

ACHEAMPONG, IRENE, M.S. Differences in Nutrition Knowledge, Attitudes and Beliefs among Low Income Hispanic and African American Women Caretakers (2011) Directed by Dr. Lauren Haldeman pp. 114

The purpose of this study was to: (1) determine the differences in nutrition knowledge, attitudes, beliefs (KAB), and self efficacy among low income African American and Hispanic women; (2) identify the associations that these variables have on diet quality and weight status; (3) identify some barriers to healthy eating; and (4) to document if the level of acculturation, among Hispanics, has any effect on KAB. Data from three separate studies were combined and analyzed. The total sample included African Americans (N=92), high acculturated Hispanics (N=73), and low acculturated Hispanics (N=199). Descriptive statistics and bivariate analyses were used to identify associations between KAB and body mass index (BMI) and diet quality. The majority of African Americans had good knowledge in nutrition while Hispanics had fair knowledge. The differences were, however, non significant. Attitudes toward eating a healthy diet were significantly different only in terms of high fiber and low fat consumption. More Hispanics (96.7%) than African Americans (90.2%) believed that it is important to consume a healthy diet, however both groups had poor dietary intakes. A computed KAB score showed no significant relation to individuals' weight status or diet quality. However, attitudes and beliefs about healthy foods strongly correlated with participants' weight or diet consumption. The most common barrier to consuming a healthy diet reported by both groups was the cost of healthy foods. The level of acculturation had a significant influence on some nutrition attitudes and belief. More high, than low acculturated Hispanics acknowledged the importance fiber and low fat diets. However,

low acculturated Hispanics were more likely to have the belief that healthy foods will keep one healthy. It is therefore recommended for educational programs to focus on these variables when addressing obesity and poor dietary intake among low income minority groups.

DIFFERENCES IN NUTRITION KNOWLEDGE, ATTITUDES
AND BELIEFS AMONG LOW INCOME
HISPANIC AND AFRICAN
AMERICAN WOMEN
CARETAKERS

By

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A Thesis Submitted to
The Faculty of the Graduate School at
The University of North Carolina at Greensboro
In Partial Fulfillment
of the Requirements for the Degree
Master of Science

Greensboro
2011

Approved by

Committee Chair

To my family. Thanks for your support and patience during my migration and adaptation to the U.S. This journey has been long but steady and I highly appreciate your encouragement. God bless you.

APPROVAL PAGE

This thesis has been approved by the following committee of the Faculty of The Graduate School at The University of North Carolina at Greensboro.

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ACKNOWLEDGEMENTS

My greatest appreciation goes to Dr Lauren Haldeman for her encouragement, patience and support in achieving my goals. Personally, I have related with most of Dr. Haldeman's research on immigrants and low income earners. Thus, I was greatly honored when she accepted me as her student. I have learned a lot of life's lessons from her, as my mentor. Her research interest and passion has rekindled a lasting flame of hope for my future profession.

I would also like to express my sincere gratitude to my committee members, Dr Cheryl Lovelady and Dr. Kenneth Gruber. Their corrections, suggestions and dedication greatly shaped up this research. Through their understanding, flexibility and devotion, I was able to successfully complete this thesis while working as a full time Nutritionist.

My appreciation goes to Lindsay Hecht and the team who collected the data that I used for my analyses. My profound gratitude also goes to Phillip Baiden for answering my midnight calls on SPSS data analyses, his support is unforgettable.

This research would not have been possible without the love and support of my sisters, Esther and Yvonne, and my parents back home in Ghana. I couldn't have asked for a better family than this. Meeting the above mentioned people was divine and I am grateful to God.

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CHAPTER I

INTRODUCTION

It is well documented that minorities are particularly prone to health disparities (Goldberg, Hayes & Huntley, 2004; Kahng, 2010; Mathur et al., 2010). Statistics show that the risk of developing diabetes among African Americans and Latinos is twice that of Caucasians (The Office of Minority Health, 2009). Similarly, the prevalence of cardiovascular disease and other weight related health issues is higher among minority groups (The office of minority health, 2009). According to the US Census Bureau (2010), the two largest minority groups in the United States (US) are Hispanics and African Americans; it is estimated that 50.5 million (16.3%) of the total US population are Hispanics and 37.7 million (12.2%) are African Americans (US Census Bureau, 2010). As compared to African Americans, Hispanics have higher health risks because of limited English proficiency and less access to basic health care needs (Hispanic/Latino Profile: The Office of Minority Health, 2009).

Over a three year span, the Centers for Disease Control and Prevention (CDC) recorded that African Americans and Hispanics, respectively had a 51% and a 21% greater prevalence of obesity than Caucasians (CDC, 2009). Though the causes of health disparity are still being debated (Goldberg et al 2004; Kissane, 2009) it is believed that low socioeconomic status (SES) plays a significant role mainly among minorities and immigrants (Ball, Crawford, & Mishra, 2006; Hulshof, Brussaard, Kruizinga, Telman, &

Lowik, 2003). This is of particular importance as in the United States, African Americans, Native Americans, Asian Americans, and Latinos tend to be overrepresented among people with low SES (Adams, Grummer-Strawn, & Chavez, 2003).

Diabetes, cardiovascular diseases and other ill health associated with weight gain continue to rise, especially, among African Americans and Hispanics (Goldberg et al., 2004). This can be attributed, in large part, to certain dietary behaviors and factors such as knowledge, beliefs and perceptions about nutrition and health. For example, although the recommended daily calories from fat is 20-30%, African Americans consume 50% of their calories from fat (Pawlak & Colby, 2009).

Since 1990, the Hispanic population in North Carolina has grown by 394 percent and this rapid growth has outpaced the nation's growth of 60 percent increase in Hispanic population (Overview, Hispanics in North Carolina, 2010). Along with this growth have been increases in health problems. In 2008, North Carolina was the 17th highest state in rating of adult obesity (Pawlak & Colby, 2009). It was also rated 9th and 10th highest for diabetes and hypertension respectively (Pawlak & Colby, 2009). One contributing cause of this is that Hispanics in North Carolina tend to consume high-fat diets and foods high in sugar (McArthur, Viramontez, & Nocetti, 2001).

A number of studies have established that an improvement in nutrition knowledge is an important tool to stimulate dietary behavior that will promote healthy weight in all generations (Agurs-Collins, Kumanyika, Ten- Have, & Adams-Campbell, 1997; Bruno, Arnold, Jacobson, Winick, & Wynder, 1983; Domel, Alford, Cattlett, & Gench, 1992). It has also been shown that increasing one's knowledge in nutrition improves attitudes,

beliefs and self efficacy towards the consumption of a healthy diet and a possible increase in physical activity (Carson, Gillham, Kirk, Reddy, & Battles, 2002; Kristjansdottir et al., 2006; Tuuri et al., 2009).

Therefore, it is vital to examine the direct relationship between nutrition knowledge and the consumption of a healthy diet in order to improve the health status among minority groups. Though some solutions, such as Food assistance programs, have been proposed and implemented to ensure a healthy diet among low income earners (4H Healthy Living, 2009; Food Assistance Programs, 2008; USDA Food and Nutrition Services, 2009), many of these solutions need to be localized in order to target specific populations. It is evident that solutions that may work for a particular group of people may not be helpful for others due to factors such as the level of education, cultural beliefs, financial status and different ethnic food consumption. Therefore, in order to tailor nutritional interventions to a specific group, one must understand the differences that exist among the various ethnicities.

Few studies have focused on the differences in nutritional knowledge, attitudes, beliefs (KAB) and self efficacy between African American and Hispanic groups (Kreuter et al., 2005; Pawlak & Colby, 2009). The purpose of this study was to compare KAB variables and self efficacy among low income African American and Hispanic women residing in North Carolina, who are caretakers of children under the age of twelve years. The study addressed the following research questions: Among low income African American and Hispanic caretakers:

- What is the level of nutrition knowledge, attitudes, beliefs (KAB) and self efficacy?
- How is KAB related to weight status and dietary quality?
- What are the common barriers to healthy eating?

Also,

- Does the level of acculturation have an influence on KAB variables among the Hispanic population?

CHAPTER II

LITERATURE REVIEW

Based on the preceding research questions, this literature review illustrates the rise in the prevalence of weight related health disparities among low income minority women residing in the southern part of the U.S, particularly North Carolina. Additionally, it outlines the process that socioeconomic determinants, nutrition knowledge, attitudes, beliefs, and levels of food security influence one's diet and weight status. Lastly, the acculturation process that the Hispanic population undergoes after migrating to the U.S is reviewed.

A) Health status of African Americans and Hispanics

i) Health disparity

Preventive medicine and the advancement of research have contributed tremendously to an increase in life expectancy and health status of Americans. However the rise in the prevalence of cardiovascular disease, certain types of cancer, and type 2 diabetes among African Americans, Hispanics, and other minority groups (CDC, 2009) show that the American population is not benefiting equally in terms of health status. Since 1980, racial/ethnic health disparity has been a focus of the nation's health promotion and the Healthy People initiative (Keppel, Percy & Heron, 2010). Health disparity within a population is defined as 'a significant disparity in the overall rate of disease incidence, prevalence, morbidity, mortality or survival rates in the population as

compared to the health status of the general population' (Minority Health and Health Disparities Research and Education Act, 2000). Currently, the five leading causes of death (COD) are heart disease, cancer, stroke, chronic lower respiratory disease and accidents. Between 1999 and 2006, deaths caused by heart disease decreased among Caucasians by 30.0%, the least reduction was observed in the Hispanic (24.1%) and African American (22.9%) populations. Additionally, African Americans had the lowest percent decrease in deaths resulting from stroke (Keppel et al., 2010). African American women over the age of 24 years are more likely to get, and die from breast cancer than women of other ethnicities. In 2001, African American women were 2.3 times more likely to die from stomach cancer than any other population. Likewise, they are 29% more likely to die from cardiovascular disease than Caucasians. In terms of diabetes and HIV/AIDS, African Americans are 1.8 times more likely to be diagnosed with these health conditions. They also stand over 22 times the chances of dying from HIV/AIDS (The office of Minority Health, 2005).

Data show that 13% of the U.S population is living with fair or poor health. Of those living with excellent health, 38% are Caucasians and 31% are African Americans. Family income, education, and having private health insurance are positively associated with excellent health status (Vital and Health statistics, 2009). The Hispanic immigrants are 33% more likely to be uninsured when compared to Caucasians. Further investigation shows that among English speaking Hispanics, those that have acquired U.S citizenship either by birth or naturalization, are more likely to see a physician within a

twelve month span as compared to Hispanics without citizenship (Ku & Waidmann 2003).

Narrowing this down, the ratio of Hispanics living in North Carolina with no health insurance is 4.6 times more than Caucasians. Uninsured African Americans in North Carolina, on the other hand, are 1.6 times the number of uninsured Caucasians (Racial and Ethnic Health Disparity in North Carolina, 2010). According to the North Carolina Minority Health facts (2010), the top four leading CODs for the Hispanic population in 2010 were cancer, motor vehicle injuries, heart disease, and homicide. Between 2006 and 2008, 18.1% of North Carolinians had fair or poor health, of this percentage, 21.6% were African Americans while 29.1% and 15.7% were Hispanics and Caucasians respectively (Racial and Ethnic health disparity in North Carolina, 2010). When compared to Caucasians, African Americans and Hispanics in North Carolina have, respectively, 1.2 and 0.3 times the risk of dying from a heart disease.

From the above statistics, the prevalence of certain diseases is higher among African Americans and the Hispanic population when compared to Caucasians. This supports the existence of a health disparity in the US.

ii) Health risks and dietary intake

Compared to African Americans, Hispanics tend to engage in less high risk behaviors due to their cultural upbringing and thus are less prone to some health problems. Some of these high risk behaviors include overeating, smoking, alcohol consumption and intake of non prescribed drugs (Talpade, 2008). Hull et al. (2010)

observed that African Americans have a higher fat-free mass and consume more fruit drinks when compared to Hispanics.

In terms of daily consumption, Diaz, Mainous, Koopman, Carek, & Geesey (2005) observed that African Americans, when compared to Hispanics, had significantly higher cholesterol levels and also consumed more kilocalories from saturated fat. They recorded that Hispanics significantly consumed more fiber; 15.62g and 11.06g among Hispanics and African Americans, respectively. Additionally, the Hispanic population sampled was noted to consume higher levels of sodium and potassium as compared to African Americans. Yang et al. (2007) noted that while 20.8% of Hispanic women, of child bearing age consumed folic acid supplements, only 19.3% of African Americans women of the same age took the supplement. Furthermore, Hispanics consumed more folic-acid rich foods than African Americans. A research study conducted by Voils et al. (2008) showed that the two ethnic groups, unlike Caucasians were less concerned about the fact that their dietary intake could have an effect on their health.

With respect to African Americans and Hispanics in North Carolina, it has been documented that Hispanics have a much lower obesity rate (63.5%) than African Americans (74.9%) (North Carolina Minority Health Facts, 2010). Therefore, even though health disparities exist among African Americans and the Hispanic population, there are various differences in terms of dietary intake and health related behaviors.

iii) Low income females

The above problems are compounded by income status. The median annual household income is estimated to be \$34,426 for Hispanic women (North Carolina

Minority Health Fact: Hispanics/Latinos, 2010) and \$32,345 for African American women (North Carolina Minority health facts: African Americans, 2010) living in North Carolina. These incomes when compared to other states are very low. Based on these income rates, minorities are less likely to purchase health insurance. Statistics obtained between 2006-2008 show that 30.1% of minority women residing in North Carolina do not have health insurance coverage. The greatest percentage (52.2%) of these women was Hispanics. Marmot (2002) stated that income is highly related to an individual's health status. According to Danis et al. (2007), mortality rates are higher among low income earners than higher income individuals. It is well documented that depression (Rusch, Kanter, Manos, & Weeks, 2008), obesity, diabetes and other health problems are particularly prevalent among low income earners (The office of Minority Health, 2009). While 17.4% of Hispanic homes are headed by women, 48.9% of African Americans head their homes (North Carolina: Women's Health Disparities). It is therefore important to examine females of the minority group to better tailor nutrition intervention and government programs that can best assist them.

B) Determinants of diet and weight status among low income African Americans and Hispanics

Even with their low income and food security issues, females in minority groups have the greatest rate of obesity. This paradox of the positive correlation between low food security and obesity (Brewer et al, 2010; Dammann & Smith, 2010) can be attributed to socioeconomic factors, low nutrition knowledge, beliefs, attitudes and behaviors about healthy eating.

i) Socioeconomic determinants

In most families, one or both parents work full time or part time. This has greatly reduced the amount of time spent at home and subsequently the number of family meals prepared and consumed. Because of less time for the families, most families have resorted to consuming fast foods and T.V dinners. These types of foods are preferred because they are cheap, easy to obtain, and easy to prepare. However, because they typically contain high amounts of fat, sodium, and sugar, they have been associated with increasing rates of obesity and a myriad of health issues. Some specific socioeconomic factors that determine an individual's dietary intake are transportation (Bodor, Rose, Farley, Swalm & Scott, 2008; Inagami, Cohen, Brown & Asch, 2009;), employment (Blake et al., 2009; Devine, Farrell, Blake, Jastran, Wethington & Bisogni, 2009; Rathnayake & Weerahewa, 2005; Rose, Habicht & Devaney, 1998;), participation in Food and Nutrition Services (FNS) (Rose & Richards, 2004) and the number of people living in a household (Sonneville, La Pelle, Taveras, Gillman, & Prosser, 2009; Sweeting & West, 2005).

a) Transportation

Several research studies have demonstrated that having an easy access to transportation fosters the consumption of healthy foods (Rose & Richards, 2004; Inagami et al., 2009; Bodor et al., 2008; Sonneville et al., 2009). In a recent focus group conducted among overweight children, lack of transportation was the major barrier to healthy eating and the leading cause of high weight gain (Sonneville et al., 2009). Also, proximity and availability of fruits and vegetables in a supermarket has shown to be a

positive predictor of fruits and vegetables consumption (Bodor et al., 2008). Among 963 Food Stamp recipients studied, Rose & Richards (2004) observed that 93% of the participants purchased their foods from supermarkets. Twenty seven percent of this figure had to travel for over 5 miles to these markets. Those who lived closer to the supermarkets consumed significantly more fruits and vegetables than those who lived 5 or more miles away from the supermarket. Though the difference was not significant, individuals who lived closer to the supermarket consumed more vegetables than those who lived further away. Less than half of the households sampled owned a car, and car ownership positively correlated to a lower intake of fruits and vegetables. It was therefore not surprising when Inagami et al. (2009) noted, in their research, that the body mass index (BMI) of car owners were significantly higher than non-car owners.

In terms of proximity to fast food restaurants, non car owners residing in communities that are concentrated with fast foods had greater BMIs than non-car owners living in a community with no fast food outlet. In a fast food clustered community, car ownership could give an individual a greater variety in making food selection. As noted above, transportation can foster or hinder the consumption of healthy foods.

b) Employment

In 2007, the U.S labor force consisted of 71% mothers with children under the age of 18 years. Of this percentage, 67.8% were employed (Working mothers and child care, 2009). Since childcare and food preparation is mostly the prime responsibility of most women, mothers with younger children are less likely to have a full time job when compared to mothers of older children or without a child (Work and family, 2010). It has

been documented that maternal income greatly affects a child's nutrition (Tucker & Sanjur, 1988). Rathnayake and Weerahewa (2005) observed an association between maternal income and the total amount of calories consumed by family members. The extra income generated by the mothers was used to increase the caloric intake of all family members. A contrasting observation, however, was made of 2,146 eleven year olds, in a study by Sweeting and West (2005). These investigators observed that the eating habits of children were the same irrespective of their mothers' employment status. However, it was also noted that the chances of eating 'less healthy' were lower among children whose moms worked part time as compared to those with non working moms. Using a telephone survey, Devine et al. (2009) observed that long working hours and busy work schedules increased the chances of mothers eating high caloric meals outside their homes. Another barrier to healthy eating among employed mothers was their work conditions, however, flexible jobs with breaks, occasional free foods and promoting healthy relationships was observed to foster healthy eating habits. Among mothers, job satisfaction is achieved when they are able to provide healthy meals for their families while balancing work and household chores (Blake et al., 2009).

c) Participation in supplemental nutrition assistance programs

Several government assistance programs have been implemented to help reduce food scarcity among low income earners. Notable among these are the Food Stamp Program, the Supplemental Food Program for Women Infants and Children (WIC) and the Farmer's Market Nutrition Program. Comparing low-income preschoolers whose parents received food stamps (FS) to those who did not (NFS), Perez-Escamilla et al. (2000)

observed that children of FS recipients consumed more kilocalories than NFS families. Additionally, intake of diets rich in folate, vitamin B6, and iron were significantly higher among FS children as compared to NFS children. Though the value was not significantly different, NFS children consumed higher percent energy from fat than FS children. Intake of soda and artificially flavored beverages were, however, higher in FS than NFS children. Nutrition education was therefore recommended for this group of people to aid in their food selection.

Rose et al. (1998) conducted a study to evaluate the nutrient intake of pre-schoolers whose parents received either food stamps, WIC or both. Similar to the results obtained from Perez-Escamilla et al. (2000), an increased intake of about 1.2 mg/d of iron was observed among FS preschoolers when compared to non participants. Similarly, intake of zinc was about 0.9 mg/d higher in FS than NFS pre-schoolers. Among 15 nutrients studied, WIC participation positively correlated with an increase intake of 10 nutrients when compared to non participants. Participation in FS program alone resulted in the increase of only 5 of these nutrients. Thus, WIC was deemed stronger than FS in terms of the nutrients studied. This could have been due to the fact that, unlike FS, WIC food instruments can be used to purchase only specific food items listed on the vouchers which are designed to increase specific nutrient intake. None-the-less, it is evident that participation in either FS or WIC greatly improves the diet of a family. Adding to the dietary benefits of these programs is an increase in participants' knowledge in nutrition.

A research study shows that members of the Farmer's Market Nutrition Program experience lower rates of food insecurity and healthy eating habits (Kropf, Holben, Holcomb, & Anderson, 2007).

ii) Food insecurity among low income women

Another determinant of dietary intake is the level of food security. As defined by the United States Department of Agriculture (USDA), the four categories of food security are: 1) High food security which is observed when there is easy access to food. 2) Marginal food security: when there is no change in food intake but one expresses concern for food shortage. 3) Low food security: when there is reduced food quality, variety, or desirability but no change in food intake. 4) Very low food security: when there are reports of multiple indications of disrupted eating patterns and reduced food intake (USDA: Food Security, 2009). Prior to 2006, Food security was categorized into three: food security, Food insecurity without hunger and Food security with hunger. As such some studies conducted before 2006, included in the current discussion, utilize the 3 broad categories of food security. The old labels combined high and marginal food security into one group- Food security, and labeled low food security and very low food security as food insecurity without hunger and food insecurity with hunger, respectively. The new labels of food security levels give a better description of the range in severity of food insecurity (USDA: Food Security, 2009). Food insecurity, categorized by low and very low food security, defined as "the limited or uncertain availability of nutritionally adequate and safe foods or limited or uncertain ability to acquire acceptable foods in

socially acceptable ways'' (Children's Health Watch- Food Insecurity, 2009), has substantially increased among low-income households.

In 2008, 26.9% of Latino/Hispanic households and 25.7% of African Americans in the United States were food insecure (USDA: Food Security, 2009). Some negative effects of food insecurity are poor dietary quality and poor health outcomes (Drewnowski & Specter, 2004; Mazur, Marquis & Jensen, 2003; Schoenborn, Adams, Barne, Vickerie & Schiller, 2004). In the household, these effects are particularly evident among children, women and the elderly (Lee & Cubbin, 2002; Winkleby, Albright, Howard-Pitney, Lin & Fortmann, 1994). Specifically, qualitative researchers suggest that in times of severely constrained resources, women may deprive themselves of food so that their children would have enough to eat (Stuff et al., 2004). Most foods consumed during severe instances of food insecurity are of lower dietary quality and lead to obesity (Hunger in the U.S, 2006). BMI has been shown to increase as food insecurity becomes more severe (Champagne et al., 2007).

A research study conducted among African American women in North Carolina revealed that food insecurity is associated with the presence or absence of certain family members in the household. The study participants were 18 to 35 year old low-income first time mothers who participated in the WIC program. The six-item short form of the USDA Core Food Security Module (CFSM) for families was used to calculate household food insecurity among 217 mother-infant dyads. Results showed that single motherhood decreased with increasing food insecurity. As opposed to food secure homes, households that expressed food insecurity were more likely to have the child's father living in the

house or the mother expressing signs of depression. Having a college degree and having the child's grandmother residing in the house was, however, associated with a decrease risk of marginal food insecurity and food insecurity respectively (Laraia, Borja, & Bentley, 2009).

Using a sample of 153 women, Tarasuk and Beaton (1999) investigated the nutritional problems among recipients of emergency food assistance. Results of the study revealed that more than half of the participants (56.9%) were food insecure and had experienced some hunger over a thirty day period. Zinc and iron intake were significantly lower among women residing in households with moderate and severe hunger as compared to households without hunger. Though not significantly different, intake of protein, vitamin C, folate, calcium and magnesium were also low among women of moderate and severely food insecure households, in contrast to households without hunger. When economic, socio-cultural and other factors were held constant, the effect of household-level hunger persisted. It was observed that low food intake, leading to low nutrient levels, could put women at risk of nutrient deficiencies. This was highly associated with women who live in households with severe food insecurity. Although participants of this study resided in Toronto, the relationship between household food insecurity and the women's dietary intake observed is applicable to women with children in food insecure households in other settings. Despite the above mentioned inadequacy of nutrients during food insecurity, the mean BMI of participants was 27.7 kg/m^2 . This suggests that the rates of overweight and obesity continue to rise among food insecure populations.

Food insecurity and obesity is an evident paradox among low income earners. Though obesity can be caused by genetics, metabolism, behavior and the environment, the leading cause, among low income families, can be attributed to poor diet consumption. These families tend to consume cheaper foods that are higher in calories in order to save some money (Radimer, Olson, Greene, Campbell & Habicht, 1992). This often limits meats, fish, fresh fruits and vegetables from the diet and when available, the variety and the quality tend to be significantly lower (Klohe-Lehman et al., 2006). Also, long periods of hunger can lead to binge eating behaviors when food is available. These individuals may overeat, thereby increasing energy intake and overall weight gain (Adams, et al., 2003). Among children, the relationship between food insecurity and weight gain is unclear. While some studies associate food insecurity with poor weight gain (Elder et al., 2000; Olson, 1999; Townsend, Peerson, Love, Achterbeng & Murphy, 2001), others state that it increases a child's BMI (Auslander, Haire-Joshu, Houston, Williams & Krebill, 2000; Brinberg, Axelson, & Price, 2000; Resnicow et al., 2000). Using a 30 minute face to face interview, Feinberg, Kavanagh, Young and Prudent, (2008), investigated the relationship between food insecurity and maternal feeding practices in an urban black population. Mothers interviewed had at least one child between the age of 3 and 13 years. Of the 278 mother-child dyads, 79 were food insecure and mothers commonly fed their children with calorie boosters (25%), added sugars (13%) and appetite stimulants (13%). However, food insecurity was not significantly associated with a higher BMI.

Using data obtained from the 1998 and 1999 California Women's Health Survey (CWHS), Adams et al. (2006) determined the prevalence of food insecurity with and without hunger and examined the relationship between food insecurity and obesity. Of the 8,169 women sampled, 18.8% were obese with an overall 18.2% prevalence of food insecurity. A significantly high percentage of women (13.9%) were food insecure without hunger and 4.3% were food insecure with hunger. Though the prevalence of obesity varied with food security status and race/ethnicity it was observed, among Caucasians, that obesity increased with increasing food insecurity. On the other hand, the prevalence of obesity increased with increasing severity of food insecurity among women of other ethnicities.

Quandt et al. (2006) used the 18- item U.S Food Security Survey Module- to investigate the levels of food insecurity and hunger among 317 Latino immigrant families residing in North Carolina. Respondents were females between the ages of 27 and 34 years, with an average household size of 4-6. Urban residents experienced more food insecurity with hunger (FIH) than females residing in the rural areas of North Carolina. This was significantly higher than the nation's food insecurity rate of 13.3%. It was noted by the researchers that FIH among immigrants could be due to utilization of their savings for transportation to the U.S, and/or for paying utility bills, especially heating bills during the winter months. These reasons, among others, leave the immigrants with little or no money for food. When they manage to purchase some food, adults often sacrifice their portions for their children. Additionally, as a result of the low wages, the foods purchased

tend to be low in meat. Fruits and other foods such as candy and cookies were mostly avoided.

Another research study investigated the level of food security, food insecurity and hunger among 102 households of migrant and seasonal Latino farm workers in North Carolina. Based on the 18-item U.S Household Food Security Survey Module, 47.1% of the study participants were found to be food insecure. Of this percentage, 9.8% and 4.9% were with moderate and severe hunger respectively and the prevalence of food insecurity was highly observed in households with children. As such, most of these families utilized food assistance programs, such as the WIC program, while those without children eased the tension of food scarcity by accessing food pantries and consuming fish and meat hunted by the local farmers (Quandt, Arcury, Early, Tapia & Davis, 2004). Among this same ethnic group, Borre, Ertle and Graff (2010) observed that 63.8% of 36 migrant and seasonal farm workers were food insecure. Of this figure, 34.7% experienced hunger. In addition, it was observed that obesity was common among adults and children, however, researchers were unable to establish a relationship between lack of food and obesity.

From the above studies, it is apparent that food insecurity is highly expressed among low-income earners, particularly African Americans and Hispanic immigrants. Additionally, certain nutrients are low in the diets of mothers who experience food insecurity, however, obesity continue to rise among this group. Though the association between food insecurity and obesity is unclear, it is certain that high caloric foods are consumed in order to stretch the daily dollar value. Additionally, certain factors and

characteristics such as age, educational level, employment status and members of a household can affect food insecurity among low-income earners.

iii) Nutrition knowledge among low income women

It has been reported that lack of knowledge, especially in nutrition, is a major contributor to the daily consumption of high caloric and low nutrient foods. A growing body of evidence suggests that most low-income families have lower levels of education (Elder et al., 2000; Kessler & Wunderlich, 1999; Kreuter et al., 2005; Shah, Adams-Huet, Elston, Hubbard, & Carson, 2010; Shankar et al., 2007). Shah et al. (2010) examined if knowledge of serving size among African Americans had any relationship with their BMI. The researchers noted that due to lack of knowledge, participants overestimated the sample sizes of cornflakes, butter, soda and some fruits. Also, BMI was positively associated with overestimation of portion sizes.

Nutrition knowledge is also associated with other dietary behaviors, in that, as nutrition knowledge increases, there is an increase in fat avoidance (Elder et al., 2000); low-fat dietary patterns (Auslander et al., 2000; Brinberg et al., 2000; Resnicow et al., 2000) implementation of more healthful cooking methods (Kennedy, Hunt, & Hodgson, 1998), improved skills for reading food labels (Kessler & Wunderlich, 1999), meal planning, and reduced consumption of high energy and high-fat foods (Bringberg et al., 2000). In a study of a group of 156 low income African American women enrolled in a seven session of nutrition education program, results of their dietary recall after the program showed a reduction in their intake by 250 calories and consumed 2.5% fewer calories from fat. Additional, participants' BMI positively correlated with the number of

barriers to making healthy dietary changes. Investigators also found that subjects with the greatest BMI had higher class attendance (Klassen, Garrett-Mayer, Houts, Shankar & Torio, 2008).

Similarly, an educational intervention aimed at increasing the consumption of fruits and vegetables, showed a big change in dietary intake among 212 urban residing African Americans. In the research, total calories consumed, at base line, was 2416 kcal with 35.8% calories from fat. On average, 3.05 servings of fruits and vegetables were consumed daily. After seven sessions of 90 minutes nutrition education intervention, a range of 246.2 to 324.5 fewer calories were consumed with 2.97 to 3.08% calories from fat (Shankar et al., 2007). Similar to the research by Klassen et al. (2008) dietary improvement positively correlated with class attendance.

A research study conducted by Klohe-Lehman et al. (2006) determined if greater nutrition knowledge, rather than increased general knowledge, better promotes weight loss among low income overweight and obese African American, Hispanic, and Caucasian mothers. Low income mothers, literate in Spanish or English, who were above the age of 18 years and had at least one child between the ages of 8 months and 12 years were invited to participate in this research. One hundred and forty one mothers completed an 8-week nutrition and physical activity intervention program which emphasized diet, physical activity, and behavior modification based on the Social Cognitive Theory (SCT). From the results, nutrition knowledge of mothers increased in all areas. Notably, participants who lost more than 2.27 kg had greater nutrition knowledge than those who did not. They also appeared more cognizant of diet, weight loss, and health information

(Klohe-Lehman et al., 2006). Although this research included African Americans and Hispanics, it did not take into consideration the educational level of these women and how that could have influenced their knowledge of nutrition and weight loss.

Nevertheless, it can be concluded from the above studies that programs pertaining to weight-management should include a component of nutrition education to improve knowledge that will promote effective weight control.

Kreuter et al. (2005) discovered that though nutrition education improves diet quality, the method of delivering the message also has a great impact on how well participants will understand and utilize the information. Using baseline questionnaires obtained from 1,227 lower-income African American women, Kreuter et al., (2005), tailored the design of women's health magazines to better suit the African American population. They used four constructs to help increase fruits and vegetable intake: religiosity, collectivism, racial pride and time orientation. These constructs were used to design a set of magazines based on behavioral construct tailoring (BCT) and culturally relevant tailoring (CRT). Subjects of the study were randomly assigned to receive a series of these magazines generated from either BCT, CRT or both (BCT + CRT). The BCT + CRT recipients reported greater number of fruit and vegetable servings consumed daily by 0.96, as compared to BCT (+0.43), CRT (0.25) and control group (0.59). Identifying the culture and behavioral construct of specific ethnic groups and integrate these constructs in educative materials is, therefore, essential in achieving positive outcomes.

From the above research studies it is clear that a general increase in knowledge, particularly in nutrition, is associated with decreases in caloric intake of low-income

women. This decrease in consumption reduces their BMI. Since mothers are the primary meal preparers, an increase in their knowledge of nutrition can enhance the dietary intake of the entire family. Because demographic factors such as ethnicity, race, and income may affect the intake of nutrition and dietary knowledge it is important to take these characteristics into consideration in designing nutrition education programs.

iv) Self efficacy

Self efficacy, defined as an individual's confidence in performing a specific task, has shown to increase as one's knowledge pertaining to the benefits of the task increases (Carson, et al., 2002; Kristjansdottir et al., 2006; Tuuri et al., 2009). Therefore, increasing one's self efficacy in healthy eating affects an individual's dietary intake. In targeting an increase in the consumption of fruits and vegetables among low income earners, especially African Americans, many researchers achieved their aim by increasing participants' self efficacy (Chang, Brown, Baumann, & Nitzke, 2008; Watters, Satia, & Galanko, 2007). Walters, Satia and Galanko (2007) discovered that among 658 African Americans residing in North Carolina, high self efficacy and the belief that fruits and vegetables are important were the strongest factors that could lead to increase fruits and vegetable intake. Annesi, (2007), studied the responses of obese 30 African American and 34 Caucasian obese women to three outcome measures: a Body Areas Satisfaction Scale (BAS), where individuals rated their level of satisfaction with the shape and size of certain body parts; Physical Self- Concept Scale, which described individual's thoughts and feelings; and Exercise Self-Efficacy Scale (ESES), that evaluated the confidence level, readiness and barriers to exercising. An intervention group involved physical

activity and nutrition lessons. Body weight and psychological factors were measured at baseline and at 20 weeks. The investigators observed that BAS scores were the primary predictor of weight change among the Caucasian group while change in ESES scores was the most important predictor of weight change among African American women. The author concluded that self efficacy theory is an effective explanatory model for weight loss among both ethnicities.

Cullen et al. (2009) randomly divided 1,104 participants of the Expanded Food and Nutrition Education Program (EFNEP), of which 89% of the women were Hispanic, into a control group and an intervention group in order to evaluate the effectiveness of a modified curriculum for EFNEP. In the modification group, the researchers among other areas, focused on increasing the self efficacy for healthy feeding. Though there was an improvement in healthy food consumption and other psychosocial variables, only the BMI of the intervention group decreased significantly. This research demonstrated the beneficial effect of boosting an individual's self efficacy.

A study conducted by Kaiser, Brown and Baumann (2010) assessed the perceived influence on physical activity and diet among a convenient sample of 137 adults residing in rural counties with annual household income less than 200% of the 2006 Federal Poverty Guidelines. Results of the face to face interview showed that only 8% of the study sample consumed 5 to 13 servings of fruits and vegetables, recommended by MyPramid food guidelines. Participants with higher self efficacy were more likely (OR = 2.65) than those with low self efficacy to engage in physical activity for the

recommended amount of time. Additionally, participants who did not perceive the cost and unavailability of fruits and vegetables as barriers consumed them more.

From the above studies it can be stated that increasing the self efficacy, either through nutrition knowledge or other means, increases the possibility of consuming healthy foods and there by decreasing one's weight.

v) Attitude

Axelsson, Federline, and Brinberg (1985) reported a meta- analysis that indicated support of the fact that positive attitudes towards nutrition greatly contributes to the consumption of a healthy diet. To improve nutrition attitudes, Jordan et al. (2008) created eight weeks of intervention classes for a convenience sample of 114 low-income mothers with children between the ages of 1 and 4 years. The classes, based on personal interests expressed by mothers, involved recommendations for healthy eating, tips for being active and behavior modifications. By the end of the classes, the researchers observed a significant average weight loss of 2.7 kg ($P < 0.001$) in the intervention group as opposed to the control group of mothers who did not participate in the classes. Also, individuals that lost weight had healthier eating attitudes and fewer perceived barriers as compared to those who did not lose any weight.

Paschal, Lewis-Moss, and White (2010) utilized a Stages of Change Model approach to evaluate attitudes and decisions made by 242 low income earners regarding health behaviors. Participants consisted of African Americans (N=127), Caucasians (N=74) and other ethnicities (Latino and Asian) (N=41). Results from the study revealed that 40-50% of the participants were in the 'maintenance' stage of vegetable

consumption. However, 30% of African Americans, 26% Caucasians and 38% of the other ethnicities were in the contemplation stage. In terms of fruit intake, 47% of African Americans, 38% Caucasians and 33% individuals of other ethnic groups were in the contemplation stage of change. A majority of African Americans (51%) were in the contemplation stage for engaging in physical activity as compared to 43% whites. There were however, more Caucasians and other ethnicities in the maintenance stage for physical activity (N=21) as compared to African Americans (N=14). The authors concluded that more effort should be placed in creating a supportive environment and accessible resources to help promote behavioral changes among low income earners. These behavioral changes will improve their attitudes and will help change their behavior from the pre-contemplation, contemplation, or preparation stage to the action or maintenance stage.

vi) Barriers and beliefs

Pawlak and Colby (2009) evaluated the beliefs, barriers and self-efficacy of consuming a healthy meal among a convenient sample of 57 African Americans living in North Carolina. The belief that a healthy diet will enhance one's health had the highest score. The greatest barrier to eating a healthy diet was the cost and the least barrier was lack of knowledge in locating healthy foods in the grocery store. Although participants reported high self efficacy and knowledge of what healthy foods were, they admitted to not consuming as much of these foods as they should. Hartman, McCarthy, Park, Schuster, and Kushi (1994) observed that among low- literacy audiences, barriers to making healthy diet choices included lack of time and money to purchase healthy foods.

Also, through focus group discussions, it was noted that lack of cooking skills and knowledge of which foods are classified as healthy were great barriers. Among low income obese African Americans and Caucasians, stressful experiences which caused participants to engage in 'emotional eating' was a major barrier to consuming healthy foods (Chang, Nitzke, Guilford Adair, & Hazard, 2008). Good personal appearances, ability to play with their children, and social support were identified factors that motivated this group of women to eat a healthy diet and engage in physical activity.

vii) Acculturation of Hispanic population to US

Another factor that influences dietary intake of individuals, specifically, of the Hispanic population is their level of acculturation. Acculturation is a social process characterized by cultural changes that occur when individuals originating from one country adapt the culture of the host country (Triandis, 1994). The hypothesis of acculturation suggests a decrease in health status among Hispanic immigrants as the number of years spent in the U.S increases (Hummer, Rogers, Nam, & LeClere, 1999; Singh & Siahpush, 2001; Singh & Siahpush, 2002). Several authors have proposed that as Hispanics get acculturated to the U.S, primarily, through the length of stay, their eating habits, level of physical activity and eating patterns change (Hummer, Rogers, Nam, & LeClere, 1999; Singh & Siahpush, 2001; Singh & Siahpush, 2002). These changes often cause an increase in weight and thus a decline in health status.

Using data from NHANES 1999-2004, Duffey, Gordon-Larsen, Ayala, and Popkin (2008) classified Mexicans (N=3375) and other Hispanics (N=622) into foreign born (FB) or US born (USB) to analyze if birth place is associated with dietary intake.

Results of the study showed that USB individuals consumed higher total energy as compared to FB. Also, USB consumed less energy from fruits and vegetables than FB. Specifically, USB Mexicans obtained an extra mean of 56 kcal from fast foods as opposed to FB counterparts. However, the total energy obtained from high fat milk and juices was less among USB Mexicans and Hispanics compared to their FB. Additionally, after controlling for age, gender, income, and education, Spanish speakers consumed 'healthier' diets. In conclusion, researchers associated low consumption of energy from 'healthier' foods, such as fruits, vegetables and legumes, to acculturation and being born in the US.

The above studies indicate that major determinants of food intake are: socioeconomic factors, such as education, employment, transportation and the participation in food assistant programs; nutrition knowledge attitudes, barriers and beliefs and level of food security and acculturation to the society. It can also be deduced that an increase in nutrition knowledge drives the other factors in determining the portions and types of food consumed. Though not clearly understood, the rate of obesity continues to raise among low income earners. And though African Americans may have several similarities there exist differences in the factors that influence their dietary intake and the ways to minimize the negative influences these factors may have.

C) Developing acculturation scales

Several models have, in the past, been proposed to help understand the process of Hispanic acculturation (Keefe, 1987). A three-phase acculturative stress model based on a theory of adaptation proposed by Berry, (1986), involves contact, conflict, and

adaptation. Conflict results when cultural groups are not readily willing to give up their respective values and customs. In addition, the more different cultures are, the more the acculturation stress is encountered by the minority group. A study conducted by Keefe (1987) demonstrated a multidimensional model which suggested that the acquisition of new customs and renouncing of traditional customs vary from trait to trait. Negy and Woods (1992) however maintain the view that in acculturation, the two groups coming into contact are mutually influential but not necessarily to the same degree. Negy and Woods' concept is greatly supported by the presence of some Hispanic culture such as foods and music in the American market. It also is evident that the Hispanic population in the U.S. is affected by the American culture, as evidenced by the gradual decline shift from the Hispanic diet to American foods as length of stay in the US increases (Himmelgreen, Perez-Escamilla, Bretnal, Peng, & Bermudez, 2005).

Over the years a number of indicators have been proposed to measure the acculturation of the Hispanic population in the US. Notably among these are length of stay in the US (Dubowitz et al., 2007; Miglietta & Tartaglia, 2009), the predominate language spoken among family members (Dubard & Gizlice, 2008; Sussner, Lindsay, & Peterson, 2009; Taverno, Rollins & Francis, 2010), and frequency of ethnic food consumption (Dixon, Sundquist, Winkleby, 1999; Ghadder, Brown, Pagan & Diaz, 2010; Gordon-Larsen, Harris, Ward & Popkin, 2003; Yeh, Vilandrich, Bruning & Roye, 2009).

Due to the differences in lifestyle, social support and behavioral characteristics, Hispanics in the US have shown to have better quality diets, lower rates of obesity and mortality rates when compared to other minority groups of similar socioeconomic status.

However, studies show a decline in the above advantages as length of stay in the US increases (Hummer et al., 1999; Singh & Siahpush, 2001; Singh & Siahpush, 2002), that is, length of stay influences adaptation in the U.S (Ward, Okura, Kennedy & Kojima, 1998). To investigate the effect length of time in the U.S has on fruits and vegetable consumption; Dubowitz et al. (2007) analyzed data on 679 low income women. Over 50% of the study participants were born outside the US and 67% were Hispanics. Results showed that mothers born in the US consumed 4 servings of fruits and vegetables while foreign born consumed 6.3 servings. This relationship weakened as the length of stay in the US increased. Upon critical analysis, foreign born mothers who have lived in the US for less than 4 years consumed 2.5 servings more than those who have lived in the US for over 4 years. Once language and other factors were adjusted, researchers observed that fruits and vegetable consumption among foreign born mothers who have lived in the US for over 15 years were the same as native US born mothers.

Using data from the Acculturation and Nutritional Needs Assessment (ANNA), Himmelgreen et al. (2005) examined whether length of time in the U.S., language use, and birthplace (proxy measures of acculturation) were associated with BMI and obesity among a sample of 174 low-in-come Puerto Rican women from Hartford, Connecticut. The mean BMI of the participants was 27.39 kg/m^2 and nearly 34% were considered obese. An increase in the length of stay was directly proportional to participants' BMI. The prevalence of obesity was greatly observed in women who had been in the U.S. for 10 years or more (40%), as compared to those who had been in the U.S. for less than 1 year (29%). It was also observed that those who spoke fluent English had a significantly

higher BMIs than women whose English was good to not-so-good. With the high prevalence of obesity, these findings suggests that the longer one stays in the U.S the more acculturated they become. Their study also revealed that a decrease in ethnic food intake is related to a higher level of acculturation.

A study conducted by Miglietta and Tartaglia (2009) revealed that immigrants adapt best in relation to their ability to negotiate between the cultural entities they confront. By administering questionnaires to 576 immigrants (196 Romanians, 179 North Africans, and 201 Latino Americans) it was observed that factors such as cultural knowledge, length of stay in the new culture, and linguistic competence strongly influence this process. Using the Healthy Eating Index (HEI), developed by USDA, it has been noted that the diets of Spanish speaking Hispanics are healthier than Hispanics who spoke English, or other ethnicities (Aldrich & Variyam, 2000). Using the HEI many researchers have linked the decline in healthy food consumption to length of time in the U.S and with obesity and subsequently with acculturation (Dixon et al., 2000; Neuhouser, Thompson, Coronado, & Solomon, 2004; Yeh, 2009). Linking these acculturation factors, it can be stated that the longer the length of stay in the U.S the better their English proficiency and the higher their BMI through the consumption of less healthy foods. Based on the literature then, an acceptable acculturation scale should include the following: length of stay, languages spoken at home and frequency of ethnic food consumption. These three variables were used to construct an acculturation scale for the current study.

D) Conclusion

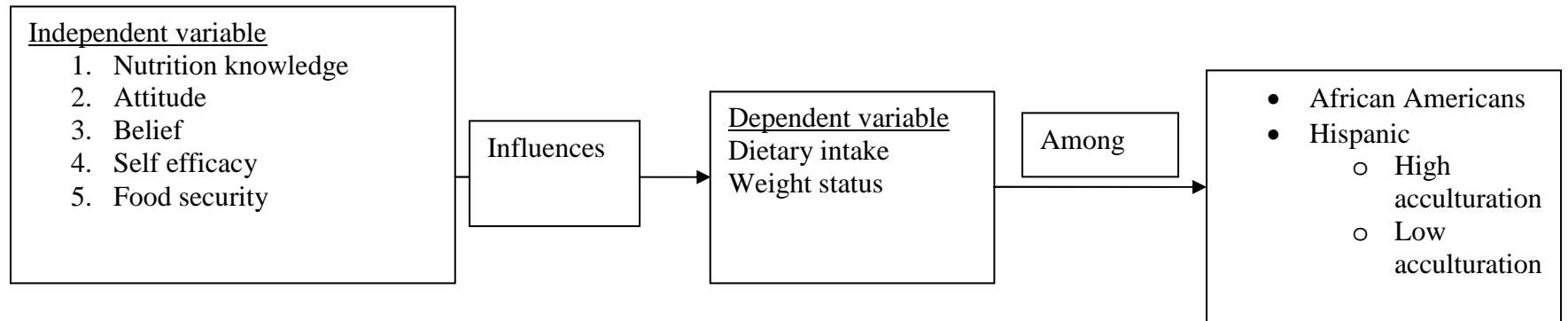
The two major minority groups in the US are Hispanics and African Americans. Socioeconomic factors, food insecurity, low nutrition knowledge, attitudes and beliefs of food are some factors that determine the food intake of these two minority groups. Rates of obesity continue to rise among low income earners; this has been partially attributed to purchasing high caloric foods which will satisfy family members for a longer time in order to reduce the rate of food consumption. Another observation made among these groups of families is that their intake of healthy foods increases with an increase in nutrition knowledge. A vital piece to this increase in healthy food consumption is the method of delivering the message to the target audience. Though an increase in nutrition knowledge helps alleviate the consumption of high caloric foods, other variables that may also affect it are participation in FNS programs, proximity and/or transportation to the supermarkets to purchase these healthy foods.

Though certain demographics, such as low food security, low education, low income, and lack of employment remain common among African America and Hispanic women, they are very different in terms of behavior, risk factors and food intake. As Hispanics get acculturated into the county, they exhibit certain characteristics similar to those seen in African Americans. Therefore, in order to better develop nutrition interventions and/or food assistance programs, it is vital to acknowledge the differences in the two low income minority groups.

E) Conceptual framework

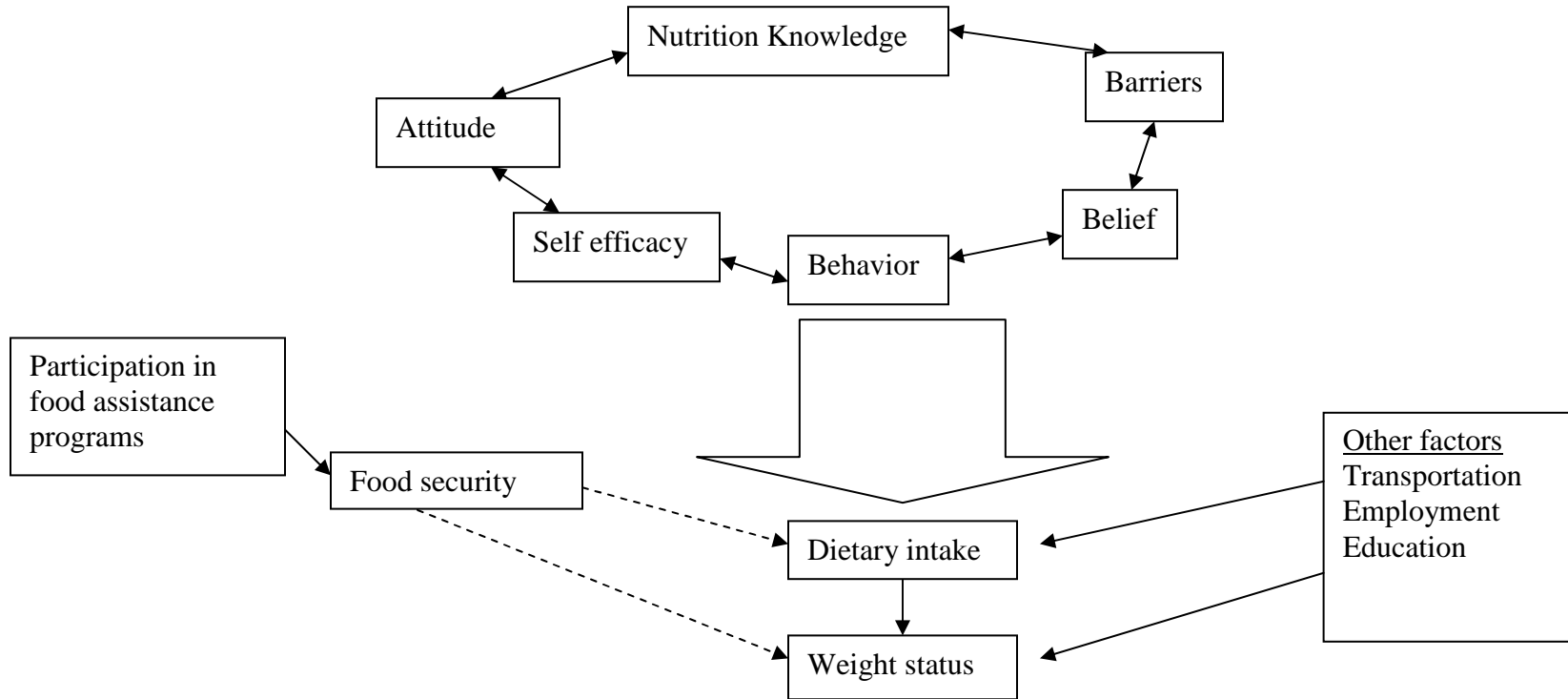
Figure 1 illustrates the identified dependent and independent variables for the current study.

Figure 1: Dependent and independent variables



Based on the literature reviewed, Figure 2 illustrates how the inter-relationships between independent variables can be conceptualized: knowledge, attitude, beliefs, self efficacy, social economic status, behavior and food security, with dependent variables dietary intake and weight status. It should be noted that the level of acculturation affects all these variables.

Figure 2: Relationships between variables



CHAPTER III

MATERIALS AND METHODS

This three phase study analyzed data from three previous studies conducted in Guilford and Chatham counties in North Carolina.

Phase I

The first step of this project combined three data sets that included the nutritional knowledge, attitudes and behaviors of rural (N=119) and urban (N=166) Hispanics and urban African American women (N=100). These data sets were cleaned and merged on 298 common variables.

i) Data on urban and rural Hispanics

Data utilized were reported by Haldeman, Gruber & Ingram (2005) in a project that aimed at achieving three major goals: (1) to assess the level of and contributors to food insecurity and weight status in a rural Latino community; (2) to compare food insecurity and weight status determinants among rural and urban Latino populations; and (3) to identify barriers to food acquisition and strategies used by food insecure Latino/Hispanic families to manage limited food resources. The researchers recruited a convenience sample of rural and urban residing low income Latino/ Hispanics adults. The participants were residents of Guilford County and Siler City, NC, low income, primary caretakers of a child 12 years or under, primary meal preparers, and Latino/Hispanic by race. A translated and face validated version of the 18 Item Core Food Security/Hunger

Module along with a survey (Appendix B) examining socioeconomic status and demographics; nutrition knowledge, attitudes, behaviors, beliefs; strategies for managing food; food group consumption; acculturation; food assistance program participation, and anthropometrics was administered. The data were collected from November 2005 to June 2006 by a bilingual, bicultural interviewer in respondents' homes. Based on information derived from the survey questionnaire, a qualitative component involving a semi-structured interview was conducted with a sub-sample of the most severely food insecure respondents. Interviews were focused on identifying barriers to food acquisition and strategies used by families to manage limited food resources. All interviews were conducted in Spanish, tape recorded and documented with field notes.

ii) Data on urban African Americans

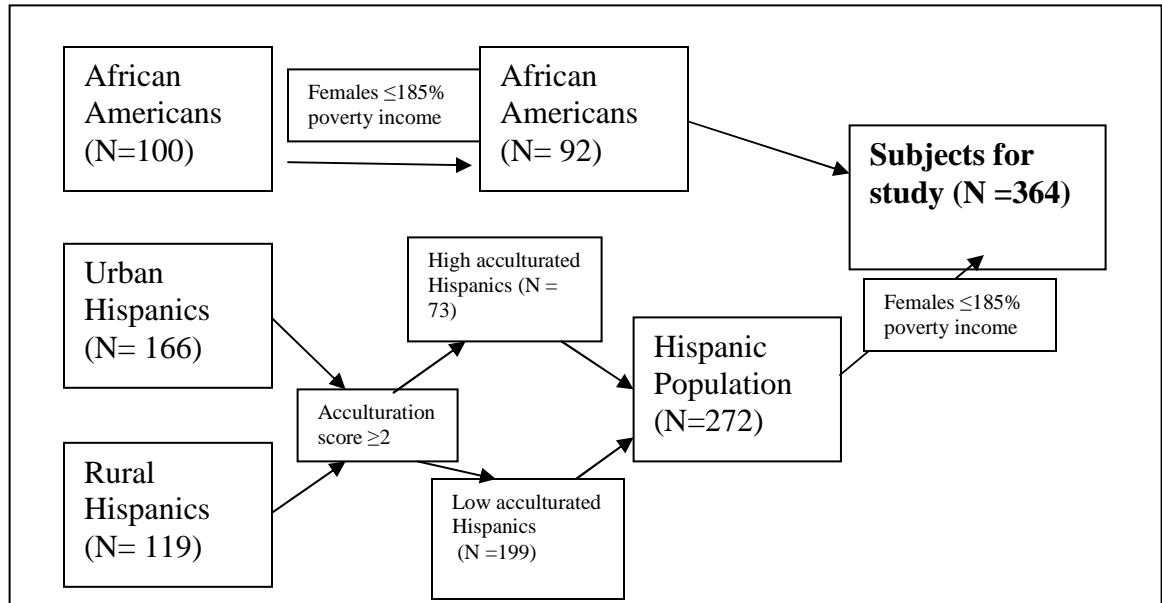
Data used in this study concerning urban African Americans were from a study conducted by Hecht (2006). The purpose of this study was to assess the food security status, food assistance program participation, nutrition knowledge and attitudes, strategies for managing food, food intake and obesity status of low income, African American caretakers of young children. This project addressed nutrition knowledge and attitudes, as well as food insecurity, food assistance program participation and strategies for managing food in an attempt to gain a better understanding of this relationship. A convenience sample of 100 participants was recruited for this study. Surveys (Appendix B) examining socioeconomic status and demographics; nutrition knowledge and attitudes, dietary intake using a brief food frequency questionnaire; food security utilizing the 18 Item Core Food Security/Hunger Module; strategies for managing food; food assistance

program participation and anthropometrics (heights/weights/hip and waist circumference) were administered in the home by a trained interviewer between January 2005 and June 2005. Selection criteria for participation included the following: participants were residents of Guilford County, the primary caretaker of a child 12 years or less, low income, primary meal preparer and self identified as African American. Participants were recruited through community agencies.

iii) Data cleaning process

The sample identification process eliminated males, who were interviewed on behalf of their wives, and participants with missing values. Participants were further screened with household income. The 2009 income eligibility for the WIC program was further used to eliminate participants who earned more than 185% of the poverty income guidelines. The total sample size for the current study therefore decreased from 385 to 364, with 92 African American women and 265 Hispanics; of which 73 and 199 were considered high and low acculturated, respectively. Figure 3 illustrates the data cleaning process used to arrive at the final sample size.

Figure 3: Data cleaning process



Phase II

i) Developing an acculturation scale

The second step of this project was to develop an acculturation scale to separate the Hispanic population into low and high acculturated Hispanics. This aided us to observe if the level of acculturation had an effect on the variables studied.

Based on literature (Dubowitz et al., 2007; Miglietta & Tartaglia, 2009; Dubard & Gizlice, 2008; Sussner, Lindsay, & Peterson, 2009; Taverno et al. 2010; Dixon et al 2000; Ghadder, et al., 2010; Gordon-Larsen, et al., 2003; Yeh et al, 2009) the acculturation scale was developed using: (1) the number of years spent in the US, (2) frequency of ethnic food consumption and (3) the languages mainly spoken at home.

Duration of stay in the US was recorded from a continuous variable and collapsed into one of the three ordinal categories: <3 years, $\geq 3 < 10$ years and ≥ 10 years. A score

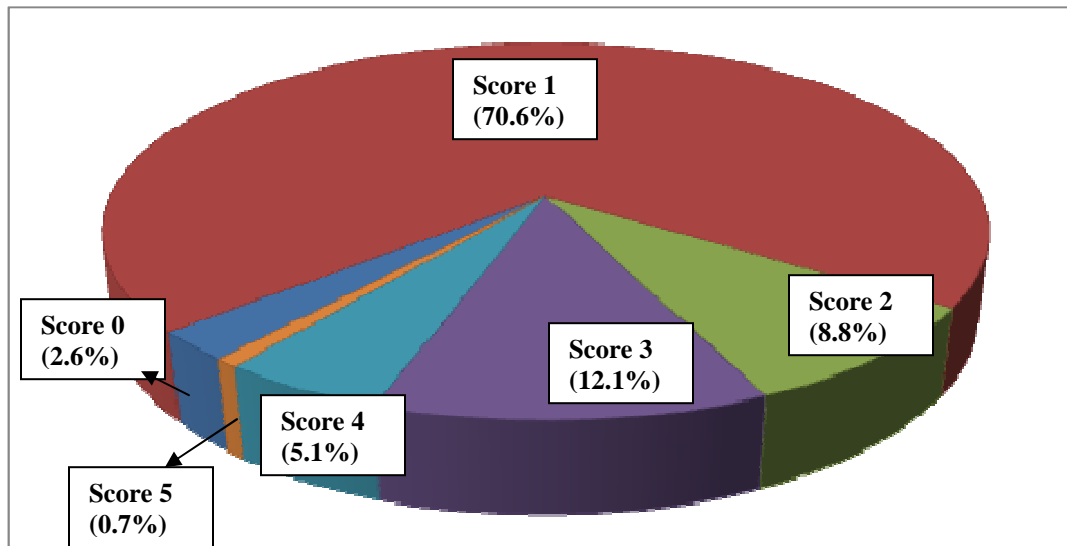
of 0, 1 and 2 were assigned to individuals who had lived in the US for less than 3 years, 3 but less than 10 years, and 10 or more years respectively. Consumption of ethnic-centric (to Hispanics) also was coded. Ethnic meals consumed daily or 4 to 6 times a week were assigned a point value of 0. Consumption between 1 to 3 times in a week received a score of 1, once every 2 to 3 weeks and once a month were awarded 2 and 3 points, respectively. In terms of the languages spoken at home, points were awarded for speaking only Spanish (0 points), Spanish and English (1 point), or English only (2 points). The possible range of values for the sum of all three scores was 0 to 7. The above acculturation scores are summarized in Table 1.

Table 1: Acculturation scores for Hispanic group.

Variable	Response	Acculturation score
Length of stay in the US	<3	0
	≥3 <10	1
	≥10	2
Ethnic food consumption	Daily/4-6 times a week	0
	1-3 times/week	1
	Once every 2-3 week	2
	1/month	3
Language spoken at home	Spanish only	0
	Spanish and English	1
	English only	2

Stratification of the Hispanic sample by acculturation level yielded two groups high and low US acculturated Hispanics. Based on this scoring system, 73 participants with a score greater than or equal to two were classified as high acculturated Hispanics. The rest (N=199) scored less than 2 and were considered low acculturated. Figure 4 illustrates the distribution of the acculturation scores.

Figure 4: Scores from acculturation scale



Phase III

The third step of this project was to define and develop additive scores for all variables used in the data analyses process.

i) Variable definitions and scores

The following section defines all variables and statistical analyses used to address this study's research questions.

a) Nutrition knowledge

Participant's knowledge about nutrition was evaluated using a 20-item nutrient questionnaire; this is illustrated in Table 2. A score of 1 was awarded to questions answered correctly and a zero was allocated to a wrong answer or a refusal/don't know response. A total of 20 points were awardable. Individuals with ≤ 5 correct answers were considered to have a poor knowledge in nutrition while those with 16 or more correct answers were considered to have an excellent knowledge in nutrition. Scores ≥ 6 but ≤ 10

were considered to be fair and participants with ≥ 11 but ≤ 15 had good nutrition knowledge.

Table 2: Nutrition knowledge variables

Variable name	Definition
Which of these foods do you think is/are high in saturated fat?	a) Bananas 01) Yes 02)No 88) D/K b) Beef 01) Yes 02) No 88) D/K c) Rice 01) Yes 02) No 88) D/K d) Potato 01) Yes 02) No 88) D/K e) Tortilla 01) Yes 02) No 88) D/K
Which of the following foods would be a good source of calcium?	a) Pork 01) Yes 02) No 88) D/K b) Apples 01) Yes 02) No 88) D/K c) Milk 01) Yes 02) No 88) D/K d) Corn 01) Yes 02) No 88) D/K e) Rice 01) Yes 02) No 88) D/K
Which of the following foods would be a good source of iron?	a) Tortilla 01) Yes 02) No 88) D/K b) Apples 01) Yes 02) No 88) D/K c) Milk 01) Yes 02) No 88) D/K d) Beef 01) Yes 02) No 88) D/K e) Rice 01) Yes 02) No 88) D/K
Which of the following foods would be a good source of fiber?	a) Fish 01) Yes 02) No 88) D/K b) Tortilla 01) Yes 02) No 88) D/K c) Milk 01) Yes 02) No 88) D/K d) Beef 01) Yes 02) No 88) D/K e) Beans 01) Yes 02) No 88) D/K

b) Attitudes score

To assess participants' attitudes towards certain foods, the following questions, shown in Table 3, were included in the questionnaires. Participants who affirmed that it was important to eat fruits and vegetable, fiber, low fat and surgery diets, choose

and eat a healthy diet, were assigned a score of 1, any other response (No, No response, I don't know) was assigned a zero.

Table 3: Nutrition attitude variables and scores

Variable name	Definition	Score
Do you believe that making healthy food choices will help keep you and your family healthy?	01) Yes, it will help 02) It will help a little 03) No it will not help 88) Not sure if it will help 99) Refused	1 0 0 0 0
Do you think that it is important to eat a diet low in sweets and deserts?	01) Yes 02) No 88) I don't know 99) Refused	1 0 0 0
Do you think it is important to eat foods that are low in fat?	01) Yes 02) No 88) I don't know 99) Refused	1 0 0 0
Do you think it is important to eat fruit and vegetables?	01) Yes 02) No 03) Don't know 04) Refuse	1 0 0 0
Do you think is important to eat fiber?	01) Yes 02) No 88) Don't know 99) Refused	1 0 0 0

c) Belief score

Belief was measured based on a single variable: ‘Healthy foods will help keep one healthy’. Participants with a positive nutrition belief that healthy foods will help keep them healthy were awarded a score of one; all other responses had a zero.

d) Knowledge, Attitude and Belief (KAB) score

Scores obtained from the nutrition knowledge questions were added to computed attitude and belief scores to obtain a total KAB score. The highest possible total KAB score was 26 and 0 was the lowest. The scores were divided into groups of six and categorized into poor (scores ≤ 5) fair (scores 6 to 12), good (scores 13 to 19) and excellent (scores ≥ 20). This is illustrated in Table 4.

Table 4: KAB scores

Categories	KAB score range
Poor	≤ 5
Fair	6 -12
Good	13 – 19
Excellent	≥ 20

e) Barriers and Self efficacy

Barriers to preparing or consuming a healthy diet together with the level of participants’ self efficacy were assessed using the questions depicted in Table 5 and 6 respectively.

Table 5: Nutrition barriers

Variable name	Definition
Do you think it is difficult to eat a healthy diet?	01) Yes 02) No 88) D/K
If yes, please tell me why it is difficult for you to eat a healthy diet.	a) It takes too much time to prepare b) Healthy foods cost too much c) My family does not eat healthy foods d) It is difficult to find healthy foods that my family likes. e) I do not know how to buy healthy foods. f) I do not know how to use food labels. g) I do not receive any support for preparing healthy foods. h) I do not know what foods are healthy. i) Other

Table 6: Self efficacy variables

Variable name	Definition
You are able to choose healthy foods at the grocery store	01) Very confident 02) Somewhat confident 03) Not confident at all 04) Not sure 99) Refused
You are able to prepare healthy foods for you and your family.	01) Very confident 02) Somewhat confident 03) Not confident at all 04) Not sure 99) Refused
You are able to select healthy snacks for your children.	01) Very confident 02) Somewhat confident 03) Not confident at all 04) Not sure 99) Refused

f) Food Security

Food security was determined using the USDA Food Security/Hunger Core Module. Table 9 defines the food security categories as defined by the USDA (USDA: Food Security, 2009).

Table 7: Food security categories

Food security categories	Definition
Food security	When all people at all times have access to sufficient, safe, nutritious food to maintain a healthy and active
Marginal food security	When there is no change in food intake but one expresses concern for food shortage
Low food security	Food insecurity is the uncertain or limited availability of adequate supplies of nutritious and safe food
Very low food security	Experiencing "multiple indications of disrupted eating patterns and reduced food intake.

g) Diet quality

Dietary intake was measured using a food frequency questionnaire that included consumption of certain specific foods, such as tortilla, bread, rice, fruits and vegetables. These specific foods were then categorized into the five main food groups. Table 8 illustrates the food groups with the individual food items and the serving sizes used in determining if participants met or did not meet the food recommendations. Using the recommendations set by the food guide pyramid, it was determined whether an individual met the daily food requirements or not. An individual was said to have met the dietary recommendation if they consumed the least number of servings recommended per food

group. The mean dietary intake was defined as the sum of, at least, four food groups divided by five, which represents the total number of food groups studied. This analysis was conducted to investigate if the population sampled were meeting the recommendations from the five food groups.

Table 8: Composition of food groups and serving sizes

Food group	Composition	Daily recommended serving sizes used
Dairy	Milk Cheese Yogurt	2-3
Fruits	Fruits (excluding juices)	2-4
Vegetables	Starchy vegetables (potatoes) Green leafy vegetables Lettuce, tomato	3-5
Meats/Proteins	Legumes Meats Eggs Fish and shell fish	2-3
Grains	Pasta Tortilla Bread Cereal Snacks (potato chips, nachos, cookies)	6-11

ii) Data analyses

SPSS version 18.0 was used to conduct all analyses. Descriptive statistics were used to describe the Hispanic and African American samples. Cross tabulation analysis was conducted to compare key socio-demographic variables on nutritional knowledge, attitudes, beliefs, self efficacy, barriers, and food security between the two ethnic groups. Relational analysis using chi- square test was employed to assess differences between

Hispanics and African Americans in terms of descriptive characteristics, food security, weight status and diet. Body mass index (BMI) was categorized into underweight, normal weight, overweight and obese by using cut points from CDC. Statistical significance was denoted by a p value < 0.05 .

CHAPTER IV

RESULTS

Sample characteristics of high and low acculturated Hispanic women

Before comparing Hispanics and African Americans, we first assessed differences in focus variables between high and low acculturated Hispanics. This was to help determine whether to compare Hispanics as a whole or based on acculturation level.

Some demographic characteristics were significantly different based on acculturation level. These include: respondents as head of household, employment status and access to transportation. High acculturated Hispanics were more likely to be the head of household, employed and have regular access to transportation. Bivariate analysis showed that low acculturated Hispanics had the lowest mean BMI of 28.80 kg/m² and fewer being obese (39.8%) as compared to high acculturated Hispanics (41.7% obese). BMI was significantly related to level of acculturation ($p = 0.004$). A cross tabulation analysis showed that BMI was significantly related to food security among the Hispanic population, in that, overweight and obese individuals were more likely to experience low food security. In terms of attitude towards healthy foods, low acculturated Hispanics were less likely to report that it is important to incorporate fiber into a meal. However, a higher percentage of low acculturated women, compared to high acculturated women, believed that making healthy food choices will help keep them healthy. All other variables studied did not yield any significant difference in terms of acculturation levels.

Table 9 illustrates the variables studied within low and high acculturated Hispanic women. Table 10 illustrates the relationship between BMI and food security among the Hispanic population.

Table 9: Sample characteristics of high and low acculturated Hispanic women

Variable	High acculturated Hispanic (N=73)	Low acculturated Hispanic (N=199)	P values
Demographics			
Age (years)	29.58 ± 6.17	29.04 ± 6.68	NS
Monthly income (\$)	855.16 ± 890.11	638.20 ± 703.57	NS
Family size	4.79 ± 1.47	5.17 ± 1.53	NS
	%	%	
Racial Identity			
Mexican	71.2	69.3	
Puerto Rican	19.2	19.3	
Dominican	1.4	0.5	
Other	8.2	10.6	NS
Head of Household	35.6	12.1	< 0.001
WIC Participation			
Respondent	75.3	74.5	
Child	69.9	66.7	NS
SNAP Participation	28.8	17.2	NS
Work First Participation	11.0	4.7	NS
Education			
Eighth Grade or less	51.2	58.8	
Some High School	23.3	18.6	
High School Graduate or GED	15.1	12.6	
Trade/Technical Training	2.7	2.0	
Some College	6.8	3.5	NS
No response	0.0	2.5	

Table 9: Sample characteristics of high and low acculturated Hispanic women (Cont')

Variable	High acculturated Hispanic (N=73)	Low acculturated Hispanic (N=199)	P values
Employment Status			
Employed Full Time	30.1	18.1	0.005
Employed Part Time	8.2	11.1	
Full Time homemaker/caretaker	45.2	65.3	
Unemployed	2.7	2.5	
No response/other	13.7	3.0	
Access to transportation			
Yes, whenever	84.5	54.4	< 0.001
Most of the time	15.5	45.6	
Very limited	0.0	0.0	
BMI category			
Underweight (<18.5)/ Normal (18.5- 24.99)	22.3	21.4	NS
Overweight (≥ 25)	36.1	38.8	
Obese (≥30)	41.7	39.8	
No significant difference was observed between self efficacy and acculturation level			
No significant difference was observed between nutrition knowledge and acculturation level			
Attitude			
	% (n) Yes	% (n) Yes	
Important to eat fiber	67.1 (49)	54.3(108)	0.018
Important to have low fat intake	97 (71)	85.9(171)	0.005
Belief			
Healthy foods will keep you healthy	93.2 (68)	97.0 (195)	0.012

Chi square was used to determine p values of all variables. NS = Non significant p value

Table 10: Percentages of individuals within specific BMI and food security categories among high and low acculturated Hispanic women

BMI	% (n) Food secure/ Marginal Food security	% (n) Low Food security	% (n) Very low food security
Underweight/ Normal weight	19.0 (11)	79.3 (46)	13.9 (15)
Overweight	10.8 (11)	82.4 (84)	72.2 (78)
Obese	40.5 (15)	72.2 (78)	13.9 (15)

P value = 0.048

Sample characteristics of African American and Hispanic women

From the above results, no significant differences were observed in SES variables between low and high acculturated Hispanics. Therefore, a comparison was made between Hispanics as a whole group with African Americans, rather than splitting by acculturation level.

From the demographic variables analyzed more African Americans (87%) considered themselves as the head of household, when compared to the Hispanic population (18.4%). High participation in the WIC program was observed among the Hispanic families (98.9%), however, very few (20.3%) benefited from the Supplemental Nutrition Assistance Program (SNAP) (Food stamps). More African Americans participated in SNAP (84.8%) than the WIC program (71.6%). Additionally, African Americans were more likely to earn a higher income and have a smaller family size than

the Hispanic group. In terms of transportation, most participants had easy access to a car when the need arose.

Using the CDC's BMI classification, the underweight and normal weight categories were combined into one group due to the low number of underweight individuals. The mean BMI for African American women was $33.07 \pm 8.84 \text{ kg/m}^2$ and $28.93 \pm 5.57 \text{ kg/m}^2$ for the Hispanic women. There was a significant difference in BMI category based on ethnicity ($p = 0.002$), in that, a higher percentage of African Americans, than Hispanics, were obese (61.5% vs. 40.3% respectively).

With regards to nutrition knowledge, most African American women had a good knowledge in nutrition while the highest percentage of Hispanic women had a fair knowledge. In terms of self efficacy, African Americans were more likely to be very or somewhat confident in choosing, preparing and selecting healthy foods for their families. It was observed that more Hispanics (29.4%), than African Americans (18.5%) described their diet as healthy. Cross tabulation showed that the perception of fiber as an important component of the diet was significantly related to ethnicity ($p = 0.016$). The majority of African Americans agreed that fiber was an important part of the diet. Responses to the importance of fiber and low fat intake were the only variables, pertaining to attitudes, that were significantly different between ethnicities ($p = 0.016$ and 0.007 respectively). When compared to African Americans, more Hispanic women stated that it was more important to eat a diet low in fat. Participants' belief about the benefits of healthy foods was determined by a single question. Over all, 95.1% stated that healthy food choices will

help keep one healthy. Of this percentage, 90.2% were African Americans and 96.7% were Hispanic women. This difference was not significantly related to ethnicity.

In terms of the computed nutrition KAB score, the majority of both ethnic groups had a good KAB level. The level of KAB was not significantly different between the two ethnic groups. Additionally, no significant difference was observed between BMI and KAB. Though the KAB scores were not significantly associated with participants' weight more than half of the obese respondents had 'good' KAB score. That is, these participants have good knowledge, and positive attitudes and beliefs regarding nutrition (Table 12).

Among African American participants who stated that eating a healthy diet was difficult, their most common reported barriers included the cost of the foods, the time it takes to prepare a healthy meal, and difficulty in finding healthy foods. The least common barrier was the ability to read food labels. Barriers specific to the Hispanic group included the lack of knowledge for purchasing healthy foods and difficulty in reading food labels.

Assessment of food security status was conducted using the 18-item U.S. Food Security Survey Module. Based on the distribution of the responses, food secure was combined with marginal food secure to form one category, and the responses were classified into 3 categories of food security status according to the U.S. Food Security Scale. Figure 5 illustrates the household food security status of participants. At $p < 0.001$, food security was related to ethnicity, in that, majority of African Americans were in the food secure/marginal food secure group while most Hispanics experienced low food security.

In terms of dietary intake, the consumption of grains, vegetables, fruits and dairy products were significantly related to ethnicity ($p < 0.001$). Among the two ethnicities, the average consumptions of dairy, fruits, meat and grains were higher among Hispanics. The difference in dietary recommendations met between groups was significantly different ($p = 0.018$) among ethnicities. African Americans were twice as likely, than Hispanics, not to meet any of the dietary recommendations. The majority of Hispanics met at least one dietary recommendation.

Among Hispanics, the consumption of fruits, meats and dairy foods were not significantly related to food security; however, grain ($p = 0.025$) and vegetable ($p = 0.018$) consumptions were statistically significant. The analysis showed that Hispanics consumed a higher amount of grains but African Americans consumed more vegetables. Participants who experienced low food security were more likely to meet more of the recommended dietary intake ($p = 0.003$). Among African Americans, a significant difference was observed in fruit consumption ($p = 0.023$) and food security. High fruit consumption was observed among food secure/marginal food secure individuals. A one way ANOVA indicated that the mean dietary intake significantly differed by ethnicity ($p < 0.001$). Hispanics had a higher mean intake than African Americans. KAB was not significantly associated with dietary intake among African Americans and Hispanics. Table 11 illustrates the above mentioned variables in relation to the African American and Hispanic women studied.

Table 11: Sample characteristics of African Americans and Hispanic women

Variable	African Americans (N=92)	Hispanics (N=272)	P values
Demographics			
Age (years)	28.83 ± 9.11	29.18 ± 6.56	NS
Monthly income (\$)	1332.94 ± 728.35	685.04 ± 779.75	< 0.001
Family size	4.25 ± 1.69	5.07 ± 1.52	< 0.001
	%	%	
Head of Household	87.0	18.4	< 0.001
WIC Participation			
Respondent	71.6	98.9	< 0.001
Child	52.2	67.5	
SNAP Participation	84.8	20.3	< 0.001
Work First Participation	56.5	6.5	< 0.001
Education			
Eighth Grade or less	2.2	58.5	< 0.001
Some High School	22.8	19.9	
High School Graduate or GED	40.2	13.2	
Trade/Technical Training	15.2	2.2	
Some College	19.6	4.4	
No response	0.0	1.9	
Employment Status			
Employed Full Time	19.8	21.4	< 0.001
Employed Part Time	12.1	10.3	
Full time homemaker/ caretaker	51.6	60.1	
Unemployed	16.5	2.6	
No response/other	0.0	0.0	
Access to transportation			
Yes, whenever	68.1	62.8	< 0.001
Most of the time	23.1	37.2	
Very limited	8.8	0.0	

Table 11: Sample characteristics of African American and Hispanic women (Cont')

Variable	African Americans (N=92)	Hispanics (N=272)	P values
BMI			
Underweight (<18.5)/ Normal (18.5- 24.99)	20.9	21.6	0.002
Overweight (≥ 25)	17.6	38.1	
Obese (≥ 30)	61.5	40.3	
Nutrition knowledge			
Level of food knowledge	% (n)	% (n)	NS
Poor	7.6 (7)	12.9 (35)	
Fair	40.2 (37)	43 (117)	
Good	42.4 (39)	33.5 (91)	
Excellent	9.8 (9)	10.7 (29)	
Attitude			
Attitudes towards healthy eating	% (n) Yes	% (n) Yes	
Important to eat fruits and vegetables	100 (92)	95.2 (269)	NS
Important to eat fiber	75 (69)	57.7 (157)	0.016
Important to have low fat intake	79.3 (73)	89.0 (242)	0.007
Important to eat healthy	98.9 (91)	93.7 (251)	NS
Important to eat a diet low in sweets/desserts	90.2 (83)	90 (242)	NS
Belief			
Belief about healthy eating	% (n) Yes	% (n) Yes	
Healthy food choices will help keep one healthy	90.2 (83)	96.7 (263)	NS
KAB			
Level of KAB	% (n)	% (n)	NS
Poor	0	1.8 (5)	
Fair	18.5 (17)	26.5 (72)	
Good	63.0 (58)	54.8 (149)	
Excellent	18.5 (17)	16.9 (46)	
No significant difference was observed between KAB and weight status			

Table 11: Sample characteristics of African Americans and Hispanic women (Cont')

Variable	African Americans (N=92)	Hispanics (N=272)	P values
Self efficacy			
	%(n)	%(n)	
Choosing healthy foods at grocery store			< 0.001
• Very	65.2 (60)	22.8 (62)	
• Somewhat	32.6 (30)	46.7 (127)	
• Not Confident	2.2 (2)	30.5 (83)	
Preparing healthy foods			
• Very	56.5 (52)	33.5 (91)	
• Somewhat	40.2 (37)	43 (117)	
• Not Confident	3.3 (3)	23.5 (64)	
Selecting healthy snacks for children			
• Very	77.2 (71)	35.7 (97)	
• Somewhat	21.7 (20)	41.5 (113)	
• Not Confident	1.1 (1)	22.8 (62)	
Barriers (multiple responses were possible.)			
Reasons for not eating healthy	% (N= 47)	% (N=122)	
Too much time to prepare	31.9 (29)	4.4 (12)	NS
Healthy foods cost too much	31.9 (29)	12.5 (34)	
Family doesn't eat healthy foods	6.4 (6)	4.0 (11)	
Difficult to find healthy foods my family likes	10.6 (10)	8.1 (22)	
Food security			
	%(n)	%(n)	< 0.001
Food secure/Marginal Food secure	57.6 (53)	14.3 (39)	
Low food security	25.0 (23)	77.2 (210)	
Very low food security	17.4 (16)	8.5 (23)	

Table 11: Sample characteristics of African Americans and Hispanic women (Cont')

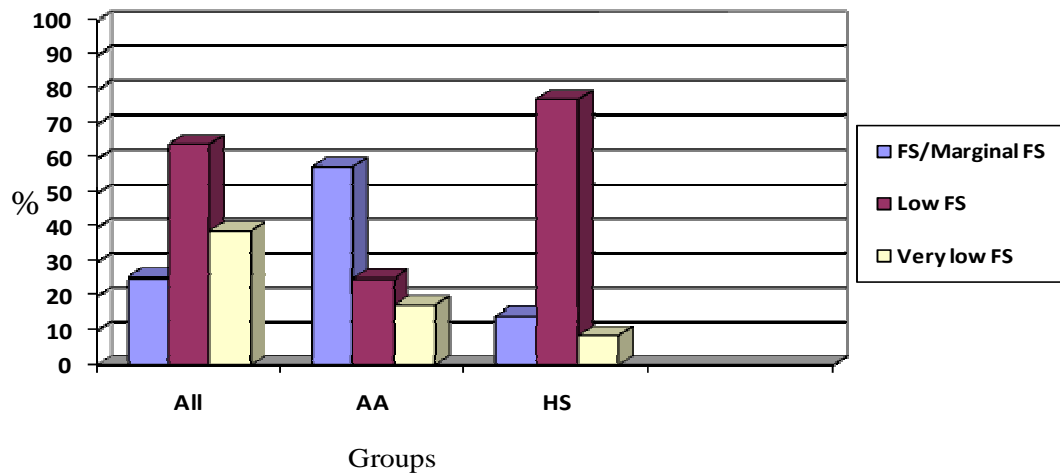
Variable	African Americans (N=92)	Hispanics (N=272)	P values
Dietary intake of food groups			
Food group	Mean intake \pm SD (range)	Mean intake \pm SD (range)	
Dairy	1.58 \pm 1.46 (0-7.57)	2.08 \pm 1.23 (0-7)	< 0.001
Fruit	0.75 \pm 1.61 (0-5)	1.17 \pm 1.66 (0-7)	< 0.001
Vegetables	0.71 \pm 0.96 (0.03-7.57)	0.50 \pm 0.66 (0-8)	< 0.001
Meat/beans	1.64 \pm 1.24 (1.14-6)	1.98 \pm 1.14 0.43-11)	NS
Grains	2.52 \pm 2.36 (0.1-17.57)	3.17 \pm 1.70 (0.2-17)	< 0.001
Number of dietary recommendations by food groups met	%	%	0.018
0	43.5 (40)	25.2 (68)	
1	31.5 (29)	30 (81)	
2	13 (12)	27 (73)	
3	9.8 (9)	15.6 (42)	
4	2.2 (2)	1.9 (5)	
5	0 (0)	0.4 (1)	
Mean dietary intake	Mean \pm SD	Mean \pm SD	
	0.192 \pm 0.216	0.286 \pm 0.225	< 0.001
No significant difference was observed between KAB and the number of dietary recommendations met			
No significant difference was observed between KAB and weight status			

Chi square was used to determine p values of all variables. NS = Non significant p value

Table 12: Weight status of different KAB categories

Level of KAB	BMI					
	African Americans(N= 92)			Hispanics (N= 272)		
	Under/normal	Over	Obese	Under/normal	Over	Obese
Poor/Fair	5	1	11	19	26	30
Good/Excellent	14	15	45	39	76	78

Figure 5: Household food security level



Legend

- AA - African Americans
- HH- High acculturated Hispanic
- LH- Low acculturated Hispanic

CHAPTER V

DISCUSSION AND CONCLUSION

The purpose of this study was to determine the differences in nutrition knowledge, attitudes, beliefs (KAB), self efficacy and barriers among low income African American and Hispanic women and how these variables influence their diet quality and weight status. In doing so, an acculturation scale was developed to differentiate the Hispanic group on the basis of their acculturation levels and then to assess whether the level of acculturation had any influence on diet quality and weight status. As used in several acculturation scales (Dubowitz et al., 2007; Miglietta & Tartaglia, 2009), the main factor for the scale was length of stay in the U.S. Consequently, the high percentage of low acculturated Hispanics observed, in our study, implies that the majority of Hispanic women sampled were newly arrived immigrants. An early engagement of this group, in nutrition education/intervention, could leave a lasting impact on their diet that might positively influence their eating habits in the U.S.

Demographic statistics show that in North Carolina, almost half of African American women (48.9%) and 17.4% of Hispanic females serve as the head of household (North Carolina: Women's Health Disparities, n.d). This relationship was consistent with our study sample. The differences in percentages were significantly related to ethnicity and acculturation level. More African Americans and high acculturated women, than low

acculturated care takers, served as head of household. Research has shown that most Hispanic women migrate to the U.S and reside with their husbands, however, as the years increase, these women tend to be more independent (Hirsch, 1999) and are more likely to file for a divorce as acculturative stress increases (Wong & Wong, 2006). This increases the percentage of women who serve as the head of household as length of time in the U.S increases. In the present study, monthly income was significantly different between ethnicities. On average, the African Americans sampled earn almost twice as much as the Hispanic families. This finding is similar to the reported state income by race (Racial and ethnic health disparity in N.C, Report Card 2010). Our study showed that low acculturated Hispanics had the lowest income. This could be due to their inability to work as a result of their immigration status; however, with time, their status changes through factors such as inter-racial marriages and visa adjustments (U.S Citizenship and immigration status, 2011). A higher percentage of Hispanic, than African American women, participated in the WIC program. SNAP was, however, less utilized by the Hispanic population. This could be due to the eligibility requirements set for SNAP (Food and Nutrition services, 2010).

One factor that affects food intake is the level of food security. In 2008, the national rates for low and very low food security among Hispanic households were 26.9% and 8.8% respectively (Nord, Coleman-Jensen, Andrews, & Carlson, 2009). The percentage of households that experienced very low food security, among the population studied was slightly lower than the national rate. However, a relatively higher percentage of the population (77.2%) experienced low food security as compared to the national rate.

Among African Americans, the rate of low food security in the current study was slightly lower than the national rate of 25.7%. Food security was significantly associated with ethnicity and acculturation, similar to several research studies (Dhokarh et al., 2010; Kaiser et al. 2002; Weigel, Armijos, Hall, Ramirez, & Orozco, 2007). Among our sample, a greater percentage of low acculturated Hispanics experienced low food security when compared to high acculturated Hispanics and African American women. Individuals in the obese category were more likely to experience very low food security as compared to individuals who are normal or over weight. This association of low food security with obesity has also been observed in previous research (Adams et al., 2003; Auslander et al., 2000; Brinberg et al., 2000; Klohe-Lehman et al. 2006; Radimer et al., 1992; Resnicow, et al., 2000), and one proposed explanation of this paradox is that low food secure families tend to purchase high caloric meals in order to stretch the value of their low income (Radimer, Olson, Greene, Campbell & Habicht, 1992).

Among the two ethnicities studied, there were some slight differences in their beliefs, attitude, self efficacy and barriers to healthy eating. More Hispanics, than African Americans, believed that making healthy food choices will help keep them healthy. Despite this belief, only a few women described their diet as healthy. It was observed that African Americans had higher healthy eating self efficacy than Hispanics. The confidence level among Hispanics increased with increasing level of acculturation. A greater number of African Americans expressed a high confidence level regarding healthy eating and making healthy food choices for their families. This could be due to the years of exposure to healthy American foods (Cullen et. al., 2009). The language

barrier, among Hispanics, could be a factor affecting their self efficacy of healthy eating; as most of the food labels, commercials and educational materials on healthy foods are in English. One unique barrier to the Hispanic women was difficulty in reading food labels. This could explain why Hispanics have been reported to use food labels less than non Hispanic groups (Grans, Burkholder, Risica, Lasater, 2003). The use of food labels has been positively associated with nutrition knowledge (Boulanger, Perez- Escamilla, Himmelgreen, Segura-Millan, Haldeman, 2002; Petrovici & Ritson , 2006) and research studies show that even though most Hispanics are familiar with the food labels, only a few are confident in using them (Fitzgerald, Damio, Segura-Pérez & Pérez-Escamilla, 2008). The two most common barriers to healthy eating among African Americans were the length of preparation and cost of healthy foods. Among Hispanic families, the cost and difficulty in getting healthy foods that their families would like were identified as primary barriers. These reported barriers are in line with previous studies (Hartman et al., 1994; Lucan, Barg, Long, 2010 ; Pawlak & Colby, 2009). The least identified barrier for both ethnicities was the dislike of healthy foods.

The majority of the study sample agreed that fruits and vegetables are vital components of a healthy diet; however, only 62.1% believed that fiber was important. This illustrates the low nutrition knowledge of the participants concerning the sources of fiber and its benefits. The perception that fiber is an important component of the diet was significantly related to ethnicity. More African Americans, than Hispanic women, stated that fiber is important. This perception was also significantly related to acculturation level. High acculturated Hispanics were more likely to report that fiber is important. The

traditional Hispanic diet is high in beans, a good source of fiber. It has been noted that Hispanic women in the U.S, on average, consume about 14 g of fiber/day (Thompson et al., 2005). Previous research shows that though 78.1% of Hispanics have heard about fiber, only 13.4% are able to recognize the definition of fiber (Fitzgerald et al., 2008). Thus, there is a need for nutrition education in the area of the sources and benefits of fiber among the Hispanic population.

In terms of daily food intake, grains were consumed more than any other food group while vegetables were consumed the least. Among the two ethnicities, the average consumption of dairy, fruits, meat and grains were higher among Hispanics than African Americans. Similar findings of racial differences in dietary intake have been documented in previous research (Robinson, 2008). The fact that vegetable intake was lower among Hispanic women than African Americans is contradictory to previous studies (Harley, Eskenazi, Block, 2005; Thompson et al, 2005). However, this may be explained by the high consumption of potatoes, which was classified as a vegetable within the survey, among African Americans. The number of dietary recommendations met was significantly associated with ethnicity. In accordance to previous studies (Ayala, Baquero, Klinger, 2008), our results showed that the Hispanic population met more dietary recommendations than African Americans. No significant differences were observed in terms of acculturation level and the number of dietary recommendations met.

A majority of African Americans had good nutrition knowledge while most of the Hispanics had only a fair knowledge about nutrition. This difference, however, was not significant. As observed in previous research (Packman & Kirk, 2008), the current study

did not observe any significant relation between participant's knowledge in nutrition with their BMI or their mean diet quality. This finding was contrary to other research (Auslander et al., 2000; Brinberg et al., 2000; Elder et al., 2000; Resnicow et al., 2000) which reported higher BMI levels being associated with poor nutrition knowledge. In the present study, 89.7% of overweight/obese individuals had fair, good or excellent nutrition knowledge. This implies that, although overweight/obese individuals have good nutrition knowledge they may not be utilizing it to make healthy food choices. Another possibility is that the knowledge being shared with this population is not practical neither is it tailored specifically to obese mothers. Kreuter et al. (2005), in their research study, noted that the method of delivering nutrition education is as equally important as the message being conveyed. Therefore, depending on the ethnic group, constructs such as religiosity, collectivism, and racial pride can be incorporated in the nutrition education. The total combination of participants' knowledge, attitude and belief scores (KAB) did not show any significant association with BMI or diet quality, however, in both ethnicities, overweight/obese individuals had higher KAB scores.

In conclusion, there are several differences between African Americans and Hispanics in terms of level of nutrition knowledge, attitudes, barriers, beliefs and self efficacy and their association with diet quality and weight status

Answers to research questions

Among low income African American and Hispanic caretakers:

- What is the level of nutrition knowledge, attitudes, beliefs (KAB) and self efficacy?

Both ethnicities had a ‘good’ level on the KAB scale. In terms of self efficacy, African Americans were more confident in choosing/preparing healthy foods and selecting healthy snacks for their children.

- How is KAB related to weight status and diet quality?

No significant association was observed between KAB and weight status, neither did KAB show any significant association with diet quality.

- What are the common barriers to healthy eating?

The common barriers to healthy eating among the two ethnicities were the cost of healthy foods, the preparation time for healthy foods, and difficulty in finding healthy foods that all family members will enjoy.

- Does the level of acculturation have an influence on KAB variables among the Hispanic population?

Acculturation level did not have any significant association with nutrition knowledge. In terms of attitude, it influenced responses to consuming a diet high in fiber and low in fat. High acculturated Hispanics were more likely to know the importance of fiber and eating a low fat diet. The belief that making healthy food choices will keep one healthy was also significantly different. More low acculturated women maintained this belief as compared to high acculturated women. Acculturation level also affected an individual’s BMI; low acculturated Hispanics had a lower BMI, when compared to high acculturated Hispanic women. Other variables that were significantly different based on acculturation level were women serving as head of household, employment status and access to transportation. In each case, high acculturated Hispanics were

more likely to serve as the head of household, be employed and have easy access to transportation.

Research limitations

This study had several limitations:

The study sample was convenient- non random sample, the results therefore cannot be generalized.

To date, there is no standardized acculturation scale for Hispanic population that migrates into the U.S. Though several studies have utilized length of stay in the U.S, languages spoken at home and frequency of ethnic food consumption, there are many factors that can influence these variables.

Score ranges for nutrition knowledge and KAB categories were not standardized nor tested.

Diet quality did not include desserts, sodas, chips nor did it consider the total calories taken in or expended.

Research implications

Our results showed a large number of low acculturated Hispanics. This means that they are newly arrived and most likely follow more traditional lifestyle patterns. Early intervention strategies with this group may help retain some healthy cultural values and eating habits, thus preventing future diet related chronic diseases.

The variation in diet, KAB and self-efficacy between the two ethnic groups supports the need for nutrition educators to acknowledge these differences and focus on group specific needs as they relate to dietary intake or BMI. For instance, among Hispanics,

beliefs influence food intake. This was not evident among the African Americans.

Among African Americans, attitude towards eating a healthy meal was related to their BMI. As such one must focus on beliefs when developing a nutrition/health plan for the Hispanic population while concentrating on the nutritional attitudes among African Americans.

Nutrition education geared towards overweight/obese individuals must be practical and aim at behavior changes. Among the Hispanic group, health/nutrition educators can focus on some basic educative topics such as the benefits of fiber and reading food labels to aid them in selecting healthy foods at the grocery stores.

The least reported barrier in both ethnicities was the dislike of healthy foods. Therefore educative programs can focus on teaching these minority groups simple and quick healthy meal preparation and purchasing seasonal foods for a lower price.

Lastly, some differences were identified based on acculturation level. Thus, educational programs targeting Hispanics need to consider their level of acculturation to better tailor topics to immigrants.

Future implications

Although the findings below were not reported, we did note some relationships that warrant further investigation. Among Hispanics, nutrition knowledge was associated with attitude. Belief was related to diet quality and food security was related to BMI and mean intake of food. Among African Americans, attitude was significantly related to BMI and food security level to diet intake. There were no other significant relations observed. Among African Americans, the majority that had good KAB scores did not meet any of

the dietary recommendations. However, within the Hispanic population, those that had good KAB scores met at most 2 of their dietary recommendations. The majority of both ethnic groups that had good KAB scores were obese. Below is a graphic representation of the findings from the current study (Figure 6).

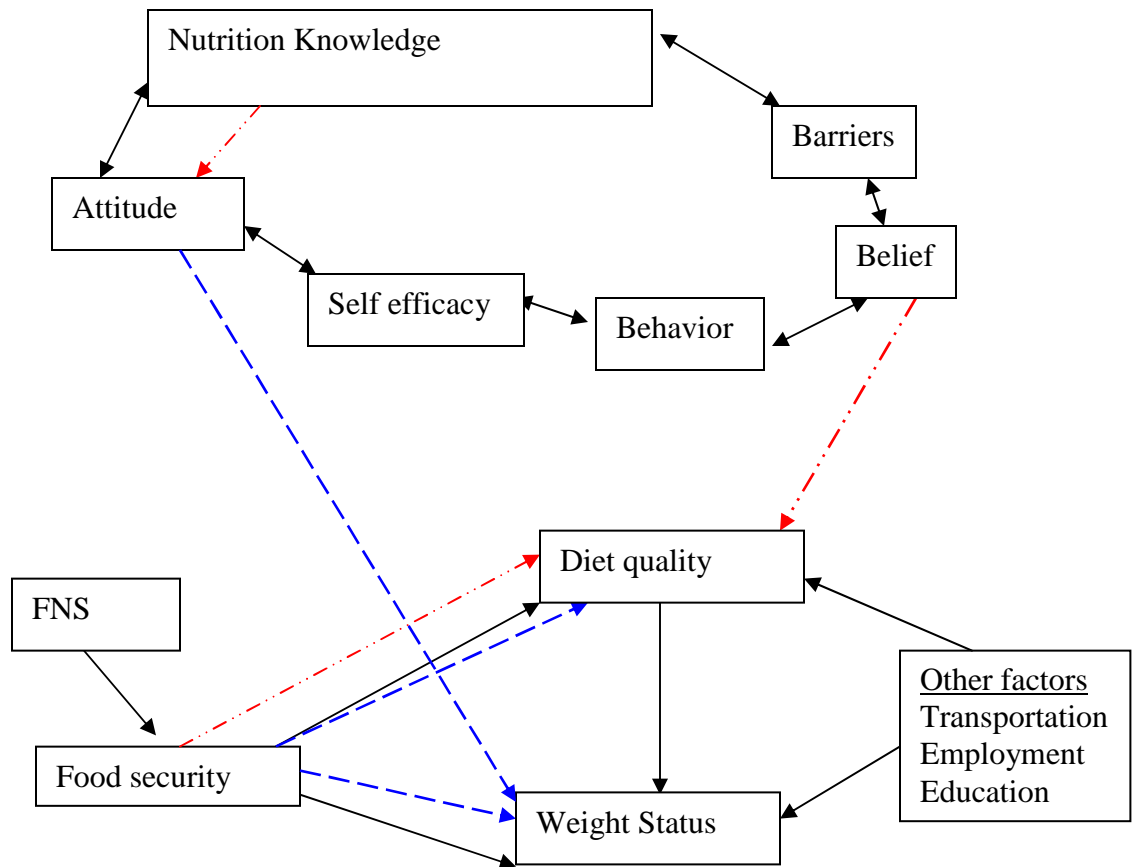
Figure 6: Relationships between variables in current study

Legend:

→ = Relation observed from literature review

Colored arrows: Relations observed in current study

- - - - - - → = African Americans
- - · - · - · - · → = Hispanics



CHAPTER VI

EPILOGUE

This research determined the differences in nutrition knowledge, attitudes, beliefs and self efficacy of dietary intake among African American and the Hispanic women; and also noted if these variables had any effect on their diet quality and weight status. There were striking differences among the two population studied, however, some similarities were also observed. In developing educative materials and interventions for low income earners, it is eminent for researchers to consider these variations and similarities.

As a Nutritionist with the WIC program, this research has defined my area of interest and also enhanced my way of educating participants of all races. The similarities observed among the ethnic groups studied enabled me to tailor nutrition education classes for large groups of participants. However, due to the uniqueness of the ethnic groups and differences observed through this study, smaller groups of same ethnicity were formed for some nutrition topics. Additionally, this research helped me restructure weight loss programs by focusing, primarily, on the barriers, attitudes and beliefs of healthy eating.

As an immigrant, the cultural shock experienced upon arrival to the U.S dwindled with increasing years. I agree to several variables that have been used in developing acculturation scales. However, through personal experience, I have come to realize that the most important variable is the length of stay in the US. Some barriers that hindered

me from purchasing and consuming healthy foods were the lack of transportation, money, and foreign accent communication barrier. For instance, when at a fast food restaurant, it was easier to order a 'number one' on the menu rather than placing a special order by requesting an elimination of some condiments. In terms of transportation, it was very inconvenient to carry grocery bags a bus. Also, the N.C bus system only allowed two grocery bags on board. I therefore related to the acculturation process stated in past researches that were used to develop the acculturation scale of the current study. Furthermore, I realized that some barriers were naturally broken, and positive beliefs and attitudes were cultivated as the years progressed. Thus, as noted in this research and several others, length of stay was the predominate contributor to my level of acculturation.

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APPENDIX A
INFORMED CONSENT FORM

THE UNIVERSITY OF NORTH CAROLINA
GREENSBORO

CONSENT TO ACT AS A HUMAN PARTICIPANT: LONG FORM

Project Title: Food Security and Weight Status of African American Caretakers

Project Director: Lauren Haldeman, Ph.D.

Participant's Name:

DESCRIPTION AND EXPLANATION OF PROCEDURES:

The purpose of this project is to learn about the eating habits of African Americans living in Guilford County, North Carolina. Participants will 1. live in Guilford County, NC 2. take care of a child < 12 years of age, 3. live in a house without much food, 4. be the primary meal preparer, and 5. African American. Participants will be asked to spend about 60 minutes with the interviewer talking about their thoughts and feelings about food. The interviewer will also ask questions about money, education, work as well as questions about members of the house. Height and weight will also be taken. All interviews will take place in the participant's home.

RISKS AND DISCOMFORTS:

This study does have some small risks due to the sensitive nature of some of the survey questions, such as money and food issues. The survey questions will be asked in a sensitive manner, and participants will be informed that they have the right to refuse answering any questions at any time. All interviews will take place in the privacy of the participant's own home. All written materials (anthropometric measurements and sociodemographic information) will be kept in a locked office.

All members of the research team will sign privacy agreements which will be kept on file by the Principal Investigator for at least 3 years. All written materials and computer files will be destroyed after 7 years.

POTENTIAL BENEFITS:

Individuals in this study will receive a \$20 gift card to a local food store for their time. The results of this study will serve as a way to gain a better understanding of the nutrition needs and desires of the African American population in Guilford County, NC. These data will aid in the future development of nutrition interventions focusing on the needs of this group.

CONSENT:

By signing this consent form, you agree that you understand the procedures and any risks and benefits involved in this research. You are free to refuse to participate or to withdraw your consent to participate in this research at any time without penalty or prejudice; your participation is entirely voluntary. Your privacy will be protected because you will not be identified by name as a participant in this project.

The research and this consent form have been approved by the University of North Carolina at Greensboro Institutional Review Board, which insures that research involving people follows federal regulations. Questions regarding your rights as a participant in this project can be answered by call Mr. Eric Allen at (336) 256-1482. Questions regarding the research itself can be answered at any time before, during or after the interview and will be answered by Dr. Lauren Haldeman by calling (336) 256-0311. Any new information that develops during the project will be provided to you if the information might affect your willingness to continue participation in the project.

By signing this form, you are agreeing to participate in the project described to you by the community interviewer.

Participant's Signature

Date

APPENDIX B
QUESTIONNAIRE

SOCIOECONOMIC STATUS/DEMOGRAPHICS

Date of Interview: ____/____/____

Respondent's Full Name: _____

Address: _____

Phone: _____ Respondent's date of birth: (MM/DD/YY) ____/____/____

Sex: Male / Female Age: _____

1. How would you identify yourself?
01) African American
02) Black
03) Other _____
99) Refused

2. Do you know how to drive a car?
01) Yes
02) No
99) Refused

3. Do you have access to transportation?
01) Yes, whenever I want
02) Most of the time
03) Very limited
04) No
99) Refused

4. How many times a week do you leave the house?
01) 0
02) 1-3
03) 4-7
04) More than 7 times

(This information should be gathered on the oldest child under 12 years of age)

Child's Full name: _____

Child's sex: Male / Female Child's age: _____

Child's date of birth: (MM/DD/YY) ____/____/____

5. What is your relation to the child?
- 01) Biological Mother
 - 02) Biological Father
 - 03) Grandmother or Grandfather
 - 04) Foster Parent
 - 77) Other (Please Specify): _____

Education:

6. What is the highest grade you reached in school?
- 01) No formal schooling
 - 02) Eighth grade or less
 - 03) Some high school
 - 04) High school graduate or GED equivalency
 - 05) Trade or technical training (specify highest grade reached): _____
 - 06) Some college
 - 07) College graduate
 - 08) Post-graduate
 - 99) Refused

The Household:

7. How many people, including yourself, live in your house/apartment? _____
8. How many people 18 years or older, including yourself, are there in your household? _____
9. How many children between 11-17 years of age are there in your household? _____
10. How many children between 6-10 years of age are there in your household? _____
11. How many children between 0-5 years of age are there in your household? _____
12. How many sons _____ and daughters _____ do you have (do not have to be currently living in same house)?
13. Are you the main meal preparer for your household?
- 01) Yes
 - 02) No
 - 88) Don't know
 - 99) Refused

Head of Household:

2. Do you consider yourself the head of the household, i.e., the person who mainly provides money for your family?

- 01) Yes –
- 02) No
- 99) Refused

3. Who is the head of the household? _____

(Interviewer: If there is more than one household head, record **all** household heads.)

4. What is the current employment status of the household head?

- 01) Employed full time
- 02) Employed part time
- 03) Full-time homemaker/caretaker
- 04) Student(not working)
- 05) Unemployed
- 06) Disabled due to poor health
- 07) Retired
- 66) Not applicable
- 77) Other (please specify): _____
- 99) Refused

(Interviewer: Ask q. 24 only if respondent is not the head of the household.)

5. What is your present employment status?

- 01) Employed full time
- 02) Employed part time
- 03) Full-time homemaker/caretaker
- 04) Student (not working)
- 05) Unemployed
- 06) Disabled due to poor health
- 07) Retired
- 77) Other (please specify): _____
- 99) Refused

6. Do you do anything to make additional money in your home (e.g., sewing, cooking, secretarial work, babysitting, care of elderly, etc.)?

- 01) Yes Please specify: _____
- 03) No
- 99) Refused

If yes, how much do you make per month from this activity? \$ _____

FOOD PURCHASING BEHAVIORS

1. Are you the main food shopper for your household?
 - 01) Yes
 - 02) No
 - 88) Don't know
 - 99) Refused

(Interviewer: If no, then please ask respondent to answer the next questions to the best of their ability about the main food shopper in the house.)

2. About how much do you (or main food shopper) spend on food at the grocery store every week?
 - 01) \$_____
 - 88) Don't know
3. Where do you do most of your grocery shopping?
 - a. Store name: _____
 - b. How many times a week: _____

DIETARY INTAKE

Interviewer: Now I would like to ask you some questions about your child's eating habits now (reference child).

- Does your child usually eat meals/snacks in the home?
- 01) Yes
 - 02) No (Go to part 4)
 - 03) I don't know
 - 04) Refused
-

Where does the child eat outside the home?

(Interviewer: If child eats these meals anywhere other than at home, ask q.3)

3. Are you responsible for purchasing / providing the food for the child receives at daycare or school?

01) Yes

02) No

88) Don't know

99) Refused

4. **Interviewer:** I am now going to ask you questions about foods *you* and *your child* eat. For each food, I want to know whether *you* or *your child* eats it (yes or no), and also approximately how many times *you* and *he/she* eats it, (times per day, week, month, or year).

	Does *** eat...	How often does *** eat...	Do you eat...	How often do you eat...
a) Fruits (excluding juices)	Y / N	___ d w m y	Y / N	___ d w m y
b) Legumes (Beans, chick peas, lentils, pigeon peas)	Y / N	___ d w m y	Y / N	___ d w m y
c) Starchy Vegetables (potato)	Y / N	___ d w m y	Y / N	___ d w m y
d) Green Leafy Vegetables (collard greens)	Y / N	___ d w m y	Y / N	___ d w m y
e) Lettuce, tomato, and other vegetables	Y / N	___ d w m y	Y / N	___ d w m y
f) Milk (Specify % _____)	Y / N	___ d w m y	Y / N	___ d w m y
g) Cheese	Y / N	___ d w m y	Y / N	___ d w m y
h) Yogurt	Y / N	___ d w m y	Y / N	___ d w m y
i) Fried Foods (ie. French fries, fried chicken)	Y / N	___ d w m y	Y / N	___ d w m y
j) Sour Cream	Y / N	___ d w m y	Y / N	___ d w m y
k) Meats (e.g. chicken, beef, pork, ham)	Y / N	___ d w m y	Y / N	___ d w m y
l) Fish and Shell fish	Y / N	___ d w m y	Y / N	___ d w m y
m) Eggs	Y / N	___ d w m y	Y / N	___ d w m y
n) Pasta	Y / N	___ d w m y	Y / N	___ d w m y
o) Tortillas	Y / N	___ d w m y	Y / N	___ d w m y
p) Bread (Specify type _____)				
q) Cereal (Specify brand _____)	Y / N	___ d w m y	Y / N	___ d w m y
r) Fruit Juices (specify brand: _____)	Y / N	___ d w m y	Y / N	___ d w m y
s) Soft (Pepsi, Coke)	Y / N	___ d w m y	Y / N	___ d w m y
t) Artificial Drinks(Tang, Sunny Delight)	Y / N	___ d w m y	Y / N	___ d w m y
u) Sweets and Desserts	Y / N	___ d w m y	Y / N	___ d w m y
w/ Snack Foods (eg Potato Chips, Nachos)	Y / N	___ d w m y	Y / N	___ d w m y

5. How often in the past week did you eat food from a: Home of Friend or Quick Food Restaurant, Cafeteria/Buffer Restaurant, Pizza Parlor, Ethnic Restaurant, Delivered food and other

Location	How many times a week?

6. How often in the past week did the child eat food from a: Home of Friend or Quick Food Restaurant, Cafeteria/Buffer Restaurant, Pizza Parlor, Ethnic Restaurant, Delivered food and other

Location	How many times a week?

HOUSEHOLD FOOD INVENTORY

Interviewer: For the next questions, I would like to know if you had any of these food items in your house during the last week. Even if you did not eat these items, I just want to know if you had them in your house.

In the last week, did you have at least three **different** kinds of fresh fruits in your house?

- Yes
- No
- 88) Don't know

In the last week, did you have at least three **different** kinds of fresh vegetables in your house?

- 01) Yes
- 02) No
- 88) Don't know

4. What foods do you consider to be American?

5. What American foods do you eat most often?

CARETAKER AND CHILD HEALTH INFORMATION

Interviewer: Now I would like to ask you about your health and ***'s health.

1. How would you rate your overall health?

- 01) Poor
- 02) Fair
- 03) Good
- 04) Excellent
- 88) Don't know
- 99) Refused

2. How would you rate ***'s overall health?

- 01) Poor
- 02) Fair
- 03) Good
- 04) Excellent
- 88) Don't know
- 99) Refused

3. Please tell us if you or *** has ever suffered from any of the following diseases:

	CARETAKER			CHILD		
	01)Yes	02)No	88)D/K	01)Yes	02)No	88)D/K
a) Diabetes	01)Yes	02)No	88)D/K	01)Yes	02)No	88)D/K
d) Hypertension (High blood pressure)	01)Yes	02)No	88)D/K	01)Yes	02)No	88)D/K
e) Asthma	01)Yes	02)No	88)D/K	01)Yes	02)No	88)D/K
g) Tuberculosis	01)Yes	02)No	88)D/K	01)Yes	02)No	88)D/K
i) Lead poisoning	01)Yes	02)No	88)D/K	01)Yes	02)No	88)D/K
j) Anemia	01)Yes	02)No	88)D/K	01)Yes	02)No	88)D/K
k) Other _____	01)Yes	02)No	88)D/K	01)Yes	02)No	88)D/K

4. If you have to go to the doctor where do you go?

- 01) Hospital
- 02) Health Serve
- 03) Clinic
- 04) Other
- 05) No response

5. Do you have health insurance?

- 01) Yes
- 02) No
- 03) No response

What type: _____

6. Did you ever breastfeed your child?

- 01) Yes
- 02) No

Physical Activity:

8. How active do you consider child to be?

- 01) Not active
- 02) Somewhat active
- 03) Active
- 04) Very Active
- 88) I don't know
- 99) Refused

9. What types of physical activity does your child do?

10. How active do you consider yourself to be?

- 01) Not active
- 02) Somewhat active
- 03) Active
- 04) Very Active
- 88) I don't know
- 99) Refused

11. What types of physical activity do you do?

TV Viewing:

12. About how many hours a day does the child spend watching television during the week?

- 01) _____
- 88) Don't know
- 99) Refused

12a. About how many hours a day does the child spend watching television on weekends?

- 01) _____
- 88) Don't know
- 99) Refused

18 ITEM U.S. HOUSEHOLD FOOD SECURITY/HUNGER SURVEY MODULE

SEE ATTACHED FORM

FOOD ASSISTANCE

Interviewer: In this section we would like to know if you are familiar with and use the following food assistance programs: WIC Program, Food Banks, Salvation Army, and others. Again, all of this information is strictly confidential.

Government Assistance (WorkFirst):

Are you now or have you ever received government checks (WorkFirst)?

- 01) Yes (Go to number 2)
- 02) No
- 88) Don't know
- 99) Refused

2. If you are not currently/ or never have received government checks (WorkFirst), why is your household not receiving them now. Is it because.....

(Circle all that apply)

- 01) It is too difficult to apply
- 02) Don't know what it is
- 03) You are not eligible to receive government assistance
- 02) You applied but have not received answer
- 03) You feel uncomfortable using government checks (WorkFirst)
- 04) There are problems with government checks (WorkFirst) office staff
- 05) You do not have transportation
- 06) You no longer need government checks (WorkFirst)
- 66) Not applicable
- 77) Other (please specify) _____
- 88) Don't know
- 99) Refused

WIC --The supplemental Food Program for Women, Infants and Children.

Maternal WIC:

3. Did you receive WIC Program benefits either during your pregnancy or after the child's

birth?

- 01) Yes, both
- 02) Yes, during pregnancy only
- 03) Yes, after birth only
- 04) Neither

4. Has your child ever received or is receiving WIC benefits?

- 01) Yes
- 02) No
- 66) Not applicable
- 88) Don't know
- 99) Refused

5. If not, could you tell me why you are not receiving WIC benefits for **yourself** now?
Is it because..(circle all that apply)

01) You are not eligible anymore because it has been too long since your child was born

(**Interviewer:** Non-breastfeeding women get checks for 5 months after birth and breastfeeding women get checks up to a year after child is born)

- 02) It is too difficult to apply
- 03) You applied, but have not received an answer
- 04) You feel uncomfortable using WIC benefits
- 05) There are problems with WIC Program staff
- 06) You do not have transportation
- 07) You did not apply because respondent believed he/she is not eligible
- 08) You applied, but respondent is ineligible due to high income
- 66) Not applicable
- 77) Other Specify: _____
- 88) Don't know
- 99) Refused

HOUSEHOLD INCOME / FOOD STAMP PARTICIPATION

Household Income:

Interviewer: For the next two questions please include all money (employment) and government assistance (government checks, Disability, Food Stamps) received by any and all members of your household.

1. What is the total amount of money your household receives per month from employment and government assistance (Please include income for all members of the household)? \$ _____
88) Don't know
99) Refused

2. From these choices, which best shows the total amount of money your household receives per month from employment and government assistance (Please include income for all members of the household)?
01) \$0-\$500
02) \$500-\$1000
03) \$1000-\$1500
04) \$1500-\$2000
05) More than \$2000
88) Don't know
99) Refused

Food Stamp Participation:

3. Are you now or have you ever received food stamps?
01) Yes
02) No --- (skip to q.6)
88) Don't know
99) Refused

4. Do you use food stamps to buy food for all members of your household?
01) Yes
02) No
88) Don't know
99) Refused

5. In an average month, how long do food stamps last you?
01) _____ Weeks
88) Don't know
99) Refused

6. Is anyone currently or has anyone else in your household ever received food stamps?
Yes
No
88) Don't know
99) Refused

(Interviewer: If respondent answered "no" to q. 3 and 6, ask q.7)

7. Why doesn't your household receive Food Stamps now? Is it because...(circle all that apply)
- 01) It is too difficult to apply
 - 02) You are not eligible to receive Food Stamps
 - 02) You applied but have not received answer
 - 03) You feel uncomfortable using Food Stamps
 - 04) There are problems with Food Stamps Office staff
 - 05) You do not have transportation
 - 06) Your food stamp benefits have stopped because of Welfare Reform
 - 07) You no longer need Food Stamps
 - 66) Not applicable
 - 77) Other (please specify): _____
 - 88) Don't know
 - 99) Refused

CARETAKER NUTRITION KNOWLEDGE, ATTITUDES, BARRIERS

Knowledge:

Interviewer: Now I would like to ask you some questions about nutrition.

1. Do you think it is important to eat fruits and vegetables?
01) Yes
02) No
88) Don't know
99) Refused
2. Do you think is important to eat fiber?
01) Yes
02) No
88) Don't know
99) Refused

3. Have you ever seen the Food Guide Pyramid?

- 01) Yes
- 02) No
- 88) Don't know
- 99) Refused

4. According to the recommendations given on the Food Guide Pyramid, how many servings from each food group should you and your family eat everyday?

	<u>Number of portions:</u>			
a) Fruits	01) 1	02) 2-4	03) 6-11	88) D/K
b) Vegetables	01) 1-2	02) 3-5	03) 6-11	88) D/K
c) Breads/cereals/rice	01) 2-4	02) 3-5	03) 6-11	88) D/K
d) Milk/yogurt/cheese	01) 2-3	02) 5-7	03) 6-11	88) D/K
e) Meat/beans	01) 2-3	02) 5-7	03) 8-10	88) D/K

5. Name some healthy foods.

88) I don't know

6. Do you think it is important to eat foods that are low in fat?

- 01) Yes
- 02) No
- 88) I don't know
- 99) Refused

7. Do you think it is important for a person to eat healthy?

- 01) Yes
- 02) No
- 88) I don't know
- 99) Refused

8. Which of these foods do you think is/are high in saturated fat?

a) Bananas	01) Yes	02) No	88) D/K
b) Beef	01) Yes	02) No	88) D/K
d) Rice	01) Yes	02) No	88) D/K
c) Potato	01) Yes	02) No	88) D/K
d) Tortilla	01) Yes	02) No	88) D/K

9. Which of the following foods would be a good source of calcium?
- | | | | |
|-----------|---------|--------|---------|
| a) Pork | 01) Yes | 02) No | 88) D/K |
| b) Apples | 01) Yes | 02) No | 88) D/K |
| c) Milk | 01) Yes | 02) No | 88) D/K |
| d) Corn | 01) Yes | 02) No | 88) D/K |
| e) Rice | 01) Yes | 02) No | 88) D/K |

10. Which of the following foods would be a good source of iron?
- | | | | |
|-------------|---------|--------|---------|
| a) Tortilla | 01) Yes | 02) No | 88) D/K |
| b) Apples | 01) Yes | 02) No | 88) D/K |
| c) Milk | 01) Yes | 02) No | 88) D/K |
| d) Beef | 01) Yes | 02) No | 88) D/K |
| e) Rice | 01) Yes | 02) No | 88) D/K |

11. Which of the following foods would be a good source of fiber?
- | | | | |
|-------------|---------|--------|---------|
| a) Fish | 01) Yes | 02) No | 88) D/K |
| b) Tortilla | 01) Yes | 02) No | 88) D/K |
| c) Milk | 01) Yes | 02) No | 88) D/K |
| d) Beef | 01) Yes | 02) No | 88) D/K |
| e) Beans | 01) Yes | 02) No | 88) D/K |

12. Do you think that it is important to eat a diet low in sweets and deserts?
- 01) Yes
 02) No
 88) I don't know
 99) Refused

Attitudes:

13. Do you believe that making healthy food choices will help keep you and your family healthy.
- 01) Yes, it will help
 02) It will help a little
 03) No it will not help
 04) Not sure if it will help
 99) Refused

Delivery of Nutrition Information:

14. Have you ever gotten information about nutrition?
- 01) Yes 02) No 88) Don't know
- If yes, where did you learn about nutrition?**
-

15. Would you like learning more about nutrition?
01) Yes
02) No (Answer # 16)
88) I don't know 99) Refused
16. Please tell us how you would like to learn about nutrition.
a) Newspaper
b) Health Fairs
c) Television
d) Radio
e) Community play
f) Workshops
g) Mail
h) From child's school
i) Nutrition professional
j) Family Doctor
k) Theater

Barriers:

17. How would you describe your diet?
01) Very healthy
02) Healthy
03) Average
04) Unhealthy
05) Very unhealthy
88) Don't know
18. Do you think it is difficult to eat a healthy diet?
01) Yes 02) No 88) Don't know
19. If yes, please tell me why it is difficult for you to eat a healthy diet.
-
- a) It takes too much time to prepare
b) Healthy foods cost too much
c) My family does not eat healthy foods
d) It is difficult to find healthy foods that my family likes.
e) I do not know how to buy healthy foods.
f) I do not know how to use food labels.
g) I do not receive any support for preparing healthy foods.
h) I do not know what foods are healthy.
i) Other

Self-Efficacy:

Interviewer: Please tell me how confident you are about the following:

20. You are able to choose healthy foods at the grocery store

- 01) Very confident
- 02) Somewhat confident
- 03) Not confident at all
- 04) Not sure
- 99) Refused

21. You are able to prepare healthy foods for you and your family.

- 01) Very confident
- 02) Somewhat confident
- 03) Not confident at all
- 04) Not sure
- 99) Refused

22. You are able to select healthy snacks for your children.

- 01) Very confident
- 02) Somewhat confident
- Not confident at all
- Not sure
- 99) Refused

CARETAKER/CHILD ANTHROPOMETRY

Caretaker Measurements:

Weight 1: _____ lbs. _____ kgs.

Height 1: _____ inches _____ cm.

Weight 1: _____ lbs. _____ kgs.

Height 1: _____ inches _____ cm

**FOOD-SECURITY/HUNGER CORE MODULE:
3-STAGE DESIGN, WITH SCREENERS
USDA, Food and Nutrition Service and Economic Research Service – 6/23/99**

Transition into Module (administered to all households): These next questions are about the food eaten in your household in the last 12 months, since (current month) of last year and whether you were able to afford the food you need.

USDA Food Sufficiency Question/Screeners: Questions 1, 1a, 1b (Optional, these questions are not used to calculate the food-security/hunger scale. Question 1 may be used in conjunction with income as a preliminary screener to reduce respondent burden for high income households).

1. [IF ONE PERSON IN HOUSEHOLD, USE "I" IN PARENTHETICALS, OTHERWISE, USE "WE."]

Which of these statements best describes the food eaten in your household in the last 12 months: --enough of the kinds of food (I/we) want to eat; --enough, but not always the kinds of food (I/we) want; --sometimes not enough to eat; or, --often not enough to eat?

- [1] Enough of the kinds of food we want to eat (SKIP 1a and 1b)
- [2] Enough but not always the kinds of food we want (SKIP 1a)
- [3] Sometimes not enough to eat [SKIP 1b]
- [4] Often not enough [SKIP 1b]
- [] DK or Refused (SKIP 1a and 1b)

- 1a. [IF OPTION 3 OR 4 SELECTED, ASK] Here are some reasons why people don't always have enough to eat. For each one, please tell me if that is a reason why YOU don't always have enough to eat. [READ LIST. MARK ALL THAT APPLY.]

- | YES | NO | DK | |
|--------------------------|--------------------------|--------------------------|--|
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Not enough money for food |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Not enough time for shopping or cooking |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Too hard to get to the store |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | On a diet |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | No working stove available |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Not able to cook or eat because of health problems |

- 1b. [IF OPTION 2 SELECTED, ASK] Here are some reasons why people don't always have the quality or variety of food they want. For each one, please tell me if that is a reason why YOU don't always have the kinds of food you want to eat. [READ LIST. MARK ALL THAT APPLY.]

- | YES | NO | DK | |
|--------------------------|--------------------------|--------------------------|---|
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Not enough money for food |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Kinds of food (I/we) want not available |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Not enough time for shopping or cooking |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Too hard to get to the store |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | On a special diet |

Stage 1: Questions 2-6 (asked of all households; begin scale items).

[IF SINGLE ADULT IN HOUSEHOLD, USE "I," "MY," AND "YOU" IN PARENTHETICALS; OTHERWISE, USE "WE," "OUR," AND "YOUR HOUSEHOLD."]

2. Now I'm going to read you several statements that people have made about their food situation. For these statements, please tell me whether the statement was often true, sometimes true, or never true for (you/your household) in the last 12 months, that is, since last (name of current month).

The first statement is "(I/We) worried whether (my/our) food would run out before (I/we) got money to buy more." Was that often true, sometimes true, or never true for (you/your household) in the last 12 months?

- Often true
- Sometimes true
- Never true
- DK or Refused

3. "The food that (I/we) bought just didn't last, and (I/we) didn't have money to get more." Was that often, sometimes, or never true for (you/your household) in the last 12 months?

- Often true
- Sometimes true
- Never true
- DK or Refused

4. "(I/we) couldn't afford to eat balanced meals." Was that often, sometimes, or never true for (you/your household) in the last 12 months?

- Often true
- Sometimes true
- Never true
- DK or Refused

[IF CHILDREN UNDER 18 IN HOUSEHOLD, ASK Q5 - 6; OTHERWISE SKIP TO 1st-Level Screen.]

5. "(I/we) relied on only a few kinds of low-cost food to feed (my/our) child/the children because (I was/we were) running out of money to buy food." Was that often, sometimes, or never true for (you/your household) in the last 12 months?

- Often true
- Sometimes true
- Never true
- DK or Refused

6. "(I/We) couldn't feed (my/our) child/the children) a balanced meal, because (I/we)

couldn't afford that." Was that often, sometimes, or never true for (you/your household) in the last 12 months?

- Often true
- Sometimes true
- Never true
- DK or Refused

1st-level Screen (screener for Stage 2): If affirmative response to any one of Questions 2-6 (i.e., "often true" or "sometimes true"), OR, response [3] or [4] to Question 1 (if administered), then continue to Stage 2; otherwise, skip to end.

Stage 2: Questions 7-11 (asked of hh's passing the 1st-level Screen: estimated 40% of hh's \leq 185% Poverty; 5.5% of hh's > 185% Poverty; 19% of all households).

[IF CHILDREN UNDER 18 IN HOUSEHOLD, ASK Q7; OTHERWISE SKIP TO Q8]

7. "(My/Our child was/The children were) not eating enough because (I/we) just couldn't afford enough food." Was that often, sometimes, or never true for (you/your household) in the last 12 months?

- Often true
- Sometimes true
- Never true
- DK or Refused

8. In the last 12 months, since last (name of current month), did (you/you or other adults in your household) ever cut the size of your meals or skip meals because there wasn't enough money for food?

- Yes
- No (Skip 8a)
- DK (Skip 8a)

8a. [IF YES ABOVE, ASK] How often did this happen---almost every month, some months but not every month, or in only 1 or 2 months?

- Almost every month
- Some months but not every month
- Only 1 or 2 months
- DK

9. In the last 12 months, did you ever eat less than you felt you should because there wasn't enough money to buy food?

- Yes
- No
- DK

10. In the last 12 months, were you every hungry but didn't eat because you couldn't afford enough food?

- Yes
- No
- DK

11. In the last 12 months, did you lose weight because you didn't have enough money for food?

- Yes
- No
- DK

2nd-level Screen (screener for Stage 3): If affirmative response to any one of Questions 7 through 11, then continue to Stage 3; otherwise, skip to end.

Stage 3: Questions 12-16 (asked of hh's passing the 2nd-level Screen: estimated 7-8% of hh's < 185% Poverty; 1-1.5% of hh's > 185% Poverty; 3-4% of all hh's).

12. In the last 12 months, did (you/you or other adults in your household) ever not eat for a whole day because there wasn't enough money for food?

- Yes
- No (Skip 12a)
- DK (Skip 12a)

12a. [IF YES ABOVE, ASK] How often did this happen---almost every month, some months but not every month, or in only 1 or 2 months?

- Almost every month
- Some months but not every month
- Only 1 or 2 months
- DK

[IF CHILDREN UNDER 18 IN HOUSEHOLD, ASK 13-16; OTHERWISE SKIP TO END.]

13. The next questions are about children living in the household who are under 18 years old. In the last 12 months, since (current month) of last year, did you ever cut the size of (your child's/any of the children's) meals because there wasn't enough money for food?

- Yes
- No
- DK

14. In the last 12 months, did (CHILD'S NAME/any of the children) ever skip meals because there wasn't enough money for food?

- Yes

No (Skip 14a)

DK (Skip 14a)

14a. [IF YES ABOVE ASK] How often did this happen---almost every month, some months but not every month, or in only 1 or 2 months?

Almost every month

Some months but not every month

Only 1 or 2 months

DK

15. In the last 12 months, (was your child/ were the children) ever hungry but you just couldn't afford more food?

Yes

No

DK

16. In the last 12 months, did (your child/any of the children) ever not eat for a whole day because there wasn't enough money for food?

Yes

No

DK

END OF FOOD-SECURITY/HUNGER CORE MODULE

User Notes

(1) Response Options: For interview surveys, DK (“don’t know”) and “Refused” are blind responses - that is, they are not presented as response options, but marked if volunteered. For self-administered surveys, DK is presented as a response option.

(2) Screeners: The two levels of screener are provided for survey designers wishing to reduce respondent burden for households not manifesting: (a) *any* level of food insecurity (1st-level screener); or (b) any signs of *hunger* (2nd-level screener).

To further reduce burden for higher-income respondents, a preliminary screener may be constructed using Q1 along with a household income measure. Households with income above twice the poverty threshold, AND who respond <1> to Q1 may be skipped to the end of the module and classified as food secure. Use of this preliminary screener reduces total burden in a survey with many higher-income household, and the cost, in terms of accuracy in identifying food insecure households, is not great. However, research has shown that a small proportion of the higher-income households screened out by this procedure will register food insecurity if administered the full module. If Q1 is not needed for research purposes, a preferred strategy is to omit Q1 and administer Stage 1 of the module to all households. Administration time for Stage 1 is very nearly the same as administration time for the preliminary USDA food sufficiency question/screener.

(3) 30-Day Reference Period: The questionnaire items may be modified to a 30-day reference period by changing the “last 12-month” references to “last 30 days.” In this case, items 8a, 12a, and 14a must be changed to read as follows:

8a/12a/14a [IF YES ABOVE, ASK] In the last 30 days, how many days did this happen?

_____ days

[] DK

(4) Food-Security/Hunger Scale: Questions 2-16 provide a complete, validated set of food-insecurity/hunger indicator variables for use in: (1) scaled measurement of the severity of household food insecurity and hunger; (2) classification of households by severity level of food insecurity and hunger; and (3) comparison of food-insecurity and hunger prevalence with national benchmark data. To request guidance materials for calculating these measures, contact the U.S. Department of Agriculture, Food and Nutrition Service, Office of Analysis, Nutrition, and Evaluation, Alexandria, VA (703-305-2125), or the U.S. Department of Agriculture, Economic Research Service, Washington, DC (202-694-5433).