient content of away-from-home food than of foods prepared at home, public health advocates have called for mandatory nutrition labeling for major sources of these foods, such as fast-food and chain restaurants. Social cognitive theory explains human behavior in terms of continuous reciprocal interaction between cognitive, behavioral, an environmental influences (Bandura, 1977). An example of Bandura's theory in action is advertising or commercials. To help low-income, food insecure women reduce health-impairing habits by health communications requires a change in emphasis. Rather than trying to scare individuals into health, it is important to enable them with the self-management skills and self-beliefs needed to take charge of their health habits (Bandura, 2004).

Social-cognitive theories suggest a subtle and potentially far-reaching effect of food advertising on eating behaviors that may occur outside of participants' intention or awareness (Harris, Bargh, & Brownell, 2009). Furthermore, social workers and public health advocates must continue to focus on the prevalence of advertising for calorie-dense low-nutrient foods as a significant contributor to the obesity epidemic. Without labeling, low-income, food insecure women may not have an understanding of how many calories they are consuming, or how energy dense the food is. This in turn may result in a decrease of adherence to healthy lifestyle behaviors



such as maintaining a healthy weight and consuming the adequate servings of fruits and vegetables per day.

**Hypothesis Three.** Using NHANES data, a binary logistic regression analysis was performed. Regression results indicated the overall model fit of the independent variable (utilization of community emergency food programs) was poor. Results of this analysis failed to support the hypothesis that low-income, food insecure women who utilized community food programs will be significantly less likely to adhere to at least two or more of the four healthy lifestyle characteristics compared to low-income, food insecure women who did not utilize community emergency food programs. Binary logistic regression analysis demonstrated the utilization of community food programs was not a significant predictor for low-income, food insecure women to adhere to two or more of the healthy lifestyle characteristics.

Results of this analysis were not significant. Therefore, further exploration of the utilization of community emergency food programs in relation to adherence to healthy lifestyle characteristics of low-income women should be examined. Emergency food from pantries is no longer being used simply to meet temporary acute food needs (Feeding America, 2014). According to Feeding America (2014), a majority of the clients being served by the Feeding America network (54%) have visited a food pantry in six or more months during the prior year. In many instances, charitable organizations that provide emergency food do not have an educational component. Unlike the SNAP program, the food is distributed to the participants, but there is no instruction on the nutritional value or preparation. Although collective efforts are made to change unhealthful social practices, people need to improve their current life circumstances over which they have some control (Bandura, 2004). Individuals need to be given the necessary resources and enabling guidance to help themselves.

The Emergency Food Assistance Program (TEFAP) is a means-tested federal program that provides food commodities at no cost to Americans in need of short-term hunger relief through food providers like emergency food pantries, food banks, soup kitchens and shelters (Feeding America, 2014). Through TEFAP, the USDA purchases food commodities, including processing and packaging, and makes it available to State Distributing Agencies based on a formula which takes into account State poverty and unemployment rates (USDA, 2014b).

These food supplies are then distributed to low-income individuals through emergency food providers. These food providers combine TEFAP commodities and storage and distribution funding with private donations of food and funds, infrastructure, and manpower to leverage the program far beyond its budgeted amount (Feeding America, 2014). Social workers and public health advocates should advocate for the examination and possible increase of TEFAP funding.

By increasing the amount of funding for TEFAP, local community organizations that distribute food may be able to redistribute funds to increase services provided to recipients. Beneficial services may include educational sessions prior to distribution, or hosting healthy cooking seminars may be beneficial to reduce the risk of obesity in food insecure, low-income women. The quality of health of a nation is a social matter, not just a personal one. It requires changing the practices of social systems that impair health rather than just changing the habits of individuals (Bandura, 2004).

Advocacy promotes equality, social justice and social inclusion (Lee & Hipolito-Delgado, 2007). It can empower people to speak up for themselves and become more aware of their own rights, to exercise those rights and be involved in and influence decisions that are being made about their future. For many low-income, food insecure women, community programs that provide food play a critical role in feeding themselves and their families. Since food banks rely heavily on

personal donations and government supplied foods for their inventory, it is important to help food bank administrators develop nutrition-oriented processes.

### **Limitations**

There are a number of limitations to consider when interpreting the results. As discussed previously, the study was conducted using secondary data from the NHANES survey. Using secondary data collected from this publically available health-related database can assist in answering a variety of research questions; however, there are also limitations to consider. First, specific to the NHANES dataset, a number of variables in NHANES contain missing values; that is data for some individuals are unavailable for analysis (CDC, 2015d). Because these missing values may distort the results, specific procedures were conducted to ensure the missing data did not have a significant effect on the representativeness of the study. Based on the results of this study, this limitation was examined and there were no significant effects.

Another limitation to consider for this study was social desirability bias. In relation to an individual's self-report on a survey, social desirability is the tendency to respond to questions in a socially acceptable direction (Lewis-Black, Bryman, & Liao, 2003). This response bias occurs mainly for items or questions that deal with personally or socially sensitive content. In the US, some individuals may believe some of the questions asked in this survey are socially sensitive, and in turn, may respond in a manner that they believe makes them look good or is politically correct. For example, there are many anti-tobacco campaigns aimed at smoking cessation. Through television, online and social media, and in newspaper and magazine advertisements, these campaigns have heightened the social stigma that smoking is wrong. When answering the survey for NHANES, participants may not have answered in a more socially acceptable direction.

Finally, an important limitation to this study was the transformation of variables. There

are two general approaches for analyzing existing data: the ‘research question-driven’ approach and the ‘data-driven’ approach (Cheng & Phillips, 2014). In the research question approach, researchers have an a priori hypothesis or a question in mind and then look for suitable datasets to address the question. In the data-driven approach researchers glance through variables in a particular dataset and decide what kind of questions can be answered by the available data. A research question driven approach was taken for this study. The variables presented in the NHANES dataset were not designed for the model presented for analysis; therefore, the variables had to be transformed in order to fit the model.

### **Recommendations for Future Research**

The first recommendation for future research is specific to this study design. It may be beneficial to conduct this study again using primary data analysis rather than transformed secondary data. An advantage of using primary data is that researchers are collecting information for the specific purposes of their study (Institute for Work and Health, 2015). In essence, the questions the researchers ask are tailored to elicit the data that will help them with their study. Given that secondary data was used, some of the variables were transformed to fit the model. For example, to determine adequate fruit and vegetable consumption as a component of the dependent variable (healthy lifestyle characteristics), dietary intakes from the two day 24 hour recall were averaged to estimate fruit and vegetable intake. These averages were then transformed into a dichotomous variable, 1= consumes the average of two or more servings of fruits and vegetables per day, and 0= consumes zero or one serving(s) of fruits and vegetables per day. Designing a survey question specifically created for the purposes of the study may produce a better fit, and therefore, more interesting results.

In addition, using the NHANES data, the sample population (low-income, food insecure

women) had missing data on the independent variables (SNAP, consumption of fast foods and utilization of community emergency food programs). Designing a survey that more accurately defines the information collected and having more control of the information that is collected may provide statistically significant results. Furthermore, performing interviews rather than self-reported questionnaires would decrease the amount of missing data in the analysis.

A second recommendation for future research would be further evaluation of healthy lifestyle characteristics. Tobacco use, poor diet, and physical inactivity have been identified as the leading contributors to overall mortality in the US, accounting for one third of all deaths (McGinnis & Foege, 1993). A study by Reeves and Rafferty (2005) examined adherence to two or more of the healthy lifestyle characteristics based on prior research that demonstrates most Americans do not adhere to the healthy lifestyle characteristics even though these characteristics play a significant role in overall health for individuals in the US.

As social workers and public health advocates, developing a better understanding of why the general population is not adhering to the four healthy lifestyle characteristics may have a significant impact on understanding why this is also the case for low-income, food insecure women. If we are to contribute significantly to the betterment of human health, we must broaden our perspective on health promotion and disease prevention beyond the individual level (Bandura, 2004). This calls for a more ambitious socially oriented agenda of research and practice.

## **Chapter Six: Conclusion**

Healthy People 2020 envisions a day when preventable death, illness, injury, and disability, as well as health disparities, will be eliminated and each person will enjoy the best health possible (Healthy People, 2014). This study focused on one of the critical components related to health outcomes under the economic stability domain of the Healthy People 2020 placed based organizing framework, having food or being able to access food, also known as food security (USDHHS, 2014). Food security is a very complex and multifaceted issue. Although household food insecurity has long been associated with poor nutrition, a growing body of research is exploring the role of food insecurity in the development of obesity (Odoms-Young, 2012). A consistent link has been found between food-insecurity and overweight and obesity in women (FRAC, 2015).

### **Implications for Social Work and Public Health**

The implications of this research enable social workers and other health professionals to understand how food behaviors may be a key factor in reducing or eliminating food insecurity and obesity of low-income, food insecure women in the US. Furthermore, this research provides a basis to intervene with preventative health recommendations and advocacy in health policy to ensure these women have improved opportunities for good health.

**Supplemental Nutrition Assistance Program.** Overall, SNAP is a valuable and effective program. It currently provides over 47 million participants in about 23 million low-income households with debit cards they can use to purchase food each month (Rosenbaum, 2013). Because eligibility generally is not restricted to specific subgroups of people, SNAP serves a wide range of low-income households, including families with children, elderly people, and people with disabilities. Although the program has been shown to be effective, the House Budget Committee's

budget plan would convert the Supplemental Nutrition Assistance Program (SNAP, formerly known as the Food Stamp Program) into a block grant beginning in 2021 and cut funding steeply — by \$125 billion (34 percent) between 2021 and 2025 (Rosenbaum & Keith-Jennings, 2015). Cuts of this magnitude would end food assistance for millions of low-income families, cut benefits for millions of households, or some combination of the two.

Although this study did not demonstrate statistically significant results, future studies could help support the notion that the component of SNAP, SNAP-Ed, is beneficial for individual health. As social workers and public health professionals, future research on the effectiveness of this program is fundamental, not only for the continuation of the program, but also to ensure the program provides effective resources to ensure participants make healthy choices within a limited budget and choose active lifestyles. One possible suggestion would be to add questions specific to the SNAP-Ed program to the NHANES survey to gather national data on the topic. Because the NHANES survey reaches communities throughout the US, this may be a beneficial way to gather data to guide future practice. Furthermore, as case workers and community practitioners, it is important to determine what questions should be asked to determine the programs are best suited for the client.

**Consumption of Fast Foods.** Social Policy is used to refer to the policies which governments use for welfare and social protection, to the ways in which welfare is developed in a society, and to the academic study of the subject (Spicker, 2014). The social work profession was founded in social change (NASW, 2016b). Through the profession's history, social workers have sought to ensure that all people have equal access to the resources and opportunities that allow them to meet their basic needs. To address this issue, social workers and public health professionals should take a socially oriented approach, seeking to raise public awareness of health

hazards, to educate and influence policy makers, to build community capacity to change health policies and practices, and to mobilize the collective citizen action needed to override vested political and economic interests that benefit from existing unhealthful practices (Bandura, 2004).

Social workers and public health policy makers should focus attention to the nutrition labeling laws on fast food. In 2014, the FDA proposed changes to the Nutrition Facts labels to reflect (1) current nutrition science, (2) more current serving size requirements, and (3) a refreshed design (State of Obesity, 2016). By providing consumers with the nutritional content of the food they are purchasing, allows consumers to make healthier, more informed choices.

**Utilization of Community Emergency Food Programs.** Social workers and public health professionals can assist by providing resources to charity organizations that will help educate donors on inexpensive, nutrition donations. Donating wholesome food for human consumption diverts food waste from landfills and puts food on the table for families in need (USDA, 2016). A growing number of organizations - both charitable and for profit - are working to recover wholesome excess food to provide low or no-cost meals to families in need (USDA, 2016). In addition, community gardens could help reduce food insecurity and obesity for low-income, food insecure women. Community gardens are collaborative projects on shared open spaces where participants share in the maintenance and products of the garden, including healthful and affordable fresh fruits and vegetables (CDC, 2010b). These gardens are collaborative projects on shared open spaces where participants share in the maintenance and products of the garden, including healthful and affordable fresh fruits and vegetables (CDC, 2010b). Community gardens enhance nutrition and physical activity, as well as we promote the role of public health in improving quality of life (Twiss, Dickinson, Duma, Kleinman, Paulsen, & Rilveria, 2011).



## Conclusion

Obesity has become a devastating and costly epidemic in our country. More than two in three adults are considered to be overweight or obese, which places them at risk for Type 2 diabetes, heart disease, high blood pressure and other serious medical conditions (NIH, 2012). Along with the rise in obesity, there has been a significant increase in the number of food insecure women in the US. Research demonstrates consistent evidence for a higher risk of overweight and obesity among low-income, food insecure women (FRAC, 2015). This study illustrates the importance of understanding the food behaviors of low-income, food insecure woman in order to aid in the prevention of diseases caused by obesity. Although the research results from this study were not significant, it was clearly demonstrated that most Americans does not adhere to the four healthy lifestyle characteristics.

As presented in this study, national health recommendations and clinical guidelines indicate the four healthy lifestyle behaviors (not smoking, maintaining a healthy weight, adequate consumption of fruits and vegetables and regular physical activity) have substantial health benefits, which will help prevent obesity and the development of chronic disease. This study examined three specific behaviors of food insecure women to determine if any were predictors of following two or more of the healthy lifestyle characteristics.

As described above, factors influencing food choice are not only based upon individual preferences, but are constrained by circumstances that are social, cultural and economic. Low-income women, who are often primarily responsible for the provision of food to the family, face specific challenges when attempting dietary change and therefore, solutions need to be specifically targeted (European Food Information Council, 2004). Understanding the food behaviors of low-

income, food insecure woman is fundamental to creating a strategy to help prevent diseases caused by obesity.

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