FOOD DESERTS IN LEON COUNTY, FL: DISPARATE DISTRIBUTION OF FOOD STAMP ACCEPTING STORES BY NEIGHBORHOOD CHARACTERISTICS

by

SAMANTHA JACLYN RIGBY

(Under the Direction of Jung Sun lee)

ABSTRACT

This study examined the distribution of food stamp accepting stores by neighborhood racial composition, income, and rurality in Leon County, FL. The lists of food store and food stamp accepting stores were obtained from ReferenceUSA, a commercial business directory, and USDA, respectively. The proportions of different type of food stamp accepting stores were compared by neighborhood characteristics. Out of 288 food stores available, 45.1% were accepting food stamps. Of the 48 neighborhoods, 37.5% had no food stamp accepting stores. Proportions of food stamp accepting grocery stores were significantly different by neighborhood racial composition and income. Primarily black neighborhoods had no supermarkets. This study suggests that a disparity exist in the distribution of food stamp accepting store across neighborhoods characteristics.

INDEX WORDS: Food stamp program; food insecurity; food deserts; neighborhood racial composition, income, and rurality

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CHAPTER 1

Introduction

An increasing number of Americans are facing financial hardships, which may put them at risk of food insecurity. Food insecurity is 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" (Nord & Coleman-Jensan, 2009a). In attempts to reduce the fiscal challenges low income Americans may face, the Supplemental Nutrition Assistance Program (SNAP), formerly the Food Stamp Program, has been providing food assistance since 1969 (Ohls, 1999). As of February 2010, food assistance benefits were being provided to nearly 39 million participants each month (Hansan, 2009; United States Department of Agriculture, 2010b).

According to the food stamp participant food access study, 51% of food stamp participants or eligible participants do not shop in their neighborhood because of lack of stores (Ohls, 1999). Food stamp program participants may not be able to purchase the foods they want and need for a healthy diet if food stamp accepting stores are not easily accessible.

The availability of different types of food stores is associated with neighborhood racial composition, income, and rurality. Primarily black neighborhoods tend to have less access to large food stores than white or mixed race neighborhoods (Galvez, et al., 2008; Larson, Story, & Nelson, 2009; Morland & Filomena, 2007; Morland, et al., 2002). Low-income neighborhoods tend to have fewer stores than higher income areas (Moore, et al., 2006), and residents in very rural or inner-city areas have fewer large stores and more

limited food selection than residents in other areas (Farley, et al., 2009; Hosler, et al., 2008; Moore, et al., 2007).

Food stamp participants are more likely to be low income and/or minority, and therefore may be more likely to live in food deserts. Food deserts can be recognized as "an area where residents have limited access to affordable food, due to lack of store availability or accessibility" (Cummins & Macintyre, 2002). Previous literature shows that neighborhoods recognized as a food desert exhibit a commonality of being located in low income and/or minority neighborhoods and having a higher number of small grocers, independent stores and convenience stores per capita than supermarkets (Cummins & Macintyre, 2002; Morland et al., 2002; Morris, 1992; Morton, 2007; Whitacre, 2009). The smaller stores usually do not offer as much variety or as low of prices as larger chain stores and supermarkets. While not having a supermarket does not mean there are no other stores available, lack of supermarkets limits persons' shopping choices (Bustillos, Sharkey, Anding, & McIntosh, 2009; Chung & Myers, 1999; Sharkey & Horel, 2008).

Individuals living in food deserts may be at increased risk of having poor quality diets and corresponding negative health outcomes including overweight, obesity, and other chronic disease (Cummins & Macintyre, 2002; Mujahid, et al., 2008; Pickett & Pearl, 2001; Powell et al., 2007; Zenk et al., 2005). Food stamp participants, who are more likely to be food insecure and to live in food deserts, would face the compounded problem of limited financial resources and limited availability of stores accepting food stamps. Their purchasing power is decreased, which may affect food purchasing choices and further exacerbate health problems associated with food deserts and food insecurity. It is imperative to gain better understanding of what neighborhood characteristics put

food stamp recipients at increased risk for experiencing a food desert, and how food stamp participants are affected by living in a food desert with limited availability of food stamp accepting stores.

The purpose of this study was to examine whether neighborhood characteristics were related to the distribution of food stores accepting food stamps in Leon County, FL. This study compared the proportion of different type of food stamp accepting stores by neighborhood characteristics of racial composition, income and rurality. The identification of neighborhoods in Leon County that have limited or no access to food stamp accepting stores may provide a basis to improve the food environment for these nutritionally vulnerable populations.

Chapter 2 is a review of literature pertaining to food deserts, food stamps and how neighborhood characteristics of racial composition, income and rurality are related to food store availability and residents' food choices, dietary intake, and nutritional health status.

Chapter 3 is a manuscript to be submitted to the Journal of Nutrition Education and Behavior. This chapter includes the abstract, introduction, methods, results, discussion and implications, and tables and figures.

Chapter 4 is a summary of the present study and provides implications for policy changes and further research.

CHAPTER 2

Literature Review

Consuming a poor quality diet is linked to negative health outcomes such as increased incidence of obesity, heart disease and diabetes. It is commonly assumed that diet choices are made because of personal preference, and that educating people about making more healthful diet choices will influence their purchasing habits. For Americans receiving food stamps, healthy food choice and nutrition information are provided along with the financial benefits. Despite such educational intervention efforts, however, some food stamp recipients still consume poor quality diets leading to poor health. Emerging research about food environment, including this particular study, look beyond personal choices and instead into if there are food stores available for which consumers to purchase healthy foods, and if so, what type of stores they are. Food environment and food desert research examines how food stores, or lack thereof, influence people's food choices, diet, and overall health.

Food Desert

Distribution of food stores is not always equal across geographic locations. Neighborhoods with higher minority populations, low household income, and in rural or inner-city areas are less likely to have equal access to a variety of food stores than those with white or mixed race, high household income, and in urban/suburban areas (Baker et al., 2006; Bustillos et al., 2009; Connell et al., 2007; Galvez et al., 2008; Morland & Filomena, 2007; Zenk et al., 2005). These areas of limited access to food stores are called

"food deserts" to signify the lack of store availability. There has been no agreed upon definition of "food desert," but most of the available definitions of food desert commonly describe it as an area where residents have limited access to affordable food, due to lack of store availability or accessibility (Cummins & Macintyre, 2002). The 2008 Farm Bill, Section 7527, defines food deserts as having "limited access to affordable and nutritious food, particularly such an area composed of predominantly lower-income neighborhoods and communities" (Whitacre, 2009).

While the tem "food desert" originated overseas, the United States is not immune to developing these areas. For example, a nationwide study found 418 US counties that could be designated as food deserts (defined as areas that all residents live more than 10 miles from any supermarket or supercenter) (Morton, 2007). This same study also found in 803 counties that at least one-half of the population lived more than 10 miles from large food stores (Morton, 2007). Residents in these counties experience lack of store availability, which could impact the quantity and quality of their diet, and ultimately their health. Determining where and why a food desert exists is imperative in improving availability and accessibility of food stores for nutritionally vulnerable populations.

Characteristics of Food Deserts

Food deserts may be due to limited availability and/or accessibility of food stores. Availability is the physical presence of stores, while accessibility is how easily residents can reach the stores. Previous food desert studies have documented the relationship of lack of availability and accessibility of food stores and neighborhoods characteristics of racial composition, income, and rurality.

Neighborhood Racial Composition

Neighborhood racial segregation is still a common occurrence, and food store availability has identifiable trends based on neighborhood racial composition. Fewer supermarkets exist in predominantly black neighborhoods than white neighborhoods and that the supermarkets are farther in distance (Morland et al., 2002; Lewis et al., 2005; Moore et al., 2006). Morland et al. found that African American neighborhoods had four times fewer supermarkets than white neighborhoods in a study of 221 census tracks in Mississippi, North Carolina, Maryland, and selected suburbs of Minnesota (Morland & Filomena, 2007; Morland et al., 2002). This finding was further supported in a study conducted in Los Angeles, CA, where poorer neighborhoods with a higher percentage of African American residents had fewer healthy food store choices (Lewis et al., 2005). A similar study also found fewer fruit and vegetable markets, bakeries, specialty stores, and natural food stores in poorer and non-Caucasian areas (Moore et al., 2006). As blacks are a racial group with a high prevalence of food insecurity, it is important to recognize that they are also more likely to live in food deserts than other races, and therefore potentially suffer the effects to their well-being.

Neighborhood Income

Neighborhood income is of interest when studying food deserts and food stamp acceptance. Low income residents, those people living under the poverty line, are more likely to receive food stamp benefits. To qualify for food stamps, eligible participants' monthly income is accounted for in both gross and net amounts, and must fall below

130% and 100% of poverty, respectively (United States Department of Agriculture, 2010a).

Low income neighborhoods are more likely to have limited food store availability and choices than higher income neighborhoods (Alwitt, 1997; Baker et al., 2006; Bustillos et al., 2009; Sharkey & Horel, 2008). In a study of store accessibility in the 36 county areas in Lower Mississippi Delta, low-income households relied more on smaller supermarkets and grocery stores and had lower rates of accessibility to supermarkets than did higher-income households (Kaufman, 1999). The lack of certain food store types, particularly supermarkets, limits a resident's shopping choices and spending power because the larger supermarkets have more selection and are usually lower priced than small stores (Bustillos et al., 2009; Chung & Myers, 1999; Sharkey & Horel, 2008). Residents in low-income neighborhoods face limited access to food stores due to lack of store availability and/or transportation (Bell, 1993; Kaufman, 1999). Low income residents may face the unique problem of balancing limited choices with limited funds.

Neighborhood Rurality

Physical location of neighborhoods, whether urban or rural, can impact the availability and accessibility of stores. For the 2000 Census, the US Census Bureau recognized urbanized areas as those "core census block groups that have a population density of at least 1,000 people per square mile, and surrounding census blocks that have an overall density of at least 500 people per square mile," and rural areas as all territories, populations and housing units outside of the urbanized area (US Census Bureau Geography Division, 2002). Urban and rural classifications in most previous food desert

studies are often based on population density, but the actual number of people in each category can vary from study to study.

While it is commonly assumed that food deserts would be most likely in sparsely populated areas, food deserts and increased food costs can also exist in inner city locations (Alwitt, 1997; Morland et al., 2002; Powell et al., 2007). Residents in these inner-city locations are more likely to be of racial minority and low-income, characteristics that also have been indentified in food insecure populations. Although there is a large populace in the cities, store availability may be very low in relation to population density. It is theorized that this phenomenon occurs for several reasons: stores do not want to pay for higher insurance rates or rent that inner-city areas often charge, or larger chain stores feel they will not make a profit and so do not build there (Ver Ploug, 2010).

Rural food deserts are often due to physical lack of establishments, whereas urban food deserts exist in densely populated areas that have small establishments with limited selection. Residents in rural areas without supermarkets shop at convenience or small grocery stores, which could result in paying more for transportation costs while still only having access to stores with limited selections (Sharkey & Horel, 2008). An additional problem residents in rural areas who rely on smaller stores may also face is higher prices for the same products than those living in suburban areas (Kaufman, 1999; Morris, 1992). Rural and very urban residents who rely on food stamps to supplement their diets may face difficulty in redeeming their benefits because of lack of food stamp accepting stores in their neighborhoods.

The Health and Economic Effects of Food Deserts

The nutrition environment is often characterized as community and consumer nutrition environment. The community nutrition environment includes the types and number of stores available, the location of those stores, and the hours of operation (Glanz et al., 2005). The consumer nutrition environment is what is available within those stores, including price and availability of healthy options (Glanz et al., 2005). When studying food deserts, it is important to consider both the community and consumer environments to determine where and why food deserts exist and what the potential implications for residents may be.

Food deserts may significantly affect consumption patterns, nutritional status and overall health of residents. Lack of availability of food stores, especially supermarkets, is linked to negative nutritional and health outcomes (Alwitt, 1997; Liese et al., 2007; Raja, 2008). Studies focused on the nutrition environment showed that supermarkets generally have lower prices and more selection than other types of stores (Kaufman, 1999; Liese et al., 2007). Consumers with access to stores with a large variety of food are less likely to be obese than consumers with limited access (Spence, 2009). Fewer stores and smaller stores may be related to fewer, more expensive food choices, consequent purchasing patterns of cheaper, high-fat, high-calorie foods, and the resulting negative health outcomes related to low-quality diet. Consumers in higher socioeconomic groups are also less likely to be at risk of developing overweight or obesity (Cummins & Macintyre, 2002; Pickett & Pearl, 2001; Zenk et al., 2005). Distance to food stores can also impact on overall health. When considering distance to stores, secondary data analysis of the 1996-97 National Food Stamp Program Survey found that people living within “easy”

access to a grocery store (less than one mile) consumed approximately 65 g/day more fruit than those living five or more miles away (Rose & Richards, 2004). Total fruit and vegetable intake has also been shown to increase with each additional supermarket in a census tract (Morland, Wing, & Roux, 2002). Food stamp recipients with reduced or no access to supermarkets may then be more likely to have to redeem their benefits at smaller stores, ultimately affecting their purchasing power and quality of food purchases.

Residents of food deserts do not consume the recommended number of fruits, vegetables, fiber or protein (Morton, 2007). Obesity and overweight prevalence has been found to be higher in areas where residents rely more on convenience stores than supermarkets (Morland, Diez Roux, & Wing, 2006). Residents who reported higher availability of healthy foods in their neighborhoods were less likely to be hypertensive than their counterparts (Mujahid et al., 2008). Body mass index (BMI) and access to healthy food outlets and supermarkets has been found to be inversely associated with BMI. As distance to stores increases, BMI also increases (Powell et al., 2007; Rundle et al., 2009).

Food Deserts and Food Insecurity

The limited availability and accessibility of food stores that characterizes food deserts may further impact the nutritional health and quality of life of food insecure residents. Food insecure people living in food deserts may not have access to the large stores providing a wide variety of foods with cheaper prices, and their shopping choices and purchasing abilities are even more compromised. People who have been indentified as food insecure are defined as “uncertain of having, or unable to acquire, enough food to meet the needs of all their members because they had insufficient money or other

resources for food (Nord & Coleman-Jensan, 2009b). According to the USDA's 2008 Household Food Security in the United States report, 14.6 % of American households were food insecure, meaning that at times during the year, these households were uncertain of having, or unable to acquire, enough food to meet the needs of all their members because they had insufficient money or other resources for food (United States Department of Agriculture, 2008). Around 42% of food insecure households in the U.S. were living below the official poverty line (United States Department of Agriculture, 2008). Food insecurity was more prevalent for households located in principal cities of metropolitan areas and non-metro areas than for households in suburbs or other metropolitan areas outside of principal cities; essentially, residents in inner-city and rural areas are more likely to be food insecure than residents in suburbs (Nord & Coleman-Jensan, 2009b).

Residents in food deserts and food insecure residents share similar characteristics of being minority, low-income and in inner city or rural areas, and are both vulnerable to negative health outcomes as related to lack of food stores and healthy food choices available.

The Food Stamp Program

History of the Food Stamp Program

The Food Stamp Program (FSP), the first food assistance program, was initiated in 1939 as a means of distributing excess farm commodities during the Great Depression

and to provide food to households that may not have the resources to purchase enough on their own (Landers, 2007). By 1964, the pilot program had extended to 22 states and 380,000 participants (United States Department of Agriculture, 2010a). Congress made the FSP permanent, and it was passed as the Food Stamp Act of 1964 (United States Department of Agriculture, 2010a), which remained in place until 1977 (United States Department of Agriculture, 2010a).

The FSP has gone through many changes since its inception. To address a severe hunger problem in the late 1980s, Congress eliminated sales tax on food stamp purchases, reinstituted the categorical eligibility, increased the resource limit for most households ($2,000), eligibility for the homeless, and expanded nutrition education (United States Department of Agriculture, 2010a). The Hunger Prevention Act of 1988 and Mickey Leland Domestic Hunger Relief Act in 1990 altered the plan by increasing benefits by applying a multiplication factor to the Thrifty Food Plan costs and establishing the Electronic Benefit Transfer (EBT) as an alternative to paper food stamps (United States Department of Agriculture, 2010a).

The Farm Bill (Food, Conservation and Energy Act) of 2008 (United States Department of Agriculture, 2010a) implemented several changes including commitment of more than $10 billion over the next 10 years to Federal food assistance programs and changing the name of the Food Stamp Act to the Supplemental Nutrition Assistance Program (SNAP) (United States Department of Agriculture, 2010a). States can choose to name their own programs as they like, but are encouraged to use the SNAP or some other name in order to eliminate the stigma of the term “food stamp” (United States Department of Agriculture, 2010a). Modifications also included increasing the minimum

benefit from $10 to $14 and eliminating the cap on the dependant care deduction (United States Department of Agriculture, 2010a). As of February 2010, FSP benefits were being extended to nearly 39 participants each month, and were accepted in 171,000 authorized retail (United States Department of Agriculture, 2010b).

Food Stamp Program Participation and Participants

Nationwide, about 66% (38,922,000 people) of people eligible to receive food stamps actually participate in the program (Cunnyngham, 2009). Food stamp participation rates varied by region (Cunnyngham, 2009). The Midwest region had the highest participation rates with 77% of eligible residents participating, and the Western region had the lowest rates, with only 56% of eligible residents participating (Cunnyngham, 2009). The US Department of Agriculture set a goal in its 2002 Strategic Plan to reach 68% of population eligible for food stamps by 2007 (Castner and Schirm, 2004), which would be an increase of 11% from the 57% participation rate in 2005 (Wolkitz, 2007). The state of Florida, the location of this study, consistently falls within the lowest quarter of state rankings in food stamp eligibility versus participation. Approximately 57% of the 2,114,000 eligible Florida citizens actually participated in 2007 (Cunnyngham, 2009). Nationally, blacks have the highest participation rate (approximately 80% of those eligible actually participated in the food stamp program) versus whites and Hispanics in 2005 (Wolkitz, 2007). Participation is also higher for households with children than households without children; for females rather than males and rural areas to urban areas. Eligible people between the ages of 18 and 59 are 29.2% more likely to participate in food assistance programs (Wolkitz, 2007).

Food stamp participants had average gross monthly income per SNAP household of $673 in 2006, and 52 percent of food assistance receiving households included children (United States Department of Agriculture, 2010a). Urban recipients are more likely to have children and less likely to have an older adult in the household than rural residents, most food stamp participants are non-Hispanic white, while urban area participants are mostly black or Hispanic. Rural households participating in the program also tend to have a slightly higher average income than households in urban areas (McConnell, 2001).

Food Store Access of Food Stamp Participants

Food Stamp Participants' Access to Food Retailers study showed that 90% of the food stamp participating or food stamp eligible households usually purchased food from a supermarket. Grocery stores were the next frequently used store, with 7% of participants, 9% of eligible nonparticipants, and 6% of near-eligible persons. The store type least likely used for food purchases was convenience stores (< 1%) (Ohls, 1999).

Approximately one-third of low-income households usually shop within a mile of their homes, while another one-third shops at stores up to four miles away (Ohls, 1999). While this does not mean that residents of low-income households cannot or will not patronize food stores further away, it does bring additional concerns about possible lack of transportation and thus limited accessibility of food stores. Racial composition has also been shown influence distance to food stores, with supermarkets being further in distance from black neighborhoods than from white neighborhoods (Inagami, Cohen, Finch, & Asch, 2006; Zenk, et al., 2005). Low income and black residents receiving food stamps

are at increased risk of having difficulty accessing the main venues that will accept their benefits, possibly resulting in a state of food insecurity.

Rural Americans on food assistance programs spent 68% of their stamp dollars in supermarkets, below the national average of 80% (Morris, 1992). Rural supermarkets account for 58.9% of food stamp redemptions in these areas, lower than the rate of 84.1% redemption rates in suburban areas (Kaufman, 1999). As supermarkets are the type of store more likely to accept food stamps, this limits the potential for some rural residents to fully utilize their benefits.

Previous research has examined the characteristics of individuals receiving food stamps, however, little information is available regarding how neighborhood characteristics would affect the availability and accessibility of food stamp accepting stores and eventually food stamp redemption rates. This study was conducted to assess if the location of food stamp accepting stores is affected by neighborhood racial composition, income and rurality.

Food Deserts and Food Stamp Program Participation

The identification of food deserts and their characteristics are important to further our understanding on the hardships food insecure and nutritionally vulnerable populations may encounter when attempting to purchase groceries. The identification of food deserts is important in understanding the cause of barriers residents of certain neighborhoods may face in fully utilizing their food stamp benefits.

Food insecure citizens and food stamp program participants share many similar neighborhood characteristics of racial composition, income and rurality, and may suffer

similar negative health effects. Food insecure residents are more likely to live in minority, low-income, and rural or inner-city neighborhoods (Nord et al., 2008; Nord & Coleman-Jensan, 2009b), as are food stamp recipients. Redemption rates for food stamps are highest among supermarkets, with 76.7% of food stamps being used in these stores. Supermarket availability, however, is not distributed equally among race, income or rurality groups. This is a marked example of how neighborhood characteristics may affect the ability of residents to redeem their food stamp benefits. Food stamp participants residing in food deserts may be placed in a situation of limited financial resources coupled with limited food store choices.

This study was designed to examine if there is disparity in the distribution of food stores and food stamp accepting stores across different neighborhood characteristics. In particular, this study examined whether neighborhood characteristics of racial composition, income, and rurality are related to the distribution of food stores and food stamp accepting stores in Leon County, Florida. The state of Florida, the location of this study, had a participation rate of 61% in 2007, below the national average (Cunnyngham, 2009). In Leon County, 10% of all county residents received food stamps (Bloch, 2009). The findings from this study may identify potential barriers of food stamp redemption, and areas in need of improvement to maximize food stamp benefit utilization.

CHAPTER 3

Food deserts in Leon County, FL: Disparate distribution of food stamp accepting stores by neighborhood characteristics [1]

[1]Rigby, S, Leone, A, Kim, H, Betterley, C, Johnson, MA, Kurtz, H, and Lee, JS. To be submitted to the Journal of Nutrition Education and Behavior.

Abstract

Objective: To examine if neighborhood characteristics of racial composition, income and rurality were related to the distribution of food stores accepting food stamps in Leon County, FL.

Design: Compare proportion of food stamp accepting stores between neighborhoods based on racial composition, income and rurality.

Setting: Leon County, FL

Sample: 48 census tracts as a proxy of neighborhoods. All and food stamp accepting stores were identified from a commercial business directory and USDA food stamp accepting store list, respectively (n=288).

Main Outcome Measures: Number and proportion of food stamp accepting stores across neighborhoods.

Analysis: Descriptive statistics were calculated to describe distribution of food stamp accepting stores by neighborhood characteristics. The proportions of food stamp accepting stores were compared by neighborhood characteristics using Wilcoxon-Mann-Whitney and Kruskal-Wallis tests.

Results: Out of 288 available stores, 45.1% accepted food stamps. Of the 48 neighborhoods, 37.5% had no food stamp accepting stores. Proportions of stamp accepting grocery stores were significantly different by neighborhood racial composition and income. Primarily black neighborhoods did not have any supermarkets. Although statistically insignificant, trends were found for disparities in the distribution of supermarkets, convenience stores and other stores across the three neighborhood characteristics.

Conclusions and Implications: This study suggests a disparity in the distribution of food stamp accepting store across neighborhoods characteristics of racial composition, income and rurality. Black, low income and/or urban neighborhoods are less likely to have food stamp accepting stores than white, high income and/or rural neighborhoods.

Introduction

An increasing number of Americans are facing financial hardships, which may put them at risk of food insecurity. Food insecurity is 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" (Nord &Coleman-Jensan, 2009a). In attempts to reduce the fiscal challenges low income Americans may face, the Supplemental Nutrition Assistance Program (SNAP), formerly the Food Stamp Program, has been providing food assistance since 1969 (Ohls, 1999). The intent of the food stamp program is to provide food purchasing assistance and nutrition education for low-income Americans. As of February 2010, food assistance benefits were being provided to nearly 39 million participants each month (Hansan, 2009; United States Department of Agriculture, 2010b).

According to the Food Stamp Participants' Access to Food Retailers" study, most food stamp receiving households use supermarkets as their primary food source and are in close proximity to a full-line grocery store or supermarket (Ohls, 1999). This study also found that 76 percent of food stamp accepting households have "easy" access to supermarkets (Ohls, 1999; Rose & Richards, 2004). While these findings imply that store accessibility is not a limiting factor for shopping for food stamp participants, 51% of participants or eligible participants do not shop in their neighborhood because of lack of stores. Rural residents may also have to travel further than suburban residents to reach supermarkets (Ohls, 1999). The ability to fully utilize food stamps may be negatively affected by the lack of availability of food stamp accepting stores. Food stamp program

participants may not be able to fully redeem their benefits if food stamp accepting stores are not easily accessible.

The availability of different types of food stores is associated with neighborhood racial composition, income, and rurality. Primarily black neighborhoods tend to have less access to food stores than white or mixed race neighborhoods (Galvez et al., 2008; Larson, et al., 2009; Morland & Filomena, 2007; Morland et al., 2002). Low-income neighborhoods tend to have less stores than higher income areas (Farley et al., 2009; Hosler et al., 2008; Moore et al., 2006), and residents in very rural or inner-city areas have fewer large stores and more limited selection than residents in other areas (Farley et al., 2009; Hosler et al., 2008; Moore et al., 2007). Food stamp participants are more likely to be low income and/or minority, and therefore may be more likely to live in food deserts. The term "food desert" has been defined in many ways since first introduced into literature, but commonly defined as "an area where residents have limited access to affordable food, due to lack of store availability or accessibility" (Cummins & Macintyre, 2002). Previous literature shows that neighborhoods recognized as a food desert share a commonality of being located in low income and/or minority neighborhoods, and having a higher number of small grocers, independent stores and convenience stores than supermarkets per capita (Cummins & Macintyre, 2002; Morland et al., 2002; Morris, 1992; Morton, 2007; Whitacre, 2009). The smaller stores usually do not offer as much variety or as low of prices as larger chain stores and supermarkets, and food prices tend to be more expensive at the smaller stores (Jetter & Cassady, 2006; Liese et al., 2007). While not having a supermarket does not mean there are no other stores available, lack of

supermarkets severely limits persons' shopping choices (Bustillos et al., 2009; Chung & Myers, 1999; Sharkey & Horel, 2008).

Previous research on food environments suggest that availability and accessibility to different type of food stores affect individuals' food purchases, which ultimately affects their overall health (Alwitt, 1997; Raja, 2008). Individuals living in food deserts may be at increased risk of having poor quality diets and possible resulting negative health outcomes of overweight, obesity, and other chronic disease (Cummins & Macintyre, 2002; Mujahid et al., 2008; Pickett & Pearl, 2001; Powell et al., 2007; Zenk et al., 2005). Therefore, food stamp participants, who are more likely to be food insecure and to live in food deserts, would face the compounded problem of limited financial resources and limited availability of stores accepting food stamps. Their purchasing power is decreased, which may affect food purchasing choices and further exacerbate health problems associated with food deserts and food insecurity. It is imperative to gain better understanding of what neighborhood characteristics put food stamp recipients at increased risk for experiencing a food desert, and how food stamp participants are affected by living in a food desert with limited availability and accessibility to food stamp accepting stores.

The purpose of this study was to examine whether neighborhood characteristics were related to the distribution of food stores accepting food stamps in Leon County, FL. In Leon County in 2008, 17.0% of the population was under poverty (defined as 100% below federal poverty lines), a higher percentage than those for state and national average. Approximately 10% of residents received food stamps, slightly lower than the state average of 11.5% (Bloch, 2009). This study compared the proportion of different

type of food stamp accepting stores by neighborhood characteristics of racial composition, income and rurality. Our hypothesis was that availability of food stores accepting food stamp benefits differs by neighborhood racial composition, income and rurality. The identification of neighborhoods in Leon County that have limited or no access to food stamp accepting stores may provide a basis to improve the food environment for these nutritionally vulnerable populations.

METHODS

Leon County, Florida

Leon County, Florida, located in northern Florida, is home to the state capitol of Tallahassee. In 2008, of the total population of 264,063, 17 % are below poverty (defined as 100% below federal poverty level) (United States Census Bureau, 2010; United States Census Bureau, 2009b). The median household income for a family of four in Leon county was $48,739 in 2008 (United States Census Bureau, 2009b), which is higher that that for the Florida state ($47,804). The median income for food stamp receiving households is $12,865 (United States Census Bureau, 2009b). Leon County consists of 64.4% white, 30.9% black, and 4.3% Hispanic population. Leon County has both urban and rural areas, with 64.7% of its residents living outside of city limits (United States Census Bureau, 2009a).

Neighborhood Characteristics

The 2000 US Census data were used to characterize neighborhood characteristics of racial composition, income, and rurality. For the purpose of this study, census tracts in Leon County were used as a proxy of neighborhoods, as was done in previous studies (Morland et al., 2006; Zenk et al., 2005). Other sociodemographic, housing, and economic characteristics of Leon County and Florida were also obtained from the Florida Legislature Office of Economic and Demographic Research and USDA-Economic Research Service (Florida Legislature Office of Economic and Demographic Research, 2009; United States Department of Agriculture, 2010).

Neighborhood racial composition was determined based on the proportion of black residents in each census tract, as was done in previous studies (Morland et al., 2002). Census tracts with <20% black residents were defined as predominately white, those between 20 and 80% black residents were defined as racially mixed, and those with >80% black residents were defined as predominantly black (Morland et al., 2002; Morland et al., 2002). Neighborhood rurality/urbanity was determined based on the proportion of urban population in each census tract, as was done in previous studies (Kaufman, 1999; Morris, 1992; Morton, 2007; Powell et al., 2007, Leone, 2010). Census tracts with >90% of urban population were defined as urban, and those with ≤10% of urban population were defined as rural. Neighborhood income was determined based on the population living under 100% federal poverty level. The 24 census tracts with higher proportion of population living under poverty level were considered "low-income," and the remaining 24 census tracts were considered "high income."

Food Stores

A list of all food stores available in Leon County, FL was obtained from ReferenceUSA, a commercial business directory, while using 8 codes from the North American Industry Classification System (NAICS) (NAICS codes, see Appendix A) (ReferenceUSA). These codes were selected for all stores selling food, including supermarkets, grocery stores, convenience stores and specialty stores, as was done in previous studies (Morland et al., 2002). The codes resulted in a total of 309 stores. Duplicate listings and listings of non-relevant industries (e.g., police stations, liquor stores, and juvenile camps) (n = 61) were removed from the initial list, ending with a final store count of 248 stores. Stores were further classified as one of four categories: supermarkets, grocery stores, convenience stores, or other stores based on store classifications used by the Florida Administrative Code for permitting purposes (Food Store Classifications, see Appendix B). Supermarkets and grocery stores, which were under a single category type in ReferenceUSA, were separated into either supermarkets (stores $\geq$ 15,000 square feet) or grocery stores (stores <15,000 square feet). Stores that were not supermarkets, grocery stores, or convenience stores were grouped together as "other stores." This category included stores such as supercenters, Dollar General stores, specialty food stores, pharmacies/drug stores, and gasoline stations. Supercenters (e.g., Super Wal-Mart, Big K Mart) were included in the "other" category because they are not primarily food selling stores, were included in the Department and Other Stores category of ReferenceUSA.

A list of all food stores that accept food stamps in Leon County, FL was obtained from the USDA Southeast Regional Field Office in Atlanta, GA. The list was comprised

of the name and street address of 134 stores. The size and main function of these stores were determined based on the data collected by using internet searches of company websites, GoogleEarth.com, yellowpages.com, and calling the stores. Duplicate listings or stores that did not exist at the address provided were deleted (n = 4). Store count used for analysis was 130 stores. Store size and function information was used to determine the type of store, as was done with the ReferenceUSA stores: supermarkets, grocery stores, convenience stores or other stores.

The ReferenceUSA list of stores and USDA list of were combined. Final store count for data analysis was 288 stores.

Data Analysis

The list of food stores from ReferenceUSA was geocoded using the provided coordinates (longitude and latitude), and the food stamp accepting stores from the USDA were geocoded by using the provided street address. The number of different type of food stores and food stamp accepting stores were counted by census tract. Store location from both the ReferenceUSA and the USDA lists were mapped on the neighborhood characteristics including income, racial composition and rurality using Geographic Information System (GIS). These maps were used to show the distribution of stores in relations to neighborhood characteristics.

Proportion of food stamp accepting stores was calculated for each type of store for each neighborhood. For each type of store in the particular neighborhood, the number of food stamp accepting stores was divided by the total number of stores available in that

neighborhood and multiplied by 100 to get percentage. Proportion of food stamp accepting stores was used for comparison between the neighborhood characteristics.

Descriptive analysis was conducted to describe the availability of food stores, food stamp accepting stores, and neighborhood characteristics in Leon County, FL. Frequency, mean, standard deviation, median, and range were calculated for the number and proportion of food stamp accepting stores by neighborhood characteristics of racial composition, income, and rurality. To test the equality of medians of proportions of food stamp accepting stores by neighborhood characteristics, non-parametric tests including Kruskal-Wallis and Wilcoxon-Mann-Whitney tests were used due to non-normal distribution of these data and small sample size. All analyses were conducted by using Stata 10 (StataCorp, 2007).

Results

Sociodemographic, housing, and economic characteristics of Leon County, FL and Florida

Table 3.1 shows the sociodemographic, housing and economic characteristics of residents of Leon County, FL, and the state of Florida. Based on the Census estimates for 2008, total population of Leon County was 264,063, which was 1.4% of the total population in the state of Florida (US Census Bureau, 2009a). Population density for the county is slightly higher than the state, with 152.9 people/km^2 (US Census Bureau, 2009a).

The median age of residents in Leon County, FL, was 29.5 years in 2008. White residents accounted for 64.4% of the total Leon County population, as compared to black residents,

who comprised 31.3% of the total County population. The population density was higher for urban residents (118.6 people/km^2) than that of those living in rural areas (20 people/km^2). Based on 2008 Census estimates, the median household income in Leon County, FL was $48,739 (Table 1). Around 17.0% of residents in Leon County were below poverty and 7.3% of residents were unemployed in 2008. Approximately 10% of Leon County residents received food stamps in 2010, which is slightly lower than that for the Florida state average of 11.5% (NY Times, 2 Jan 2010).

Sociodemographic, housing, and economic characteristics by neighborhood characteristics in Leon County, FL

Table 3.2 shows the sociodemographic, housing, and economic characteristics by neighborhood racial composition, income, and rurality in Leon County, FL in 2000. Among the 48 neighborhoods in Leon County, 11 were primarily white, 31 were primarily mixed, and 6 were primarily black. For neighborhood income comparison, the 48 neighborhoods were split evenly with 24 tracts deemed high income and 24 tracts deemed low income. When categorized based on population density, 38 were urban neighborhoods and 10 were rural neighborhoods. Based on 2000 Census**,** the median household income was higher in predominantly white neighborhoods than mixed and primarily black neighborhoods. Approximately 75% of whites residents lived in high income neighborhoods, compared to 17.8% of black residents lived in high income neighborhoods.

The median household income in high income neighborhoods were more than twice as much as that in low income neighborhoods ($51,742 versus $23,186,

respectively). The median household income was higher in rural neighborhoods than urban neighborhoods.

Residents in primarily black, low income, or rural neighborhoods were more likely to be on public assistance than those in other race, urban, or high income neighborhoods, respectively. Approximately 60% of residents in predominantly black neighborhoods received some type of public assistance, versus 51.2% of mixed neighborhoods and 18.7% of white neighborhoods. In rural neighborhoods, 60.1% were on public assistance, versus 40.8% of residents living in urban neighborhoods, and 54.0% of residents living in low income neighborhoods received assistance, as compared to 35.7% of high income neighborhoods.

Table 3.3 shows the number and percent of neighborhoods by income and rurality in each race group. A majority of white neighborhoods were high income (9 of 11; 81.8%) and urban (7 of 11; 63.6%). Mixed neighborhoods were almost evenly divided between high and low income, but were more likely to be urban (25 of 31; 80.6%) than rural. Black neighborhoods were exclusively low income and urban; there were no high income or rural black neighborhoods.

Percentage of food stores accepting food stamps by neighborhood characteristics

Table 3.4 shows the total number of food stores and food stamp accepting stores by store type in Leon County. A total of 288 food stores available in Leon County were included in this study. These stores were comprised of 20 supermarkets (6.9%), 40 grocery stores (13.9%), 75 convenience stores (26.0%), and 153 other stores (53.1%). Of these stores, 130 stores accepted food stamps (45.1%) including 19 supermarkets (92.0%

of all supermarkets), 16 grocery stores (40.0% of all grocery stores), 29 convenience stores (38.7% of all convenience stores), and 66 other stores (43.1% of all other stores).

The distribution of total food stores across different neighborhood characteristics in Leon County, FL is shown in **Table 3.5**. The 288 food stores were not distributed evenly across race, income and rural divisions. Mixed neighborhoods had the highest total number and percentage of food stores available when compared by neighborhood income and rurality. Mixed, low income neighborhoods had 107 stores (37.1% of all stores) and mixed, urban neighborhoods had 159 stores (55.2% of all stores).

Table 3.6 shows the distribution of food stamps accepting stores available by neighborhood racial composition, income and rurality. Mixed race neighborhoods had the highest number and percentage of food stamp accepting stores available when compared by neighborhood income and rurality. Mixed, low income neighborhoods had 54 stores (41.5% of all stores) and mixed, urban neighborhoods had 72 stores (55.4% of all stores).

The number of different kind of food stores accepting food stamps was different by neighborhood characteristics (**Table 3.7**). The proportion of different kind of food stores accepting food stamp stores was different by neighborhood characteristics (**Figure 3.1, 3.2 and 3.3**). The proportion of any food stores accepting food stamps in Leon County was 45.1%. Of all types of foods stores, supermarkets had the highest food stamp acceptance rate (95%). The category of other stores had the next highest percentage rate (43.1%). Approximately 40% of all grocery stores available accepted food stamps. Convenience stores had the lowest acceptance rate (38.7%).

The proportion of all food stamp accepting stores was higher in black, high income, and rural neighborhoods than their counterparts, respectively. The type and

availability of food stores/food stamp accepting stores (supermarket, grocery, convenience, or other) varied greatly when compared by neighborhood characteristics of racial composition, income and rurality.

Supermarkets

The proportion of food stamp accepting supermarkets was higher in white, urban, and low income neighborhoods than their counterparts, respectively. All supermarkets available in predominantly white neighborhoods accepted food stamps (100% acceptance rate). Mixed race neighborhood supermarkets had a 94.1% acceptance rate. Predominantly black neighborhoods, however, had no supermarkets available. Supermarkets in rural and high income neighborhoods had food stamp acceptance rates of 90.9% and 93.7%, respectively.

Grocery Stores

Based on Kruskal-Wallis and Wilcoxon-Mann-Whitney tests, the proportion of food stamp accepting grocery stores were significantly different by neighborhood racial composition and income (**Table 3.8**). Predominantly black neighborhoods had the highest median of percent of grocery stores accepting food stamps than other racial composition neighborhoods. When examined by neighborhood income status, 43.3% of all grocery stores available in high income neighborhoods accepted food stamps, compared to 30% of stores in low income neighborhoods. The proportion of food stamp accepting grocery stores in rural neighborhoods was more than twice of that in urban neighborhoods (54% and 20%, respectively).

Convenience Stores

Food stamp acceptance rate was higher in mixed neighborhoods (47.1%), rural neighborhoods (43.6%), and low income neighborhoods (47.6%), than their counterparts, respectively. However these did not reach statistical significance.

Other Stores

Food stamp acceptance rate were higher in black (68.7%), rural (44.8%) and low income tracts (46.1%) than other neighborhoods, respectively. These, however, did not reach the statistical significance.

Food deserts - Neighborhoods without any food stores or food stamp accepting stores

Table 3.9 shows the number of neighborhoods without any food stores or food stamp accepting stores available. Of the 48 neighborhoods in Leon County, 44 (91.7%) had at least one store available, which means there were four neighborhoods (8.3%) without any stores available. Distribution trends were uneven between other store types and the neighborhood characteristics. Especially notable was the lack of any supermarkets in primarily black neighborhoods.

Among the 48 neighborhoods, 18 neighborhoods (37.5%) had no food stamp accepting stores. The store type most likely to be missing was supermarkets (79.1%). Predominantly black neighborhoods had no supermarkets, and therefore no food stamp accepting supermarkets. In high income neighborhoods, 66.7% did not have food stamp accepting supermarkets, slightly lower than the 75% of low income neighborhoods.

Discussion

This exploratory descriptive study is the first to our knowledge to document the distribution of food stores and food stamp accepting stores by neighborhood racial composition, income, and rurality, and to examine if these particular neighborhood sociodemographic characteristics are associated with food access, especially lack of food stamp accepting stores or the existence of food deserts. The most significant findings of this study are the identification of disparities of food stamp accepting store distribution, particularly by neighborhood racial composition, and the absence of any food stamp accepting stores in some neighborhoods.

Emerging research about the community food environment, including this particular study, looks beyond people's personal food choices and instead into how the food environment affects the ability of food stamp recipients to redeem their benefits. Food environment and food desert research examines how food stores, or lack thereof, influence people's food choices, diet, and therefore overall health.

Availability of food stamp accepting stores may influence whether and where food stamp recipients can use their benefits. In Leon County, 45.1% of all stores studied accepted food stamps. Neighborhoods that were primarily black, rural, or high income had the greater proportion of food stamp accepting stores compared to other racial categories, urban, or low income neighborhoods. The distribution of different type of food stores did not follow the same trends, and disparities were found for availability of certain type of stores, particularly supermarkets, when compared by racial composition. While 100% of the supermarkets in primarily white accepted food stamps, the primarily

black neighborhoods had no supermarkets available. This finding was consistent with previous research about food environments and lack of supermarkets in predominantly black neighborhoods (Galvez, et al., 2008; Morland, Filomena, 2007).

The size and types of stores available may have considerable impact on what people can purchase and consume, which ultimately influences their health. Consumers with access to stores with a large variety of food are less likely to be obese than consumers with limited access (Spence, 2009). Access to supermarkets has shown to promote healthy food choices (Morland et al., 2002), and these large stores are most likely of food store types to provide the greatest variety of foods at the lowest prices (Ver Ploug, 2010). For food stamps recipients, supermarkets have the greatest rate of food stamp acceptance among food store types (Olander, 2006). Lack of stores may lead food stamps recipients to shop in smaller stores, which tend to have less variety and choices available. These may leave them unable to redeem their stamps, or reduced quality, or quantity of their diet.

For residents in primarily black neighborhoods in Leon County, there were no supermarkets. Residents in the primarily black neighborhoods who rely on food stamps may have limited shopping options because the food store type that is most likely to accept their benefits, supermarkets, are not present. If residents are shopping exclusively in their neighborhoods, their dietary patterns may be affected by what can be purchased at the smaller stores. Primarily black neighborhoods had the highest proportion of food stamp accepting grocery stores when compared to primarily white or mixed neighborhoods. While these types of stores are smaller than supermarkets, they still offer a greater selection over convenience stores or other smaller stores. Because of the high

food stamp acceptance rate among grocery stores in the primarily black neighborhoods, not all shoppers there may feel they are affected by the lack of supermarkets. For residents in the two black neighborhoods without grocery stores, however, they may be impacted by the lack of supermarkets and grocery stores, limiting shopping options to convenience stores and other stores. As this racial group historically has a higher prevalence of chronic disease than whites (Gillum, Mussolino, & Madans, 2000; Li et al., 2004; McGee et al., 1996), not being able to access supermarkets may lead to limited food choices and negative diet-related health outcomes.

Neighborhood income is also of interest when studying food deserts and food stamp acceptance. To qualify for food stamps, eligible participants monthly income is accounted for in both gross and net amounts, and must fall below 130% and 100% of poverty, respectively (United States Department of Agriculture, 2010a). This study found that high income neighborhoods had a greater number and proportion of food stamp accepting stores than the low income neighborhoods. In the low-income neighborhoods, 100% of the supermarkets accepted food stamps, but there were far fewer (n = 4) supermarkets present than in the high income neighborhoods (n = 16). As this is the store type with the greatest food stamp acceptance rate, residents in these neighborhoods may experience difficulty redeeming their stamps because lack of availability. This situation may limit the opportunity for food-stamp recipients in low-income neighborhoods to use their benefits, putting them at risk for food insecurity and not eating a healthy, complete diet.

Food deserts and increased food costs can also exist in inner city locations (Alwitt, 1997; Morland et al., 2002; Powell et al., 2007). Residents in these inner-city

locations are more likely to be of racial minority and low-income, characteristics that have also been indentified in food insecure populations. Although there is a large populace in the cities, store availability may be very low in relation to population density. Although Leon county residents in urban areas tend to have slightly lower access to food stamp accepting stores than those in rural areas (41.8% of stores and 50.9% of stores accepting food stamps, respectively), it did not reach statistical significance. Despite having a higher proportion of food stamp accepting stores, however rural residents are not immune to food deserts. In Leon County, 30% of rural neighborhoods have no food stamp accepting stores available.

This study is the first of our knowledge to study food deserts that are distinct to food assistance beneficiaries. By identifying areas where food stamp accepting stores do not exist, we may gain a better understanding of why some food stamp recipients cannot fully utilize their benefits.

This study is not without limitations. Generalization of the findings of this study focusing only on one county may be limited. Our methodology, however, could be applied to other geographic areas. We did not assess or know residents grocery shopping behaviors and patterns or if they perceive their neighborhoods as a food desert. Residents living in an identified food desert may not experience lack of access if they regularly shop in other neighborhoods. People in neighborhoods with few stores may go to a different neighborhood to shop, or may shop in areas more geographically aligned with their place of employment, school, or social activities. In this study, one of the black neighborhoods had a neighboring census tract with a supermarket very close to the tract lines. While no black neighborhoods have a supermarket, residents can access this

particular store and may perceive it as being in their own neighborhood. Although this study used census tracts as the best available proxy of neighborhood, what people may perceive as their neighborhood, the area where they live, shop and socialize, may be very different than such government ordained lines. Neighborhood charactersitiscs used for this study was based on the 2000 Census, and it is possible that population statistics and demographics has changed since that information was published. An additional limitation may be that when defining rurality, suburban areas are not separated from urban or rural areas. As suburban neighborhoods may display characteristics from both urban and rural neighborhoods, people who live in suburban areas may not feel they are singularly urban or rural. Another limitation of this study is the reliance on a commercial business directory database to identify store locations and main function. The store lists may be inaccurate due to duplicate/multiple listings, incorrect locations/addresses, and/or incorrect function categories. To counteract these limitations, the store lists were cross-referenced to ensure location and business type, and questionable listings were either corrected or removed.

Implications for Research and Practice

The identification of food deserts and their characteristics is important to further our understanding of the barriers and challenges food insecure and other nutritionally vulnerable populations are facing in their food environments. These residents often live in low-income, rural or inner-city, and minority neighborhoods, and limited store access may lead to difficulty in maintaining healthy eating patterns and dietary intake. Food stamp benefit recipients, who by nature of the program are low-income, are also more

likely to live in rural or inner city areas and be of racial minority. This research will serve as a basis to identify the presence of food deserts, specifically for food stamp receiving populations, in neighborhoods based on specific census characteristics. Food deserts that result from lack of food stamp accepting stores may leave recipients unable to fully utilize their benefits and could possibly result in reduced food buying power. By identifying the location of food deserts that food stamp assistance receiving people may face, appropriate strategies can be devised to improve the food store access in these vulnerable populations. Future research should be directed to better understand why neighborhoods of specific characteristics have limited access to food stamp accepting stores and how it affects the ability of food stamp participants' to utilize their benefits. Such information can be used as a basis to improve policies and program procedures to aid residents who may not be fully utilizing their food stamp benefits because of lack of food stamp accepting stores, and possibly prevent food insecurity and further food desert development.

Table 3.1. Sociodemographic, housing, and economic characteristics of Leon County, Florida and Florida

	Leon County	Florida
Land area (km^2)	1726.9	139,670.5
Total population	264,063	18,328,340
Population density (people/ km^2)	152.9	131.6
Urban (people/ km^2)	118.6[a]	107.2[b]
Rural (people/ km^2)	20.0[a]	7.2[b]
White persons (%)	64.4%	79.8%
Black persons (%)	31.3%	15.9%
Female (%)	51.8%	50.9%
Median age (years)	29.5	40.1
High school graduates, age 25+ (%)	89.1%	79.9%
College degree, age 25+ (%)	41.7%	22.3%
Homeownership rate (%)	57.0%	70.1%
Median household income	$48,739	$47,804
Median value of owner-occupied housing units (dollars)	$110,900	$105,500
Population below poverty (%)	17.0%	12.1%
Population receiving food stamps[c] (%)	10%	11.5%
Unemployment rate, 2000[d] (%)	3.0%	3.8%
Unemployment rate, 2008 (%)	7.3%[e]	11.8%[d]

Data Source: US Census Bureau Leon County QuickFacts. 2008 estimate. Accessed 27 October 2009.Internet: http://quickfacts.census.gov/qfd/states/12/12073.html
Florida Legislature Office of Economic and Demographic Research. Leon County, Florida. Internet: http://edr.state.fl.us/county
[a] Economic Development Intelligence System. Leon County (FL) 2009. Accessed 20 January 2010. Internet: https://edis.commerce.state.nc.us/EDIS/page1.html
[b] USDA-ERS. State Fact Sheets: Florida. Accessed 20 January 2010. Internet: http://www.ers.usda.gov/Statefacts/FL.htm.
[c] New York Times. Living on Nothing But Food Stamps. 2 January 2010. Internet: http://www.nytimes.com/interactive/2009/11/28/us/20091128-foodstamps.html
[d] US Bureau of Labor Statistics. Local unemployment statistics, 2009. Internet: http://www.bls.gov/lau/home.html
[e] US Bureau of Labor Statistics. Labor force data by county, not seasonally adjusted for Nov 2008-Dec 2009. http://www.bls.gov/lau/laucntycur14.txt

Table 3.2. Sociodemographic, housing, and economic characteristics of neighborhoods in Leon County, FL

Mean ± SD	Total (n=48)	Racial composition		
		Predominantly White (n=11)	Mixed (n=31)	Predominantly Black (n=6)
Land area (km^2)	1533.8±3801.9	1588.5±2443.2	1795.8±4490.0	80.1±33.4
Total Population	4988.6±2512.9	6225.7±2340.1	5097.7±2410.3	2156.8±698.9
Population density (people/ km^2)	21.9±20.4	18.6±29.9	21.8±18.0	28.9±10.6
Urban (people/ km^2)	21.8±20.6	18.3±30.1	21.7±18.2	28.9±10.6
Rural (people/ km^2)	0.18±0.33	0.36±0.47	0.14±0.27	0
White persons (%)	58.9±26.7	85.1±3.1	59.9±16.9	5.4±5.0
Black persons (%)	34.5±27.8	8.4±3.0	32.5±16.7	92.4±6.5
Female (%)	52.8±3.4	53.2±3.4	52.4±2.7	54.1±6.2
High School or College Graduate (%)	87.1±9.7	95.3±2.9	86.8±9.7	77.3±8.5
Owner Occupied Households	1146.1±870.1	1803.3±958.4	1078.2±751.8	291.3±175.2
Median household income ($)	37464.3±20725.7	59294.7±24366.2	33075.2±14543.3	20119.0±7239.9
Households with public assistance (%)	44.8±43.3	18.7±16.9	51.2±45.9	60.0±49.0
Population below poverty (%)	20.4±17.9	9.9±17.1	20.8±16.8	37.5±12.8
Unemployed >16 yrs (%)	7.6±11.4	5.8±12.6	6.4±10.1	16.6±13.2

Table 3.2. Sociodemographic, housing, and economic characteristics of neighborhoods in Leon County, FL

Mean ± SD	Total (n=48)	Income		Rurality	
		High Income (n=24)	Low Income (n=24)	Urban (n=38)	Rural (n=10)
Land area (km^2)	1533.8±3801.9	2866.9±5078.0	200.8±199.3	273.0±268.8	6324.9±6555.1
Total Population	4988.6±2512.9	5863.8±2495.4	4113.3±2253.6	4647.2±2297.9	6285.9±2984.6
Population density (people/ km^2)	21.9±20.4	12.0±11.4	31.9±22.8	27.2±19.9	2.1±1.7
Urban (people/ km^2)	21.8±20.6	11.7±11.6	31.9±22.8	27.1±19.9	1.4±1.5
Rural (people/ km^2)	0.18±0.33	0.33±0.40	0.02±0.09	0.04±0.15	0.69±0.29
White persons (%)	58.9±26.7	75.4±9.9	42.4±28.2	54.3±28.1	76.3±8.1
Black persons (%)	34.5±27.8	17.8±9.3	51.1±30.3	38.8±18.2±8.5	18.2±8.5
Female (%)	52.8±3.4	52.7±4.5	52.9±1.9	53.2±3.7	51.3±0.8
High School or College Graduate (%)	87.1±9.7	92.1±5.8	83.1±11.1	87.7±10.3	87.1±8.5
Owner Occupied Households	1146.1±870.1	1695.7±873.1	596.5±392.8	932.2±717.4	1959.1±954.1
Median household income ($)	37464.3±20725.7	51742.2±18981.9	23186.4±9593.1	32951±18302.4	54612.8±21292.2
Households with public assistance (%)	44.8±43.3	35.7±43.6	54.0±41.9	40.8±37.9	60.1±59.7
Population below poverty (%)	20.4±17.9	6.6±4.2	34.1±15.7	23.6±18.6	8.1±7.4
Unemployed >16 yrs (%)	7.6±11.4	4.9±11.5	10.2±10.8	8.8±12.5	2.8±1.5

Table 3.3. Number and percent of census tracts by income and rurality in each racial group

n and percent of census tracts	Predominantly White (n=11)	Mixed (n=31)	Predominantly Black (n=6)
High income	9 (81.8%)	15 (48.4%)	0*
Low income	2 (18.1%)	16 (51.6%)	6 (100%)
Urban	7 (63.6%)	25 (80.6%)	6 (100%)
Rural	4 (36.4%)	6 (19.4%)	0*

*Indicates no neighborhoods of this type available

Table 3.4. Total food stores and food stamp accepting stores in Leon County, Florida

	All stores (n and % of total stores)	Food stamp accepting stores (n and % of total food stamp accepting stores)	% of food stamp accepting stores by store type
All stores	288	130	45.1%
Supermarkets	20 (6.9%)	19 (14.6%)	92.0%
Grocery	40 (13.9%)	16 (12.3%)	40.0%
Convenience stores	75 (26.0%)	9 (22.3%)	38.7%
Other stores	153 (53.1%)	66 (50.8%)	43.1%

Table 3.5. Number of total food stores by neighborhood characteristics

n = 288	Predominantly White (n=11)	Mixed (n=31)	Predominantly Black (n=6)
High income	36 (12.5%)	99 (34.4%)	0*
Low income	12 (4.2%)	107 (37.1%)	34 (11.8%)
Urban	31 (10.8%)	159 (55.2%)	34 (11.8%)
Rural	17 (5.9%)	47 (16.3%)	0*
Total	48	206	34

*Indicates no stores are available in this neighborhood

Table 3.6. Number of food stamp accepting stores by income and rurality in each racial group

n = 130	Predominantly White (n=11)	Mixed (n=31)	Predominantly Black (n=6)
High income	11 (8.5%)	43 (33.1%)	0*
Low income	3 (2.3%)	54 (41.5%)	19 (14.6%)
Urban	9 (6.9%)	72 (55.4%)	19 (14.6%)
Rural	5 (3.8%)	25 (19.2%)	0*
Total	14	97	19

* Indicates no stores are available in this neighborhood

Table 3.7. Total number of food stores and food stamp accepting stores by neighborhood characteristics in Leon County, FL

Store type (n of food stamp accepting stores/n of total stores)	All tracts (n=48)	Racial Composition			Income		Rurality	
		Predominantly White (n=11)	Mixed (n=31)	Predominantly Black (n=6)	High (n=24)	Low (n=24)	Urban (n=38)	Rural (n=10)
Supermarkets	19/20	3/3	16/17	0/0	15/16	4/4	9/9	10/11
Grocery stores	16/40	1/7	9/25	6/8	13/30	3/10	3/15	13/25
Convenience stores	29/75	3/14	24/51	2/10	19/54	10/21	12/36	17/39
Other stores	66/153	7/24	48/113	11/16	30/75	36/78	53/124	13/29
All stores	130/288	14/48	97/206	19/34	101/175	53/113	77/184	53/104

Table 3.8. Median and range of food stamp accepting stores in Leon County, FL

Proportion of Store type (% of food stamp accepting stores)	All census tracts (n=48)	Racial Composition			Income		Rurality	
		White (n=11)	Mixed (n=31)	Black (n=6)	High (n=24)	Low (n=24)	Urban (n=38)	Rural (n=10)
Supermarkets	0 (0, 100)	0 (0, 100)	0 (0, 100)	0 (0,0)	0 (0, 100)	0 (0, 100)	0 (0, 100)	0 (0, 100)
Grocery stores [a,b]	0 (0, 100)	0 (0, 100)	0 (0, 100)	100 (0, 100)	0 (0, 100)	0 (0, 100)	0 (0, 100)	0 (0, 100)
Convenience stores	0 (0, 100)	0 (0, 100)	0 (0, 100)	0 (0, 100)	0 (0, 100)	0 (0, 100)	0 (0, 100)	35 (0, 100)
Other stores	50 (0, 100)	20 (0, 100)	50 (0, 100)	75 (33.3, 100)	34.3 (0, 100)	50 (0, 100)	50 (0, 100)	47.8 (0, 100)
All stores	50 (0, 100)	25 (0,100)	63.4 (0, 100)	45 (0, 100)	33.3 (0, 100)	50 (0, 100)	50 (0, 100)	46.7 (0, 100)

[a] Significant difference in the proportion of food stamp accepting stores by neighborhood racial composition based on Kruskal-Wallis test ($p<.05$)

[b] Significant difference in the proportion of food stamp accepting stores by neighborhood income based on Wilcoxon-Mann-Whitney test ($p<.05$)

Table 3.9. Total number of census tracts without any food stores or food stamp accepting stores in Leon County, FL

	All tracts (n = 48)	Racial Composition		
		White (n=11)	Mixed (n=31)	Black (n=6)
Neighborhoods without:				
Supermarket	34 (79.1%)	8 (72.7%)	20 (64.5%)	6 (100%)
Grocery Store	22 (45.8%)	5 (45.4%)	16 (51.6%)	1 (16.7%)
Convenience Store	12 (25.0%)	2 (18.2%)	9 (29.0%)	1 (16.7%)
Other Stores	6 (12.5%)	2 (18.2%)	4 (12.9%)	0
Any store	4 (8.3%)	1 (9.1%)	3 (9.7%)	0
Neighborhoods without food stamp accepting stores:				
Supermarket	34 (79.1%)	8 (72.7%)	20 (64.5%)	6 (100%)
Grocery Store	35 (72.9%)	10 (90.9%)	23 (74.2%)	2 (33.3%)
Convenience store	29 (60.4%)	8 (72.7%)	16 (51.6%)	5 (83.3%)
Other Stores	15 (31.2%)	5 (45.4%)	10 (32.2%)	0
Any store	18 (37.5%)	6 (54.5%)	11 (35.5%)	1 (16.7%)

Table 3.9. Total number of census tracts without any food stores or food stamp accepting stores in Leon County, FL

	All census tracts (n = 48)	Income		Rurality	
		High (n=24)	Low (n=24)	Urban (n=38)	Rural (n=10)
Neighborhoods without:					
Supermarket	34 (79.1%)	16 (66.7%)	18 (75.0%)	28 (73.7%)	6 (60.0%)
Grocery Store	22 (45.8%)	14 (58.3%)	8 (33.3%)	18 (47.4%)	4 (40.0%)
Convenience Store	12 (25.0%)	7 (28.2%)	5 (20.8%)	10 (26.3%)	2 (20.0%)
Other Stores	6 (12.5%)	4 (16.7%)	2 (8.3%)	4 (10.5%)	2 (20.0%)
Any store	4 (8.3%)	2 (8.3%)	2 (8.3%)	3 (7.9%)	1 (10%)
Neighborhoods without food stamp accepting stores:					
Supermarket	34 (79.1%)	16 (66.7%)	18 (18.0%)	28 (73.7%)	6 (60.0%)
Grocery Store	35 (72.9%)	21 (87.5%)	14 (58.3%)	28 (73.7%)	7 (70.0%)
Convenience store	29 (60.4%)	16 (66.7%)	13 (54.2%)	25 (65.8%)	4 (40.0%)
Other Stores	15 (31.2%)	11 (45.8%)	4 (16.7%)	11 (28.9%)	4 (40.0%)
Any store	18 (37.5%)	12 (50%)	6 (25%)	15 (39.5%)	3 (30%)

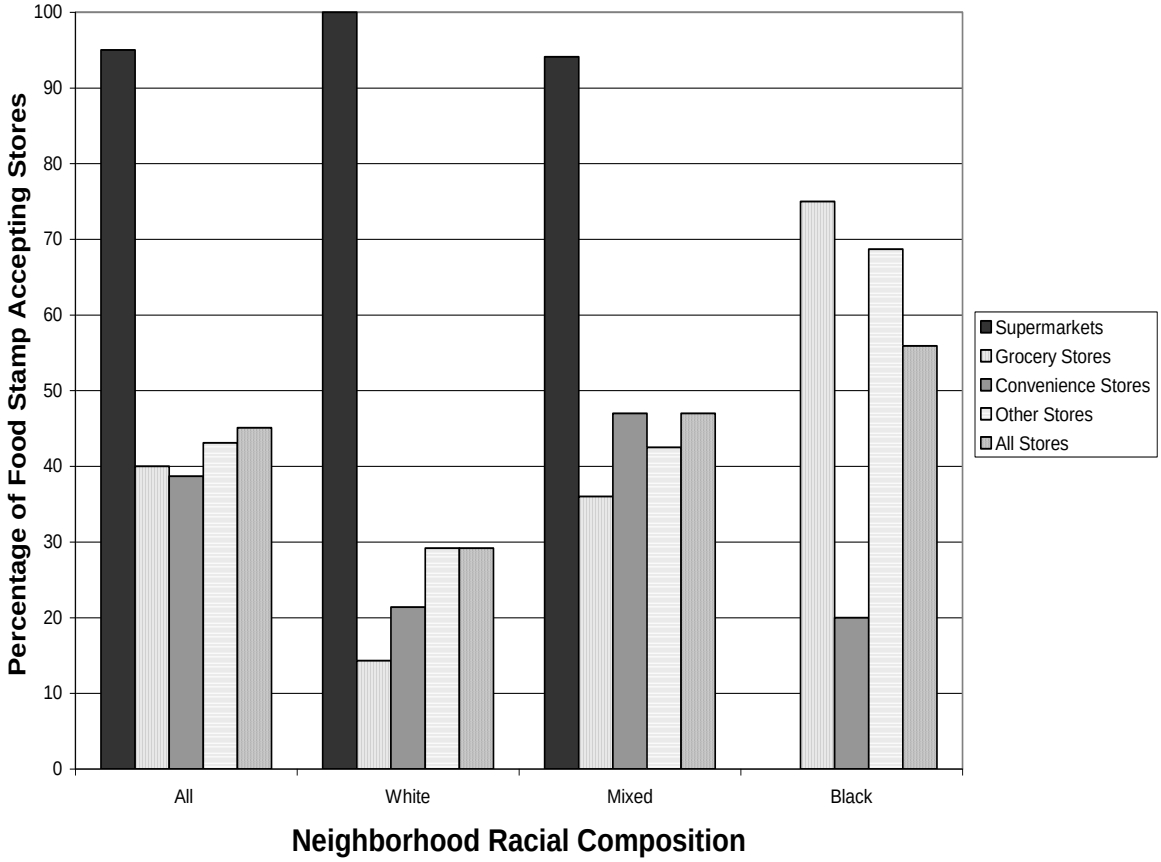

Figure 3.1. Percentage of Food Stamp Accepting Stores by Neighborhood Racial Composition in Leon County, FL

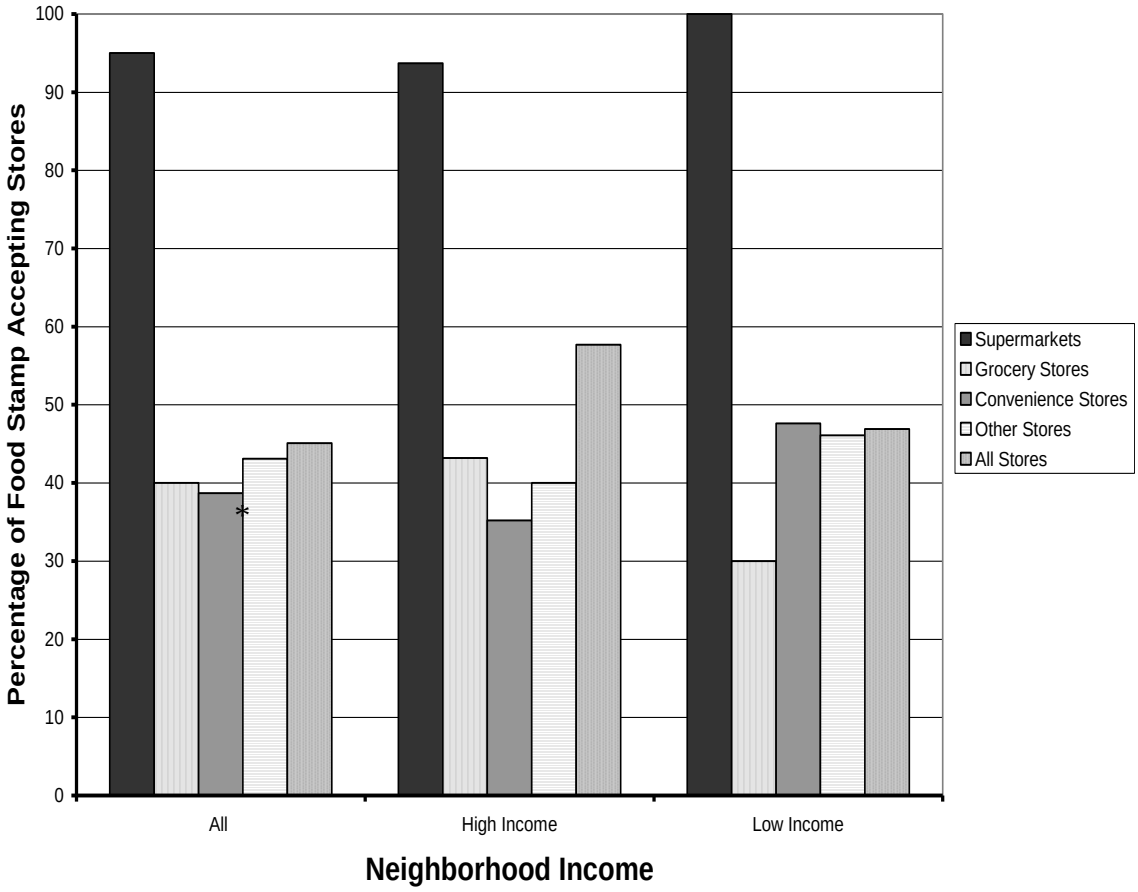

Figure 3.2. Percentage of Food Stamp Accepting Stores by Neighborhood Income in Leon County, FL

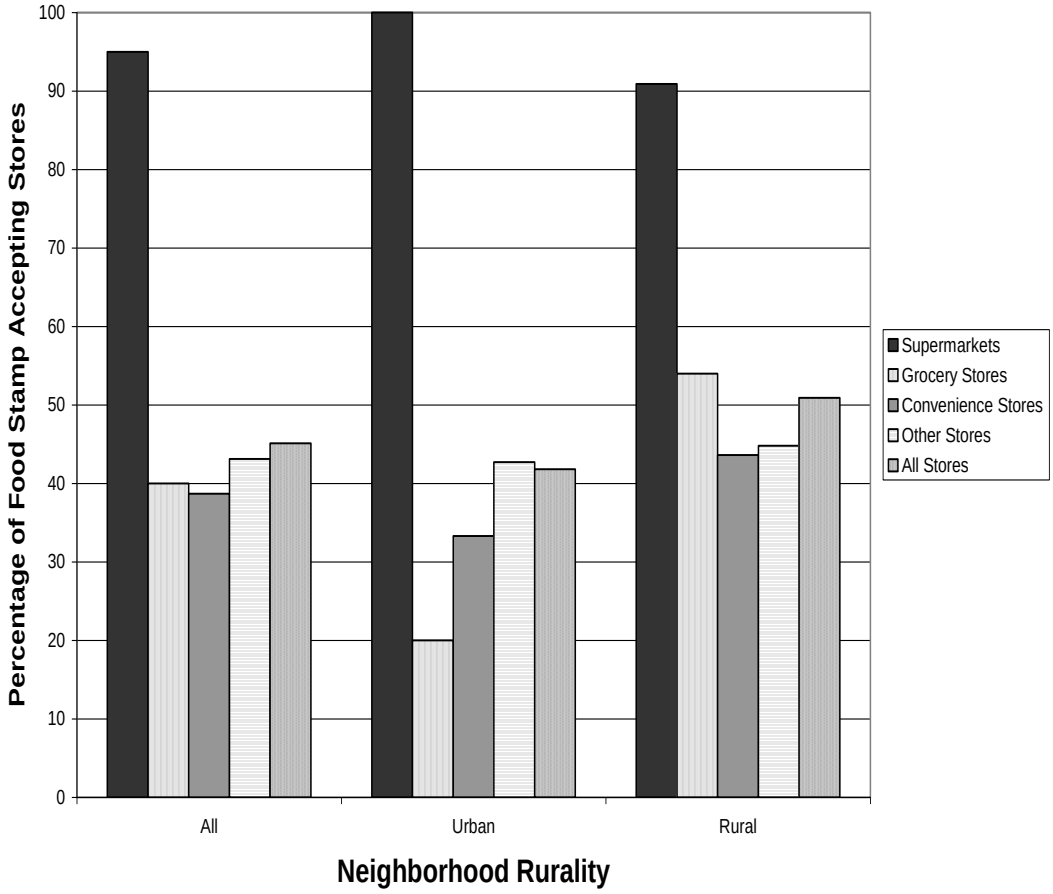

Figure 3.3. Percentage of Food Stamp Accepting Stores by Neighborhood Rurality in Leon County, FL

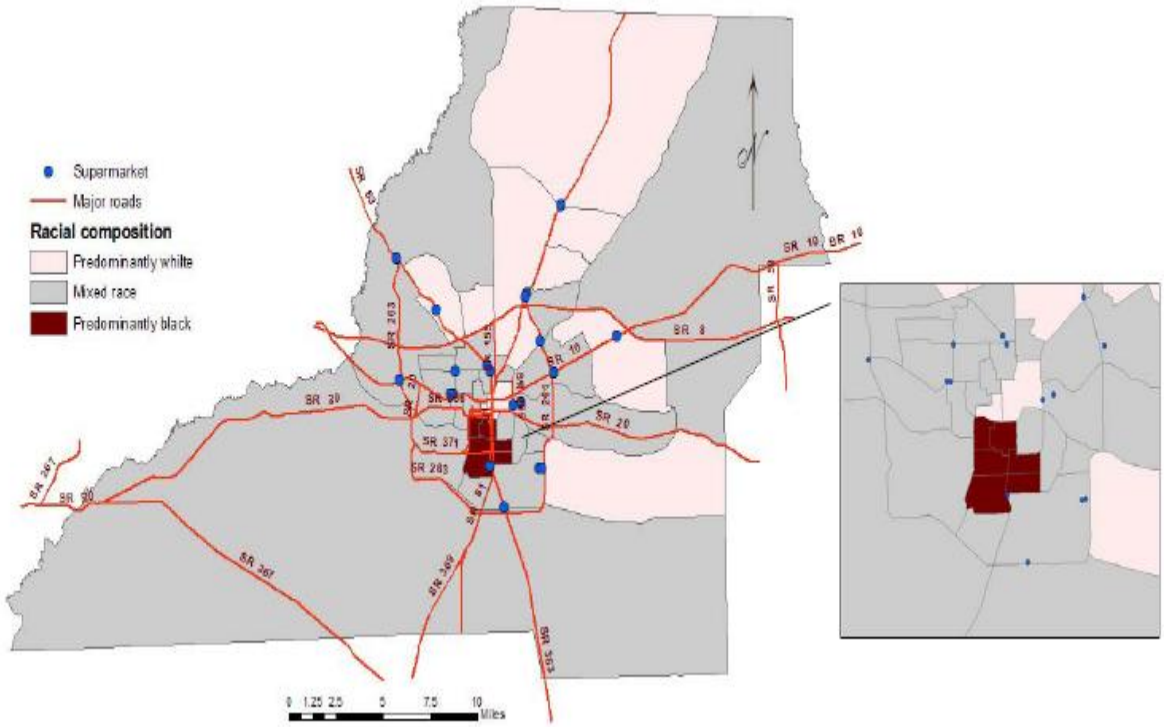

Figure 3.4. Availability of supermarkets by neighborhood racial composition in Leon county, FL

CHAPTER 4

Conclusion

In accordance with our hypotheses, significant differences were found in the proportion of food stamp accepting grocery stores available by neighborhood racial composition and income. In Leon County, 45.1% of all stores studied accepted food stamps. Neighborhoods that were primarily black, rural, or high income had the greater proportion of food stamp accepting stores compared to other racial categories, urban, or low income neighborhoods. Although statistically insignificant, disparities were also noted in food stamp store distribution of the other store types, particularly supermarkets.

The primarily black neighborhoods had no supermarkets available. This is consistent with previous research that showed black neighborhoods have less access to supermarkets than white neighborhoods and that the supermarkets are farther in distance (Glanz et al., 2005; Liese et al., 2007; Moore et al., 2006; Zenk et al., 2005). As supermarkets are the store types that are most likely to accept food stamps, participants in primarily black neighborhoods may experience reduced ability to fully redeem their benefits. While there are other stores available, the smaller stores tend to not have as great of variety than supermarkets, and may have higher prices (Bustillos et al., 2009; Chung & Myers, 1999; Sharkey & Horel, 2008).

With respect to neighborhood income, it was found that in low income neighborhoods, 46.9% of all stores accepted food stamps, versus 57.5% of stores in high income neighborhoods. In the low-income neighborhoods, 100% of the supermarkets accepted food stamps, but there were far fewer (n = 4) supermarkets present than in the

high income neighborhoods (n = 16). The food stamp program was designed to financially assist people who cannot afford to purchase the food they need, and so residents in the low-income neighborhoods are more likely to rely on food stamps. Fewer food stamp accepting stores in the low-income neighborhoods may mean that residents cannot fully utilize their benefits.

Although not statistically significant, it was found in Leon County that urban neighborhoods had more stores available and a lower proportion of food stamp accepting stores available when compared to their rural counterparts. As a result, residents in those urban neighborhoods may experience more difficulty redeeming their food assistance benefits.

In conclusion, this study demonstrates that a disparity in proportion of food stamp accepting stores does exist across different neighborhood racial composition, income and income. Such disparity may affect the ability of food stamp participants to redeem food stamp benefits. Results from this study have implications with regards to public policy concerning food assistance programs. This study was conducted at a time of economic crisis in the United States. Job loss rates are continuing to increase, and more Americans will turn to the food stamp program to aid them through this time. These benefits may not be fully utilized, however, if the stores that accept food stamps are not available. Identification of neighborhoods that are more likely to have limited availability of food stamp accepting stores is important, as these residents are less likely to redeem their stamps and therefore not consume an adequate diet. By identifying where these neighborhoods exist, food assistance programs could be implemented to improve the food environment for nutritionally vulnerable populations. Identifying barriers to food stamp

redemption is vital in helping participants use their benefits, ensuring a better quality diet for themselves and their families.

APPENDICES

Appendix A

North America Industry Classification System (NAICS) codes and examples of food stores and food service places

Industry group 1997 NAICS definitions

445110 Supermarkets and Other Grocery Stores
- 446110 Pharmacies and Drug Stores
- 447190 Other Gasoline Stations
- 445120 Convenience Stores
- 452111 Department Stores, except discount
- 452112 Discount Department Stores
- 452990 All other general merchandise stores

(Morland et al., 2002)

Appendix B

Food store classifications

Store Type	Definition
Supermarkets	A retail food store stocking a wide variety of foods and engaged in retail food processing which contains five or more check-out registers or 15,000 or greater total square footage, including display, preparation and storage areas.
Grocery stores	A retail food store stocking a wide variety of foods and engaged in retail food processing which contains four or fewer check-out registers and less than 15,000 total square footage, including display, preparation and storage areas.
Convenience stores	A business that is engaged primarily in the retail sale of groceries or motor fuels or special fuels and may offer food services limited to coffee from urns, or iced or frozen drinks, and no retail food processing.
Other stores	Other stores that sell food, but not necessarily as the main item

Source: Florida Department of Agriculture and Consumer Services Food Administrative Code

Appendix C

2000 Census sociodemographic, housing, and economic characteristics of neighborhoods in Leon County, FL

Census track number	Land area (km2)	Total population	Population density	% of urban population	% of rural population	% of nonhispanic White	% of nonhispanic Black
000200	181.84	3669	20.18	100.00	0.00	84.33	8.23
000301	110.08	1511	13.73	100.00	0.00	64.79	29.32
000302	140.58	2414	17.17	100.00	0.00	73.86	20.51
000303	86.80	3417	39.37	100.00	0.00	43.87	50.10
000400	71.59	3020	42.18	100.00	0.00	3.58	92.78
000500	43.49	4625	106.34	100.00	0.00	83.91	6.53
000600	55.85	2764	49.49	100.00	0.00	17.66	73.52
000700	83.27	1855	22.28	100.00	0.00	68.09	25.93
000800	88.25	3050	34.56	100.00	0.00	75.84	14.69
000901	336.45	6849	20.36	100.00	0.00	71.06	19.55
000902	315.02	8442	26.80	100.00	0.00	59.52	30.48
001001	63.68	2341	36.76	100.00	0.00	14.48	80.73
001002	62.30	1735	27.85	100.00	0.00	7.90	89.74
001101	81.67	2704	33.11	100.00	0.00	2.92	95.97
001102	145.83	2070	14.19	100.00	0.00	1.88	97.78
001200	55.78	1071	19.20	100.00	0.00	1.59	97.39
001300	57.06	2550	44.69	100.00	0.00	75.80	15.18
001400	113.34	6870	60.61	100.00	0.00	36.27	55.76
001500	142.68	4041	28.32	100.00	0.00	71.91	22.47
001601	193.43	4040	20.89	100.00	0.00	63.02	28.42
001602	334.79	3046	9.10	100.00	0.00	88.94	5.22
001700	468.48	7104	15.16	100.00	0.00	86.47	7.00
001801	173.56	3710	21.38	100.00	0.00	18.33	75.63
001802	657.89	3399	5.17	98.62	1.38	44.16	52.49
001900	738.40	7070	9.57	100.00	0.00	27.03	61.71
002001	102.38	7392	72.20	100.00	0.00	61.89	26.08
002002	341.40	7912	23.18	100.00	0.00	42.97	49.12
002101	125.79	3847	30.58	100.00	0.00	68.94	22.12

Census track number	% of female	% of high school or college graduates	Owner occupied households	Median household income	% of households with public assistance	% of population under poverty	% of unemployed population >16yrs
000200	54.76	94.53	34.19	29919.00	2.09	16.41	4.38
000301	50.36	100.00	53.18	41550.00	0.00	21.44	4.26
000302	56.01	95.70	83.43	45324.00	1.15	8.03	2.35
000303	50.60	94.97	15.43	24095.00	0.97	31.50	6.57
000400	51.59	78.63	23.39	16875.00	2.41	37.26	36.13
000500	62.70	98.54	4.20	8313.00	0.00	59.67	43.81
000600	49.06	68.78	27.96	10976.00	6.86	51.75	14.75
000700	50.40	79.50	29.87	24470.00	4.42	22.12	6.20
000800	53.34	96.16	43.67	39036.00	1.72	11.03	1.56
000901	55.44	91.28	51.12	44765.00	0.59	11.87	2.51
000902	53.02	95.02	34.33	34123.00	1.43	15.95	2.71
001001	57.80	75.97	21.03	15268.00	17.18	52.17	9.82
001002	51.24	91.00	63.29	26818.00	5.89	28.42	9.25
001101	64.57	64.81	36.65	17022.00	10.62	42.87	30.62
001102	52.42	79.31	77.86	31406.00	4.87	17.34	5.09
001200	46.97	73.96	36.20	13325.00	9.35	46.82	8.71
001300	51.80	100.00		0.00		0.00	58.69
001400	54.66	67.21	19.39	13529.00	2.74	58.03	7.40
001500	49.94	94.34	55.32	42240.00	1.58	16.51	2.40
001601	53.99	88.55	35.74	33658.00	2.80	15.25	4.00
001602	53.22	96.70	93.92	71121.00	0.00	2.80	1.60
001700	53.49	97.61	72.14	67593.00	0.00	4.26	1.06
001801	53.42	68.14	73.31	27679.00	8.64	21.85	3.37
001802	54.40	73.64	52.36	25944.00	2.61	18.18	8.11
001900	50.48	79.93	36.59	18105.00	5.33	35.27	5.61
002001	45.85	89.73	11.26	10780.00	1.52	63.40	10.38
002002	45.35	78.51	9.18	16588.00	1.38	48.66	4.29
002101	54.59	96.59	61.02	35591.00	1.17	18.90	3.26

Census track number	Land area (km^2)	Total population	Population density	% of urban population	% of rural population	% of nonhispanic White	% of nonhispanic Black
002102	194.07	7557	38.94	100.00	0.00	59.23	31.04
002201	248.22	5220	21.03	100.00	0.00	57.85	33.95
002203	536.97	7594	14.14	97.46	2.54	66.64	26.39
002204	669.90	7172	10.71	100.00	0.00	80.93	12.26
002302	4083.28	3409	0.83	17.98	82.02	70.61	22.21
002303	879.21	3504	3.99	75.49	24.51	67.98	28.17
002304	623.98	2478	3.97	88.10	11.90	75.42	18.24
002403	195.44	2753	14.09	100.00	0.00	61.50	30.62
002405	8466.02	10090	1.19	80.59	19.41	88.28	7.88
002407	1650.71	7228	4.38	74.24	25.76	86.47	7.68
002408	628.88	7387	11.75	92.88	7.12	87.53	7.82
002409	400.59	8573	21.40	100.00	0.00	87.64	4.82
002410	245.44	5583	22.75	100.00	0.00	79.60	11.59
002502	12561.44	9654	0.77	13.28	86.72	68.95	25.21
002504	1352.15	7517	5.56	94.11	5.89	52.79	35.24
002505	530.76	4719	8.89	100.00	0.00	69.76	24.75
002506	1618.80	6664	4.12	76.59	23.41	81.44	10.11
002601	3010.40	2925	0.97	9.47	90.53	80.44	15.11
002602	9506.06	7425	0.78	14.49	85.51	64.36	31.78
002700	20849.40	9482	0.45	29.48	70.52	79.01	15.69

Census track number	% of female	% of high school or college graduates	Owner occupied households	Median household income	% of households with public assistance	% of population under poverty	% of unemployed population >16yrs
002102	52.86	90.45	25.90	17660.00	0.44	45.44	7.89
002201	54.35	86.96	48.62	27712.00	1.87	24.26	5.07
002203	54.06	94.24	76.77	50302.00	0.60	5.33	2.87
002204	51.95	91.54	59.19	43224.00	1.00	11.39	3.56
002302	51.66	89.57	89.72	46902.00	2.32	8.74	2.18
002303	50.86	90.09	77.61	44241.00	1.17	4.53	3.95
002304	52.18	73.32	61.61	26486.00	6.70	25.47	5.77
002403	54.41	93.52	72.58	51302.00	0.00	8.83	7.90
002405	50.42	95.11	89.45	70551.00	0.85	3.54	1.62
002407	49.90	97.31	94.53	96311.00	0.50	0.83	1.48
002408	52.47	95.48	92.18	66659.00	1.10	4.36	1.40
002409	53.13	97.21	85.59	70840.00	1.14	1.70	1.60
002410	52.27	96.45	59.00	55013.00	1.11	4.88	1.53
002502	50.89	87.03	90.54	60280.00	4.26	8.74	2.28
002504	56.86	89.80	73.15	40203.00	1.61	5.76	2.51
002505	56.66	89.00	53.21	43131.00	1.42	7.92	1.86
002506	51.94	95.56	95.23	75730.00	0.00	1.41	1.42
002601	51.59	88.38	88.24	51981.00	1.94	3.58	1.83
002602	50.98	74.94	84.38	39207.00	5.71	10.56	4.35
002700	52.45	79.77	75.52	34439.00	3.12	13.54	3.46

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