

Fall 2014

Obesity, Food Insecurity and the Impact on Perceptions and Behaviors Toward Dietary Nutrition in Low Income Women in Georgia

Amanda Lowe
Georgia Southern University

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OBESITY, FOOD INSECURITY AND THE IMPACT ON PERCEPTIONS AND BEHAVIORS
TOWARD DIETARY NUTRITION IN LOW INCOME WOMEN IN GEORGIA

by

Amanda Lowe-DuBose

Under the Direction of Moya Alfonso

Abstract

The purpose of this study was to explore the paradoxical relationship between obesity and food insecurity and the subsequent impact of this relationship on perceptions and behaviors towards diet and nutrition among low-income women in Georgia. Specifically, this study sought to investigate whether factors such as poverty, education, socio-economic status, and participation in food assistance programs influence obesity outcomes among low-income women in Georgia. A sequential exploratory mixed-method research design was conducted for this study. Using qualitative and quantitative measures, the study employed key informant interviews with 16 administrators and staff members from the Women, Infant and Children (WIC) program as well as, a survey instrument administered to 119 low-income women between the ages of 18-44 years. Study results suggested lack of nutrition knowledge, lack of transportation, and limited access to grocery stores and supermarkets were reported to be barriers to obtaining and maintaining a healthy lifestyle among low-income women that participate in the Supplemental Nutrition Assistance Program (SNAP) and WIC programs. Study results suggested that neighborhood food environments affect low-income women's food choices. WIC and SNAP clients were inclined to shop at local stores that were affordable, offered fresh fruits, vegetables and lean meats, and were WIC and SNAP approved. In addition, the following variables were both associated with and

influenced obesity: income, food access, food affordability, behaviors, and perceptions.

Interestingly, there was no statistically significant association between obesity and food insecurity. Qualitative findings suggested that increasing nutrition education, expanding nutrition regulations across federally-funded nutrition assistance programs, and identifying the barriers to services that exist within these programs may lead to reduced food insecurity and prevent obesity in low-income women.

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TOWARD DIETARY NUTRITION IN LOW INCOME WOMEN IN GEORGIA

by

Amanda Lowe-DuBose

B.S., Xavier University, 2006

MPH, Mercer University, 2008

A Dissertation Submitted to the Graduate Faculty of Georgia Southern University

in Partial Fulfillment of the Requirements for the Degree

Doctor of Public Health (DrPH)

With an Emphasis in

Community Health Behavior and Education (CHBE)

Statesboro, Georgia

December, 2014

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Amanda Lowe-DuBose

Major Professor: Moya Alfonso
Committee: Raymona Lawrence
Hani Samawi

Electronic Version Approved:

Fall 2014

DEDICATION

I would first like to thank God for granting me the inspiration and will to continue my research even in the mist of roadblocks. He continues to direct my path and provides me with the knowledge, grace and unfailing love that has allowed me to pursue all my aspirations in life. I would like to dedicate this research to my family, particularly my parents Collie and Shelia Lowe, my husband Derrick and our beautiful son Joshua. The endless love, support, encouragement and sacrifice you have given me has allowed me to persevere through every obstacle life has presented. By reminding me of my goals and encouraging me to pursue those goals, your positivity has shown me that I am blessed to have a family who is dedicated and invested in me accomplishing my dreams.

ACKNOWLEDGEMENTS

I would like to thank the participants who gave their time to assist me in conducting my research. I appreciate their sincere willingness to share their stories with me. I would also like to thank Pastor Jason McClendon of Community Church of God, Latasha Harvey and Jamel Harris of the Bibb County Department of Parks and Recreation, Ms. Nancy Jeffrey and Ms. Trisha Battle of the Georgia Women Infant and Children (WIC) program for allowing me to conduct my research with their organizations and providing assistance when requested. Their support, enthusiasm and participation were invaluable and allowed me to further my research interest in obesity and food insecurity. I also want to extend a special thank you to my dissertation committee, Dr. Moya Alfonso, Dr. Raymona Lawrence and Dr. Hani Samawi for sharing their guidance, support and expertise during this research process. Lastly, I would like to thank my family and friends for their continual support and everyday encouragement to succeed.

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Chapter 1

BACKGROUND AND SIGNIFICANCE

Introduction

Obesity is a condition characterized by having an excessive amount of body fat (Obesity Society, 2012). Food insecurity is defined by the United States Department of Agriculture (USDA) as having limited or uncertain availability of adequate, nutritious, safe foods or when the ability to acquire acceptable foods in socially acceptable ways is limited or uncertain (USDA, 2012). According to the most recent public health data, obesity and food insecurity are two of the most prevalent public health problems in the United States. More than one-third (35.7%) of U.S. adults are obese, and 14.5 % of United States households are food insecure, and the highest rates of both conditions occur among minorities and women (Center for Disease Control and Prevention (CDC), 2012; United States Department of Agriculture, 2012). African- Americans have the highest rates of obesity (49.5%), followed by Mexican- Americans (40.4%) and all Hispanics (39.1%) in the United States (CDC, 2012). In the state of Georgia, 29.6% of adults are obese (CDC, 2012). Households with children supported by a single woman had the highest food insecurity rates (36.85) in 2011. In addition to high obesity rates, Hispanic households had the second highest food insecurity rates (26.2%) followed by African- American households (25.1%) with the third highest food insecurity rates (USDA, 2012). In 2009 through 2011, 17.4% of Georgia households were food insecure (USDA, 2012). The health effects of obesity and food insecurity are well documented, with both obesity and food insecurity identified as risk factors for hypertension, diabetes, and adverse lipid concentrations (National Institute of Health, 2010; Seligman, Laraia, & Kushel, 2010).

The coexistence of obesity and food insecurity is a paradox that presents unique challenges to public health professionals who are working to develop solutions to address these issues. The association between the two is further obscured when the risk factor of poverty is explored in relation with the increasing prevalence of obesity and food insecurity among these vulnerable low-income minority populations (Food Research and Action Center, 2012). In recent years, obesity prevalence has increased from 13% in 1962 to 36% through 2010, while food insecurity rates increased in 2008 from 11.0% to 14.6% and remained at that level through 2011. In 2011 the highest recorded percentage of food insecurity was reached since national monitoring of food security began in 1995 (Coleman-Jensen, Nord, Andrews, & Carlson, 2011).

In 2011, state-to-state trends also revealed an increase in Supplemental Nutrition Assistance Program (SNAP) participation, while five states including Hawaii (10.0 percent), Florida (9.6 percent), Georgia (7.2 percent), Colorado (7.0 percent), and Delaware (7.0 percent) registered with the highest over-the-year percentage increases (FRAC, 2012). The national medical cost associated with obesity in 2008 was estimated at \$147 billion; whereas the medical costs for people who are obese were \$1,429 per year higher than those of normal weight (CDC, 2012). By the year 2020, the United States is projected to spend over \$343 billion on health care costs attributable to obesity, while today's spending attributable to obesity is approximately \$150 billion (IOM, 2012). This study sought to explore the paradoxical relationship between obesity and food insecurity and the impact of this relationship on perceptions and behaviors towards diet and nutrition among low-income women in Georgia.

Statement of the Problem

Obesity is a public health epidemic that has tripled over the past three decades (CDC, 2012). However, current research shows that obesity prevalence, in the United States, though

very high, has stabilized (Flegal, Carroll, Ogden, & Curtin, 2010; Ogden, Carroll, Curtin, Lamb, & Flegal, 2010). There are numerous factors such as family history, inactive lifestyle, and the environment that interact together to explain this increase. The drastic rise in the prevalence of obesity in the United States has reinforced the need to identify the many factors that are associated with the risks for obesity such as food insecurity, poverty and low-income minority populations. Obesity among low-income and food insecure people presents a unique challenge because these at risk populations have limited resources and access to healthy affordable foods (FRAC, 2012). Lack of access and limited resources make it difficult for the individuals to adopt healthful behaviors toward dietary nutrition. The choices that people make are determined by the choices that they have available to them (Smedley, 2010). The context or environment to which a person is born affects the life opportunities that are available to them and presents a challenge to advancing health equity (Smedley, 2010). This challenge is further compounded among obese, low-income, and food insecure people who participate in food assistance programs. A greater understanding of whether factors such as poverty, education, socio-economic status and participation in food assistance programs influence obesity outcomes among women in Georgia is needed to better understand the obesity/ food insecurity paradox.

Purpose of the Study

The purpose of this study was to examine the relationships among obesity, food insecurity, and the perceptions and behaviors towards dietary nutrition among low-income women in Georgia. The literature reveals that poverty, environment, race, education, gender, food deserts, food assistance, and perceptions and behaviors towards nutrition all have an association with the obesity, food insecurity relationship (Adam, Grummer-Strawn, & Chavez, 2003; Boardman, Saint Onge, Rogers, & Denney, 2005; Drewnowski, & Specter, 2004;

Frongillo, Olson, Rauschenbach, & Kendall, 1997; Gibson, 2003; ; Herman, Harrison, & Jenks, 2006; Ludwig et al., 2011; Powell, Slater, Mirtcheva, Bao, & Chaloupka, 2007; Truong & Sturm, 2005). A greater understanding of how poverty, environment, race, education, gender, food deserts, and food assistance usage affect one another will help to elucidate specific barriers faced by low-income women who are obese and experience food insecurity. As a result, the information gleaned has the potential to inform further interventions that will assist this population more effectively. The study also examined food environments on the community level and how these food environments affect food purchase, food preparation and food consumption.

Significance of the Study

Obesity is a serious public health problem associated with some of the leading causes of death in the United States including diabetes, heart disease, stroke, and some types of cancer (CDC, 2012). Obesity is also associated with more chronic conditions than both smoking and excessive alcohol consumption (Institute of Medicine, 2012). Research indicates that low income people, particularly minority women, are susceptible to food insecurity and obesity (Adams, Grummer-Strawn, & Chavez, 2003; Hedley, Ogden, Johnson, Carroll, Curtin & Flegal, 2004). Low income women, particularly African- American and Hispanic women, are much more likely than others to suffer from food insecurity and obesity because they have fewer resources to buy food (Adams, Grummer-Strawn, & Chavez, 2003; Townsend, Peerson, Love, Achterberg, & Murphy, 2001). The reoccurrence of the positive association between food insecurity and obesity are due to several factors associated with poverty, which include low socio-economic status, poor neighborhood environment, participation in food assistance programs, racial and gender disparities and negative impacts on perceptions and behaviors toward nutrition. Due to limited

resources, lack of access to healthy affordable foods, and limited access to healthcare, low income food insecure people are at risk of obesity and other chronic diseases (Food Research and Action Center, 2012).

It is important to address how food behavior practices are shaped by neighborhood environments (Larson, Story, & Nelson, 2009; Morland, Wing, Roux, & Poole, 2002). When low-income residents have access to healthy fresh and affordable foods (fruits and vegetables) they make wise, diverse and nutritious choices with the foods that they purchase and consume (Herman, Harrison, & Jenks, 2006; Pitts et al., 2014). The contribution of this research is significant and beneficial to low income women that participate in food assistance programs because it examined the association between obesity, food insecurity and the impact of perceptions and behaviors from a racial, cultural and social standpoint among low income women. The rise in rates of obesity and food insecurity among low income women particularly minority women, is an area of research that warrants further investigation.

The outcomes of this study will help researchers and practitioners to develop and implement nutrition interventions targeting low-income women that focus on increasing knowledge, promoting self-efficacy, and providing resources such as referrals to health services. Perceptions and behaviors toward dietary nutrition may shift and potentially impact food insecurity and obesity among women as a result of these interventions designed to focus on increasing Implementing well targeted nutrition interventions for low income women that focuses on increasing nutrition awareness, promoting participant collaboration, and demonstrating strategies to improve food budgeting. Women who participated in this study received valuable nutrition and health education resources. As a result of sharing their

experiences with the researcher, a greater understanding of the factors that contribute to obesity and food insecurity among low-income women was gained.

Research Questions

1. What is the relationship between food insecurity and obesity among low-income women?
2. What effects do personal perceptions and behaviors have on obesity and food insecurity among low-income women?
3. How does a neighborhood food environment affect low-income women's food choices?

Research Aims

1. To examine the relationship between household food insecurity and obesity status among low-income women living in Georgia, who participate in the WIC and SNAP programs.
2. To investigate the relationship between household food insecurity and factors that comprise neighborhood food environments and impact nutrition perceptions and behaviors.
3. To determine the extent of association that the positive relationship between food insecurity, obesity and poverty has on the perceptions of nutrition and food choices.
4. To identify perceptions and behavioral factors that influence food buying practices, food preparation and food consumption among low-income women living in Georgia who participate in the WIC and SNAP programs.

Chapter 2

Review of Literature

Over the years, the United States has encountered increasing threats to the public health of the nation. Some of the challenges faced by society are due to the complexity of the public health issues and the multifactorial determinants uncovered during investigations of health threats such as obesity, heart disease, cancer, or diabetes. In order to effectively address the many existing health threats, public health professionals must recognize the relationship that exists between an individual and their environment. Today, our society faces many public health threats and two of those threats are obesity and food insecurity. This chapter will review literature that addresses factors such as poverty, environment, race, education, gender, food deserts, food assistance, and nutrition perception and behaviors that are associated with the obesity/food insecurity relationship.

Obesity, is a serious disease characterized by an excessive accumulation of adipose tissue which affects more than one-third (35.7%) of adults in the United States (Obesity Society, 2012). Of those affected by obesity, the highest prevalence is seen in the Southern region of the United States (29.4%) followed by the Midwest region (28.7%), Northeast region (24.9%) and the Western region 24.1% (CDC, 2012). In the state of Georgia, 29.6 percent of adults are obese (CDC, 2012). In addition to geographic locations, there are obesity-related disparities. African - Americans have the highest rates of obesity (44.1%) compared with Mexican- Americans (39.3%), all Hispanics (37.9%) and Caucasians 32.6% (CDC, 2012).

Food security for a household is defined by the United States Department of Agriculture (USDA) as having access and ready availability to adequate, safe and nutritious foods by all members of a household at all times to have an active, healthy life (USDA, 2012). Food

insecurity occurs when there is limited or uncertain availability of adequate, nutritious, safe foods or when the ability to acquire acceptable foods in socially acceptable ways is limited or uncertain. During 2010, 85.5 percent (101.5 million) of United States households were food secure, indicating that most of the households in the United States had the ability to acquire acceptable foods vital for reasonably healthy living. Still, this left 14.5 percent (17.2 million) of households in 2010 which lacked the availability, accessibility, and resources needed to become food secure. These 17.2 million food insecure households include households with low food security and very low food security (USDA, 2012). By definition, low food security occurs when households obtain enough food to avoid substantially disrupting their eating patterns. Low food security means that while these families had difficulty obtaining adequate foods, they were also able to avoid reducing food intake by using a variety of coping strategies such as eating less varied diets, participating in Federal food assistance programs, or getting emergency food from community food pantries (USDA, 2012). Very low food security occurs when normal eating patterns of one or more household members were disrupted and food intake was reduced at times during the year because they had insufficient money or other resources for food (USDA, 2012).

According to the USDA, in the year 2011 the rate of food insecurity among households with children headed by a single woman was 36.8%, which is higher than the national average of 14.9% (USDA, 2012). With such high rates of food insecurity, many low-income people participate in food assistance programs in order to alleviate food insecurity and hunger. In 2011, 1,780,039 people participated in SNAP in the state of Georgia alone (USDA, 2012). Additionally in 2012, the Georgia's WIC program provided benefits to 303,000 participants.

Poverty and low income communities in the United States

The relationship between obesity and food insecurity is a complex one. When more than one-third (35.7%) of United States adults are obese and 14.5 percent (17.2 million) of United States households were food insecure in 2010, it becomes difficult to understand how food insecurity can be positively linked to obesity (CDC, 2010; USDA, 2010). One explanation researchers have explored regarding this association is the role of poverty or low-income status and its impact on access, availability, and behavior towards food. In the United States, 15% of the population lives below the national poverty line (United States Census Bureau, 2011). Risk factors associated with poverty including limited resources, limited access to healthy and affordable food, and limited opportunities for physical activity, can create a greater risk of obesity for low-income and food insecure people (Food Research and Action Center, 2012).

Many WIC and SNAP participants experience poverty, which can affect their health. Studies have suggested that neighborhood-level racial composition where high levels of racial segregation and poverty exist, are associated with the risk of obesity in adults (Boardman, Saint Onge, Rogers, & Denney, 2005; Li, Wen, & Henry, 2014). Living in neighborhoods characterized by high levels of poverty increases the likelihood of a multitude of negative health outcomes including obesity and diabetes (Boardman et al., 2005; Ludwig et al., 2011). These outcomes are especially seen among women and minorities in disadvantaged communities (Boardman et al., 2005; Ludwig et al., 2011). Lifestyle choices such as locations where foods are purchased, and the types of foods that are selected are influenced by low socioeconomic neighborhoods (Hill & Peters, 1998; Morland, Wing, Roux, & Poole, 2002).

Studies that have examined neighborhood characteristics (neighborhood wealth and residential racial segregation) associated with the location of food stores and food services places, found that supermarket locations and food service places such as corner grocery stores were associated with the

wealth and racial composition of neighborhoods (Larson, Story, & Nelson, 2009; Morland, Wing, Roux, & Poole, 2002). The choices that people make concerning where they shop and what they eat have been limited to the options that are available to them. Small corner stores are more prevalent in low-income neighborhoods with large minority populations, while supermarkets and grocery stores are located predominately in Caucasian wealthy neighborhoods (Larson, Story, & Nelson, 2009; Morland, Wing, Roux, & Poole, 2002).

Further investigation into this phenomenon has revealed that dietary selections among low-income residents are a result of the availability of supermarkets and grocery stores, suggesting that a disadvantage may have existed for some people in terms of food availability and access within their local food environment (Morland et al., 2002). Supermarkets, are more prevalent in Caucasian, affluent neighborhoods; whereas smaller corner grocery stores were located in Black and poor neighborhoods (Larson, Story, & Nelson, 2009; Morland et al., 2002). In addition, these studies found that transportation had an impact on residents achieving a healthy diet and revealed that many of the residents within the studies lacked private transportation which served as a disadvantage to shopping at supermarkets and grocery stores that provided a variety of nutritious food selections. The lack of access to healthy and affordable foods in low-income neighborhoods may create a disadvantage to residents being able to achieve a healthy diet and lifestyle.

Neighborhood characteristics of food deserts

The impact of food insecurity and obesity can be seen throughout the United States, particularly in communities characterized as food deserts. These communities tend to be in areas with higher poverty rates and are influenced by both socioeconomic and demographic factors including smaller populations, higher rates of abandoned or vacant homes, and residents with lower levels of education, lower levels of income, and higher levels of unemployment (USDA, 2012).

Several research studies have identified the links that exist between obesity and food insecurity (Lyons, 2008; Wilde, 2006). Among those who have been disproportionately impacted by the association, single-parent households, minorities, and women have experienced greater rates of food insecurity when compared to the national average (USDA, 2009). As researchers continue to explore the causes associated with food insecurity, one area of interest that deserves further investigation is the presence of food deserts and their influence on food insecurity and health status (particularly obesity).

A food desert is defined as a *low-income census tract* where a substantial number or share of residents has *low access* to a supermarket or large grocery store (USDA, 2009). In order to qualify as a “low-income community”, the community within the low-income census tract must have either a poverty rate of 20 percent or higher, or a median family income at or below 80 percent of the area's median family income. To qualify as a “low-access community” at least 500 people and/or at least 33 percent of the census tract's population must reside more than one mile from a supermarket or large grocery store, and for rural census tracts, the distance is more than 10 miles (USDA, 2009).

Food cost and access in food deserts

The growing prevalence of obesity and food insecurity in the United States is a public health concern that warrants continual research that thoroughly explores potential factors that influence these areas. As researchers continue to explore the link between obesity and food insecurity there is a growing interest as to whether the environment in which people live has an influence on this association.

Studies have suggested that access to healthy affordable foods might be determined by neighborhoods characteristics (Morland et al., 2002; Powell, Slater, Mirtcheva, Bao, & Chaloupka, 2007). Residents in low-income neighborhoods often have to shop in corner stores and grocery stores with limited food choices, small selections, poor quality and expensive prices. Any combination of these factors hinders residents' access to a wide variety of fresh and healthy

foods (Auchincloss, Riolo, Brown, Cook, Diez Roux, 2011; Hendrickson, Smith, & Eikenberry, 2006; Jetter, & Cassady, 2006; Larson, Story, & Nelson, 2009). With respect to food access, residents' lack of transportation and further proximity to neighborhood stores creates barriers to obtaining and maintaining a healthy diet. Studies have shown that lack of transportation and spatial disparities of grocery stores and supermarkets have caused residents in low income communities to be limited to where they can shop. These factors cause residents to compromise in other ways which include the purchase of poor-quality, limited quantity, and pricey food selections (Hendrickson et al., 2006; Larson et al., 2009; Zenk et al., 2005). When residents have access to affordable healthy foods, this reduces their risk of chronic disease such as heart disease, cancer and diabetes; and increases their ability to choose foods that help maintain a healthy lifestyle (Hendrickson et al., 2006; Liu, 2003).

Impact of low education and the association to low income and obesity

Research has shown that a strong relationship exists between low-income, low-education and obesity (Mokdad et al., 2001; Truong & Sturm, 2005). Women with lower education (i.e., high school or less) and lower income have higher rates of obesity and obesity-related conditions (e.g. high blood pressure, high cholesterol, and asthma), compared to women with higher education and higher income (Ploeg, Chang, & Lin, 2008; Truong & Sturm, 2005). Studies have suggested that highly educated women are more likely to make health improving behavior changes in response to new knowledge more quickly compared to less educated women, which may explain the obesity disparity between the two groups (Pierce, Fiore, Novotny, Hatziaandreu, & Davis, 1989; Truong & Sturm, 2005). In addition, studies have suggested that minority women with lower education and lower income were more prone to misperceptions about their weight. Minority women with lower education and lower income were less likely to recognize they were overweight, and perceived themselves as having a healthy weight

compared to non-minority women with higher education levels and a higher income (Bennett, & Wolin, 2006; Paeratakul, White, Williamson, Ryan, & Bray, 2002; Ploeg, Chang, & Lin, 2008).

Disproportionate burden of obesity and food insecurity

With the increasing prevalence of obesity and food insecurity posing as national public health threats, statistics have shown that some groups are affected at a higher percentage than others. It is estimated that 35.5 % of women and 32.2% of men are classified as obese in the United States (Flegal, Carroll, Ogden, & Curtin, 2010). In addition, 36.8% of households with children headed by a single woman are food insecure (USDA, 2011). These trends have led researchers to explore the various associations that exist among food insecurity and obesity. One association researchers have begun to explore is the link between gender, food insecurity, and obesity.

Gender and the association to food insecurity and body weight

Research has shown that gender differences have been linked to food insecurity and increased obesity rates among adults in the United States, especially among young minorities (Robinson, Larsen, Kaufman, Suchindran, & Steven, 2009; Wilde, & Peterman, 2006). Studies have also suggested that food insecurity is related to obesity among women (Frongillo, Olson, Rauschenbach, & Kendall, 1997; Townsend, Peerson, Love, Achterberg, & Murphy, 2001). These female to male disparities have been found among families with low parental education, low socio-economic status, African -American race, and Hispanic ethnicity (Olson, 1999; Robinson et al., 2009).

When exploring gender differences, studies have presented explanations for why these differences may exist. Lower income men tend to have physically demanding jobs, and lower income women tend to be single mothers who have less time and resources to buy healthy foods and prepare healthy meals (Drewnowski & Specter, 2004; Pampel, Krueger, & Denney, 2010). Additional studies have suggested that low-income mothers manage with limited resources and sacrifice their own nutrition

in order to protect their children from hunger, which creates a feast or famine situation and a preoccupation with food that can cause obesity (Olson, 2005; Tarasuk, McIntyre, & Li, 2007).

Impact of race and food insecurity on chronic disease

Studies suggest that a relationship exists between housing instability, food insecurity and access to healthcare utilization (Kushel, Gupta, Gee, & Haas, 2006; Kushel, Vittinghoff, & Haas, 2001). In the referenced studies, housing instability and food insecurity were strongly associated with poor access to ambulatory care and high rates of acute care (Kushel et al., 2006; Kushel, Perry, Bangsberg, Clark, & Moss, 2002). One explanation that might address this relationship is the impact that competing life demands have on health and seeking care. When the health of low-income households are in competition with other factors such as housing instability, food insecurity and household food expenditures (bills, goods, services) these factors create barriers and delays to seeking care while compromising health and increasing the rates of acute care (Kushel et al., 2006; Tarasuk, 2001).

Studies show that race and food insecurity are factors that directly impact health (Adams et al., 2003; Hedley et al., 2004; Kushel et al., 2006; Seligman, Larala, & Kushel, 2010; Terrell & Vargas, 2009; Townsend et al., 2001). Race and food insecurity were strongly associated with both chronic disease (kidney disease) and chronic disease control (hypertension and diabetes) particularly in African-Americans and Hispanics/Latinos and minority (African-American and Hispanic/Latino) women (Seligman et al., 2010; Terrell et al., 2009). The association between food insecurity and chronic disease presents a unique challenge to low income minorities because many of them lack the access to basic health care, or, if healthcare is available, it is of lower quality. This results in lack of diagnosis and treatment of emerging chronic diseases and health problems like obesity (Food Research and Action Center, 2012).

Racial disparities among the obese and food insecure

The disproportionate burden of obesity and food insecurity extends beyond gender and is also reflected through racial disparities. According to the CDC, African -Americans have the highest rates of obesity (49.5%) followed by Mexican-Americans (40.4%), all Hispanics (39.1%) and Caucasians (34.3%). Similar trends are also seen among food insecurity statistics. It is estimated that one in four (25.1%) African- American households experienced food insecurity in 2010, a significantly higher rate than the national average (14.5 %). Among these African- American households, 16 percent faced low food security, and 9.1 percent faced very low food security, which indicates the most severe incidence of food insecurity (FRAC, 2012). In addition, the Food Research and Action Center estimated that the rate of food insecurity among African- American households with incomes below 130 percent of the federal poverty level in 2010 was 44.0 percent. Among low-income Black households, 27.5 percent of households faced low food security and 16.5 percent faced very low food security.

To investigate the increasing incidence of obesity and food insecurity in the United States, research in recent years explored race/ethnicity as a possible risk factor. Food insecurity with hunger has been associated with increased risk of obesity for minority low-income women (Adams, Grummer-Strawn, & Chavez, 2003; Hedley, Ogden, Johnson, Carroll, Curtin & Flegal, 2004). Low-income households are much more likely than others to suffer from hunger and food insecurity because they have fewer resources to buy food (Adams, Grummer-Strawn, & Chavez, 2003; Nord, Andrews, & Carlson, 2002). Hunger is defined as the uneasy or painful sensation caused by a recurrent or involuntary lack of food and is a potential, although not necessary, consequence of food insecurity (FRAC, 2012). Thus, the disproportionate burden of obesity and food insecurity among minority women in comparison to Caucasian women is due to several factors including coping mechanisms, attitudes, and personal characteristics (Adams, Grummer-Strawn, & Chavez, 2003; Hedley, Ogden, Johnson Carroll, Curtin, & Flegal, 2004; Townsend, Peerson, Love, Achterberg, & Murphy, 2001). Observed differences

in food insecurity and obesity among minority women (African- American, Asian and Hispanic) and White women may be a result of differences in strategies used to cope with food insecurity among these groups. In addition to coping tactics, other causes that may account for the differences among these groups, include cultural attitudes toward body size and specific characteristics of those experiencing food insecurity in each group (Adam, Grummer-Strawn, & Chavez, 2003).

Studies show that minority women (particularly low-income women) are more likely than Caucasian women to modify behaviors towards food intake when food insecurity is present (Tarasuk, 2001; Zezza, Duffy, & Gerrior, 2008). As a result of poor nutritional behaviors, which include skipping meals, overeating when food is plentiful, and consuming caloric and cheap foods when less food is available, minority women are at a greater risk of developing both obesity and poor nutrition practices (Dinour et al., 2007; Tarasuk, 2001; Zezza et al., 2008).

Food stamp participation and obesity

As food access and affordability continue to present challenges to achieving a healthy diet and wellness, societal changes such as the increase in food assistance programs are being examined to determine their effects on the obesity and food insecurity association. Household participation in SNAP is associated with obesity among low-income women (Gibson, 2003; Leung, Walter, Willett, & Ding, 2012). Studies have suggested that this association is a results of low-income women who participate in SNAP consuming more calories than non-SNAP participants (Drewnowski, & Specter, 2004; Leung, Walter, Willett, & Ding; 2012). Many of the calories that are consumed by low-income SNAP participants come from products that contain added sugars, high fats and sodium. Studies have suggested that because processed foods, sugars and fats are less expensive to purchase than fruits and vegetables, women who lack resources may be inclined to avoid purchasing fruits and vegetables because of their cost, while consuming cheaper foods that have been associated with obesity

(Drewnowski, & Specter, 2004; Hu, Manson, & Willett, 2001; Leung, Walter, Willett, & Ding, 2012; Malik, Shulze, & Hu, 2006).

Food intake patterns in food insecure households

Although food assistance programs were created as a safety net for households that experience food insecurity, these programs are comprised of monthly monetary restrictions and, as a result, many households participating in food assistance programs still experience food insecurity. When food insecurity is present and households experience hunger, this can lead to a shift in perceptions and behaviors toward nutrition and the association to obesity.

In an effort to learn more about obesity, food insecurity, and the impact that they have on perceptions and behaviors toward nutrition, researchers have explored the role of hunger to better understand this association. Women in households characterized by food insecurity with severe or moderate hunger reported to more likely modify their food intake patterns, which included lower consumption of vegetables, fruits and meats as a means to cope with food insecurity and hunger (Olsen, 2005; Tarasuk, 2001). In addition to food intake patterns, house expenditures (such as bills, goods and services) also are reported to compete with food shortage, indicating that when food difficulties are present other areas are affected and compromised. As a result, this causes additional adverse outcomes, which include social isolation, poorer self-related health, longstanding health problems and activity limitations (Jones, 2005; Tarasuk, 2001).

Impact of fruit and vegetable monetary supplements on perceptions and behaviors

Behaviors and nutrition choices among low income women are impacted when participating in food assistance programs (Drewnowski, & Specter, 2004; Herman et al., 2006). Studies have suggested that women who received fruit and vegetable subsidies and shopped at local farmers markets increased their fruit and vegetable consumption as a result of targeted interventions that focused on promoting healthy foods and increasing access to fresh fruits and vegetables (Herman, Harrison, Afifi, & Jenks,

2008; Pitts et al., 2014). The studies suggested that low-income consumers, particularly low-income women, make wise, diverse, and nutritious choices when fresh available produce are present (Herman et al., 2006; Pitts et al., 2014). The study also suggests that there is significant potential for dietary improvement when a target subsidy is present that allows access to free choice of fresh products (Herman et al., 2008; Herman et al., 2006).

Cost has been identified as a major barrier to purchasing and consuming fresh fruits and vegetables among low-income women who participate in the food stamp program (Haynes-Maslow, Parsons, Wheeler, & Leone, 2013; Wiig & Smith, 2008). Studies have suggested that low-income women's food choice and grocery shopping behavior were driven by their family's personal preferences along with their economic and environmental situation (Haynes-Maslow, Parsons, Wheeler, & Leone, 2013; Leone et al., 2012; Wiig & Smith, 2008). The results from these studies also suggested that low-income women's food choices were also influenced by factors such as quality of produce, proximity to establishment to shop for food, lack of transportation to shop for food, shopping at multiple stores to stretch food stamp dollars, and high gasoline prices which were thought to influence food cost, and limiting the amount of food they could purchase. Studies have also suggested that low-income women prioritize their food choices, identifying meat as the most important item to purchase and consume whereas fruit and vegetables were perceived as too expensive with higher spoilage rates and a greater dislike of the taste resulting in their low purchase and consumption (Darmon & Drewnowski, 2008; Haynes-Maslow, Parsons, Wheeler, & Leone, 2013; Wiig & Smith, 2008). Providing nutrition education that incorporates food budgeting skills and meal preparation strategies involving less meat and more fruits and vegetables could be useful in helping low-income families make the best use of their food stamp dollars. In addition to nutrition education, the findings of these studies suggest the need for improvement to the food stamp program that will grant low-income food stamp participants specific

fruit and vegetable allotments and promote the option to use food stamps at local farmers' markets due to the high cost in retail stores (Herman et al., 2008; Herman et al., 2006; Wiig & Smith, 2008).

Summary

This literature review sought to analyze the relationship between obesity and food insecurity among women who reside in low income communities. The findings of this review revealed that poverty, education, gender, race/ethnicity, personal behavior and perceptions were all influential factors associated with obesity and food insecurity among women living in low-income communities throughout the United States.

The findings of this review suggest that the association between obesity and food insecurity is a result of both internal and external factors that affect low- income women, especially minority women. African- American residents who live in low-income neighborhoods throughout the United States are disproportionately affected by obesity and other chronic conditions such as diabetes, hypertension and kidney disease (Seligman et al, 2010; Terrell et al., 2009). In addition to many of the external factors associated with obesity and food insecurity (poverty, poor neighborhoods, and low wages), several internal factors (limited resources, lack of education, food modification patterns) also were explored.

Poverty, low socioeconomic status, poor neighborhood environment and low education levels all have a direct influence on an individual's weight (Boardman, Saint Onge, Rogers, & Denney, 2005; Truong & Sturm, 2005; Mokdad et al., 2001). Research has also found that participation in food assistance programs has a positive and statistically significant relationship to obesity in low-income women (Gibson, 2003). Although food assistance programs were created as a safety net for households that experience food insecurity, these programs are comprised of monthly monetary restrictions. As a result, many households participating in food

assistance programs still experience food insecurity, which has been shown to lead to a shift in perceptions and behaviors toward nutrition resulting in modification of food intake patterns that can also lead to obesity (Tarasuk, 2001).

As researchers continue to explore the link between obesity and food insecurity, particular attention should be placed on the public health outcomes that stem from this relationship (poor nutrition and poor physical health). The findings from this research study helped to show congruence between literature findings and reality surrounding the obesity food insecurity paradox.

Theoretical Framework

The Social Cognitive Theory (SCT) explains how people both acquire and maintain certain behavioral patterns (Bandura, 2004). Within this theory, there are three factors 1) environment, 2) people, 3) and behavior that influence one another, demonstrating that every outcome of this relationship is a result of each factor's influence (Glanz et al, 2002). SCT emphasizes the importance of modeling, or learning by observation, as a learning mechanism (Baranowski et al., 2002). SCT consists of 11 constructs that can be used to explain a person's current health behavior, design health education and health behavior programs, and develop intervention strategies that achieve study aims. SCT constructs include environment, situation, behavior capability, outcome expectations, outcome expectancies, self-control, observational learning, reinforcements, self-efficacy, emotional and coping/management (Baranowski et al., 2002). The constructs of SCT will be addressed as outlined in Table 1.

The environment refers to all the factors that are external to the individual and that with which s/he interacts, such as lighting, temperature, noise and people within the person's surroundings (Baranowski et al., 2002). The situation refers to the mental awareness that the individual person has about the environment (Baranowski et al., 2002). Behavior capacity is the knowledge of the correct behavior and the skill required to perform the behavior (Baranowski et al., 2002). In order to perform the skill a person must have the knowledge of the correct behavior. Expectations are the anticipated outcomes of the behavior. These expectations may be developed through past experience, personal observations, and being told about the possible outcomes (Baranowski et al., 2002). Expectancies speak to how the person values an outcome and incentive. If the person places value on the intended outcome, it is likely that a behavior change will take place; but if the intended outcome is not of value to the person than the change

of behavior will not be performed (Baranowski et al., 2002). Self-control is a person's ability to regulate their own behavior especially when that behavior is focused on setting goals. By having knowledge of the behavior, this allows the person to be able to recognize what needs to be monitored in order to accomplish goals and self-reward (Baranowski et al., 2002). Observational learning is a form of learning that occurs by watching others. By watching the outcomes and actions of others who perform the targeted behavior, the observer can then model the desired behavior in order to achieve the same outcomes (Baranowski et al., 2002). Reinforcement occurs when response to a person's behavior either decreases or increases the likelihood that behavior will reoccur. Reinforcement can direct an individual's behavior based off of outcomes the individual has experienced personally or has witnessed through others. The use of reinforcement can also serve as an incentive to promote behavior change (Glanz et al., 2002). Self-efficacy is the belief a person has in their own competence. Self-efficacy refers to the ability to work through challenges and barriers that may inhibit a person's ability to perform the behavior (Bandura, 2004; Bandura, 2007). By taking small steps toward behavior change these stages help to achieve the larger desired change (Bandura, 2004, 2007). Managing emotional arousal is essential when promoting knowledge which is necessary in order to influence behavior change (Baranowski et al., 2002; Glanz et al., 2002). An individual's ability to respond to emotional stimuli such as fear and anxiety with various techniques and strategies can help a person cope with emotionally arousing situations (Baranowski et al., 2002; Glanz et al., 2002). Reciprocal determinism is the continual interaction of the person, the environment and the behavior. When a change occurs in one of the factors the other two are inevitably impacted (Glanz et al., 2002). Table 1 outlines each construct with a brief description.

Table 1

Social Cognitive Theory Construct Summary

<i>Construct</i>	<i>Description</i>
Environment	Physically external factors with which the person interacts
Situation	How the person perceives their environment
Behavioral capability	Knowledge of the correct behavior and having the skill to perform the behavior
Outcome Expectations	What the individual expects to occur as a result of performing the behavior
Outcome Expectancies	The amount in which the persons values the given outcome: incentives
Self-Control	Person ability to regulate their own behavior, especially when that behavior is focused on setting goals and acquiring self reward
Observational learning	A form of learning that occurs by watching others
Reinforcements	The response of others to an individual's behavior
Self-efficacy	The belief or confidence a person has in their own competence
Emotional coping responses	An individual's ability to respond to emotional stimuli using various techniques and strategies to help cope
Reciprocal Determinism	Continual interaction between the person, the environment and the behavior

(Bandura, 1977; Baranowski et al., 2002)

SCT has been extensively used in nutritional intervention studies to address the effects of personal, behavioral and environmental factors on health and diet, and the SCT, served as the framework for this study (Baranowski, Perry, & Parcel, 1997, 2002). Table 2 gives an outline of how the constructs were addressed in this study.

Social Cognitive Theory Constructs and Measurement Methods

Variable	Use of Construct		Measurement
Environment	Availability of food at home (food security).		Survey (WIC and Food Stamp participants)
	Availability of adequate and nutritious food in neighborhood supermarkets, grocery stores, corner stores and convenience stores		Field Observations
	Shopping access to healthy foods		Key Informant Interviews
Situation	Women’s perception of their home and neighborhood food environments		Survey (WIC and Food Stamp participants)
Behavioral capability	Women’s Knowledge		Survey (WIC and Food Stamp participants)
Expectations	Outcome from consuming a healthier diet(positive or negative)		Survey (WIC and Food Stamp participants)
Expectancies	Why the outcome from consuming a healthier diet is valued (positive or negative)		Survey (WIC and Food Stamp participants) Key Informant Interview
Self-Control	A woman’s rationale (perceptions) for eating or not eating a healthy diet		Survey (WIC and Food Stamp participants)
Observational learning	Peer modeling from previous studies	The likelihood of performing the same behavior.	Survey (WIC and Food Stamp participants)
	A woman’s consumption		
Reinforcements	A woman’s ability to identify the benefits that occur after changing a behavior		Survey (WIC and Food Stamp participants)
Self-efficacy	A woman’s belief of being able to purchase, prepare, and consume healthier foods		Survey (WIC and Food Stamp participants)
Reciprocal determinism	How neighborhood food environments impact behaviors towards food selection, which impacts a woman health		Field Observations, Survey (WIC and Food Stamp participants)

Note: adapted from (Baranowski et al., 2002)

Chapter 3

RESEARCH DESIGN AND METHOD

A sequential exploratory mixed-method research design was employed. This particular research approach was utilized due to the incorporation of both qualitative and quantitative data collection (Creswell, 2008). Qualitative research is a means for exploring and understanding the meaning individuals or groups ascribe to a social or human problem. The process of research involves emerging questions and procedures, data typically collected in the participant's setting, data analysis inductively building from particulars to general themes, and the researcher making interpretations of the meaning of the data. Quantitative research is a means for testing objective theories by examining the relationship among variables. These variables, in turn, can be measured, typically on instruments, so that the numbered data can be analyzed using statistical procedures (Creswell, 2008).

By utilizing a sequential exploratory mixed-method design, qualitative aspects of the study were first conducted and given priority followed by quantitative aspects. The sequence of the design was significant because it served to elaborate and build on the findings of the first qualitative phase (Creswell, 2008). The design consisted of two phases. The first phase was the qualitative phase where qualitative data were collected and analyzed. The second phase was the quantitative phase where quantitative data were collected and analyzed. The purpose of this approach was to use quantitative data and results to assist in the explanation of qualitative findings (Creswell, 2008). In this study, qualitative data were transformed into quantitative so that data responses and perspectives could be more easily compared and triangulated, adding to the validity of the study (Creswell, 2008). The utilization of a mixed-method research approach

helped to gain a deeper understanding of the complex relationship between obesity and food insecurity while assisting to address the research questions at the community level.

Participants

An online A-priori Sample Size Calculator for Multiple Regression from Statistics Calculators Version 3.0 Beta was utilized to calculate the power of test and the sample size. The level of significance (0.05), the number of predictors (9): food assistance participation, food affordability, poverty, education, gender, race, food access, employment and perceptions and behaviors), the anticipated effect size (0.18), and the statistical power level (0.9) were all used to calculate the minimum sample size of 119 participants

(<http://www.danielsoper.com/statcalc3/calc.aspx?id=1>). Women were recruited for the survey and recruitment stopped when the required sample size was reached. The sample consisted of low-income women between the ages of 18-44 years in middle Georgia who were not pregnant, were adults of child bearing age, received food assistance in the form of food vouchers from WIC, utilized the electronic benefits transfer (EBT) card from SNAP, and could provide feedback regarding the impact of obesity and food insecurity on personal perceptions and behaviors toward dietary nutrition among women.

Recruitment

Full support for aspects of this study was obtained from the Georgia WIC Program, Community Church of God, and the Macon, Bibb County Department of Parks and Recreation. A convenience sampling (voluntary sampling) method was used to recruit eligible women who were interested in participating in the study. The investigator was present and onsite at the Community Church of God, the Central City Park, and the Frank Johnson Recreation Center in Macon, Georgia to collect research data and answer questions three days a week. While on site,

women who participate in food assistance programs in the form of food vouchers from WIC and utilize the EBT card from SNAP were recruited for this study.

The study was explained to participants through the use of a written scripted speech (Appendix B). The speech (informed consent form) included details of how the study would benefit and inform the women who participate in food assistance programs and the administration that work to provide services to the participants. Included were details of how confidentiality was maintained, how data were secured and why their help was valued. Participants were encouraged and allowed to ask questions prior to consenting to participate. Consent was obtained from the women in concordance with Georgia Southern University's Institutional Review Board from which the investigator received approval to conduct this study. Each of the key informants who participated in an interview received a small gift bag valued at \$5 that consisted of a healthy snack, a piece of fruit and a bottle of water. In addition, the 119 low income women, between the ages of 18-44 who participated in the WIC program and or SNAP received a packet of WIC-approved educational materials on health and nutrition, along with a small gift bag valued at \$5 that consisted of a healthy snack, a piece of fruit, and a bottle of water.

Phase 1: Qualitative Phase

Procedures

The qualitative methods that were utilized in this study began with interviews with WIC key informants, including administrators, staff, and affiliates of the WIC program. Using Social Cognitive Theory (SCT) as the theoretical framework allowed for the development of interview questions that explained how low-income women both acquire and maintain certain behavior patterns. The study utilized constructs of the SCT to gain key informants insight and perspective

about obesity, food insecurity and the availability and access of nutritional foods in the community and the impact on low-income women. In addition, the interview guide was developed based on current literature findings that addressed the factors associated with the obesity/food insecurity relationship. Prior to data collection, two experts in the field of food and nutrition reviewed the qualitative interview guide for appropriateness (face validity). The interview guide was further reviewed for accuracy and to ensure that questions addressed the role of policies in federally funded nutrition assistance programs, health status of WIC and SNAP participants, and food access and accessibility of WIC and SNAP clients (content validity). In this study, the interview guide was pretested with three WIC key informants to determine readability and comprehension. The revised guide was piloted with two key informants to identify if participants were responding to the questions correctly. An Informed Consent form was used for the pretest and pilot test interviews included in this study.

In addition to interviews that were pretested and pilot tested, interviews were conducted with key informants comprised of WIC administrators, WIC staff and affiliates of the WIC program. The interviews aided in the development of clear and concise questions for a survey that was utilized and expanded upon in the later quantitative phase of the research design. The key informants initially consisted of two healthcare providers at the Bibb County Health Department and two nutritionists at the Department of Family and Children Services who could speak to the issues of obesity, food insecurity, and policies surrounding the two. From the initial key informant interviews, the investigator asked key informants for recommendations of other potential key informants by utilizing snowball sampling. Snowball sampling was employed to gather names and contact information of other potential key informants that could share their experiencing with the WIC and SNAP programs. The key informant group was representative of

the members in the community that have direct interaction with the issues of obesity and food insecurity. These members were also essential to identify resources, databases and building community partnerships.

Instrumentation

Phase 1 comprised the use of one qualitative interview guide. Interviews served to expand dialogue on the issues of obesity and food insecurity while generating ideas and solutions to address the problem. A cognitive pretest of the interview guide was conducted by the investigator with three participants who were similar to the target group in background. The pretest was utilized to ensure that the participants had a clear understanding of the meaning of each interview question, while also determining if there was a better way of asking a question. In order to test the dependability and credibility of the instrument, the interview guide for this study was pilot-tested by the investigator with two WIC administrators. The pilot test aided in determining if the interview guide worked well, how the overall process worked, and gauged interest and participation in the research. The participants worked with the investigator to review the qualitative guide to ensure consistency, clarity of questions, and non-leading techniques to prompt response. In addition to pilot testing, other methods suggested by Creswell (2008) were used to enhance qualitative documentation included note-taking and audio recording to strengthen the trustworthiness and dependability of the data. The interviews served to gain insight and perspectives from the experts in the community on the issues of obesity and food insecurity within the communities they serve.

Analysis

Interviews were conducted and analyzed to find out what people thought about obesity and food insecurity in their community. The insight gathered from the interviews helped to

identify themes within the community and support the development of sound survey questions that elicited feedback that was quantitative. The interviews were documented through both comprehensive note-taking and digital audio recording and transcribed verbatim to gain an understanding of the perceptions and behaviors of low-income WIC and Food Stamp participants. All audio recording of the interviews were transcribed verbatim by the researcher into a Microsoft Word document. Data were reviewed to gain an understanding of the factors associated with obesity and food insecurity, the trustworthiness and credibility of the data, and to gain insight on the perspectives and experiences of the experts who provide services to women that participate in food assistance programs, particularly WIC and SNAP (Creswell, 2008; Lincoln & Guba). By utilizing qualitative research, a focus was placed on participant's perceptions and personal experiences with obesity, food insecurity, and working in the WIC and SNAP programs, providing an authentic account of the participants' realities (Lincoln & Guba, 2000).

Themes are patterns formed by words spoken by participants that express a unifying idea (Creswell, 2008). Perceived messages from participants may repeat themselves revealing common themes within the discussion. For example, the participants may indicate that they know the difference between healthy and unhealthy foods. However, the participants may believe that the lack of financial resources may be identified as the leading factor to why women who receive food assistance are obese. Through interviews, open-ended data was collected based on asking general questions. A code was assigned to each item of data that answered each interview question. Coding for each interview consisted of two phases in order to identify similarities, differences, and patterns across interviews. The coding of the qualitative data helped to identify themes within the data. Common themes were identified and extracted from the interviews to

assess the level of importance to participants. Participants' perceptions, feelings, and experiences were examined to gain an accurate understanding of the themes within the data. Coherence and consistency of the themes helped to identify the overarching themes.

Data from interviews were identified as themes if messages could be categorized by areas of interest including thoughts, behaviors, knowledge, and outlooks on obesity and food insecurity. These messages could include, but are not limited to, statements, questions, or descriptions the participants directed at the interviewer. The data (messages) were coded from transcripts in Microsoft Word software using a preliminary qualitative codebook (Appendix C) based on predetermined codes that allowed data to be examined based on constructs of the Social Cognitive Theory (SCT). Data (themes) were compared across different interviews and messages were highlighted with color codes based on the different voices (research interviewer, participant) heard in the interview. The researcher and the research coders, (who included a Master's level student with a concentration in health and safety science and a doctoral student at Georgia Southern University's Jiann-Ping Hsu College of Public Health), reviewed and coded data separately and discussed the findings to identify similarities between the results which increased dependability and ensured the accuracy (consistency) of the information (Creswell, 2008).

The process of qualitative data analysis consisted of a six-step multilevel process. These levels are listed in the following steps: 1) organize and prepare the data for analysis, 2) read through all the data, 3) begin a detailed analysis with a coding process, 4) use the coding process to generate a description of the setting or people as well as categories or themes for the analysis, 5) advance how the description and themes will be represented in the qualitative narrative, 6) and make an interpretation or meaning of the data (Creswell, 2009). Prior to conducting key

informant interviews, the principle investigator developed a preliminary codebook with twelve deductive codes which were derived from the principle investigator's professional experience and from research literature (Appendix C). Qualitative data were collected by administering on site interviews for a period of four weeks. A total of 16 key informant interviews were transcribed verbatim from a digital audio recorder. Data from the interviews were organized and sorted by each interview question.

Coding for this study consisted of two phases. The initial phase was conducted by the primary investigator and research coders independently. During this phase, a detailed analysis of each interview was conducted. The primary investigator read each transcript systematically, writing memos to capture emerging ideas and to reflect on the responses from each interview. Data were segmented into categories and labeled based on the actual language of the participants (in vivo term). In the second phase, the primary investigator and the research coders all meet to conduct and compare initial findings from previous independent coding. During the second phase, the primary investigator and the research coders re-read the transcripts and worked collaboratively to redefine the preliminary codes. Creswell's multiple-level analysis was used to contextualize the qualitative results in order to interpret the larger meaning of the data exploring experiences and perceptions of the participants surrounding obesity, food insecurity, policy, and the availability and access of nutritious foods among low-income WIC clients.

The second phase of coding helped to identify several themes and how those themes would be represented. The qualitative themes from this study were determined based on the participants' responses to the interview questions. An interpretation of the themes was conducted to identify what was learned and how the information gathered from the interviews compared to

information obtained from the literature (Creswell, 2009). The themes that were identified in the qualitative phase were further explored through survey questions in the quantitative data.

Phase 2: Quantitative Phase

Procedures

The quantitative phase of the research study consisted of a three question assessment that was used to calculate the Body Mass Index (BMI) of each potential respondent (National Heart Lung and Blood Institute, 2012). The assessment questions addressed the respondent's current weight, height and age in order to identify whether the respondent's BMI classified them as underweight (BMI < 18.5), normal weight (BMI of 18.5 – 24.9), overweight (BMI of 25-29.9) or obese (BMI of 30 or greater). The survey instrument utilized in this study was developed based on the constructs of the SCT. The survey gathered information about food access, food availability and the impact of nutrition on health, personal behaviors and perceptions among low-income women.

In addition to the BMI assessment and the use of SCT constructs, the survey instrument was also developed from qualitative feedback of the interviews and modeled after similar surveys from the San Francisco Southeast Food Access Working Group and the United States Department of Agriculture Community Food Security Assessment Toolkit. The Southeast Food Access Working Group is a collaborative of residents, community based organizations, city agencies, and others working on food access and food systems. Interviews were then used to facilitate questionnaire design, formulate survey questions and modify the wording of questions developed for the survey to make certain that the questions were clear and appropriate (Krueger

& Casey, 2009). By utilizing interviews prior to surveys, they were used to anticipate survey non response or refusal problem (Krueger & Casey, 2009).

Data provided by the key informant interviews helped to develop the questions for the survey instrument in the quantitative phase of the research study. Prior to data collection, two experts in the field of food and nutrition reviewed the quantitative survey instrument for appropriateness (face validity). The survey instrument was further reviewed for survey accuracy and to ensure that the survey included questions on obesity, food insecurity, behaviors, perceptions, food access, and food affordability (content validity). Prior to administering surveys, the survey instrument was pretested with seven survey respondents who were not included in the study. A cognitive pretest of the draft survey instrument was conducted by the investigator with seven survey respondents who were similar to the target group in background. The pretest was utilized to ensure that the survey respondents had a clear understating of the meaning of each survey question, while also determining if there was a better way of asking a question and were the choices provided for answering the question appropriate. In addition to a pretest, a pilot test was performed with thirty women similar in background to the target population in this study. A pilot test was used to demonstrate the validity of the survey instrument. In addition to demonstrating validity, part of the purpose of conducting a survey pilot test was so that the process resulted in an amended survey instrument that had an improved design and made it easier to follow and ask questions that were relevant to the issues that were being researched. Although the survey instrument was modeled after similar surveys from the San Francisco Southeast Food Access Working Group and the United States Department of Agriculture Community Food Security Assessment Toolkit, reliability of the survey instrument in this study was not assessed.

Instrumentation

Phase 2 utilized one quantitative instrument, a survey. The quantitative survey helped to complement and compare themes generated during the qualitative key informant interviews. The quantitative survey questions were first pretested with seven respondents similar to the target population in background. Once the questions were pretested to ensure respondents' understanding of each question, the survey was piloted with 30 women who participate in the WIC program and SNAP, (formally known as food stamps) to make sure the survey approach worked and ensured that questions were clear, appropriate, and adequately spoke to the issues that were being researched. In addition to pilot testing the survey for appropriateness, and clarity, the pilot test also served to estimate the amount of time for survey completion. Surveys were administered at the time of recruitment at the Community Church of God, the Central City Park, and the Frank Johnson Recreation Center in Macon, Georgia. The survey gathered quantifiable data that identified trends and examined the relationship between research variables. The survey asked for information in the following areas: general background, family medical history, personal history and knowledge of obesity, food access in the participants' communities, types of foods participants ate, personal eating patterns, and knowledge about obesity.

Descriptive analysis

Descriptive statistics such as the frequency, mean, and percentage of the demographic variables (race, gender, poverty, education, employment, perceptions, behaviors, food access, food affordability and food assistance participation) from the WIC and Food Stamp participant survey was obtained.

Cross Tabulation Analysis

A cross-tabulation analysis was performed to measure the association between the dependent variable (obesity) and the covariate variables (race, gender, poverty, education, employment, perceptions, behaviors, food access, food affordability and food assistance participation). The analysis also measured the association between food insecurity and personal perceptions, with food insecurity and personal behaviors.

Fisher's Exact Test

Due to using small and nonprobability sample a fisher's exact test was used as a test of statistical significance to determine whether variables were statistically independent of each other.

Bootstrapping

A bootstrap procedure was utilized to draw statistical inference from the research sample. By utilizing nonprobability sampling, no variation was produced from the sample. A bootstrapping procedure was utilized to generate variation in the survey data.

ETHICAL CONSIDERATIONS

Low-income women who participate in the WIC and/or SNAP programs were asked about their experiences with federal food assistance programs and the challenges they face living in food insecure households. All women who participated in this study were afforded privacy and confidentiality of all identifying and personal information such as their name, age, and the food assistance program they utilized. To ensure that participants provided honest responses and were comfortable sharing their experiences, various considerations (including identifying participants by number not by name and storing records electronically where information is password protected) were utilized. Women who participated in this study received valuable nutrition and

health education resources. As a result of sharing their experiences with the researcher, recommendations were made to improve access and affordability of healthy nutritious foods for low-income women who participate in food assistance programs.

Chapter 4

RESULTS

This chapter summarizes the results of the study and reports the statistical outputs of the analysis. The qualitative and quantitative findings were merged in this chapter, which reports on participant characteristics, perceptions of obesity and food insecurity, perceptions of food availability and food access, perceptions of community barriers, and perceptions of dietary nutrition. The qualitative findings consisted of themes and quotes extracted from interviews, whereas the quantitative findings consisted of descriptive statistics, variables that were not associated with obesity, statistically significant variables associated with obesity, and the odds ratio of obesity.

Participant Characteristics

The sample consisted of 16 interview participants and N=119 survey respondents. The average age of the survey respondents was 31.8 years (SD= 6.653). The Body Mass Index (BMI) for each respondent was calculated using self-reported data and included the respondent's current age, weight, and height in order to measure body fatness and to identify weight categories. Three BMI categories were identified from the assessment. Of the 119 respondents that provided information on all three categories (age, weight, height), 26.05% were identified as having a normal weight (BMI of 18.5-24.9), while 26.8% were identified as overweight (BMI of 25-29.9) and 47.05% were identified as obese (BMI 30 or greater). Results revealed that 73% of the respondents were overweight or obese at the time of this study. The mean and standard deviation of the selected health characteristics (age, height, weight and BMI) are displayed in Table 3. The three BMI categories representing the respondents in this study are depicted in Figure 1. The majority of the respondents self-identified as African- American (96.6%) and more than 33% of

the respondents had an income level below \$10,000. Fifty-two percent of the respondents were employed full-time during the study period and 37% identified some college as their highest level of education. Frequency counts and percentages for demographic variables are seen in Table 4.

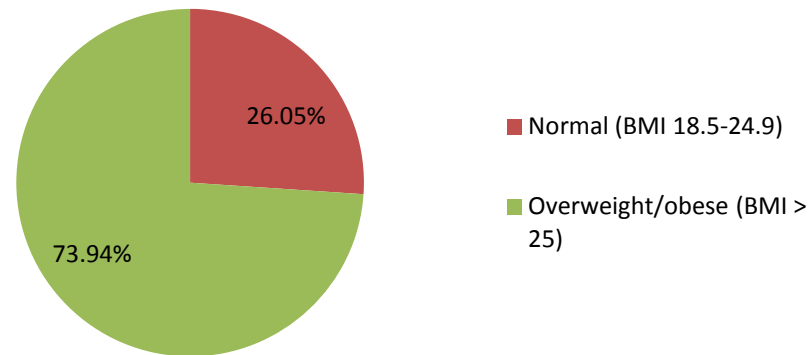
Table 3

Health Characteristics of Survey Respondents: Descriptive Statistics (N=119)

Characteristic	N	Mean	SD
Age	119	31.8	6.653
Height	119	64.61	3.186
Weight	119	177.94	42.084

BMI	N	(%)
Normal (BMI 18.5-24.9)	31	26.05
Overweight/obese (BMI > 25)	88	73.94

Note. BMI, Body Mass Index.



N=119

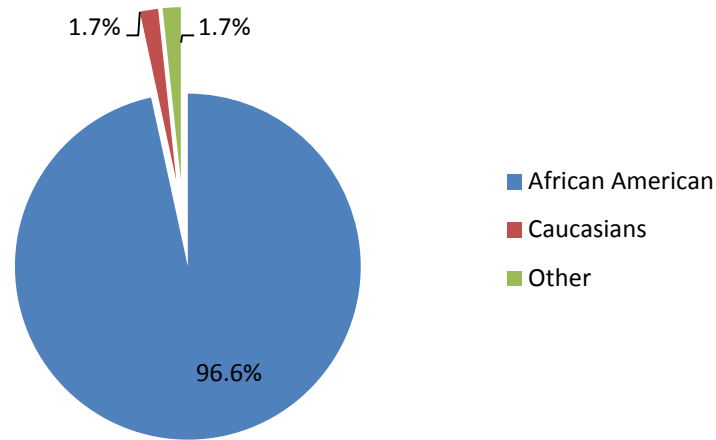
Figure 1. Body Mass Index of Survey Respondents.

Table 4*Descriptive Statistics of Demographic Variables of Survey Respondents*

Variables	Frequency (n)	Percentage (%)	Missing
Obese			9
Not Obese	58	48.7	
Obese	52	43.7	
Race			0
African American	115	96.6	
Caucasians	2	1.7	
Other	2	1.7	
Income			2
Under 10,000	40	33.6	
10,000 - 20,000	26	21.8	
20,000 - 30,000	16	13.4	
30,000 - 40,000	26	21.8	
40,001 or more	9	7.6	
Employment Status			0
Employed full-time	62	52.1	
Employed part-time	26	21.8	
Self-employed	4	3.4	
Unemployed	21	17.6	
Disabled	2	1.7	
Other	4	3.4	
Education			0
8th grade or less	2	1.7	

Some high school	6	5.0
High school graduate or GED	26	21.8
Trade school	6	5.0
Some college	45	37.8
College graduate or higher	34	28.6

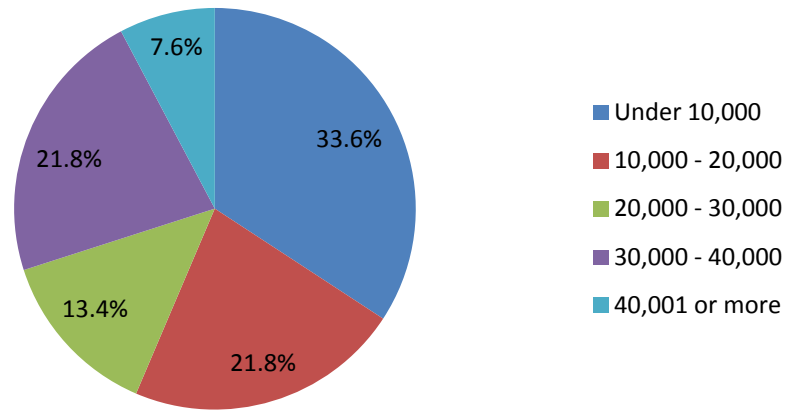
The majority of the survey respondents (96.6%) were African- American. There were two Caucasian respondents and two respondents that identified their race as other, as shown in Figure 2.



N=119

Figure 2. Race of Survey Respondents.

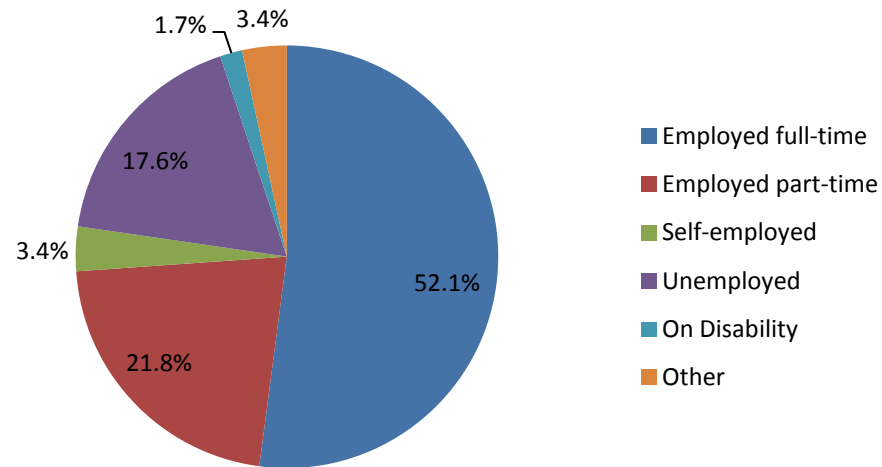
Figure 3 displays income level of the respondents. There were 33.6% in the under 10,000 income level, 21.8% in the income level 10,000 – 20,000, 21.8% in the income level 30,000 – 40,000 and 7.6% in the 40,001 or more income level.



N=119

Figure 3. Income Level of Survey Respondents.

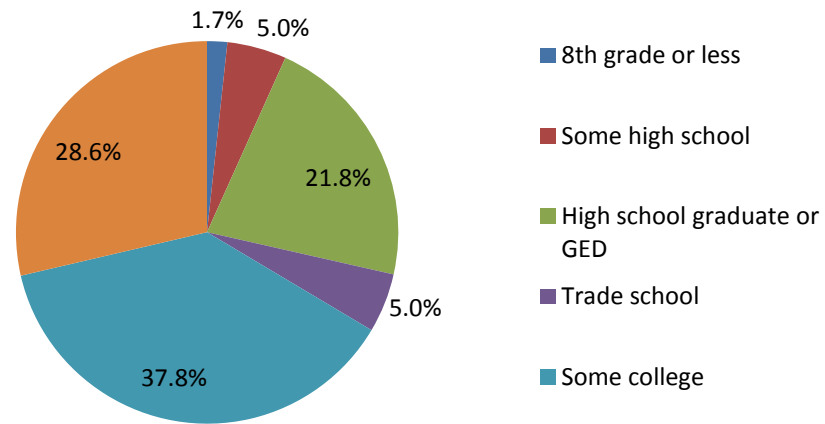
The majority of respondents were employed full-time (52.1%), followed by employed part-time (21.8%), unemployed (17.6%), self-employed (3.4%), other (3.4%) and were on disability (1.7%) as shown in Figure 4.



N=119

Figure 4. Employment Status of Survey Respondents.

Figure 5 displays the percentages for the highest level of education among the survey respondents. Thirty-seven percent of respondents identified some college as their highest level of education, followed by 28.6% that identified college graduate or higher, 21.8% that identified high school graduate or GED, 5.0% some high school, and 1.7% eighth grade or less.



N=119

Figure 5. Education Level of Survey Respondents.

Qualitative Analysis

Qualitative interviews were conducted until theoretical saturation was reached. A total of 16 interviews were conducted with WIC administrators and WIC staff members. Interviews were transcribed verbatim from digital audio recordings and comprehensive notes taken during the interviews were transcribed onto Microsoft Word documents. Common themes were identified and extracted from the interviews using a six step multilevel process which included the following steps: 1) Organize and prepare the data for analysis. Each key informant interview was transcribed verbatim onto a Microsoft Word document; 2) Read through all the data. Transcribed interviews were read in their entirety to gain a sense of what participants were saying; 3) Begin a detailed analysis with a coding process. The response to each interview question was read line by line and a code was assigned to each item of data that answered each interview question; 4) Use the coding process to generate a description of the setting or people as well as categories or themes for the analysis. The codes that were assigned were used to express unifying ideas that generated themes; 5) Advance how the description and themes will be represented in the qualitative narrative. Themes were compared across each interview and overarching themes were presented as a narrative in the qualitative results; 6) Make an interpretation or meaning of the data (Creswell, 2009). A comparison was made of the interview findings with information derived from literature. The qualitative data analysis provided rich narratives based on the lived experiences of the interview participants. The narratives identified and explored the most important variables that impact the relationship between obesity and food insecurity. In addition, the narratives obtained from the interviews aided in the development of survey questions used for quantitative data collection.

Qualitative Results

The qualitative findings from this study answered the following research question:

- How does a neighborhood food environment affect low-income women's food choices?

Women's weight status was identified as a major concern related to the health status of women who participate in the WIC and food stamp program. Many of the participants explained that weight status was a concern among the clients they serve because there is a lack of knowledge among WIC clients regarding proper nutrition and healthy lifestyles. According to participants, many of their clients lacked an understanding of how to prevent overweight/obesity and did not practice a healthy lifestyle or eat proper nutrition, with one participant specifically stating, "I guess the biggest concern is the inappropriate, [or] what we consider inappropriate nutrition practices and the types of foods they consume on a daily basis."

Although many of the participants identified lack of knowledge as the reason why many WIC clients are obese and overweight, others identified lack of self-efficacy and motivation as underlying causes. Participants suggested that many of their WIC clients lack self-confidence in their ability to change their poor nutrition practices and adopt a healthier lifestyle. Clients are hesitant to make small changes to their diets and often minimize the power they have in affecting their health outcomes, as one participant described:

"What concerns me most is that a lot of women are not responsive to make small changes to their daily nutrition, [they do not respond to recommendations to change their lifestyle and are very hesitant to make small changes]."

The participants explained that many of their clients do not take part in activities that address nutrition and weight. An example of these activities includes setting health goals while participating in nutrition education interventions. In nutrition education interventions clients set simple attainable goals such as exercising ten minutes a day. While participating in the interventions clients also receive messages from a health educator on how to accomplish their goals. Clients later meet again with a health educator to assess behavior changes and to determine intervention effectiveness

With women's weight status being a major concern among WIC and food stamp clients, participants addressed clients' access to purchase healthy foods. Wal-Mart and Kroger grocery stores were identified as the two major grocery stores where WIC and SNAP clients shop. These stores were selected by WIC clients based on their proximity to the WIC clients as well as whether or not the store was a WIC-approved facility and accepted WIC vouchers. Participants highlighted locality as a reason for why WIC clients shopped at these particular grocery stores with one participant stating "well you have the local grocery stores your Kroger, Wal-Mart." Other places that were identified in the interviews as places WIC and SNAP clients shopped included the "Publix" supermarket, the local farmers market and smaller chain super markets, such as "J & L" and "Harvey's". The chains Kroger and Wal-Mart were identified as common places for shopping among WIC participants because these stores are WIC approved facilities, accepting WIC vouchers. In addition to accepting WIC vouchers participants explained that clients chose to shop at Kroger and Wal-Mart because they offer a variety of healthy food options, particularly fruits, vegetables, and lean meats at affordable prices for clients. Participants stressed the importance of clients shopping at WIC-approved facilities. As one participant explained:

“Any store that accepts WIC vouchers - that’s going to gear or determine where they actually shop, because they want to shop at some place that accepts not only their WIC, but the EBT SNAP card as well.”

Participants also addressed how policies and legislation affect both access to and affordability of healthy foods. Several of the participants suggested they were not aware of the challenges or barriers to implementing policies or legislation to improve healthy food access and affordability that policy makers face, stating “I don’t see any barriers.” The lack of awareness suggested a gap in communication from a policy level to a local level, which can potentially present challenges at the local level where programs are implemented and services are delivered. An example of this is seen when clients enter the WIC clinics and request additional formula for their infants because their infant has consumed the entire supply of formula that is allocated during a particular time frame. Due to regulations put forth by policy makers, clients are often denied extra formula. This example illustrates how large-scale regulations developed by policy makers impact families and services at the local level. Another theme that emerged from the data is funding and budget. Participants suggested funding and budgets were the major challenges or barriers experienced by policy makers, with one participant stating specifically, “I guess you’re always faced with the income guidelines.” Funding is needed in order to provide programs such as WIC and SNAP. Participants expressed the need for financial support for these programs in order for them to deliver services that promote healthy food access and affordability.

Participants further identified poor communication between policy makers and the general public as a community barrier. Participants expressed a need for policy makers to engage more with the communities that are serviced through WIC in order to understand how guidelines from a policy level impact specific communities’ needs. Participants explained that increasing

communication between policy makers and WIC clients will help clients to understand why certain regulations exist from a policy level. This increase in communication would directly inform policy makers how regulations impact clients and provide policy makers with information that could help guide recommendations for the future.

In addition to challenges and barriers experienced by policy makers, participants also discussed ways policy makers could address the prevalence of obesity. Many participants identified the need for collaboration in order to address the obesity prevalence. Empowering the community through dialogue and partnership was a major recommendation. Participants identified the need for dialogue and partnership among policy makers and community partners in order to identify and address the problems that exist within the community. Participants explained that increasing dialogue would help to identify issues within the community, as well as to identify the extent of these issues. Roundtable discussions on how to combine resources to address the problem of obesity are needed. However, another participant voiced the importance of hearing directly from the clients that are served through WIC and SNAP, stating that “maybe utilizing focus groups” would contribute to helping find solutions. The participant proposed utilizing community forums to build dialogue between policy makers, administrators, and the community. The participant recommended that administrators and policy makers engage and educate the community on the problem of obesity, as well as work directly with the community to develop the tools and skills needed to address the issue.

In addition to collaboration, providing health education resources was another theme that emerged from the data. Participants explained that in order to change the health outcomes of the communities they serve, clients have to be educated on the risks associated with certain behaviors and lifestyles. Several of the participants provided comments, with one stating, “I

believe education-education is going to be really the only tool.” Many of the participants identified that the lack of nutrition education among various groups was a concern. Participants suggested several ways to expand nutrition education to address the different needs of the clients that are served through the WIC and SNAP programs. Participants suggested that developing and incorporating nutrition education specifically for the elderly, and/or other specific at-risk populations would help to improve dietary behaviors stating, “I know it’s real important not only for the young people to have good nutrition but the elderly too.” Implementing a course on food budgeting and meal preparation was also suggested as a way to expand nutrition education. By teaching clients how to shop for healthy foods that are also affordable and how to prepare healthy meals from those foods would illustrate to clients that they could eat healthy even with a limited budget. These suggestions highlight concerns expressed among the participants regarding the need for more targeted nutrition education programs that include education services for different segments of the population, such as specific nutrition education for the elderly, food budgeting and cooking for young mothers, and nutrition education for those that participate in the SNAP program.

Along with offering suggestions to improve the health and wellness of communities, participants also mentioned current and future health initiatives. The use of community collaboration was a current health initiative taking place in Macon, Georgia. The majority identified various community partners with whom they collaborated in efforts to improve the health and wellness of their communities. Participants identified working with the Macon housing authority, collaboration with the local Head Start programs, the presence of local farmers markets in the community, and the presence of community health fairs as current

initiatives. Future initiatives discussed included increasing WIC advertisements, which was both a current and future initiative for the WIC administrators serving the Macon area.

In addition to current health initiatives and current health programs, participants discussed the role that elected officials play in promoting health and well-being. Participants identified the need for policy makers to serve as role models to the communities they serve. One participant expanded on the role model theme, highlighting the need to see leadership within the community engaging in physical exercise stating, “they need to be out in front doing it, they need to be on commercials, you know on TV commercials or send[ing] letters themselves telling the people to eat right to exercise.” Participants explained that if policy makers want to engage their community in adapting healthy behavior changes, they must first model those behaviors and be a visible example to the communities they aim to motivate.

Participants identified the need for policy makers to engage the community through programs that promote physical activity. Several suggestions for community engagement included community-wide physical activity initiatives such as a Saturday Zumba class and a school-based nutrition education course for students that teaches healthier food choices, the importance of eating healthy, and how to shop for healthy foods. Participants identified the need to provide community programs for the entire family, and the need to tailor programs to be family-oriented by providing “more gyms, family friendly activities, and more reasons for people to come outside.” The need to create programs and allow access to those programs for the entire community was expressed among the participants.

In addition, participants suggested that policy makers could improve the health and wellness of their communities by continuing to provide programs such as WIC and SNAP, which

address and support the needs of the communities. Several of the needs include supplemental nutritious foods, nutrition education and counseling, breastfeeding peer counseling, and screening and referrals to other health services such as Welfare and social services. Participants also addressed the financial role that policy makers have in ensuring the sustainability of federally-funded nutrition assistance programs. Participants expressed that in order to serve communities with the full capacity of their organization, “continuing to support and provide funding for programs like WIC” was key.

Participants also suggested that policy makers conduct needs assessments with the community. Many of the participants expressed wanting to conduct a needs assessment in order to acquire an accurate account from community members on the health issues of interest within their respective communities. Participants identified that performing a needs assessment of the community is essential. They highlighted the roles that communities play in identifying the problems that are within their communities, as well as pointed towards the community’s unique ability to develop strategies to address problems and assess how potential solutions might benefit their communities as a whole. Participants explained the importance of need assessments stating, “Go visit those communities. See what you know, what’s going on, what’s there in the community, [and] what the community has to work with.”

In addition to discussing ways that policy makers could promote health and wellness, participants also discussed how incentives worked to mobilize community businesses. Several of the participants suggested they were personally not aware of any incentives available to local stores, restaurants and farmer markets for providing healthy food options, while other participants identified profit as a major incentive gained by community businesses. Participants explained that when WIC clients shop at supermarkets, grocery stores, convenient stores, farmers

markets, and restaurants that accept WIC vouchers, those facilities are reimbursed from those sales which increases their revenue. They went on to explain that clients often shop for both their WIC foods and non-WIC foods at the same facility, which then becomes additional profits for the business owners.

In addition to highlighting the role that policy makers and community businesses play in promoting health and wellness, participants also discussed the role public health advocates play in this complicated equation. Participants identified healthcare providers (health department, hospitals, clinics, pediatricians, and private doctor's office) and the local school system (Head Start, daycares, Central Georgia Technical College) as the public health advocates they work with in their communities. In addition, participants identified the strong presence of community partnerships with various organizations. These community partnerships highlight the existence of public health within various occupations.

Several suggestions from participants were also discussed throughout the interviews. Participants identified addressing the lack of transportation as a suggestion for policy makers with one participant, stating "to provide better access to public transportation because a lot of clients have trouble with transportation and it can be difficult for them to access services." Participants shared that many of their clients express the need for transportation to get to the grocery store. In addition, participants highlighted that if clients had transportation they would more likely access WIC services. Furthermore, participants suggest that having transportation would decrease the number of clients that miss their WIC appointments and voucher pick up and would also be beneficial to clients that live in areas that do not have public transportation. One participant went a step further by recommending the use of electronic benefits which would

allow clients to receive WIC benefits electronically onto a card. This would eliminate the burden of transportation to the WIC clinics.

Throughout the interviews lack of nutrition education and the lack of nutrition regulations were identified as major concerns within the SNAP program. Participants explained the need for nutrition assistance programs, (particularly SNAP) to provide the clients that participate in the program with nutrition education and regulations on the kinds of foods they can purchase. Participants also emphasized that nutrition education can teach clients how to eat healthy as well as explain how healthy eating can improve their health. Participants explained that incorporating nutrition regulations would ensure that clients are only able to purchase healthy foods, which essentially teaches clients how to shop and to look at the nutritional value of the foods they select.

Participants expressed the importance of having nutrition regulations, (such as guidelines), for eligible foods that can be purchased within all nutrition assistance programs. Participants pointed out that by not having regulations within programs, (again particularly within SNAP), clients are not required to follow any nutritional guidelines which can lead to poor food selections, which can then potentially cause obesity. As one participant explained:

“It’s hard to regulate things, WIC we have specific foods that you can purchase on WIC program whereas on the EBT you know SNAP program your able to purchase any food item so there no regulation to it, it has to be a healthy item or a nonfat item or a whole wheat item so I think with the two programs it’s probably hard to provide a program that’s one providing a service that’s putting food in the mouths of the people who need it,

and two regulating it so it's healthy foods, so in essence we may be assisting them in an unhealthy lifestyle by providing them the means to purchase any foods they want.”

All participants identified outreach as a major part of their role as a public servant. Participants explained the individual ways they could serve their clients and improve health outcomes. The participants identified various forms of outreach such as sharing information, serving as a role model, making recommendations, educating clients, encouraging clients to make healthy choices, motivating clients, and supporting self-efficacy among clients. Participants expressed the importance of engaging in outreach. Through outreach, WIC administrators and staff members provide health education, promote healthy nutrition practices, and encourage community members to adopt healthy lifestyles. Participants suggested that taking part in outreach helps to introduce the WIC program to community members. In addition, providing outreach also helps to reinforce rules that exist within the WIC program, particularly for those who are current participants of the WIC program.

Quantitative Analysis

A total of 119 respondents were surveyed in this study. Surveys were entered and coded into IBM Statistical Package for the Social Sciences (SPSS) version 22 software. The surveys were analyzed and frequencies, associations, and odds were identified from statistical outputs. Statistical tests were used to confirm findings from the qualitative interviews.

Quantitative Results

Fifty-six percent of the respondents reported that they receive food stamp benefits through the SNAP program, whereas 21% identified that they receive food vouchers through the

WIC program. Furthermore, 19% of the women had children who participate in the school lunch program. Frequency counts and percentages for food insecurity are shown in Table 5.

Table 5*Descriptive Statistics of Food Insecurity Variables of Survey Respondents*

Variables		Frequency (n)	Percentage (%)	Missing
Food Insecurity (Food Stamps)	No Food Stamps	52	43.7	0
	Food Stamps	67	56.3	
Food Insecurity (Food Bank/Food Pantry)	No Food Bank	117	98.3	0
	Food Bank	2	1.7	
Food Insecurity (WIC)	No WIC	93	78.2	0
	WIC	26	21.8	
Food Insecurity (Shelter)	No Shelter	116	97.5	0
	Shelter	3	2.5	
Food Insecurity (School Lunch)	No School Lunch	96	80.7	0
	School Lunch	23	19.3	
Food Insecurity (Summer Food Service)	No Summer Food Service	116	97.5	0
	Summer Food Service	3	2.5	
Food Insecurity (Elderly Nutrition Program)	No Elderly Nutrition	118	99.2	0

	Program			
	Elderly Nutrition Program	1	0.8	
Food Insecurity (Other Program)				0
	No Other Program	118	99.2	
	Other Program	1	0.8	

Thirty-eight percent of respondents indicated that they shopped for food once or twice a month, whereas 23% percent of the women identified shopping at a convenient store two to three times a week. Moreover, 96% of the women reported that they purchase the majority of the food for their family at a major grocery store. The majority of the women (89.9%) identified having their own vehicle for transportation to the grocery store, while a small percentage (3.4%) relied on public transportation. Frequency counts and percentages for food access are found in Table 6.

Table 6
Descriptive Statistics of Food Access Variables of Survey Respondents

Variables	Frequency (n)	Percentage (%)	Missing
Food Access (Shop For Food)			0
1 time a week or more	41	34.5	
Every other week	28	23.5	
1 or 2 times/ month	45	37.8	
Less than 1 time a month	2	1.7	
Other	2	1.7	
Never	1	.8	
Food Access (Convenient Store Shop)			0
Daily	10	8.4	
Almost daily	8	6.7	
2-3 times a week	28	23.5	
Weekly	13	10.9	
Every other week	24	20.2	
Other	12	10.1	
Never	24	20.2	

Food Access (Major Grocery Store Purchase)	No Major Grocery Store Purchase	4	3.4	0
	Major Grocery Store Purchase	115	96.6	
Food Access (Convenient Store Purchase)	No Convenient Store Purchase	119	100	0
Food Access (Farmers Market Purchase)	No Farmers Market Purchase	113	95	0
	Farmers Market Purchase	6	5	
Food Access (Other Purchase)	No Other Purchase	115	96.6	0
	Other	4	3.4	
Food Access (Bus Transportation)	No Bus Transportation	115	96.6	0
	Bus Transportation	4	3.4	
Food Access (Own Vehicle for Transportation)	No Vehicle Transportation	12	10.1	0
	Vehicle Transportation	107	89.9	
Food Access (Pay Someone for Transportation)	No Pay for Transportation	116	97.5	0
	Pay for Transportation	3	2.5	
Food Access (Ride In Someone's Vehicle)	No Ride in Someone's Vehicle	115	96.6	0

	Ride in Someone Vehicle	4	3.4	
Food Access (Bike Transportation)				0
	No Bike Transportation	119	100	
Food Access (Walk)				0
	No Walk	117	98.3	
	Walk	2	1.7	
Food Access (Other)				0
	No Other	118	99.2	
	Other	1	0.8	

Paying utilities (35.0%) was identified by respondents as the major reason that prevents them from buying the foods they need for their families. The largest percentage (18.5%) of the women who identified participating in a food assistance program indicated that the food they receive feeds their family for the whole month. Frequency counts and percentages for food affordability are seen in Table 7.

Table 7
Descriptive Statistics of Food Affordability Variables of Survey Respondents

Variables	Frequency (n)	Percentage (%)	Missing
Food Affordability (Stops From Buying Food)			0
Nothing	68	57.1	
Utilities	42	35.3	
Cost of daycare	1	0.8	
Medical bills	4	3.4	
Transportation	3	2.5	
Being treated poorly by store owners	1	0.8	
Food Affordability (Food Assistance Days)			1
One day	2	1.7	
Two days	3	2.5	
Three days	5	4.2	
Four days	3	2.5	
Five days	8	6.7	
Six days	1	0.8	
Seven days	34	28.6	
Not Applicable	62	52.1	

Food Affordability (Food Assistance Weeks)			0
One week	1	0.8	
Two week	11	9.2	
Three week	15	12.6	
Four week	22	18.5	
Five week	4	3.4	
Six week	1	0.8	
Seven week	10	8.4	
Not Applicable	55	46.2	

Twenty-four percent of the women indicated that in a month they eat the largest amount of food in week one and eat the smallest amount in week four (19.3%). In addition, 47% of the women identified that they eat three meals a day. Whereas 31% identified drinking juice weekly, 22% identified drinking soda two to three times a week. Forty-five percent of women reported eating both junk food and fast food (44.5%) two to three times a week; whereas 47% indicated that they prepare home cooked meals two to three times a week. Sixty-five percent of the women indicated that the majority of the foods they cook are baked. Frequency counts and percentages for behaviors are shown in Table 8.

Table 8
Descriptive Statistics of Nutrition Behavior Variables of Survey Respondents

Variables	Frequency (n)	Percentage (%)	Missing
Behavior (Eat the Most a Month)			0
Week 1	29	24.4	
Week 2	24	20.2	
Week 3	17	14.3	
Week 4	9	7.6	
Week 5	1	0.8	
Other	14	11.8	
None	25	21	
Behavior (Eat the Least a Month)			0
Week 1	19	16	
Week 2	4	3.4	
Week 3	13	10.9	

	Week 4	23	19.3	
	Week 5	15	12.6	
	Other	8	6.7	
	None	37	31.1	
Behavior (Meals A Day)				0
	One meal	5	4.2	
	Two meals	45	37.8	
	Three meals	57	47.9	
	Four meals	10	8.4	
	Five meals	1	0.8	
	Six meals	1	0.8	
Behavior (Three Meals A Day)				1
	1 time a week	15	12.6	
	2- 3 times a week	36	30.3	
	4- 5 times a week	41	34.5	
	Every other week	7	5.9	
	Other	10	8.4	
	None	9	7.6	
Behavior (Drink Juice A Week)				1
	2- 3 times a day	37	31.1	
	1 time a day	18	15.1	
	4- 5 times a week	18	15.1	
	2-3 times a week	27	22.7	
	1 time a week	9	7.6	
	None	3	2.5	

Behavior (Drink Soda A Week)				0
	2- 3 times a day	26	21.8	
	1 time a day	12	10.1	
	4- 5 times a week	11	9.2	
	2-3 times a week	27	22.7	
	1 time a week	19	16.0	
	None	4	3.4	
	Don't Know	20	16.8	
Behavior (Junk Food A Week)				0
	1 time a week	23	19.3	
	2-3 times a week	54	45.4	
	4- 5 times a week	16	13.4	
	Daily	19	16.0	
	None	7	5.9	
Behaviors (Fast Food A Week)				0
	1 time a week	46	38.7	
	2- 3 times a week	53	44.5	
	4- 5 times a week	8	6.7	
	Daily	5	4.2	
	None	7	5.9	
Behaviors (Prepare Home-cooked Meals)				0
	1 time a week	6	5.0	
	2- 3 times a week	56	47.1	
	4- 5 times a week	33	27.7	
	Daily	15	12.6	
	None	9	7.6	

Behaviors (Prepare Food Fried)				0
	No Fried	79	66.4	
	Fried	40	33.6	
Behaviors (Prepare Food Grilled)				0
	No Grilled	93	78.2	
	Grilled	26	21.8	
Behaviors (Prepare Food Baked)				0
	No Baked	42	35.3	
	Baked	77	64.7	
Behaviors (Prepare Other)				0
	No Other	115	96.6	
	Other	4	3.4	

Furthermore, more than half of the respondents (50.4%) indicated that fruits and vegetable should be consumed daily and sixty-nine percent reported that meals should be consumed three times a day. Sixty-seven percent of the respondents identified high calorie foods as a risk factor for becoming overweight and/or obese and 89% identified diabetes as being a health condition that results from being overweight or obese. Many of the women (89.1%) indicated that eating more fruits and vegetables could lower their chances of becoming overweight and obese; while 75% of women identified that they receive messages about being overweight and/or obese from their television. Frequency counts and percentages for food affordability are found in Table 9.

Table 9
Descriptive Statistics of Nutrition Perception Variables of Survey Respondents

Variables	Frequency (n)	Percentage (%)	Missing
Perceptions (Eat Fruits and Vegetables a Week)			0
1 time a week	5	4.2	
2- 3 times a week	22	18.5	
4- 5 times a week	31	26.1	
Daily	60	50.4	
None	1	.8	

Perceptions (Meals to Eat A Day)				0
	One meal	2	1.7	
	Two meals	8	6.7	
	Three meals	83	69.7	
	Four meals	12	10.1	
	Five meals	7	5.9	
	Six meals or more	7	5.9	
Perceptions (Risk Too Much Sleep)				0
	No Too Much Sleep	105	88.2	
	Too Much Sleep	14	11.8	
Perceptions (Risk High Calorie Foods)				0
	No High Calorie Foods	39	32.8	
	High Calorie Foods	80	67.2	
Perceptions (Risk Having Children)				0
	No Having Children	111	93.3	
	Having Children	8	6.7	
Perceptions (Risk Not Exercising)				0
	No Exercising	63	52.9	
	Exercising	56	47.1	
Perceptions (Risk Age)				0
	No Age	114	95.8	
	Age	5	4.2	
Perceptions (Risk Overeating)				0

	No Overeating	81	68.1	
	Overeating	38	31.9	
Perceptions (Risk Headaches)				0
	No Headaches	94	79	
	Headaches	24	20.2	
Perceptions (Risk Nosebleeds)				0
	No Nosebleeds	118	99.2	
	Nosebleeds	1	0.8	
Perceptions (Risk Diarrhea)				0
	No Diarrhea	119	100	
Perceptions (Risks Diabetes)				0
	No Diabetes	12	10.1	
	Diabetes	107	89.9	
Perceptions (Lower Chances of Medications)				0
	No Medications	112	94.1	
	Medications	7	5.9	
Perceptions (Lower Chances One to Two Meals A Day)				0
	No One to Two Meals A Day	109	91.6	
	One to Two Meals A Day	10	8.4	
Perceptions (Lower Chances Eat Fruit and Vegetables)				0
	No Fruit and Vegetables	13	10.9	

	Fruit and Vegetables	106	89.1	
Perceptions (Lower Chances Drink Juice No Soda)				0
	No Soda	104	87.4	
	Soda	15	12.6	
Perceptions (Television Messages on Obesity)				0
	No Television	29	24.4	
	Television	90	75.6	
Perceptions (Newspaper Messages on Obesity)				0
	No Newspaper	88	73.9	
	Newspaper	31	26.1	
Perceptions (Computer Messages on Obesity)				0
	No Computer	89	74.8	
	Computer	30	25.2	
Perceptions (Book/Magazine Messages on Obesity)				0
	No Book/Magazine Messages	83	69.7	
	Book/Magazine Messages	36	30.3	
Perceptions (Radio Messages on Obesity)				0
	No Radio Messages	97	81.5	
	Radio Messages	22	18.5	
Perceptions (Other Messages on Obesity)				0
	No Other Messages	106	89.1	

Other Messages

13

10.9

Fisher's Exact Test

A Fisher's Exact Test was used to determine the individual variables that were associated with obesity (Table 10). The test was also used to determine the nutrition behavior variables (Table 13 and Table 14) and the nutrition perception variables (Table 15 and Table 16) that were associated with food insecurity. The test also answered the following research questions:

- What is the relationship between food insecurity and obesity among low-income women?
- What effects do personal perceptions and behaviors have on obesity and food insecurity among low-income women?

Fisher's Exact Test is significant at the 0.05 level (2-tailed)

A statistically significant association was found between obesity and home-cooked meals ($p = 0.02$). A greater percentage (75%) of those that ate home-cooked meals 4-5 times a week, compared to those who ate home-cooked meals less than 4 times per week who were obese (25%). Similarly, a statistically significant association was found between obesity and meals a day you should eat ($p = 0.02$). A greater percentage (55%) of respondents who considered three as the appropriate number of meals to eat a day, were not obese compared to a smaller percentage (44%) who were obese. A statistically significant association was also found between obesity and having children ($p = 0.02$). Out of those who did not perceive that having children is a risk factor for obesity, a greater percentage of respondents (55%) were not obese, compared to a smaller percentage (44%) who were obese. Lastly, a statistically significant association was found between obesity and computer messages ($p = 0.02$, Table 10). Out of those who have not heard messages about what it means to be overweight and/or obese through computers, 59% were not obese compared to 40% who were obese.

Table 10
Variables Associated with Obesity

Variables	Test	DF	P-Value
Race	3.27*	2	0.17
Income	0.06	1	0.52
Education	0.16	1	0.71
Employment	8.49*	5	0.09
Food Insecurity (Food Stamps)	0.82*	1	0.44

Food Insecurity (Food Bank/Food Pantry)	0.00*	1	1.00
Food Insecurity (WIC)	0.00*	1	1.00
Food Insecurity (Shelter)	3.03*	1	0.22
Food Insecurity (School Lunch)	1.04*	1	0.32
Food Insecurity (Summer Food Service)	3.03*	1	0.22
Food Insecurity (Other Program)	1.50*	1	0.47
Food Access (Shop For Food)	4.53	5	0.48
Food Access (Convenient Store Shop)	4.62	6	0.60
Food Access (Major Grocery Store Purchase)	5.25*	1	0.12
Food Access (Farmers Market Purchase)	0.01*	1	1.00
Food Access (Other Purchase)	5.25*	1	0.12
Food Access (Bus Transportation)	0.24*	1	1.00
Food Access (Own Vehicle for Transportation)	0.01*	1	1.00
Food Access (Pay Someone for Transportation)	0.24*	1	1.00
Food Access (Ride In Someone's Vehicle)	1.32*	1	0.34
Food Access (Walk)	0.00*	1	1.00
Food Access (Other)	1.50*	1	0.47
Food Affordability (Stops From Buying Food)	6.50	5	0.17
Food Affordability (Food Assistance Days)	3.26	7	0.95
Food Affordability (Food Assistance Weeks)	6.38	7	0.49
Behavior (Eat the Most a Month)	8.85	6	0.15
Behavior (Eat the Least a Month)	5.59	6	0.48
Behavior (Meals A Day)	4.36	5	0.51
Behavior (Three Meals A Day)	7.59	6	0.24
Behavior (Drink Juice A Week)	7.93	7	0.31
Behavior (Drink Soda A Week)	2.40	6	0.90
Behavior (Junk Food A Week)	4.78	4	0.30
Behaviors (Fast Food A Week)	5.65	4	0.22
Behaviors (Prepare Home cooked Meals)	10.92	4	0.02

Behaviors (Prepare Food Fried)	0.05*	1	0.84
Behaviors (Prepare Food Grilled)	0.09*	1	0.82
Behaviors (Prepare Food Baked)	0.17*	1	0.69
Behaviors (Prepare Other)	0.01*	1	1.00
Perceptions (Eat Fruits and Vegetables a Week)	3.54	4	0.46
Perceptions (Meals to Eat a Day)	11.91	1	0.02
Perceptions (Risk Too Much Sleep)	0.66*	1	0.54
Perceptions (Risk High Calorie Foods)	0.36*	1	0.68
Perceptions (Risks Having Children)	6.15*	1	0.02
Perceptions (Risk Not Exercising)	3.52*	1	0.08
Perceptions (Risk Age)	0.34*	1	0.66
Perceptions (Risk Overeating)	0.00*	1	1.00
Perceptions (Risk Headaches)	2.03*	1	0.16
Perceptions (Risk Nosebleeds)	1.50*	1	0.47
Perceptions (Risks Diabetes)	0.71*	1	0.51
Perceptions (Lower Chances of Medications)	0.50*	1	0.68
Perceptions (Lower Chances One to Two Meals A Day)	0.80*	1	0.47
Perceptions (Lower Chances Eat Fruit and Vegetables)	0.25*	1	0.75
Perceptions (Lower Chances Drink Juice No Soda)	2.89*	1	0.13
Perceptions (Television Messages on Obesity)	0.01*	1	1.00
Perceptions (Newspaper Messages on Obesity)	2.00*	1	0.18
Perceptions (Computer Messages on Obesity)	5.45*	1	0.02
Perceptions (Book/Magazine Messages on Obesity)	0.65*	1	0.54
Perceptions (Radio Messages on Obesity)	3.95*	1	0.05
Perceptions (Other Messages on Obesity)	1.20*	1	0.37

*Note.** Data not reported by the Fisher's Exact Test. Bold values are significant at $p < 0.05$ level (2-tailed).

A bootstrap procedure was utilized to gain statistical inference from the research sample. A moderate association was found between obesity and income (0.21, Table 11). A greater percentage of those (62%) with an income level under \$10,000 dollars were not obese, compared to a smaller percentage (37%) who were obese.

Table 11

Measures of Association with Obesity

Variables	Measure of Association	Bootstrap 95% CI
Race	0.05**	(0.01, 0.10)
Income	0.21*	(-0.04, 0.46)
Education	0.00*	(-0.29, 0.28)
Employment	0.03**	(0.01, 0.13)
Food Insecurity (Food Stamps)	0.00**	(0.00, 0.05)
Food Insecurity (Food Bank/Food Pantry)	0.00**	(0.00, 0.05)
Food Insecurity (WIC)	0.00**	(0.00, 0.04)
Food Insecurity (Shelter)	0.03**	(0.01, 0.08)
Food Insecurity (School Lunch)	0.00**	(0.00, 0.07)
Food Insecurity (Summer Food Service)	0.03**	(0.01, 0.08)
Food Insecurity (Other Program)	0.01**	(0.01, 0.06)
Food Access (Shop For Food)	0.02**	(0.00, 0.09)
Food Access (Convenient Store Shop)	0.01**	(0.01, 0.08)
Food Access (Major Grocery Store Purchase)	0.05**	(0.01, 0.10)
Food Access (Farmers Market Purchase)	0.00**	(0.00, 0.06)
Food Access (Other Purchase)	0.05**	(0.01, 0.10)
Food Access (Bus Transportation)	0.00**	(0.00, 0.06)
Food Access (Own Vehicle for Transportation)	0.00**	(0.00, 0.06)
Food Access (Pay Someone for Transportation)	0.00**	(0.00, 0.06)

Food Access (Ride In Someone's Vehicle)	0.01**	(0.00, 0.09)
Food Access (Walk)	0.00**	(0.00, 0.05)
Food Access (Other)	0.01**	(0.01, 0.06)
Food Affordability (Stops From Buying Food)	0.05**	(0.02, 0.11)
Food Affordability (Food Assistance Days)	0.01**	(0.01, 0.09)
Food Affordability (Food Assistance Weeks)	0.03**	(0.02, 0.10)
Behavior (Eat the Most a Month)	0.03**	(0.01, 0.11)
Behavior (Eat the Least a Month)	0.02**	(0.01, 0.09)
Behavior (Meals A Day)	0.02**	(0.01, 0.09)
Behavior (Three Meals A Day)	0.03**	(0.01, 0.11)
Behavior (Drink Juice A Week)	0.03**	(0.01, 0.11)
Behavior (Drink Soda A Week)	0.00**	(0.00, 0.07)
Behavior (Junk Food A Week)	0.02**	(0.00, 0.09)
Behaviors (Fast Food A Week)	0.02**	(0.00, 0.11)
Behaviors (Prepare Home cooked Meals)	0.05**	(0.02, 0.15)
Behaviors (Prepare Food Fried)	0.00**	(0.00, 0.03)
Behaviors (Prepare Food Grilled)	0.00**	(0.00, 0.04)
Behaviors (Prepare Food Baked)	0.00**	(0.00, 0.04)
Behaviors (Prepare Other)	0.00**	(0.00, 0.06)
Perceptions (Eat Fruits and Vegetables a Week)	0.02**	(0.00, 0.08)
Perceptions (Meals to Eat a Day)	0.08**	(0.05, 0.17)
Perceptions (Risk Too Much Sleep)	0.00**	(0.00, 0.07)
Perceptions (Risk High Calorie Foods)	0.00**	(0.00, 0.04)
Perceptions (Risks Having Children)	0.05**	(0.00, 0.16)
Perceptions (Risk Not Exercising)	0.02**	(0.00, 0.09)
Perceptions (Risk Age)	0.00**	(0.00, 0.07)
Perceptions (Risk Overeating)	0.00**	(0.00, 0.03)
Perceptions (Risk Headaches)	0.01**	(0.00, 0.08)
Perceptions (Risk Nosebleeds)	0.01**	(0.01, 0.06)

Perceptions (Risks Diabetes)	0.00**	(0.00, 0.07)
Perceptions (Lower Chances of Medications)	0.00**	(0.00, 0.07)
Perceptions (Lower Chances One to Two Meals A Day)	0.00**	(0.00, 0.09)
Perceptions (Lower Chances Eat Fruit and Vegetables)	0.00**	(0.00, 0.04)
Perceptions (Lower Chances Drink Juice No Soda)	0.02**	(0.00, 0.11)
Perceptions (Television Messages on Obesity)	0.00**	(0.00, 0.03)
Perceptions (Newspaper Messages on Obesity)	0.01**	(0.00, 0.08)
Perceptions (Computer Messages on Obesity)	0.04**	(0.00, 0.14)
Perceptions (Book/Magazine Messages on Obesity)	0.00**	(0.00, 0.05)
Perceptions (Radio Messages on Obesity)	0.03**	(0.00, 0.12)
Perceptions (Other Messages on Obesity)	0.01**	(0.00, 0.08)

Note. CI=Confidence Interval. * Measure of Gamma ordinal by ordinal. **Measure of Uncertainty nominal by nominal.

The findings revealed that there was a statistically significant relationship between obesity and preparing home-cooked meals ($p = 0.02$). A greater percentage (75%) of those that ate home-cooked meals 4-5 times a week, were not obese compared to those who were obese (25%). Similarly, a statistically significant association was found between obesity and meals a day you should eat ($p = 0.00$). A greater percentage of respondents who considered three as the appropriate number of meals to eat a day, were not obese compared to a smaller percentage (44%) who were obese. A statistically significant association was also found between obesity and having children ($p = 0.02$). Out of those who did not perceive that having children is a risk factor for obesity, a greater percentage of respondents (55%) were not obese, compared to a smaller percentage (44%) who were obese. Lastly, a statistically significant association was found between obesity and computer messages ($p = 0.02$, Table 12). Out of those who have not heard messages about what it means to be overweight and/or obese through computers, 59% were not obese compared to 40% who were obese.

Table 12
Statistically Significant Variables Associated with Obesity

Variables	Test	DF	P-Value	Measure of Association	Bootstrap 95% CI
Behaviors (Prepare Home cooked Meals)	10.92	4	0.02	0.05	(0.02, 0.15)
Perceptions (Meals to Eat a Day)	11.91	5	0.00	0.08	(0.05, 0.17)
Perceptions (Risks Having Children)	6.15*	1	0.02	0.05	(0.00, 0.16)
Perceptions (Computer Messages on Obesity)	5.45*	1	0.02	0.04	(0.00, 0.14)

*Note.**Data not reported by the Fisher's Exact Test. Values are significant at $p < 0.05$ level (2-tailed). CI=Confidence Interval.

The findings revealed that there was a statistically significant relationship between food insecurity and other food preparation methods such as “boiled,” “sautéed,” and “stir-fried” among SNAP participants in Table 13. Out of the respondents who have not utilized other food preparation methods (e.g. boiled, sautéed, and stir-fried) to prepare meals, 45% were not SNAP clients, compared to 54% who were SNAP clients.

Table 13
Nutrition Behavior Variables Associated with Food Insecurity Among SNAP Participants

Variables	Test	DF	P-Value	Measure of Association	Bootstrap 95% CI
Behavior (Eat the Most a Month)	10.17	6	0.08	0.03	(0.01, 0.11)
Behavior (Eat the Least a Month)	6.14	6	0.37	0.02	(0.01, 0.09)
Behavior (Meals A Day)	6.85	5	0.17	0.03	(0.01, 0.10)
Behavior (Three Meals A Day)	8.12	6	0.17	0.03	(0.01, 0.11)
Behavior (Drink Juice A Week)	8.54	7	0.15	0.03	(0.02, 0.10)
Behavior (Drink Soda A Week)	6.00	6	0.42	0.02	(0.00, 0.08)
Behavior (Junk Food A Week)	4.89	4	0.27	0.02	(0.00, 0.09)
Behaviors (Fast Food A Week)	2.50	4	0.64	0.01	(0.00, 0.08)
Behaviors (Prepare Home cooked Meals)	6.59	4	0.13	0.02	(0.10, 0.10)
Behaviors (Prepare Food Fried)	0.35*	1	0.05	0.00	(0.00, 0.03)
Behaviors (Prepare Food Grilled)	0.53*	1	0.46	0.00	(0.00, 0.05)
Behaviors (Prepare Food Baked)	0.06*	1	0.80	0.00	(0.00, 0.03)
Behaviors (Prepare Other)	4.70*	1	0.03	0.04	(0.01, 0.09)

Note. *Data not reported by the Fisher's Exact Test. Bold values are significant at $p < 0.05$ level (2-tailed). CI=Confidence Interval.

The findings revealed that there was a statistically significant relationship between food insecurity and eating fast food among WIC participants in Table 14. A greater percentage (66%) of those that ate fast food 2-3 times a week, were not WIC clients compared to those who were WIC clients (33%).

Table 14
Nutrition Behavior Variables Associated with Food Insecurity Among WIC Participants

Variables	Test	DF	P-Value	Measure of Association	Bootstrap 95% CI
Behavior (Eat the Most a Month)	3.03	6	0.83	0.01	(0.00, 0.07)
Behavior (Eat the Least a Month)	11.13	6	0.08	0.04	(0.02, 0.12)
Behavior (Meals A Day)	8.56	5	0.15	0.04	(0.01, 0.12)
Behavior (Three Meals A Day)	3.42	6	0.83	0.01	(0.00, 0.07)
Behavior (Drink Juice A Week)	5.54	7	0.28	0.03	(0.02, 0.09)
Behavior (Drink Soda A Week)	5.15	6	0.33	0.02	(0.01, 0.09)
Behavior (Junk Food A Week)	2.75	4	0.34	0.02	(0.01, 0.07)
Behaviors (Fast Food A Week)	9.04	4	0.02	0.05	(0.02, 0.14)
Behaviors (Prepare Home cooked Meals)	3.78	4	0.22	0.02	(0.01, 0.07)
Behaviors (Prepare Food Fried)	2.26*	1	0.13	0.01	(0.00, 0.80)
Behaviors (Prepare Food Grilled)	2.30*	1	0.12	0.01	(0.00, 0.10)
Behaviors (Prepare Food Baked)	1.67*	1	0.19	0.01	(0.00, 0.07)
Behaviors (Prepare Other)	0.02*	1	0.87	0.00	(0.00, 0.06)

Note. *Data not reported by the Fisher's Exact Test. Bold values are significant at $p < 0.05$ level (2-tailed). CI=Confidence Interval.

The findings revealed that there was a statistically significant relationship between food insecurity and receiving television messages on obesity among SNAP participants in Table 15. A greater percentage (63%) of those that have heard message about what it means to be overweight and/or obese through television were SNAP clients compared to those who were not SNAP clients (36%).

Table 15
Nutrition Perception Variables Associated with Food Insecurity Among SNAP Participants

Variables	Test	DF	P-Value	Measure of Association	Bootstrap 95% CI
Perceptions (Eat Fruits and Vegetables a Week)	6.15	4	0.13	0.03	(0.01, 0.09)
Perceptions (Meals to Eat a Day)	7.24	5	0.19	0.03	(0.01, 0.12)
Perceptions (Risk Too Much Sleep)	3.43*	1	0.06	0.02	(0.00, 0.11)
Perceptions (Risk High Calorie Foods)	0.00*	1	0.98	0.00	(0.00, 0.03)
Perceptions (Risks Having Children)	0.13*	1	0.71	0.00	(0.00, 0.06)
Perceptions (Risk Not Exercising)	0.87*	1	0.34	0.00	(0.00, 0.05)
Perceptions (Risk Age)	0.02*	1	0.86	0.00	(0.00, 0.05)
Perceptions (Risk Overeating)	0.40*	1	0.52	0.00	(0.00, 0.04)
Perceptions (Risk Headaches)	0.42*	1	0.51	0.00	(0.00, 0.04)
Perceptions (Risk Nosebleeds)	1.66*	1	0.19	0.01	(0.01, 0.06)
Perceptions (Risks Diabetes)	0.21*	1	0.64	0.00	(0.00, 0.05)
Perceptions (Lower Chances of Medications)	0.51*	1	0.46	0.00	(0.00, 0.07)
Perceptions (Lower Chances One to Two Meals A Day)	0.06*	1	0.80	0.00	(0.00, 0.04)
Perceptions (Lower Chances Eat Fruit and Vegetables)	0.60*	1	0.43	0.00	(0.00, 0.05)
Perceptions (Lower Chances Drink Juice No Soda)	0.06*	1	0.80	0.00	(0.00, 0.05)
Perceptions (Television Messages on Obesity)	7.42*	1	0.00	0.05	(0.00, 0.13)
Perceptions (Newspaper Messages on Obesity)	0.03*	1	0.84	0.00	(0.00, 0.03)
Perceptions (Computer Messages on Obesity)	0.22*	1	0.63	0.00	(0.00, 0.04)
Perceptions (Book/Magazine Messages on Obesity)	0.83*	1	0.36	0.00	(0.00, 0.05)

Perceptions (Radio Messages on Obesity)	0.03*	1	0.85	0.00	(0.00, 0.04)
Perceptions (Other Messages on Obesity)	0.16*	1	0.68	0.00	(0.00, 0.05)

Note. *Data not reported by the Fisher's Exact Test. Bold values are significant at $p < 0.05$ level (2-tailed). CI=Confidence Interval.

The findings revealed that there was a statistically significant relationship between food insecurity and other ways to receive obesity messages (e.g. doctor, work, and school) among WIC participants in Table 16. Out of the respondents who have not utilized other ways to receive obesity messages (e.g. doctor, work, and school), 81% were not WIC clients, compared to 18% who were WIC clients.

Table 16

Nutrition Perception Variables Associated with Food Insecurity Among WIC Participants

Variables	Test	DF	P-Value	Measure of Association	Bootstrap 95% CI
Perceptions (Eat Fruits and Vegetables a Week)	6.42	4	0.07	0.04	(0.01, 0.11)
Perceptions (Meals to Eat a Day)	1.33	5	0.80	0.01	(0.00, 0.08)
Perceptions (Risk Too Much Sleep)	1.61*	1	0.20	0.01	(0.00, 0.10)
Perceptions (Risk High Calorie Foods)	0.48*	1	0.48	0.00	(0.00, 0.05)
Perceptions (Risks Having Children)	0.04*	1	0.82	0.00	(0.00, 0.06)
Perceptions (Risk Not Exercising)	0.01*	1	0.91	0.00	(0.00, 0.03)
Perceptions (Risk Age)	0.01*	1	0.91	0.00	(0.00, 0.04)
Perceptions (Risk Overeating)	2.97*	1	0.08	0.02	(0.00, 0.10)
Perceptions (Risk Headaches)	0.53*	1	0.46	0.04	(0.00, 0.05)
Perceptions (Risk Nosebleeds)	0.49*	1	0.48	0.00	(0.00, 0.02)
Perceptions (Risks Diabetes)	0.22*	1	0.63	0.00	(0.00, 0.06)
Perceptions (Lower Chances of Medications)	0.18*	1	0.66	0.00	(0.00, 0.06)
Perceptions (Lower Chances One to Two Meals A Day)	0.02*	1	0.88	0.00	(0.00, 0.05)
Perceptions (Lower Chances Eat Fruit and Vegetables)	0.01*	1	0.91	0.00	(0.00, 0.06)
Perceptions (Lower Chances Drink Juice No Soda)	2.88*	1	0.09	0.02	(0.00, 0.09)
Perceptions (Television Messages on Obesity)	0.49*	1	0.48	0.00	(0.00, 0.05)

Perceptions (Newspaper Messages on Obesity)	0.01*	1	0.90	0.00	(.000, .038)
Perceptions (Computer Messages on Obesity)	0.65*	1	0.41	0.00	(0.00, 0.06)
Perceptions (Book/Magazine Messages on Obesity)	0.17*	1	0.67	0.00	(0.00, 0.05)
Perceptions (Radio Messages on Obesity)	1.16*	1	0.28	0.01	(0.00, 0.08)
Perceptions (Other Messages on Obesity)	4.33*	1	0.03	0.04	(0.00, 0.17)

Note. *Data not reported by the Fisher's Exact Test. Bold values are significant at $p < 0.05$ level (2-tailed). CI=Confidence Interval.

Chapter 5

Discussion

The goal of this study was to determine the impact of perceptions and behaviors towards dietary nutrition on obesity and food insecurity among low-income women in Georgia. This study assessed whether factors such as poverty, education, socioeconomic status, and participation in food assistance programs influenced obesity outcomes among women in rural Georgia. This chapter provides a discussion of the results, implications for public health programs, and suggestions for future research. Qualitative interviews were conducted with WIC key informants to gain insight and perspectives about obesity, food insecurity and the availability and access of nutritional foods in the community. Surveys were conducted to assess BMI and to gather information about food access, food availability, and the impact of nutrition on health, personal behaviors, and personal perceptions among low-income women.

Several of the themes that emerged from the interviews confirm findings from studies in previous literature. The lack of nutrition knowledge, lack of transportation, and lack of access to healthy foods were identified as themes from the interviews while previous literature has shown that all three create barriers to obtaining and maintaining a healthy diet (Haynes-Maslow, Parsons, Wheeler, & Leone, 2013; Wiig & Smith, 2008). The results of the interviews suggested that neighborhood environments affect low-income women's food choices. Also, store locality, food affordability, having a variety of healthy food options (fruits, vegetables and lean meats), and shopping at WIC-and SNAP-approved facilities influenced where WIC and SNAP clients shopped for food. These findings are consistent with other studies that find that access to supermarkets and grocery stores is important because they provide access to a variety of fruits and vegetables and have been shown to lower the prevalence of obesity and reduce weight gain

(Michmi & Wimberly, 2010; Robert Wood Johnson Foundation, 2007). This study also raised new questions regarding the obesity/food insecurity relationship. One issue that emerged focuses on the potential role that federally-funded nutrition assistance programs have in facilitating program participants' engagement in unhealthy lifestyles that can potentially cause obesity. Studies have shown that there are mixed results on whether participation in the SNAP and WIC programs actually *cause* obesity (Jones, & Frongillo, 2006; Leung, & Villamor, 2011). This question suggests that more research is needed to explore the role that federally-funded nutrition assistance programs play in diet composition and weight among low-income women. Another question that emerged from the interviews focuses on whether policy makers will utilize methods such as community forums to better identify the health needs of their constituents. By utilizing community forums to engage in dialogue with WIC and SNAP participants, policy makers can gain insightful information about the health resources their communities utilize for specific health problems, and can identify any barriers or gaps that may exist that prevent low-income women from receiving health services.

In addition to the themes that emerged from the qualitative interviews, several quantitative associations also emerged from the survey data. Results suggested that the following factors were associated with-, and shown to influence obesity: income, preparing home-cooked meals, number of meals to eat a day, having children, and receiving computer messages on obesity. In addition, the following factors were associated with and shown to influence food insecurity among SNAP participants: other food preparation methods (e.g. boiled, sautéed, and stir-fried), and receiving television messages on obesity. The following factors were associated with and shown to influence food insecurity among WIC participants: eating fast food and other ways to receive obesity messages such as (e.g. doctor, work, and school). More than thirty-three

percent of respondents had an income level under \$10,000 dollars and 21.8% had an income level between \$10,000 and \$20,000 dollars, which suggests that the majority of the respondents would have qualified for SNAP and WIC services based on income alone (SNAP, 2014; WIC, 2014). A moderate association was found between obesity and income in this study. Studies have suggested that the link between obesity and income is complex and is the result of many factors including gender and education level. Risks factors associated with low-income including limited resources, limited access to healthy and affordable food, and limited opportunities for physical activity, can create a greater risk of obesity (Food Research and Action Center, 2012). This study found that 37.8% of respondents had some college education whereas 28.6% of respondents were college graduates or higher. An association between education and obesity was not found in this study due to lack of variation among study respondents. Education level has been linked to obesity, particularly among low-income women (Mokdad et al., 2001; Truong & Sturm, 2005). Women with lower education (i.e., high school or less) have higher rates of obesity and obesity-related conditions (e.g. high blood pressure, high cholesterol and asthma) compared to higher-educated women (Ploeg, Chang, & Lin, 2008; Truong & Sturm, 2005). Higher rates of obesity among low-income women may be due to misperceptions about weight among lower-educated, low-income women. Women with lower education and low-income are less likely to recognize they were overweight and instead perceive themselves as having a healthy weight (Bennett, & Wolin, 2006; Paeratakul, White, Williamson, Ryan, & Bray, 2002). The results reported herein suggest that providing targeted health education initiatives focused on decreasing obesity among lower-educated women will require the development of obesity and nutrition education information specifically tailored to low-income women. In addition to providing health education, offering peer support and counseling can address obesity by increasing dialogue

through two-way communication and enhancing knowledge by providing accurate information addressing misperceptions as well as by, fostering behavior changes and perceptions towards achieving and maintaining a healthy weight.

In addition to income, gender, and education level, nutrition perceptions were also associated with obesity. A statistically significant association was found between obesity and perceptions of the number of meals to eat a day. Roughly 70% of respondents considered three as the appropriate number of meals to eat a day and less than 50% of respondents reported eating three meals a day. However, studies have suggested that adults who eat more frequently (four or more small meals) throughout the day lower their odds of becoming overweight/obese and increase their odds of maintaining a healthy weight by suppressing hunger and serum insulin concentrations (Bachman, Phelan, Wing, & Raynor, 2011; Ma et al., 2003). These findings suggest that misconceptions may exist between respondents' perceptions of a healthy diet and diet recommendations found in the literature. By addressing misconceptions of a healthy diet, through factual and accessible health education resources, public health professionals have the potential to change perceptions within communities surrounding their beliefs of healthy diet.

In addition to exploring perceptions about nutrition and health, this study also explored the nutrition behaviors of survey respondents. In this study, a statistically significant association was found between obesity and home-cooked meals. A statistically significant association was also found between food insecurity and eating fast food among WIC participants. In the current study findings, 47.1% of respondents prepared home-cooked meals two to three times a week, whereas 44.5% reported eating fast food two to three times a week. Studies suggest that where people eat appears to influence diet. Foods consumed away from home have been positively associated with increased body fat in adults. These foods contain more total fat, saturated fat,

cholesterol and sodium which contribute to poor diet quality (Lin, & Frazao, 1997; McCrory et al., 1999). There are a number of explanations why restaurant food consumption may promote obesity. Restaurant meals tend to be higher in fat and, lower in fiber which results in higher energy density. Research suggest that in restaurants, serving sizes are larger, highly palatable foods are served, and there are a high number of choices (Lin, Guthrie, Frazao, 1999; McCrory et al., 1999). These findings suggest that acquiring foods away from home is associated with obesity and may explain the rising national prevalence of obesity.

In addition to where foods are prepared, the manner in which foods are prepared has also been linked to obesity (Drewnowski, & Specter, 2004; Seligman, Laraia, & Kushel, 2010). In the current study, 96.6% of respondents reported they have not utilized other food preparation methods (e.g. boiled, sautéed, and stir-fried) to prepare meals. In this study, the findings revealed that a statistically significant association was found between food insecurity and other food preparation methods. Families with limited resources are often forced to compromise between paying bills and consuming a healthy diet. When household needs compete with acquiring food, people within food insecure households often adjust their eating behaviors by purchasing and consuming cheaper foods that are processed, high in sugars and fats, and are associated with obesity (Drewnowski, & Specter, 2004; Hu, Manson, & Willett, 2001; Leung, Walter, Willett, & Ding, 2012; Malik, Shulze, & Hu, 2006). Foods that are perceived as more expensive such as fruits and vegetables are often not purchased even though they are recognized to be associated with reducing chronic disease such as heart disease, cancer, and diabetes (Haynes-Maslow, Parsons, Wheeler, & Leone, 2013; Hendrickson et al., 2006; Liu, 2003; Wiig & Smith, 2008). Studies suggest that when low-income households adopt diets that consist of more plant-based meals (utilizing ingredients such as vegetables and olive oil), these changes may help to improve

health and decrease food insecurity within households by decreasing the amount of money spent on more expensive grocery items such as meat (Flynn, & Schiff, 2011; Steffen et al., 2005). These findings suggest the need for additional services such as food budgeting, meal preparation, and nutrition education, to help SNAP and WIC participants to better maximize their benefits and reduce their risk of chronic diseases that are associated with poor diet.

When exploring risk factors associated with obesity, 93.3% of respondents reported that having children did not increase a women's risk of becoming overweight and/or obese. In this study, a statistically significant association was found between obesity and perceptions that having children is a risk factor for obesity. However, studies have shown that a vulnerable weight gain period is during pregnancy, when increased weight gain is required to support the development of the fetus and positive pregnancy outcomes (Nteff, 2013; Raatikainen, Heiskanen, & Heinonen, 2006). As a result of increased caloric intake, which causes increased weight gain during pregnancy, studies have identified that gestational weight gain was a predictor of long term weight gain and obesity in women (Gunderson, & Abrams, 2000; Mamun et al., 2010, Nteff, 2013). Providing a targeted approach to address excess gestational weight gain and to prevent long term maternal obesity will require programs that provide obesity and nutrition education, health counseling and social support that is provided prior to pregnancy, during pregnancy, and postpartum.

Computer messages and television messages were shown to influence obesity and food insecurity in this study. A statistically significant association was found between obesity and receiving computer messages about obesity. In addition, a statistically significant association was found between food insecurity and receiving television messages on obesity among SNAP participants. Seventy-five percent of the survey respondents reported they have not heard

messages about what it means to be overweight and/or obese through computers, and 76% reported they had received messages through television. Utilizing various communication mediums have been shown to positively impact health (Beaudoin, Fernandez, Wall, & Farley, 2007; Campbell, Honess-Morreale, Farrell, Carbone, & Brasure, 1999; Freimuth, & Quinn, 2004). Computer-tailored nutrition education programs and television entertainment education may have the potential to reach large segments of the population, specifically women (Campbell, Honess-Morreale, Farrell, Carbone, & Brasure, 1999). By providing tailored nutrition education programs specific to women, these programs may serve as effective tools in disseminating nutrition information, promoting behavior change towards a healthy diet, and encouraging self-efficacy in adopting a healthier lifestyle, especially among women who participate in the SNAP and WIC programs (Brug, Oenema, & Campbell, 2003; Campbell, Honess-Morreale, Farrell, Carbone, & Brasure, 1999).

In addition to computer-tailored nutrition education programs and television entertainment education, successful uses of health communication will utilize multifaceted approaches such as radio, doctor's offices, and workplaces in order to effectively reach intended audiences (Beato, & Telfer, 2010; Hall, Johnson-Turbes, & Williams, 2010; Parvis, 2002). A statistically significant association was found between food insecurity and other ways (radio, work, school, doctor's office) to receive obesity messages among WIC participants. The study found that 82% of survey respondents reported they had not heard messages about what it means to be overweight and/or obese through radio. Radio may serve as a potential medium to disseminate health messages and reduce disparities (Hall, Johnson-Turbes, & Williams, 2010).

Radio stations, (specifically those that target minority audiences), can play an important role in health promotion by encouraging community partnerships, promoting drug awareness,

education, nonviolent behavior, and other community issues related to health (Beaudoin, Fernandez, Wall, & Farley, 2007; Hall, Johnson-Turbes, & Williams, 2010). Radio can serve as an effective way to recruit African- Americans into public health intervention studies and focus groups to explore attitudes and beliefs on issues including breast cancer, prostate cancer, and smoking (Giri et al., 2009; Johnson-Turbes, Hall, Kamalu, & Zavahir, 2008; Webb, Seigers, & Wood, 2009). Considering a wide range of communication mediums to promote health information will be important in changing perceptions and behaviors toward obesity among low-income minority groups.

Health communication using primary care facilities may also serve as a medium to address obesity. Studies have suggested that effective communication between patients and providers leads to beneficial health outcomes for patients such as improved treatment for diabetes and hypertension (Flach et al., 2004; Greiner et al., 2008; Potter, Vu, & Croughan-Minihane, 2001). By collaborating with healthcare providers, patients become a part of the decision-making process. Patient-centered collaboration allows physicians the ability to provide health education, behavioral recommendations, and appropriate referral of resources that are specific to the patient and their health needs. By including patients in the conversation about obesity, it allows patients to receive direct information and specific recommendations that can encourage behavioral changes, promote self-efficacy, and motivate patients to reach their health goals (Greiner et al., 2008; Stewart et al., 2000).

The study found that 96.6% of respondents self-identified as African American. Although studies have shown that race and food insecurity are factors that directly impact health and were associated with both chronic disease and chronic disease control particularly in African-Americans and Hispanic/Latinos and minority women an association between race and

obesity and race and food insecurity was not found in this study (Adams et al., 2003; Hedley et al., 2004; Kushel et al., 2006; Seligman, Larala, & Kushel, 2010; Terrell & Vargas, 2009; Townsend et al., 2001). The lack of variation among the respondents may have impacted the results of this study.

This study also found that 52.1% of respondents worked full-time and 21.8% worked part-time, which suggested that the majority of participants were employed at the time of this study. Employed adults spend a quarter of their lives at work, and as a result of the pressures and demands (psychosocial stress and job strain) at work, eating habits and activity patterns can be affected and may lead to overweight and obesity among employees (Geliebter, Gluck, Tanowitz, Aronoff, & Zammit, 2000; Hellerstedt, & Jeffery, 1997; Schulte et al., 2007). Whereas some studies have highlighted the negative impact of the workplace on weight, other studies have suggested that the workplace can serve as a partner to employees in preventing obesity through workplace obesity prevention programs. These programs can serve as effective ways to addressing obesity by utilizing theory and evidence-based interventions reaching larger segments of the population, and providing incentives for employees to participate (CDC, 2014; Heinen & Darling; 2009).

Quantitative statistics were also used to support earlier qualitative findings. Store proximity and locality were identified as a major theme from the qualitative interviews. Participants highlighted that where WIC and SNAP clients shopped was based on how close the stores were to WIC and SNAP clients. More than 23% of respondents reported that they shopped at convenient stores 2-3 times a week and roughly 97% of respondents reported buying the majority of their family's food from a local major grocery store. These findings suggest that neighborhood food environments affect low-income women's food choices and access to food.

Food affordability was also identified as a theme in the qualitative findings. Further quantitative findings suggested the majority (18.5%) of respondents reported that the assistance that they receive for food feeds their families for four weeks. These results indicate that in the months of the year where there are more than four weeks, many participants experienced hardships in being able to afford food for their families for the remainder of the month.

The lack of nutrition knowledge among WIC and SNAP participants was another theme identified in the qualitative findings. Interview participants identified the need to receive messages about health and well-being from their elected officials through communication mediums such as television and community letters. In the quantitative data, roughly 76% of respondents reported they had received messages on obesity from television. In addition to highlighting the role that policy -makers play in promoting health and wellness, participants also identified that public health advocates such as health departments, clinics, and private doctor's offices play a role in promoting nutrition knowledge. In the quantitative data, more than 89% of respondents reported that they had not heard messages about obesity from other sources such as primary care facilities. By utilizing a variety of mediums such as television, radio, and healthcare facilities, public health professionals and advocates can reach a larger audience and increase nutrition knowledge and obesity education among the groups most affected by this health problem.

The lack of nutrition regulations specifically within the SNAP program was a major theme identified in the qualitative findings. Qualitative findings suggested that when food assistance participants are not required to follow any nutritional guidelines this can lead to poor food selections which can potentially cause obesity. Regarding the quantitative data, more than 45% of respondents reported eating junk food 2-3 times a week. Studies have suggested that many of the calories consumed

by low-income SNAP participants come from products that contain added sugars, high fats and sodium, and have been associated with obesity (Drewnowski, & Specter, 2004; Hu, Manson, & Willett, 2001; Leung, Walter, Willett, & Ding, 2012; Malik, Shulze, & Hu, 2006).

Contrary to literature findings, results from this study did not show a statistically significant relationship between obesity and food insecurity (Wilde, & Peterman, 2006). Based upon the results of the Fisher's Exact test, there was no association between obesity and food insecurity among low-income women. A lack of access to the target population may have impacted the results of this study. The study aimed to recruit low-income and food insecure women who currently participate in federally-funded food assistance programs (SNAP and WIC). Of the 119 respondents, 56.3% of respondents participated in the SNAP program and 21.8% participated in the WIC program. The percentage of respondents who participated in both SNAP and WIC did not include the entire sample. Due to federal regulations of the WIC and SNAP programs, clients that participate in these programs were not allowed to be identified or approached in WIC and SNAP facilities by outside entities, this policy included graduate students. Therefore, participants for this study could only be recruited from limited locations which included community organizations (churches, parks and recreation centers) with the idea in mind that participants from these organizations would be able to provide feedback regarding the impact of obesity and food insecurity.

In addition, the study sought to recruit low-income women who participate in federally funded nutrition assistance programs. However, as a result of the necessary variety in recruiting strategies, multiple income levels were represented in the sample. The multiple income levels represented by the respondents may have impacted the results of this study, and caused a lack of

association between obesity and food insecurity in the quantitative results. The results of this study revealed that a statistically significant association was found between obesity and personal perceptions of obesity risk. The findings from this study suggest the need to further explore low-income women's perceptions of risk factors associated with obesity. Addressing the misperceptions about obesity and the consequences it has on health will require interventions that focus on health education, behavior change approaches, peer support and collaboration from private and public sectors.

In addition, future studies exploring how low-income women receive messages on obesity will be beneficial in understanding what communication mediums are more efficient in promoting health education on obesity. By expanding communication mediums (computer and radio) to reach larger audiences, computer and radio mediums have the potential to serve as a major source of health information that raises awareness and informs audiences. The use of targeted interventions that utilize computer and radio as communication channels may serve as valuable sources in addressing health disparities, through an interactive learning that provides two-way communication (Brug, Oenema, & Campbell, 2003; Hall, Johnson-Turbes, & Williams, 2010). By utilizing comprehensive and multifaceted (computer, radio, television and print) approaches to deliver interventions with targeted messages, health communication strategies and practices can serve as tools in creating social change (CDC, 2011; Freimuth, & Quinn, 2004). Multi-strategy health communication programs can also support policy change through media advocacy. Utilizing media to increase awareness of a health issue can shape the debate surrounding a health issue and the political environment in which the decisions that affect health and health resources are made. Communication mediums can be used to advocate for a position on a health issue or policy and increase support for health services. By gaining interest and

support from political leaders, public health professionals can work collaboratively with policy makers to impact policy changes to improve health (Freimuth, & Quinn, 2004; National Cancer Institute, 2001).

This research study helps support the findings and claims in other studies that address the obesity, food insecurity relationship. Several of the themes that emerged from the interviews confirm findings from studies in previous literature. The lack of nutrition knowledge, lack of transportation, and lack of access to healthy foods were identified as themes from the interviews that support previous literature finding which have shown that all three create barriers to obtaining and maintaining a healthy diet (Haynes-Maslow, Parsons, Wheeler, & Leone, 2013; Wiig & Smith, 2008). In this study an association was not found between obesity and food insecurity, contrary to literature findings (Adams, Grummer-Strawn, & Chavez, 2003; Wilde, & Peterman, 2006). As in similar studies eating home-cooked meals instead of fast food meals and consuming three meals a day lowered the risks of becoming obese (Bachman, Phelan, Wing, & Raynor, 2011; Lin, & Frazao, 1997; Ma et al., 2003; McCrory et al., 1999). This study found an association between obesity and income and obesity and having children which also supports findings in other studies (Nteff, 2013; Ploeg, Chang, & Lin, 2008; Raatikainen, Heiskanen, & Heinonen, 2006; Truong & Sturm, 2005). An association was also found between obesity and receiving computer messages about what it means to be overweight and/or obese through computers (Beaudoin, Fernandez, Wall, & Farley, 2007; Campbell, Honess-Morreale, Farrell, Carbone, & Brasure, 1999; Freimuth, & Quinn, 2004).

In addition to findings that support those in existing studies on obesity and food insecurity, new findings also emerged from the current study. An association was found between food insecurity and other food preparation methods and food insecurity and receiving television

messages on obesity. This study found that women who participate in SNAP were less likely to utilize other food preparation methods (e.g. boiled, sautéed, and stir-fried), and were more likely to have heard messages about what it means to be overweight and/or obese through television compared to non-SNAP participants. An association also was found between food insecurity and eating fast food and food insecurity and utilizing other ways to receive obesity messages among WIC participants. The current study found that women who participate in WIC were less likely to eat fast food compared to non-WIC participants, and were less likely to use other ways to receive obesity messages (e.g. doctor, work, and school). This study contributes to the current literature that addresses the obesity, food insecurity paradox, and factors that influence this relationship by supporting previous findings and presenting new finding that help to explain the association between obesity and food insecurity.

Implications

The findings of this study have a number of important public health implications for future practice. Future research examining the social determinants of obesity and food insecurity in low-income women, (particularly those that participate in federally-funded nutrition assistance programs), will require direct access to this population. Although several studies have shown a relationship between obesity and food insecurity, a link between obesity and food insecurity among the participants in this study was not found. Due to federal regulations of the WIC and SNAP programs, clients that participate in these programs were not allowed to be identified or approached in WIC and SNAP facilities. As a result of these regulations, contact with the target population was limited although recruitment took place at several locations in which the target demographic could be identified in a non-stigmatizing manner (church, recreational center, and park). In future studies a comprehensive assessment of the sample population should involve

direct contact with the aforementioned target population. Establishing solid relationships with organizations that have direct contact to the target population such as the Macon Housing Authority, the Head Start Program, and local food banks will help to create dialogue surrounding the obesity and food insecurity relationship; and build community partnerships, which will aid in providing greater access to the target population.

Utilizing community based organizations such as United Way, local churches, schools, and neighborhood pharmacies can help to address the issue of food insecurity and the health risks associated with poor nutrition. Community-based organizations are essential in communities with limited resources and multiple needs. Working with community-based organizations helps to leverage community resources and build relationships. These resources include: utilizing churches, schools and pharmacies to provide health education on food insecurity and the impact it has on health, performing health screenings and medicine consultations through local pharmacies and community sponsored health fairs, utilizing school facilities in the afternoon for communities to engage in physical activity, providing meals through church based food ministries, offering school sponsored cooking demonstrations for low-income food insecure women and their families, and providing access to fresh fruits and vegetables from local farmers through local church and school sponsored farmer's markets.

The current study demonstrates that community barriers can limit low-income women's ability to obtain and maintain a healthy lifestyle. By addressing barriers such as lack of healthy food access, poor food quality, and lack of food affordability, intervention strategies can be developed and utilized to promote healthy eating and address obesity among WIC and SNAP participants. Addressing the community barriers in this study will require developing multifaceted approaches to improving nutrition. These approaches include increasing the number

of grocery stores and farmers markets in low-income communities and increasing partnerships between federally funded nutrition assistance programs, local farmers, and local store owners in an effort to provide affordable, high quality, and nutritious foods. In addition to improving food access, quality, and affordability, partnerships between federally-funded nutrition assistance programs, local farmers and grocery store owners can also be beneficial in addressing transportation barriers. By providing transportation services that come into the community (such as vegetable and fruit trucks operated by local farmers), or providing courtesy vans from local grocery store owners, low-income communities benefit from these services through increased food and vegetable consumption, and local farmers and store owners increase their business (Algert, Agrawal, & Lewis, 2006; USDA, 2009).

The nutrition behavior of low-income women can provide insight into the development of well-targeted interventions to improve nutrition assistance programs. Impacting nutrition practices through federally-funded nutrition assistance programs can influence health outcomes of low income women by improving diet quality, fruit and vegetable consumption, and shopping practices (Hersey et al., 2001; Mabli et al., 2010). The utilization of nutrition assistance programs can reduce chronic diseases such as diabetes, heart disease, and stroke. These strategies can also reduce costs associated with obesity by providing benefits that allow clients to afford adequate diets which include foods associated with positive improvements in dietary quality and nutrient density (CDC, 2012; FRAC, 2013; Thorpe, Florence, Howard, & Joski, 2004).

Nutrition assistance programs alleviate poverty by providing SNAP benefits that positively impact families' incomes and move households above the national poverty line (FRAC, 2013; United States Census Bureau, 2011). These programs also help to reduce food insecurity by enhancing the food purchasing power of eligible low-income families and

providing supplemental nutrition assistance to low-income pregnant women and low-income families with children up to the age of five (FRAC, 2013; WIC, 2013). Food insecurity is associated with some of the most costly health problems in the United States such as diabetes, heart disease, and obesity (Eisenmann, Gundersen, Lohman, Garasky, & Stewart, 2011; Seligman, Bindman, Vittinghoff, Kanaya, & Kushel, 2007; Vozoris, & Tarasuk, 2003). Nutrition assistance programs are critical because they reduce food insecurity and ultimately the negative health consequences associated with food insecurity (FRAC, 2013; WIC, 2013).

The findings from this study can be used to actively engage low-income women through new communication mediums (computer –tailored nutrition education programs) focused on providing nutrition education and delivery of services from federally-funded nutrition assistance programs. By stepping out of WIC and SNAP facilities and expanding how these programs communicate and promote services to the community, providing computer-tailored nutrition education may serve as a promising tool to motivate women to make healthy dietary changes. Designing computer –tailored nutrition education programs specific to women will help to improve the health of low-income women and their children since women are often the gatekeepers of food and nutrition for the family. For example, women do much of the planning, shopping and preparing of the family meals, which has the potential to positively influence the diets of their family members (Case & Paxson, 2002; Jilcott, Laraia, Evenson, & Ammerman, 2009).

Computer-tailored nutrition education programs can be useful to federally funded nutrition assistance programs because they have the potential to deliver culturally appropriate nutrition education messages that incorporate relevant concerns, barriers and motivators of the individual (Campbell, Honess-Morreale, Farrell, Carbone, & Brasure, 1999). By serving as a

stand-alone, self-help program that includes education and media to deliver audio and visual messages rather than printed messages, this program is more accessible to participants with lower literacy levels. Computer-tailored nutrition education programs may have the potential to reach larger numbers of WIC and SNAP participants compared to the face-to-face nutrition counseling that is currently offered through these programs. In addition, a computer-tailored nutrition education intervention can potentially reduce the burden of additional responsibilities for the WIC and SNAP agencies (Brug, Oenema, & Campbell, 2003). By tailoring health education messages to the individual and providing individual feedback and advice, this strategy may serve as a more effective way to promote self-efficacy, change nutrition behaviors, and prevent obesity among low income women.

Additional studies that explore food insecurity and the link to obesity from an ecological standpoint are needed in addition to longitudinal studies that began in childhood and/or adolescence, to determine whether the exposure to food insecurity, poor nutrition and unstable dietary consumption practices serve as precursors for poor behaviors towards nutrition and obesity in adulthood. By exploring obesity over time researchers can gain insight as to what predisposing factors in childhood and youth contribute to obesity in adulthood among low-income women. In addition, future research on poor neighborhood food environments and the effect it has on poor food choice may also produce valuable data on the issue of obesity and food insecurity.

Study Strengths and Limitations

The use of a mixed method research approach to examine the relationships among obesity, food insecurity, and the perceptions and behaviors toward dietary nutrition was the primary strength of this study. Qualitative interviews with key informants provided rich in depth

narratives that were exemplified in themes and quotes. Subsequently, the quantitative surveys provided data that allowed quantitative predictions to be made and answered the emergent research questions. By utilizing a mixed methods research approach, data were triangulated and merged. This approach facilitated the validation of the research data through cross verification from the qualitative interviews to the quantitative surveys, which allowed each method to complement the other. Interviews from the qualitative phase were used to help develop the survey instrument used in the quantitative phase of the study. By incorporating both qualitative and quantitative research methods, the researcher sought to gain a greater understanding of the obesity/food insecurity relationship.

Additional strengths of the study included the use of pre-testing and pilot testing of the survey to improve readability, understanding, and clarity of each question. These methods resulted in the elimination of two consistently misunderstood questions, but similar information was captured from other questions that were well-understood by the participants. The focus of the study on low-income women aged 18 to 44 years helps to identify a segment of our population who are of child-bearing age and often times are mothers and head of households where food insecurity is present. The knowledge gained by the researcher and participants is useful in helping to identify why the relationship between obesity and food insecurity exists and who needs to be a part of the conversation to create solutions that address this health concern.

Limitations to this study should be considered, however. Pilot testing of the survey instrument revealed low variation from the survey variables and made it impossible to perform psychometric testing as anticipated previously in the research procedures for this study. The survey instrument in this study was not assessed for reliability. Psychometric testing would have shown the level of internal consistency reliability and validity information. Future research

should establish the psychometric properties of the survey. Exploratory Factor Analysis could be used to determine the dimensionality of the survey instrument (i.e., the identification of possible subscales). Exploratory Factor Analysis serves to orderly simplify interrelated measures without imposing preconceived structure on the outcome. In addition, Exploratory Factor Analysis is utilized to aid in condensing information gathered from the survey data. In addition, all participant-data gathered were self-reported, which increases the potential for social response bias. The use of self-report assessment tools to elicit information regarding a participant's weight, height and age may lead to discrepancies, and inaccuracy in BMI results. The use of self-report assessment tools may have influenced participants to falsely report their age, weight and height, while also impelling participants who were unaware of their correct weight and height to provide incorrect information. The study surveys were conducted in person by the primary researcher, which may have influenced participants' responses especially surrounding sensitive questions about their experiences with federal food assistance programs, food insecurity, and health as it relates to weight (Huang, Liao, & Chang, 1998; Johnson & Fendrich, 2005; Toozee et al., 2004).

This study represents just one of only a few recent studies seeking to examine the relationship between obesity and food insecurity among low-income women (Adams, Grummer-Strawn, & Chavez, 2003; Dinour et al., 2007; Lyons, Park, & Nelson, 2008). The results of this study cannot be generalized to the entire population of low-income women who are obese and experience food insecurity. The sample participants in this study were not representative of the population due to the convenience sampling (voluntary sampling) method that was utilized by the investigator to recruit participants. As a result of utilizing a convenience sampling (volunteer sampling) method, multiple education levels were represented in the sample. The multiple

education levels represented by the respondents may have impacted the results of this study, and caused a lack of association between obesity and education in the quantitative results. The findings from this study suggest that utilizing a convenience sample may have the potential to create bias among the research sample. By utilizing a convenience sample, inferences about the entire population could not be made and only allowed the sample to be representative of itself and not a wider population.

Access to the target population was also a limitation of this study. Due to federal regulations of the WIC program and the SNAP program, clients who participate in these programs were not allowed to be identified or approached in WIC and SNAP facilities by outside entities, which include graduate students. Therefore, participants for this study could only be recruited from limited locations which included community organizations (churches, parks, and recreation centers) with the idea in mind that participants from these organizations would be able to provide feedback regarding the impact of obesity and food insecurity. The inability to provide private face-to-face interviews with participants was also a limitation of this study. Qualitative data for this study were obtained through key informant interviews only, limiting the gain of in-depth perspective from participants in order to identify and understand factors that comprise neighborhood food environments and impact perceptions and behaviors toward dietary nutrition.

Future Research

The findings of this study indicated that lack of nutrition knowledge, lack of transportation, and limited access to grocery stores and super markets were reported to be barriers to obtaining and maintaining a healthy lifestyle. The results of the study also suggested that the following factors were associated with obesity and were shown to influence obesity: income, preparing home-cooked meals, number of meals to eat a day, having children, and

receiving computer message on obesity. In addition, the results of the study suggested that the following factors were associated with food insecurity and were shown to influence food insecurity among SNAP participants: other food preparation methods such as (e.g. boiled, sautéed, and stir-fried) and receiving television messages on obesity. Furthermore, the results of the study suggested that the following factors were associated with food insecurity and were shown to influence food insecurity among WIC participants: eating fast food and other ways to receive obesity messages such as (e.g. doctor, work, and school).

The findings of this study suggest high levels of awareness of obesity risk factors and high levels of obesity among respondents. In future research and program interventions, a focus should be placed on how to overcome the gap between knowledge and behavior. By providing low-income women with community resources such as healthy cooking demonstrations at local grocery stores, farmers markets, and health fairs where they can also purchase the foods that are being used in the demonstration, low-income women can learn how to make healthier choices and improve nutrition behaviors. Incorporating well-targeted cooking strategies that focus on preparing meals that are quick, nutritious, require limited ingredients and are affordability for low-income women will be valued service that can be translated into practice. By engaging with various community partners (local grocery stores, local farmers, and public health advocates) that also provide services to low-income women, barriers such as food cost and lack of nutrition knowledge can be addressed whereas healthier behaviors can be modeled. In addition to improving nutrition behaviors, program interventions that focus on improving the built environment will also help to address the gap between knowledge and behavior. By collaborating with policy makers, stakeholders, and community partners to develop and improve neighborhood parks, walking trails, and recreational centers, this will provide women with environments that

allow them to be physically active. Future program interventions will also need to implement measures that ensure safety so that women feel safe and want to engage in exercise in their neighborhoods. These measures include providing street lights, streets and trails that provide good walkability, and courtesy officers that patrol areas where high crime has been identified.

The findings of this study can also be applied to rural communities within the United States. Rural communities are faced with a number of challenges that have been identified as risk factors for obesity and food insecurity. These challenges included poorer-quality food, limited options for transportation, lower access to healthcare, and lower levels of physical activity (Dillion & Rowland, 2008; Hosler, 2009; Morton, Bitto, Oakland, & Sand, 2005; Morton, Worthen, & Weatherspoon, 2004; Yousefian, Ziller, Swartz, & Hartley, 2009). Poor food quality in rural communities has been linked to obesity (Hosler, 2009; Morton, Bitto, Oakland, & Sand, 2005; Morton, & Blanchard, 2007) Many rural families live in food deserts where grocery stores and healthy food options are limited. These limitations increases families reliance on shopping at convenience stores with higher food prices and fewer options resulting in eating more processed foods which have been linked to obesity (Morton, Bitto, Oakland, & Sand, 2005; Morton, & Blanchard, 2007). The lack of transportation has also been linked to obesity and food insecurity among rural residents. Traveling long distances from home to the grocery store and the high cost of gas presents challenges for rural communities that lack public transportation (Dillion & Rowland, 2008; Yousefian, Ziller, Swartz, & Hartley, 2009). These challenges limit rural residents shopping choices which may impact their eating behaviors. In addition to transportation there is also a lack of access to quality healthcare services. Due to high rates of unemployment, lack of insurance coverage by employers, and fewer healthcare providers in rural areas, rural communities often lack the healthcare services needed to address problems

associated with nutrition (Morton, Worthen, & Weatherspoon, 2004; United States Census, 2014). Although rural communities are identified as having more open space compared to urban areas, studies have found that there is little open public space available for residents (Dillion & Rowland, 2008; Yousefian, Ziller, Swartz, & Hartley, 2009). Rural communities may lack the governing body needed to provide public space or care for existing space resulting in lack and/or neglect of spaces to engage in physical activity. In addition to public space, sparsely populated communities with fewer community partners and lack of large indoor spaces, such as malls make it difficult to bring physical activities opportunities to the community (Dillion & Rowland, 2008; Patterson, Moore, Probst, & Shinogle, 2004; Yousefian, Ziller, Swartz, & Hartley, 2009).

The findings of this study did not support an existing relationship between obesity and food insecurity among the sample population. Additional research is needed to explore the obesity and food insecurity paradox, specifically in low-income women that participate in food assistance programs. As studies increase investigating the obesity and food insecurity relationship, opportunities for explanatory research will also increase which is needed to better understand how obesity and food insecurity can co-exist within a population. In future research studies, a focus should be placed on using a more rigorous survey sampling approach to expand the sample size and increase contact between the researcher and the target population. Future studies should utilize larger samples to explore predictors of obesity. There is also a need for more qualitative studies that examine the link between obesity and food insecurity. An increase in qualitative research studies could aid in identifying specific factors that contribute to obesity and food insecurity. Future research is also needed to determine the role that public health and federally funded nutrition assistance programs can play in increasing nutrition knowledge and

access and preventing and decreasing obesity among women that participate in food assistance programs.

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APPENDICES

Appendix A

CONSENT TO PARTICIPATE (KEY INFORMANT INTERVIEW)

CONSENT TO PARTICIPATE IN RESEARCH: KEY INFORMANT INTERVIEW

You are being asked to participate in a study on the use of food assistance programs by Women Infant and Children and the Food Stamp (EBT) Program. You were selected for the study because of your participation (as an administrator, staff member or affiliate) in one or both of these federal food assistance programs. The information gathered for this project will be used by Amanda Lowe-DuBose, a graduate student at Georgia Southern University, in the completion of her doctoral dissertation.

Purpose of the Study:

The aim of the study is to identify and understand factors that comprise neighborhood food environments and impact perceptions and behaviors toward dietary nutrition. The contribution of information gathered during this study will be beneficial to low-income women who participate in food assistance programs, because it will look at food access and accessibility among WIC and Food Stamp (EBT) participants and increase dialogue on identifying ways to improve neighborhood food environments in the form of recommendations to the WIC and Food Stamp administrators.

Procedures:

If you volunteer to participate in this study, you will be asked to do the following things: Participate in an interview regarding your experiences educating and working with women who utilize the WIC and/or Food Stamp programs in order to purchase food, learn about healthy food preparation and dietary nutrition. The interview will be documented through both comprehensive note taking and digital audio recording and transcribed verbatim to gain an understanding of the perceptions and behaviors of WIC and Food Stamp participants. The interview should take approximately 30 minutes to complete.

Potential Risks and Discomforts

The risks of the research are minimal. However, you may feel some discomfort speaking about your experiences with federal food assistance programs. If you are uncomfortable with any of the questions, you can skip questions and stop participating at any time.

Potential Benefits to Study Participants/ and or Society:

As a result of sharing your experiences with the researcher, recommendations for improving the access and accessibility of healthy food options to WIC and Food Stamp recipients may be made. These recommendations will address the needs that interviewees, such as yourself, have identified. Therefore, the results of this interview may potentially improve your access to resources in your community.

Duration:

The interview should last about 30 minutes, but depending on how much you have to share, it may be shorter or longer.

Confidentiality:

The information you share will only be used in this study. Once the information is collected and stored, all information that can identify you will be removed. Your name will not be associated

with your responses and will be identified only by an assigned code number. The information you give will be stored electronically on password-protected computers. Once data has been collected and analyzed from the Key Informant interviews, the information will be destroyed after a 7 year period. After 7 years, all notes and electronic transcripts will be permanently deleted.

Questions about the Study:

If you have any questions about this study or your part in it, please speak with Amanda Lowe-DuBose, Principal Investigator at 251-769-1007. If you have any questions about your rights as a participant in this study or any concerns or complaints, please contact the Georgia Department of Public Health Institutional Review Board at 404-463-2448 or via email at irb@dhr.state.ga.us.

Compensation:

A free gift bag valued at \$5 will be provided to key informants that participate in the interview. Partial compensation will be provided to participants that start but do not complete an interview. Prior to beginning the interview the PI will inform the participants about how they will be compensated for their full and partial participation. Participants who partially complete the interview will receive a healthy snack for their participation in the study.

Voluntary Participation and Withdrawal:

Your participation in this study is voluntary. You have the right to not be in this study. If you do not participate, you will not lose any benefits to which you are otherwise entitled and will continue to receive services from the Women, Infants, and Children and the Supplemental Nutrition Assistance Program. If you decide to be in the study and change your mind, you have the right to drop out at any time. You may also skip questions that you do not wish to answer. To withdraw from the study, please contact the Principal Investigator Amanda Lowe-DuBose, by calling 251-769-1007.

Penalty:

There is no penalty if you decide not to participate in this study.

Participant Signature:

You will be given a copy of this consent form to keep for your records. This project has been reviewed and approved by the GSU Institutional Review Board under tracking number H13453.

Title of Project: Obesity, Food Insecurity and the Impact On Perceptions and Behaviors Toward Dietary Nutrition In Low Income Women In Georgia

Principal Investigator: Amanda Lowe-DuBose, 251-769-1007, al01911@georgiasouthern.edu

Faculty Advisor: Dr. Moya Alfonso, 912-478-0966, malfonso@georgiasouthern.edu

Participant Signature

Date

I, the undersigned, verify that the above informed consent procedure has been followed.

Investigator Signature

Date

KEY INFORMANT INTERVIEW GUIDE FOR COMMUNITY PARTNERS IN MACON, GA

“Hello. Thank you for agreeing to be interviewed. This interview is for a project that I am working on as a graduate student at Georgia Southern University, in the completion of my Doctorate Dissertation. I am interested in hearing your perspective about obesity, food insecurity and the availability and access of nutritional foods in the community.

The interview should last about 30 minutes, but depending on how much you have to share, it may be shorter or longer. Taking part in this in this interview is purely voluntary. You can choose to pass on any questions, or stop the interview at any time. I will be taking notes and recording (with your permission) this discussion so as not to miss any of your valuable insight. All information from the interviews will be utilized for research insight and recommendation to improve local food environments. Do you have any questions about the interview process before we begin?”

1. What is your relationship with the community of Macon, Georgia?
2. What concerns you most about the health status of the women that participate in the WIC and Food Stamps programs in Macon, Georgia?
3. Where do members of your community shop for healthy food selections?
4. What challenges or barriers do policy makers face when trying to implement policy or legislation to improve healthy food access and affordability?
5. How can policy makers collaborate with community partners to address the prevalence of obesity among in WIC and Food Stamp participants in Macon, GA?
6. What are the current health initiatives taking place in Macon, GA that utilize WIC and Food Stamps to improve the health and wellness of the communities?
7. What role can policy makers take in promoting health and wellness in their communities?
8. What incentives if any are available, for local stores, restaurants and farmers markets that provide healthy food options?
9. Who are the public health advocates in your community, and what is your working relationship with this group or groups?
10. What ideas or suggestions would you offer fellow policy makers, to improve the health and wellness of the communities in Macon, GA?
11. As a public servant, how will you use your role in leadership to improve the health outcomes of your constituents?

12. Is there anything else about nutrition, community partnerships, policies or food access and availability that I haven't asked that you would like to talk about that you weren't able to share earlier?

Appendix B

CONSENT TO PARTICIPATE (SURVEY)

CONSENT TO PARTICIPATE: SURVEY

You are being asked to participate in a study on food insecurity and obesity in Georgia. You were selected for the study based upon the idea in mind that you will be able to provide feedback regarding the impact of obesity and food insecurity on personal perceptions and behaviors toward dietary nutrition among women. The information gathered for this project will be used by Amanda Lowe-DuBose, a graduate student at Georgia Southern University, in the completion of her doctoral dissertation.

Purpose of the Study:

The aim of the study is to identify and understand factors that comprise neighborhood food environments and impact perceptions and behaviors toward dietary nutrition. The contribution of information gathered during this study will be beneficial to low-income women particularly women who participate in food assistance programs, because it will look at food access and accessibility among WIC and Food Stamp (EBT) participants and increase dialogue on identifying ways to improve neighborhood food environments in the form of recommendations to the WIC and Food Stamp administrators.

Procedures:

If you volunteer to participate in this study, you will be asked to do the following things: Participate in a survey to gather information about your experiences with food access, food availability and the impact of nutrition on your health, personal behaviors and perceptions toward dietary nutrition. The survey should take approximately 20-30 minutes to complete.

Potential Risks and Discomforts

The risks of the research are minimal. However, you may feel some discomfort speaking about your experiences with federal food assistance programs. If you are uncomfortable with any of the questions, you can skip questions and stop participating at any time.

Potential Benefits to Study Participants/ and or Society:

As a result of sharing your experiences with the researcher, recommendations for improving the access and availability of healthy food options to food insecure communities may be made. These recommendations will address the needs that interviewees, such as yourself, have identified. Therefore, the results of this survey may potentially improve your access to resources in your community.

Duration:

The survey should last about 30 minutes, but depending on how much you have to share, it may be shorter or longer

Confidentiality:

The information you share will only be used in this study. Once the information is collected and stored, all information that can identify you will be removed. Your name will not be associated with your responses and will be identified only by an assigned code number. The information you give will be stored electronically on password-protected computers. Once data has been

collected and analyzed from the survey, the information will be destroyed after a 7 year period. After 7 years, all notes and electronic transcripts will be permanently deleted.

Questions about the Study:

If you have any questions about this study or your part in it, please speak with Amanda Lowe-DuBose, Principal Investigator at 251-769-1007.

Compensation:

A packet of WIC approved educational materials on health and nutrition and free gift bag valued at \$5 will be provided to women that participate in the survey.

Voluntary Participation and Withdrawal:

Your participation in this study is voluntary. You have the right to not be in this study. If you decide to be in the study and change your mind, you have the right to drop out at any time. You may also skip questions that you do not wish to answer. To withdraw from the study, please contact the Principal Investigator Amanda Lowe-DuBose, by calling 251-769-1007.

Penalty:

There is no penalty if you decide not to participate in this study.

Participant Signature:

You will be given a copy of this consent form to keep for your records. This project has been reviewed and approved by the GSU Institutional Review Board under tracking number H13453.

Title of Project: Obesity, Food Insecurity and the Impact On Perceptions and Behaviors Toward Dietary Nutrition In Low Income Women In Georgia

Principal Investigator: Amanda Lowe-DuBose, 251-769-1007, al01911@georgiasouthern.edu

Faculty Advisor: Dr. Moya Alfonso, 912-478-0966, malfonso@ georgiasouthern.edu

Participant Signature

Date

I, the undersigned, verify that the above informed consent procedure has been followed.

Investigator Signature

Date

The following survey is intended to gather information about food access, food availability and the impact of nutrition on health, personal behaviors and perceptions. The survey will take 20 minutes to complete and participant's answers are anonymous and no identifying information will be included in this research. Thank you for agreeing and taking the time to complete this survey.

Assessment Questions:

1. What is your Age? _____
2. What is your height? _____
3. What is your weight? _____

Now I am going to ask you about your Medical History.

1. How would you rate your general health?
 - A. Excellent
 - B. Good
 - C. Fair
 - D. Poor

2. Where do you **usually** go for routine physical exams or check-ups?
 - A. Private doctor's office
 - B. Hospital clinic
 - C. Health Department clinic
 - D. Community Health Center
 - E. Other location (**Specify**)_____
 - F. Don't GO
 - G. Refused

3. Where do you **usually** go when you are sick?
 - A. Private Doctor's office
 - B. Hospital clinic
 - C. Health Department clinic
 - D. Community Health Center
 - E. Emergency room
 - F. Other location (**Specify**) _____
 - G. Don't go
 - H. Refused

4. How long has it been since you last visited your doctor, or other health care provider for any reason?
 - A. Within the past year [0 to 12 months ago]
 - B. Within the past 1-2 years [13 to 24 months ago]

- C. Within the past 2-5 years [25 to 60 months ago]
- D. 5 or more years ago
- E. Don't know/Not sure
- F. Refused

The next group of questions asks you to report your health and family history.

5. Compared to other women your age, would you say that your physical health is:
- A. Excellent
 - B. Good
 - C. Fair
 - D. Poor
 - E. Don't know/Not sure
 - F. Refused
6. Have you ever been identified as overweight or obese by a physician?
- A. Yes
 - B. No (**Go to Question- 8**)
 - C. Don't know/Not sure (**Go to Question- 8**)
 - D. Refused (**Go to Question- 8**)
7. If yes which were you identified as?
- A. Obese
 - B. Overweight
 - C. Don't know/Not sure
 - D. Refused
8. Do you have any relatives who are overweight?
- A. Yes
 - B. No (**Go to Question- 10**)
 - C. Don't know/Not sure (**Go to Question- 10**)
 - D. Refused (**Go to Question-10**)
9. Which relative or relatives are overweight?
- A. Mother
 - B. Sister(s)
 - C. Daughter(s)
 - D. Grandmother(s)
 - E. Aunt(s)
 - F. Other (**SPECIFY**)_____
10. Do you have any relatives who are obese?
- A. Yes
 - B. No (**Go to Question- 12**)
 - C. Don't know/Not sure (**Go to Question-12**)
 - D. Refused (**Go to Question-12**)

11. Which relative or relatives are obese?
- A. Mother
 - B. Sister(s)
 - C. Daughter(s)
 - D. Grandmother(s)
 - E. Aunt(s)
 - F. Other (**SPECIFY**)_____

These next questions are about food access in your community.

12. How often do you shop for food?
- A. 1 time week or more
 - B. Every other week
 - C. 1 or 2 times /month
 - D. Less than 1 time a month
 - E. Other (**SPECIFY**)
 - F. Never
13. How often do you buy food from a convenient store?
- A. Daily
 - B. Almost daily
 - C. 2-3 times a week
 - D. Weekly
 - E. Every other week
 - F. Other (**SPECIFY**)_____
 - G. Never

14. Where do you purchase the majority of the food your family eats?
- A. Major grocery store
 - B. Convenient store
 - C. Farmers Market
 - D. Other (**SPECIFY**)_____

15. Which of the following stops you from buying the food that you need?
- A. Nothing
 - B. Utilities
 - C. Cost of Daycare
 - D. Medical bills
 - E. Transportation
 - F. Being treated poorly by store owners

16. Which of the following food assistant programs do you or members of your household currently participate in?
- A. Food stamps
 - B. Food bank/food pantry

- C. WIC
- D. Shelter that provides food
- E. School lunch and/or breakfast program
- F. Summer food service program
- G. Nutrition program for the elderly
- H. Other _____
- I. None

17. How many days does the food you get from the assistance program usually feed your family?

- A. One day
- B. Two days
- C. Three days
- D. Four days
- E. Five days
- F. Six days
- G. Seven days
- H. Not applicable

18. How many weeks does the food you get from the assistance program usually feed your family?

- A. One week
- B. Two weeks
- C. Three weeks
- D. Four weeks
- E. Five weeks
- F. Six weeks
- G. Seven weeks
- H. Not applicable

19. Which of the following problems, if any, did you have in using the food assistance program?

- A. The application process was hard
- B. The food provided was not of good quality and/or variety
- C. It was hard to get the food assistant program named: _____
- D. You were treated poorly when applying for assistance
- E. You were treated poorly when using assistance
- F. There was a barrier to your language _____
- G. Other _____
- H. No problems
- I. Not applicable

20. What is the name of the store where you buy most of the food that you make at home?

- A. Kroger
- B. Publix
- C. Walmart
- D. Food Lion
- E. Farmers Market (**Specify**) _____
- F. Other _____

21. Why do you buy most of your food there? Is it because of
- A. Low prices
 - B. Good selection/quality
 - C. It's close to home
 - D. It's on the way to/from somewhere you usually go
 - E. It's near the bus stop or other public transportation
 - F. They treat you well there
 - G. They accept food stamps/WIC vouchers/other method of payment
 - H. Other _____

22. How do you usually get there?
- A. Bus
 - B. Own vehicle
 - C. You pay someone \$_____ to drive you
 - D. You ride free in someone else's vehicle
 - E. Bike
 - F. Walk
 - G. Other _____

23. How often do you eat fruit or vegetables?

- A. Once a week or less
- B. 2-4 times a week
- C. Once a day
- D. 2-4 times a day
- E. 5 or more times a day

24. Which of the following problems, if any, stops you from eating the fruits and vegetables you want?

- A. Prices are too expensive
- B. Stores are too hard to get to
- C. Fruits and vegetables are poor quality where you shop
- D. Fruits and vegetables you want are unavailable where you shop
- E. Not enough time to shop for fruits and vegetables
- F. Not enough time to prepare fruits and vegetables
- G. No kitchen equipment to prepare/store fruit and vegetables
- H. You don't like fruits and vegetables
- I. Not enough fruits and vegetables to feed everyone in your home
- J. Nothing
- K. Other _____

25. What is your current housing status? Are you

- A. A home owner
- B. Renting
- C. Staying for free at someone else's home
- D. Living in a hotel/motel

- E. Staying at a shelter
- F. Living in an automobile
- G. Homeless
- H. Other _____
- I. Decline to answer

26. Which of the following appliances do you have to cook or store food?

- A. Do you have a refrigerator
- B. Do you have a nonelectric ice box
- C. Do you have a freezer
- D. Do you have a microwave
- E. Do you have an oven
- F. Do you have a hotplate/burner/stovetop
- G. Do you have a crockpot
- H. Do you have a BBQ/outdoor grill
- I. Do you have a toaster oven
- J. Do you have a deep fat fryer
- K. Do you have a rice cooker
- L. Other
- M. None _____

27. How many children in your household do you provide food for on a daily basis and without pay?

- A. One
- B. Two
- C. Three
- D. Four
- E. Five
- F. Six
- G. Seven
- H. Other (more than seven please specify) _____
- I. None

28. How many people, including yourself, relatives, non-relative, roommates, or others, currently live in your household?

- A. One
- B. Two
- C. Three
- D. Four
- E. Five
- F. Six
- G. Seven
- H. Other (more than seven please specify) _____
- I. None

29. How many adults 18 or older, including yourself (if applicable), currently live in your household? Circle only one

- A. One
- B. Two
- C. Three
- D. Four
- E. Five or More
- F. None

30. How many people in your household, including yourself (if applicable) are working full time?

- A. One
- B. Two
- C. Three
- D. Four
- E. Five or More
- F. None

The following questions are about your eating patterns and the types of foods you eat.

31. What part of the month do you usually eat the most amount of food?

- A. Week 1
- B. Week 2
- C. Week 3
- D. Week 4
- E. Week 5
- F. Other (**specify**) _____
- G. None

32. What part of the month do you usually eat the least amount of food?

- A. Week 1
- B. Week 2
- C. Week 3
- D. Week 4
- E. Week 5
- F. Other (**specify**) _____
- G. None

33. How many meals do you eat a day?

- A. One meal
- B. Two meals
- C. Three meals
- D. Four meals

- E. Five meals
- F. Six meals or more (**specify**) _____
- G. Other (**specify**) _____

34. How many days a week do you eat three meals a day?

- A. 1 time a week
- B. 2-3 times a week
- C. 4-5 times a week
- D. Every other week
- E. Other (**specify**) _____
- F. None

35. How many days a week do drink juice?

- A. 2-3 times a day
- B. 1 time a day
- C. 4-5 times a week
- D. 2-3 times a week
- E. 1 time a week
- F. Other (**specify**) _____
- G. None

36. How many days a week do drink soda?

- A. 2-3 times a day
- B. 1 time a day
- C. 4-5 times a week
- D. 2-3 times a week
- E. 1 time a week
- F. Other (**specify**) _____
- G. None

37. How many days a week do you eat junk foods ect. (chips, candy, cookies, fast food)?

- A. A. 1 time a week
- B. 2-3 times a week
- C. 4-5 times a week
- D. Daily
- E. None

38. How many days a week do you eat fast food meals?

- A. 1 time a week
- B. 2-3 times a week
- C. 4-5 times a week
- D. Daily
- E. None

39. How many days a week do you prepare home cooked meals?

- A. 1 time a week
- B. 2-3 times a week
- C. 4-5 times a week
- D. Daily
- E. None

40. What types of foods do you like to eat often?

- A. Sweet
- B. Salty
- C. Fried
- D. Organic (fruits, vegetables)
- E. Other (**specify**) _____
- F. None

41. How do you prepare the majority of your foods when you cook?

- A. Fried
- B. Grilled
- C. Baked
- D. Other (**specify**) _____
- E. None

42. How do prefer your meals when you eat out?

- A. Fried
- B. Grilled
- C. Baked
- D. Other (**specify**) _____
- E. None

43. How many times a week should you eat fruits and vegetables?

- A. 1 time a week
- B. 2-3 times a week
- C. 4-5 times a week
- D. Daily
- E. None

44. How many meals a day should you eat?

- A. One meal
- B. Two meals
- C. Three meals
- D. Four meals
- E. Five meals
- F. Six meals or more (**specify**) _____

Now I want you to think about the kind of factors that increase the chances that a woman might become overweight or obese? Tell me if you think each of the following items may or may not increase the chances that a woman might become overweight. There is no right or wrong answer. I am only interested in your opinion.

45. Which of the following make you more at risk of becoming overweight and/or obese?

- A. Too much sleep
- B. High calorie foods (junk food)
- C. Having children
- D. Not exercising
- E. Age
- F. Over-eating

46. What health conditions can you develop if you are overweight and/or obese?

- A. Headaches
- B. Nosebleeds
- C. Diarrhea
- D. Diabetes

47. How can you lower your chances of becoming obese?

- A. Medications
- B. Eating one to two meals a day
- C. Eating more fruits and vegetables
- D. Drinking juice instead of soda

48. Where have you heard messages about what it means to be overweight and/or obese?

- A. Television
- B. Newspaper
- C. Computer
- D. Books/magazines
- E. Radio
- F. Other (**specify**) _____

I would like to ask you some general questions about yourself.

49. What is your age?

- A. _____
- B. Refused

50. What is your race?

- A. African American
- B. Caucasian

- C. Hispanic/Latino
- D. Native American
- E. Alaskan Native
- F. Asian
- G. Other (**SPECIFY**) _____

51. What is your marital status?

- A. Married
- B. Widowed
- C. Divorced
- D. Separated
- E. Never Married
- F. Living as Married
- G. Other (**SPECIFY**) _____
- H. Refused

52. What was your household or family income? (Include your total family income from all sources and from all the people who live with you)

- A. Under 10,000
- B. 10,000 – 20,000
- C. 20,000 – 30,000
- D. 30,000 – 40,000

53. Do you have any children?

- A. Yes
- B. No (**Go to Question-55**)

54. How many children do you have that live at home with you?

- A. _____
- B. Refused

55. What is your highest level of education?

- A. 8th grade or less
- B. Some high school
- C. High School graduate or GED
- D. Trade school
- E. Some college
- F. College graduate or higher
- G. Refused

56. How would you describe your employment status?

- A. Retired
- B. Employed full-time (35 hours or more per week)
- C. Employed part-time (1-34 hours per week)
- D. Self-employed

- E. Unemployed
- F. Disabled
- G. Other (**SPECIFY**)_____
- H. Refused

Appendix C

PRELIMINARY QUALITATIVE CODEBOOK

Dissertation Preliminary Qualitative Codebook (Key Informant Interview)

1. What is your relationship with the community of Macon, Georgia?

Community Relationship

- Work in Macon
 - Live in Macon
2. What concerns you most about the health status of the women that participate in the WIC and Food Stamps programs in Macon, Georgia?

Health Status in WIC/SNAP Participants

- Lack of healthcare
 - Lack of primary care doctor
 - Poor status
 - Overweight
 - Obese
3. Where do members of your community shop for healthy food selections?

Healthy Food Purchases

- Convenient Store/ Gas Station
 - Corner Store
 - Grocery Store
 - Super Market
 - Farmers Market
4. What challenges or barriers do policy makers face when trying to implement policy or legislation to improve healthy food access and affordability?

Policy Barriers

- Agreement among political groups
- Slow to act on issues
- Lack of community partnerships

5. How can policy makers collaborate with community partners to address the prevalence of obesity among in WIC and Food Stamp participants in Macon, GA?

Collaboration

- Dialogue
 - Task force group
6. What are the current health initiatives taking place in Macon, GA that utilize WIC and Food Stamps to improve the health and wellness of the communities?

WIC Initiatives

- Farmers Markets
7. What role can policy makers take in promoting health and wellness in their communities?

Health and Wellness Promotion

- Provide incentives to local farmers who participate with WIC
8. What incentives if any are available, for local stores, restaurants and farmers markets that provide healthy food options?

Incentives for local business

- Publicity
 - Increase in business
9. Who are the public health advocates in your community, and what is your working relationship with this group or groups?

Public Health Advocates

- Health Department
- Women Infant and Children

Working Relationship

- Co-workers
 - Employee
 - Supervisor
10. What ideas or suggestions would you offer fellow policy makers, to improve the health and wellness of the communities in Macon, GA?

Health and Wellness Advice

- Collaboration
- Open dialogue
- Educate the community

11. As a public servant, how will you use your role in leadership to improve the health outcomes of your constituents?

Improve Health Outcomes

- Identify health improvements
- Share health outcomes
- Advocate for health and food equity

Table 1

Social Cognitive Theory Construct Summary

<i>Construct</i>	<i>Description</i>
Environment	Physically external factors with which the person interacts
Situation	How the person perceives their environment
Behavioral capability	Knowledge of the correct behavior and having the skill to perform the behavior
Outcome Expectations	What the individual expects to occur as a result of performing the behavior
Outcome Expectancies	The amount in which the persons values the given outcome: incentives
Self-Control	Person ability to regulate their own behavior, especially when that behavior is focused on setting goals and acquiring self reward
Observational learning	A form of learning that occurs by watching others
Reinforcements	The response of others to an individual's behavior
Self-efficacy	The belief or confidence a person has in their own competence
Emotional coping responses	An individual's ability to respond to emotional stimuli using various techniques and strategies to help cope
Reciprocal Determinism	Continual interaction between the person, the environment and the behavior

(Bandura, 1977; Baranowski et al., 2002)

Table 2

Proposed use of SCT Constructs and Measurement Methods

Variable	Use of Construct	Measurement
Environment	Availability of food at home (food security).	Survey (WIC and Food Stamp participants)
	Availability of adequate and nutritious food in neighborhood supermarkets, grocery stores, corner stores and convenience stores	Field Observations
	Shopping access to healthy foods	Key Informant Interviews
Situation	Women's perception of their home and neighborhood food environments	Survey (WIC and Food Stamp participants)
Behavioral capability	Women's Knowledge	Survey (WIC and Food Stamp participants)

Table 2 cont'd

Proposed use of SCT Constructs and Measurement Methods

Expectations	Outcome from consuming a healthier diet(positive or negative)		Survey (WIC and Food Stamp participants)
Expectancies	Why the outcome from consuming a healthier diet is valued (positive or negative)		Survey (WIC and Food Stamp participants) and Key Informant Interview
Self-Control	A woman's rationale (perceptions) for eating or not eating a healthy diet		Survey (WIC and Food Stamp participants)
Observational learning	Peer modeling from previous studies	The likelihood of performing the same behavior.	Survey (WIC and Food Stamp participants)
	A woman's consumption		
Reinforcements	A woman's ability to identify the benefits that occur after changing a behavior		Survey (WIC and Food Stamp participants)
Self-efficacy	A woman's belief of being able to purchase, prepare, and consume healthier foods		Survey (WIC and Food Stamp participants)
Reciprocal determinism	How neighborhood food environments impact behaviors towards food selection, which impacts a woman health		Field Observations, Survey (WIC and Food Stamp participants)

Note: adapted from (Baranowski et al., 2002)

Table 3*Health Characteristics of Survey Respondents: Descriptive Statistics (N=119)*

Characteristic	N	Mean	SD
Age	119	31.8	6.653
Height	119	64.61	3.186
Weight	119	177.94	42.084
BMI	N	(%)	
Underweight (BMI < 18.5)	0	0	
Normal (BMI 18.5-24.9)	31	26.05	
Overweight/obese (BMI > 25)	88	73.94	

Note. BMI, Body Mass Index.

Table 4*Descriptive Statistics of Demographic Variables of Survey Respondents*

Variables	Frequency (n)	Percentage (%)	Missing
Obese			9
Not Obese	58	48.7	
Obese	52	43.7	
Race			0
African American	115	96.6	
Caucasians	2	1.7	
Other	2	1.7	
Income			2
Under 10,000	40	33.6	
10,000 - 20,000	26	21.8	
20,000 - 30,000	16	13.4	
30,000 - 40,000	26	21.8	
40,001 or more	9	7.6	
Employment Status			0
Employed full-time	62	52.1	
Employed part-time	26	21.8	
Self-employed	4	3.4	
Unemployed	21	17.6	
Disabled	2	1.7	
Other	4	3.4	
Education			0
8th grade or less	2	1.7	

Some high school	6	5.0
High school graduate or GED	26	21.8
Trade school	6	5.0
Some college	45	37.8
College graduate or higher	34	28.6

Table 5*Descriptive Statistics of Food Insecurity Variables of Survey Respondents*

Variables		Frequency (n)	Percentage (%)	Missing
Food Insecurity (Food Stamps)	No Food Stamps	52	43.7	0
	Food Stamps	67	56.3	
Food Insecurity (Food Bank/Food Pantry)	No Food Bank	117	98.3	0
	Food Bank	2	1.7	
Food Insecurity (WIC)	No WIC	93	78.2	0
	WIC	26	21.8	
Food Insecurity (Shelter)	No Shelter	116	97.5	0
	Shelter	3	2.5	
Food Insecurity (School Lunch)	No School Lunch	96	80.7	0
	School Lunch	23	19.3	
Food Insecurity (Summer Food Service)	No Summer Food Service	116	97.5	0
	Summer Food Service	3	2.5	
Food Insecurity (Elderly Nutrition Program)	No Elderly Nutrition	118	99.2	0

	Program			
	Elderly Nutrition Program	1	0.8	
Food Insecurity (Other Program)				0
	No Other Program	118	99.2	
	Other Program	1	0.8	

Table 6*Descriptive Statistics of Food Access Variables of Survey Respondents*

Variables	Frequency (n)	Percentage (%)	Missing
Food Access (Shop For Food)			0
1 time a week or more	41	34.5	
Every other week	28	23.5	
1 or 2 times/ month	45	37.8	
Less than 1 time a month	2	1.7	
Other	2	1.7	
Never	1	.8	
Food Access (Convenient Store Shop)			0
Daily	10	8.4	
Almost daily	8	6.7	
2-3 times a week	28	23.5	
Weekly	13	10.9	
Every other week	24	20.2	
Other	12	10.1	
Never	24	20.2	
Food Access (Major Grocery Store Purchase)			0
No Major Grocery Store Purchase	4	3.4	
Major Grocery Store Purchase	115	96.6	
Food Access (Convenient Store Purchase)			0
No Convenient Store Purchase	119	100	
Food Access (Farmers Market Purchase)			0
No Farmers Market Purchase	113	95	

	Farmers Market Purchase	6	5	
Food Access (Other Purchase)				0
	No Other Purchase	115	96.6	
	Other	4	3.4	
Food Access (Bus Transportation)				0
	No Bus Transportation	115	96.6	
	Bus Transportation	4	3.4	
Food Access (Own Vehicle for Transportation)				0
	No Vehicle Transportation	12	10.1	
	Vehicle Transportation	107	89.9	
Food Access (Pay Someone for Transportation)				0
	No Pay for Transportation	116	97.5	
	Pay for Transportation	3	2.5	
Food Access (Ride In Someone's Vehicle)				0
	No Ride in Someone's Vehicle	115	96.6	
	Ride in Someone Vehicle	4	3.4	
Food Access (Bike Transportation)				0
	No Bike Transportation	119	100	
Food Access (Walk)				0
	No Walk	117	98.3	
	Walk	2	1.7	

Food Access (Other)				0
	No Other	118	99.2	
	Other	1	0.8	

Table 7*Descriptive Statistics of Food Affordability Variables of Survey Respondents*

Variables	Frequency (n)	Percentage (%)	Missing
Food Affordability (Stops From Buying Food)			0
Nothing	68	57.1	
Utilities	42	35.3	
Cost of daycare	1	0.8	
Medical bills	4	3.4	
Transportation	3	2.5	
Being treated poorly by store owners	1	0.8	
Food Affordability (Food Assistance Days)			1
One day	2	1.7	
Two days	3	2.5	
Three days	5	4.2	
Four days	3	2.5	
Five days	8	6.7	
Six days	1	0.8	
Seven days	34	28.6	
Not Applicable	62	52.1	
Food Affordability (Food Assistance Weeks)			0
One week	1	0.8	
Two week	11	9.2	
Three week	15	12.6	
Four week	22	18.5	
Five week	4	3.4	
Six week	1	0.8	
Seven week	10	8.4	

Not Applicable

55

46.2

Table 8*Descriptive Statistics of Nutrition Behavior Variables of Survey Respondents*

Variables	Frequency (n)	Percentage (%)	Missing
Behavior (Eat the Most a Month)			0
Week 1	29	24.4	
Week 2	24	20.2	
Week 3	17	14.3	
Week 4	9	7.6	
Week 5	1	0.8	
Other	14	11.8	
None	25	21	
Behavior (Eat the Least a Month)			0
Week 1	19	16	
Week 2	4	3.4	
Week 3	13	10.9	
Week 4	23	19.3	
Week 5	15	12.6	
Other	8	6.7	
None	37	31.1	
Behavior (Meals A Day)			0
One meal	5	4.2	
Two meals	45	37.8	
Three meals	57	47.9	
Four meals	10	8.4	
Five meals	1	0.8	
Six meals	1	0.8	

Behavior (Three Meals A Day)				1
	1 time a week	15	12.6	
	2- 3 times a week	36	30.3	
	4- 5 times a week	41	34.5	
	Every other week	7	5.9	
	Other	10	8.4	
	None	9	7.6	
Behavior (Drink Juice A Week)				1
	2- 3 times a day	37	31.1	
	1 time a day	18	15.1	
	4- 5 times a week	18	15.1	
	2-3 times a week	27	22.7	
	1 time a week	9	7.6	
	None	3	2.5	
Behavior (Drink Soda A Week)				0
	2- 3 times a day	26	21.8	
	1 time a day	12	10.1	
	4- 5 times a week	11	9.2	
	2-3 times a week	27	22.7	
	1 time a week	19	16.0	
	None	4	3.4	
	Don't Know	20	16.8	
Behavior (Junk Food A Week)				0
	1 time a week	23	19.3	
	2-3 times a week	54	45.4	
	4- 5 times a week	16	13.4	

	Daily	19	16.0	
	None	7	5.9	
Behaviors (Fast Food A Week)				0
	1 time a week	46	38.7	
	2- 3 times a week	53	44.5	
	4- 5 times a week	8	6.7	
	Daily	5	4.2	
	None	7	5.9	
Behaviors (Prepare Home-cooked Meals)				0
	1 time a week	6	5.0	
	2- 3 times a week	56	47.1	
	4- 5 times a week	33	27.7	
	Daily	15	12.6	
	None	9	7.6	
Behaviors (Prepare Food Fried)				0
	No Fried	79	66.4	
	Fried	40	33.6	
Behaviors (Prepare Food Grilled)				0
	No Grilled	93	78.2	
	Grilled	26	21.8	
Behaviors (Prepare Food Baked)				0
	No Baked	42	35.3	
	Baked	77	64.7	

Behaviors (Prepare Other)				0
	No Other	115	96.6	
	Other	4	3.4	

Table 9*Descriptive Statistics of Nutrition Perception Variables of Survey Respondents*

Variables	Frequency (n)	Percentage (%)	Missing
Perceptions (Eat Fruits and Vegetables a Week)			0
1 time a week	5	4.2	
2- 3 times a week	22	18.5	
4- 5 times a week	31	26.1	
Daily	60	50.4	
None	1	.8	
Perceptions (Meals to Eat A Day)			0
One meal	2	1.7	
Two meals	8	6.7	
Three meals	83	69.7	
Four meals	12	10.1	
Five meals	7	5.9	
Six meals or more	7	5.9	
Perceptions (Risk Too Much Sleep)			0
No Too Much Sleep	105	88.2	
Too Much Sleep	14	11.8	
Perceptions (Risk High Calorie Foods)			0
No High Calorie Foods	39	32.8	

	High Calorie Foods	80	67.2	
Perceptions (Risk Having Children)				0
	No Having Children	111	93.3	
	Having Children	8	6.7	
Perceptions (Risk Not Exercising)				0
	No Exercising	63	52.9	
	Exercising	56	47.1	
Perceptions (Risk Age)				0
	No Age	114	95.8	
	Age	5	4.2	
Perceptions (Risk Overeating)				0
	No Overeating	81	68.1	
	Overeating	38	31.9	
Perceptions (Risk Headaches)				0
	No Headaches	94	79	
	Headaches	24	20.2	
Perceptions (Risk Nosebleeds)				0
	No Nosebleeds	118	99.2	
	Nosebleeds	1	0.8	
Perceptions (Risk Diarrhea)				0
	No Diarrhea	119	100	

Perceptions (Risks Diabetes)				0
	No Diabetes	12	10.1	
	Diabetes	107	89.9	
Perceptions (Lower Chances of Medications)				0
	No Medications	112	94.1	
	Medications	7	5.9	
Perceptions (Lower Chances One to Two Meals A Day)				0
	No One to Two Meals A Day	109	91.6	
	One to Two Meals A Day	10	8.4	
Perceptions (Lower Chances Eat Fruit and Vegetables)				0
	No Fruit and Vegetables	13	10.9	
	Fruit and Vegetables	106	89.1	
Perceptions (Lower Chances Drink Juice No Soda)				0
	No Soda	104	87.4	
	Soda	15	12.6	
Perceptions (Television Messages on Obesity)				0
	No Television	29	24.4	
	Television	90	75.6	
Perceptions (Newspaper Messages on Obesity)				0
	No Newspaper	88	73.9	
	Newspaper	31	26.1	

Perceptions (Computer Messages on Obesity)				0
	No Computer	89	74.8	
	Computer	30	25.2	
Perceptions (Book/Magazine Messages on Obesity)				0
	No Book/Magazine Messages	83	69.7	
	Book/Magazine Messages	36	30.3	
Perceptions (Radio Messages on Obesity)				0
	No Radio Messages	97	81.5	
	Radio Messages	22	18.5	
Perceptions (Other Messages on Obesity)				0
	No Other Messages	106	89.1	
	Other Messages	13	10.9	

Table 10*Variables Associated with Obesity*

Variables	Test	DF	P-Value
Race	3.27*	2	0.17
Income	0.06	1	0.52
Education	0.16	1	0.71
Employment	8.49*	5	0.09
Food Insecurity (Food Stamps)	0.82*	1	0.44
Food Insecurity (Food Bank/Food Pantry)	0.00*	1	1.00
Food Insecurity (WIC)	0.00*	1	1.00
Food Insecurity (Shelter)	3.03*	1	0.22
Food Insecurity (School Lunch)	1.04*	1	0.32
Food Insecurity (Summer Food Service)	3.03*	1	0.22
Food Insecurity (Other Program)	1.50*	1	0.47
Food Access (Shop For Food)	4.53	5	0.48
Food Access (Convenient Store Shop)	4.62	6	0.60
Food Access (Major Grocery Store Purchase)	5.25*	1	0.12
Food Access (Farmers Market Purchase)	0.01*	1	1.00
Food Access (Other Purchase)	5.25*	1	0.12
Food Access (Bus Transportation)	0.24*	1	1.00
Food Access (Own Vehicle for Transportation)	0.01*	1	1.00
Food Access (Pay Someone for Transportation)	0.24*	1	1.00
Food Access (Ride In Someone's Vehicle)	1.32*	1	0.34
Food Access (Walk)	0.00*	1	1.00
Food Access (Other)	1.50*	1	0.47
Food Affordability (Stops From Buying Food)	6.50	5	0.17
Food Affordability (Food Assistance Days)	3.26	7	0.95
Food Affordability (Food Assistance Weeks)	6.38	7	0.49
Behavior (Eat the Most a Month)	8.85	6	0.15

Behavior (Eat the Least a Month)	5.59	6	0.48
Behavior (Meals A Day)	4.36	5	0.51
Behavior (Three Meals A Day)	7.59	6	0.24
Behavior (Drink Juice A Week)	7.93	7	0.31
Behavior (Drink Soda A Week)	2.40	6	0.90
Behavior (Junk Food A Week)	4.78	4	0.30
Behaviors (Fast Food A Week)	5.65	4	0.22
Behaviors (Prepare Home cooked Meals)	10.92	4	0.02
Behaviors (Prepare Food Fried)	0.05*	1	0.84
Behaviors (Prepare Food Grilled)	0.09*	1	0.82
Behaviors (Prepare Food Baked)	0.17*	1	0.69
Behaviors (Prepare Other)	0.01*	1	1.00
Perceptions (Eat Fruits and Vegetables a Week)	3.54	4	0.46
Perceptions (Meals to Eat a Day)	11.91	1	0.02
Perceptions (Risk Too Much Sleep)	0.66*	1	0.54
Perceptions (Risk High Calorie Foods)	0.36*	1	0.68
Perceptions (Risks Having Children)	6.15*	1	0.02
Perceptions (Risk Not Exercising)	3.52*	1	0.08
Perceptions (Risk Age)	0.34*	1	0.66
Perceptions (Risk Overeating)	0.00*	1	1.00
Perceptions (Risk Headaches)	2.03*	1	0.16
Perceptions (Risk Nosebleeds)	1.50*	1	0.47
Perceptions (Risks Diabetes)	0.71*	1	0.51
Perceptions (Lower Chances of Medications)	0.50*	1	0.68
Perceptions (Lower Chances One to Two Meals A Day)	0.80*	1	0.47
Perceptions (Lower Chances Eat Fruit and Vegetables)	0.25*	1	0.75
Perceptions (Lower Chances Drink Juice No Soda)	2.89*	1	0.13
Perceptions (Television Messages on Obesity)	0.01*	1	1.00
Perceptions (Newspaper Messages on Obesity)	2.00*	1	0.18

Perceptions (Computer Messages on Obesity)	5.45*	1	0.02
Perceptions (Book/Magazine Messages on Obesity)	0.65*	1	0.54
Perceptions (Radio Messages on Obesity)	3.95*	1	0.05
Perceptions (Other Messages on Obesity)	1.20*	1	0.37

*Note.** Data not reported by the Fisher's Exact Test. Bold values are significant at $p < 0.05$ level (2-tailed).

Table 11*Measures of Association with Obesity*

Variables	Measure of Association	Bootstrap 95% CI
Race	0.05**	(0.01, 0.10)
Income	0.21*	(-0.04, 0.46)
Education	0.00*	(-0.29, 0.28)
Employment	0.03**	(0.01, 0.13)
Food Insecurity (Food Stamps)	0.00**	(0.00, 0.05)
Food Insecurity (Food Bank/Food Pantry)	0.00**	(0.00, 0.05)
Food Insecurity (WIC)	0.00**	(0.00, 0.04)
Food Insecurity (Shelter)	0.03**	(0.01, 0.08)
Food Insecurity (School Lunch)	0.00**	(0.00, 0.07)
Food Insecurity (Summer Food Service)	0.03**	(0.01, 0.08)
Food Insecurity (Other Program)	0.01**	(0.01, 0.06)
Food Access (Shop For Food)	0.02**	(0.00, 0.09)
Food Access (Convenient Store Shop)	0.01**	(0.01, 0.08)
Food Access (Major Grocery Store Purchase)	0.05**	(0.01, 0.10)
Food Access (Farmers Market Purchase)	0.00**	(0.00, 0.06)
Food Access (Other Purchase)	0.05**	(0.01, 0.10)
Food Access (Bus Transportation)	0.00**	(0.00, 0.06)
Food Access (Own Vehicle for Transportation)	0.00**	(0.00, 0.06)
Food Access (Pay Someone for Transportation)	0.00**	(0.00, 0.06)
Food Access (Ride In Someone's Vehicle)	0.01**	(0.00, 0.09)
Food Access (Walk)	0.00**	(0.00, 0.05)
Food Access (Other)	0.01**	(0.01, 0.06)
Food Affordability (Stops From Buying Food)	0.05**	(0.02, 0.11)
Food Affordability (Food Assistance Days)	0.01**	(0.01, 0.09)
Food Affordability (Food Assistance Weeks)	0.03**	(0.02, 0.10)

Behavior (Eat the Most a Month)	0.03**	(0.01, 0.11)
Behavior (Eat the Least a Month)	0.02**	(0.01, 0.09)
Behavior (Meals A Day)	0.02**	(0.01, 0.09)
Behavior (Three Meals A Day)	0.03**	(0.01, 0.11)
Behavior (Drink Juice A Week)	0.03**	(0.01, 0.11)
Behavior (Drink Soda A Week)	0.00**	(0.00, 0.07)
Behavior (Junk Food A Week)	0.02**	(0.00, 0.09)
Behaviors (Fast Food A Week)	0.02**	(0.00, 0.11)
Behaviors (Prepare Home cooked Meals)	0.05**	(0.02, 0.15)
Behaviors (Prepare Food Fried)	0.00**	(0.00, 0.03)
Behaviors (Prepare Food Grilled)	0.00**	(0.00, 0.04)
Behaviors (Prepare Food Baked)	0.00**	(0.00, 0.04)
Behaviors (Prepare Other)	0.00**	(0.00, 0.06)
Perceptions (Eat Fruits and Vegetables a Week)	0.02**	(0.00, 0.08)
Perceptions (Meals to Eat a Day)	0.08**	(0.05, 0.17)
Perceptions (Risk Too Much Sleep)	0.00**	(0.00, 0.07)
Perceptions (Risk High Calorie Foods)	0.00**	(0.00, 0.04)
Perceptions (Risks Having Children)	0.05**	(0.00, 0.16)
Perceptions (Risk Not Exercising)	0.02**	(0.00, 0.09)
Perceptions (Risk Age)	0.00**	(0.00, 0.07)
Perceptions (Risk Overeating)	0.00**	(0.00, 0.03)
Perceptions (Risk Headaches)	0.01**	(0.00, 0.08)
Perceptions (Risk Nosebleeds)	0.01**	(0.01, 0.06)
Perceptions (Risks Diabetes)	0.00**	(0.00, 0.07)
Perceptions (Lower Chances of Medications)	0.00**	(0.00, 0.07)
Perceptions (Lower Chances One to Two Meals A Day)	0.00**	(0.00, 0.09)
Perceptions (Lower Chances Eat Fruit and Vegetables)	0.00**	(0.00, 0.04)
Perceptions (Lower Chances Drink Juice No Soda)	0.02**	(0.00, 0.11)
Perceptions (Television Messages on Obesity)	0.00**	(0.00, 0.03)

Perceptions (Newspaper Messages on Obesity)	0.01**	(0.00, 0.08)
Perceptions (Computer Messages on Obesity)	0.04**	(0.00, 0.14)
Perceptions (Book/Magazine Messages on Obesity)	0.00**	(0.00, 0.05)
Perceptions (Radio Messages on Obesity)	0.03**	(0.00, 0.12)
Perceptions (Other Messages on Obesity)	0.01**	(0.00, 0.08)

Note. CI=Confidence Interval. * Measure of Gamma ordinal by ordinal. **Measure of Uncertainty nominal by nominal.

Table 12*Statistically Significant Variables Associated with Obesity*

Variables	Test	DF	P-Value	Measure of Association	Bootstrap 95% CI
Behaviors (Prepare Home cooked Meals)	10.92	4	0.02	0.05	(0.02, 0.15)
Perceptions (Meals to Eat a Day)	11.91	5	0.00	0.08	(0.05, 0.17)
Perceptions (Risks Having Children)	6.15*	1	0.02	0.05	(0.00, 0.16)
Perceptions (Computer Messages on Obesity)	5.45*	1	0.02	0.04	(0.00, 0.14)

*Note.** Data not reported by the Fisher's Exact Test. Values are significant at $p < 0.05$ level (2-tailed). CI=Confidence Interval.

Table 13*Nutrition Behavior Variables Associated with Food Insecurity Among SNAP Participants*

Variables	Test	DF	P-Value	Measure of Association	Bootstrap 95% CI
Behavior (Eat the Most a Month)	10.17	6	0.08	0.03	(0.01, 0.11)
Behavior (Eat the Least a Month)	6.14	6	0.37	0.02	(0.01, 0.09)
Behavior (Meals A Day)	6.85	5	0.17	0.03	(0.01, 0.10)
Behavior (Three Meals A Day)	8.12	6	0.17	0.03	(0.01, 0.11)
Behavior (Drink Juice A Week)	8.54	7	0.15	0.03	(0.02, 0.10)
Behavior (Drink Soda A Week)	6.00	6	0.42	0.02	(0.00, 0.08)
Behavior (Junk Food A Week)	4.89	4	0.27	0.02	(0.00, 0.09)
Behaviors (Fast Food A Week)	2.50	4	0.64	0.01	(0.00, 0.08)
Behaviors (Prepare Home cooked Meals)	6.59	4	0.13	0.02	(0.10, 0.10)
Behaviors (Prepare Food Fried)	0.35*	1	0.05	0.00	(0.00, 0.03)
Behaviors (Prepare Food Grilled)	0.53*	1	0.46	0.00	(0.00, 0.05)
Behaviors (Prepare Food Baked)	0.06*	1	0.80	0.00	(0.00, 0.03)
Behaviors (Prepare Other)	4.70*	1	0.03	0.04	(0.01, 0.09)

Note. *Data not reported by the Fisher's Exact Test. Bold values are significant at $p < 0.05$ level (2-tailed). CI=Confidence Interval.

Table 14*Nutrition Behavior Variables Associated with Food Insecurity Among WIC Participants*

Variables	Test	DF	P-Value	Measure of Association	Bootstrap 95% CI
Behavior (Eat the Most a Month)	3.03	6	0.83	0.01	(0.00, 0.07)
Behavior (Eat the Least a Month)	11.13	6	0.08	0.04	(0.02, 0.12)
Behavior (Meals A Day)	8.56	5	0.15	0.04	(0.01, 0.12)
Behavior (Three Meals A Day)	3.42	6	0.83	0.01	(0.00, 0.07)
Behavior (Drink Juice A Week)	5.54	7	0.28	0.03	(0.02, 0.09)
Behavior (Drink Soda A Week)	5.15	6	0.33	0.02	(0.01, 0.09)
Behavior (Junk Food A Week)	2.75	4	0.34	0.02	(0.01, 0.07)
Behaviors (Fast Food A Week)	9.04	4	0.02	0.05	(0.02, 0.14)
Behaviors (Prepare Home cooked Meals)	3.78	4	0.22	0.02	(0.01, 0.07)
Behaviors (Prepare Food Fried)	2.26*	1	0.13	0.01	(0.00, 0.80)
Behaviors (Prepare Food Grilled)	2.30*	1	0.12	0.01	(0.00, 0.10)
Behaviors (Prepare Food Baked)	1.67*	1	0.19	0.01	(0.00, 0.07)
Behaviors (Prepare Other)	0.02*	1	0.87	0.00	(0.00, 0.06)

Note. *Data not reported by the Fisher's Exact Test. Bold values are significant at $p < 0.05$ level (2-tailed). CI=Confidence Interval.

Table 15*Nutrition Perception Variables Associated with Food Insecurity Among SNAP Participants*

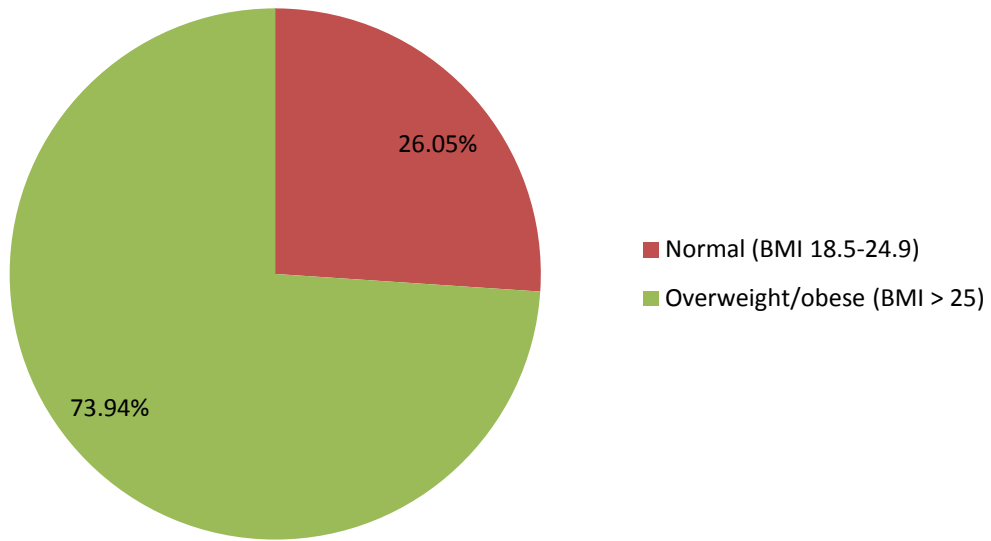
Variables	Test	DF	P-Value	Measure of Association	Bootstrap 95% CI
Perceptions (Eat Fruits and Vegetables a Week)	6.15	4	0.13	0.03	(0.01, 0.09)
Perceptions (Meals to Eat a Day)	7.24	5	0.19	0.03	(0.01, 0.12)
Perceptions (Risk Too Much Sleep)	3.43*	1	0.06	0.02	(0.00, 0.11)
Perceptions (Risk High Calorie Foods)	0.00*	1	0.98	0.00	(0.00, 0.03)
Perceptions (Risks Having Children)	0.13*	1	0.71	0.00	(0.00, 0.06)
Perceptions (Risk Not Exercising)	0.87*	1	0.34	0.00	(0.00, 0.05)
Perceptions (Risk Age)	0.02*	1	0.86	0.00	(0.00, 0.05)
Perceptions (Risk Overeating)	0.40*	1	0.52	0.00	(0.00, 0.04)
Perceptions (Risk Headaches)	0.42*	1	0.51	0.00	(0.00, 0.04)
Perceptions (Risk Nosebleeds)	1.66*	1	0.19	0.01	(0.01, 0.06)
Perceptions (Risks Diabetes)	0.21*	1	0.64	0.00	(0.00, 0.05)
Perceptions (Lower Chances of Medications)	0.51*	1	0.46	0.00	(0.00, 0.07)
Perceptions (Lower Chances One to Two Meals A Day)	0.06*	1	0.80	0.00	(0.00, 0.04)
Perceptions (Lower Chances Eat Fruit and Vegetables)	0.60*	1	0.43	0.00	(0.00, 0.05)
Perceptions (Lower Chances Drink Juice No Soda)	0.06*	1	0.80	0.00	(0.00, 0.05)
Perceptions (Television Messages on Obesity)	7.42*	1	0.00	0.05	(0.00, 0.13)
Perceptions (Newspaper Messages on Obesity)	0.03*	1	0.84	0.00	(0.00, 0.03)
Perceptions (Computer Messages on Obesity)	0.22*	1	0.63	0.00	(0.00, 0.04)
Perceptions (Book/Magazine Messages on Obesity)	0.83*	1	0.36	0.00	(0.00, 0.05)
Perceptions (Radio Messages on Obesity)	0.03*	1	0.85	0.00	(0.00, 0.04)
Perceptions (Other Messages on Obesity)	0.16*	1	0.68	0.00	(0.00, 0.05)

Note. *Data not reported by the Fisher's Exact Test. Bold values are significant at $p < 0.05$ level (2-tailed). CI=Confidence Interval.

Table 16*Nutrition Perception Variables Associated with Food Insecurity Among WIC Participants*

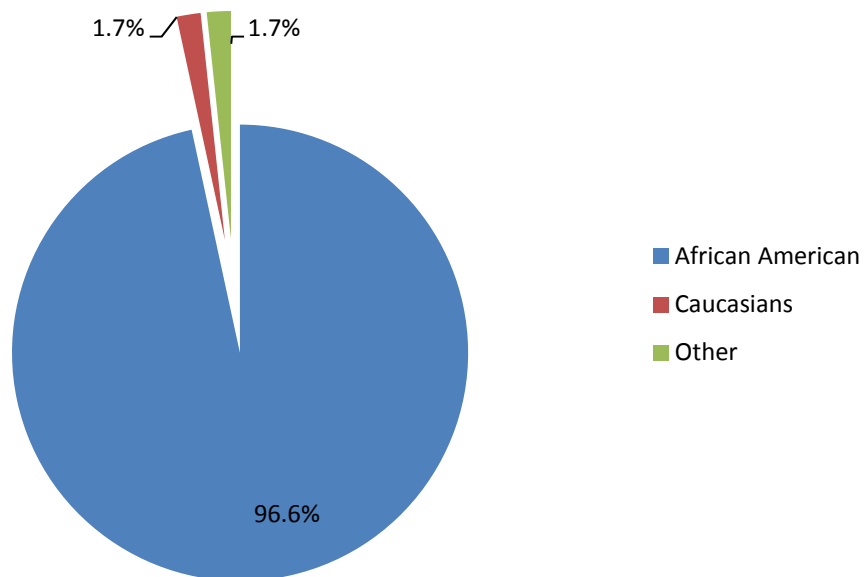
Variables	Test	DF	P-Value	Measure of Association	Bootstrap 95% CI
Perceptions (Eat Fruits and Vegetables a Week)	6.42	4	0.07	0.04	(0.01, 0.11)
Perceptions (Meals to Eat a Day)	1.33	5	0.80	0.01	(0.00, 0.08)
Perceptions (Risk Too Much Sleep)	1.61*	1	0.20	0.01	(0.00, 0.10)
Perceptions (Risk High Calorie Foods)	0.48*	1	0.48	0.00	(0.00, 0.05)
Perceptions (Risks Having Children)	0.04*	1	0.82	0.00	(0.00, 0.06)
Perceptions (Risk Not Exercising)	0.01*	1	0.91	0.00	(0.00, 0.03)
Perceptions (Risk Age)	0.01*	1	0.91	0.00	(0.00, 0.04)
Perceptions (Risk Overeating)	2.97*	1	0.08	0.02	(0.00, 0.10)
Perceptions (Risk Headaches)	0.53*	1	0.46	0.04	(0.00, 0.05)
Perceptions (Risk Nosebleeds)	0.49*	1	0.48	0.00	(0.00, 0.02)
Perceptions (Risks Diabetes)	0.22*	1	0.63	0.00	(0.00, 0.06)
Perceptions (Lower Chances of Medications)	0.18*	1	0.66	0.00	(0.00, 0.06)
Perceptions (Lower Chances One to Two Meals A Day)	0.02*	1	0.88	0.00	(0.00, 0.05)
Perceptions (Lower Chances Eat Fruit and Vegetables)	0.01*	1	0.91	0.00	(0.00, 0.06)
Perceptions (Lower Chances Drink Juice No Soda)	2.88*	1	0.09	0.02	(0.00, 0.09)
Perceptions (Television Messages on Obesity)	0.49*	1	0.48	0.00	(0.00, 0.05)
Perceptions (Newspaper Messages on Obesity)	0.01*	1	0.90	0.00	(.000, .038)
Perceptions (Computer Messages on Obesity)	0.65*	1	0.41	0.00	(0.00, 0.06)
Perceptions (Book/Magazine Messages on Obesity)	0.17*	1	0.67	0.00	(0.00, 0.05)
Perceptions (Radio Messages on Obesity)	1.16*	1	0.28	0.01	(0.00, 0.08)
Perceptions (Other Messages on Obesity)	4.33*	1	0.03	0.04	(0.00, 0.17)

Note. *Data not reported by the Fisher's Exact Test. Bold values are significant at $p < 0.05$ level (2-tailed). CI=Confidence Interval.



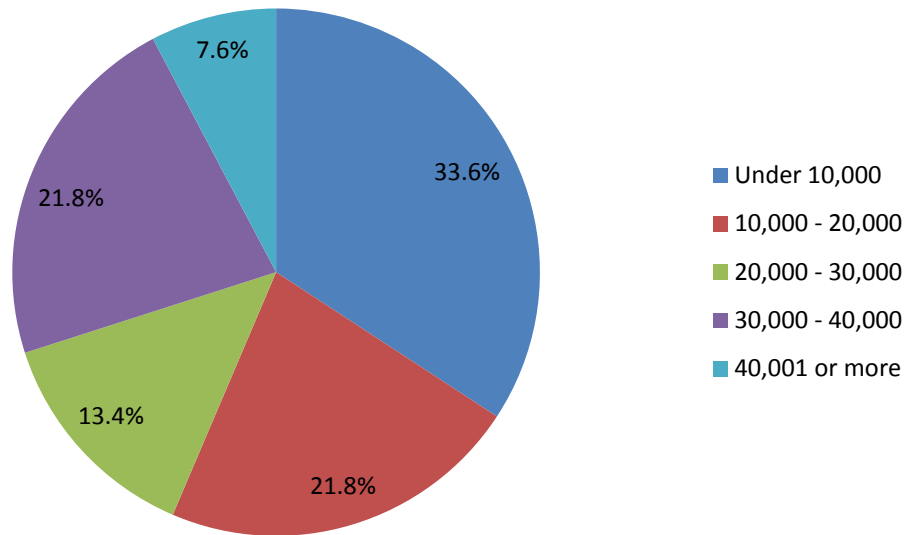
N=119

Figure 1. Body Mass Index of Survey Respondents.



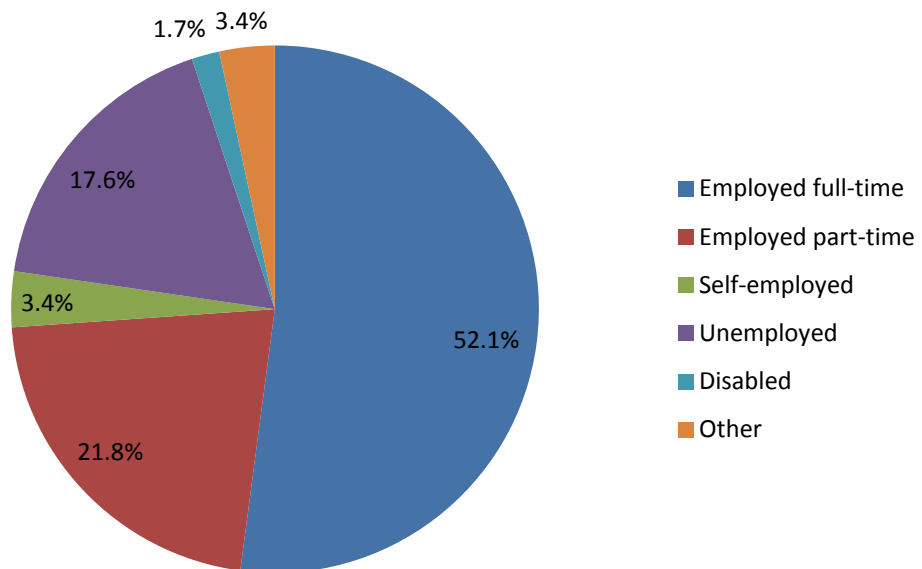
N=119

Figure 2. Race of Survey Respondents.



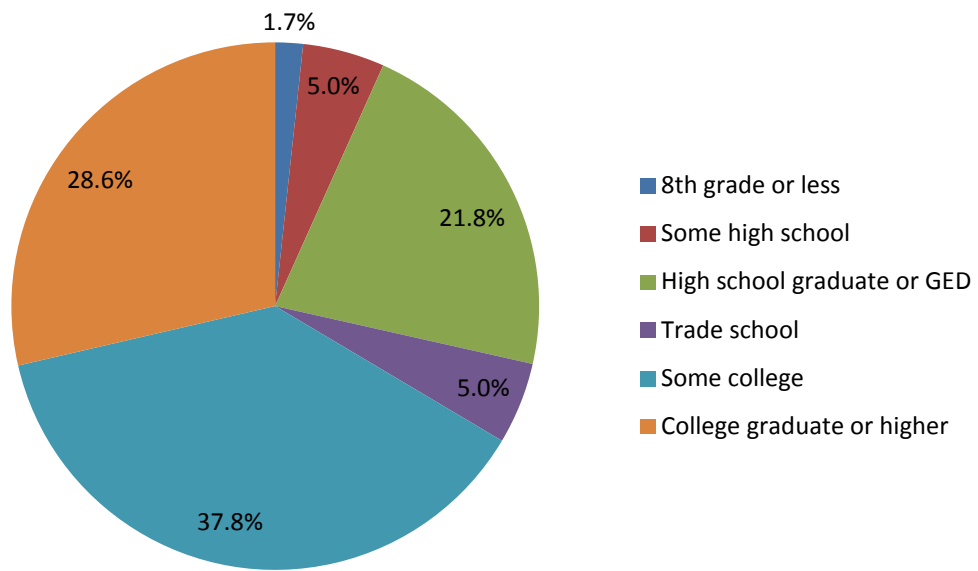
N=119

Figure 3. Income Level of Survey Respondents.



N=119

Figure 4. Employment Status of Survey Respondents.



N=119

Figure 5. Education Level of Survey Respondents.