

A COMMUNITY BASED MIXED METHODS EXPLORATION OF FOOD ACCESS AND
PERCEPTIONS OF FOOD ACCESS IN FLINT, MICHIGAN

By

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ABSTRACT

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The purpose of this community based mixed methods study was: 1) to assess the availability, price and quality of foods within food stores in the city of Flint and the immediate 2 mile suburban area; 2) to explore the perceptions of food access by African American women from two complementary age groups who lived in Flint. As a post-industrial city, Flint, Michigan has experienced disinvestment in businesses that has partially led to the removal of large grocery stores from the city and surrounding suburban area. While engaged with a community collaborative, data were collected during a food store assessment from 273 total food stores and focus groups were conducted with two age groups of African American women. The groups of women were between the ages of 21 and 50 with children up to 18 years old, and women who were 60 years old and older. Results from the food store assessment showed that smaller food stores had significantly lower mean food availability, food price and food quality compared to larger food stores; and that suburban food stores had significantly higher mean food availability and food quality, but lower food prices compared to stores within Flint. Results also showed that as food availability and food quality declined and prices increased, the percentage of Blacks significantly increased; that as food availability and food quality increased and food price declined, the median household income significantly increased, though negligibly. Undergirded by the three most prominent dimensions of Womanist theory, 1) lived experience as criteria of meaning, 2) the use of dialogue in assessing knowledge claims and 3) the ethics of personal accountability, the focus groups showed that the women encountered multiple direct

and indirect facilitators and barriers within the food environment and demonstrated variety of strengths despite adversities.

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To my parents, Dr. Carolyn S. Mayfield and Spencer Mayfield, Jr., of Surprising Suffolk, Virginia—the place that made me, me. To my sisters, Dr. Kerrita K. Mayfield and Karrin A. Jones: I am gamma to your alpha and beta. To Nana, Earline Allen, who in her last years of life ended every conversation by letting me know how proud she was of me. It took a village of loving family, extended family and friends to raise a passionate, hardworking, and conscientious community based researcher. Consider me grateful.

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CHAPTER 1

INTRODUCTION

1.1 Background

Inequitable access to affordable, healthy foods, whether real or perceived, contributes to food insecurity, and postindustrial cities like Flint, Michigan have been especially hard hit (Scorsone & Bateson, 2011). Characteristics of food access include availability, price, and quality — all dimensions of food access as conceptualized by (Penchansky & Thomas, 1981) and these in turn affect food consumption. If inner-cities like Flint offer few healthy foods like fruits and vegetables this differential access can contribute to differences in prevalence of chronic diseases such as diabetes (Ford & Mokdad, 2001), heart disease (Hung et al., 2004) and hypertension (Appel et al., 1997).

The food environment plays an integral role in the kind of foods consumed, for some groups more than others, (Lovasi, Hutson, Guerra, & Neckerman, 2009) and can have wide ranging effects (Glanz, Sallis, Saelens & Frank, 2005). For example, one nationwide study found lower income urban residents had access to significantly fewer chain supermarkets, but more corner stores compared to middle income residents (Powell, Slater, Mirtcheva, Bao, & Chaloupka, 2007). A review of neighborhood environment studies in the United States reported that race, level of urbanicity and income all contributed to access to healthy food (Larson, Story, & Nelson, 2009).

A recent report on food insecurity found certain groups were most likely to have limited food availability (Coleman-Jensen, Nord, Andrews, & Carlson, 2012). Some such groups were households with children, those headed by a single woman or man, and low-income and African

American¹ and Hispanic households (Coleman-Jensen et al., 2012). In addition to food insecurity as a risk, non-Hispanic African Americans, and Hispanic women have the highest rates of obesity (Flegal, Carroll, Kit, & Ogden, 2012). Furthermore, for women, diabetes is the fourth leading cause of death for African Americans, while only the seventh for Whites (Hoyert & Xu, 2012).

One important aspect of health and food access, often overlooked, is neighborhood crime and safety. This relationship is especially pertinent to a city like Flint, where disinvestment has led to the retreat of businesses, including larger supermarkets and grocery stores leaving a high proportion of small corner and convenience stores within the inner city limits (Scorsone & Bateson, 2011). When urban crime is added to such an environment, some groups—such as women with young children and seniors with limited mobility, for example—can view the use of public transportation or walking to grocery stores as dangerous (Coveney & O’Dwyer, 2009; Zenk et al., 2011). Even advertising in these areas is more likely to feature cigarettes and or fast foods than it is to feature healthy products (Grier & Kumanyika, 2008; Seidenberg, Caughey, Rees, & Connolly, 2010).

1.2 Problem statement

Therefore, overall objectives of this research were to describe food access in the city of Flint, Michigan and to elucidate the perceptions of African American women about their local food store environment. Over 50% of the city of Flint is African American. I measured the location and content of urban food store venues, and conducted focus groups with African

¹ For consistency, African American is used in places where the data or information is described as Black. The only exception is when Black is used in the titles of journal articles, book titles and in Black Feminist Theory.

American women, some with limited resources, at two different and important life stages about their perceptions of food access: ages 21 to 50 with children in the under 18 years old and 60 years and older.

Elucidation of the food environment was undergirded by the socio-ecological framework of the nutrition environment (Bronfenbrenner, 1977; Story, Kaphingst, Robinson-O'Brien, & Glanz, 2008), which was rename the Ecological model by Story and others. The exploration of African American women's experiences in their local food environment was supported by this theory as well as that of Womanism (Collins, 1986). Because women are still the predominant gatekeepers of food for households (Wansink, 2006), their perceptions about food access are important. Two age groups that are most likely to be vulnerable to food insecurity—are women with children and those over age of 60 years. These groups of women were recruited for the qualitative work in Specific Aim 2 (Coleman-Jensen, 2012), because women with young children are very concerned about neighborhood safety (Johnson et al., 2009). Furthermore, older adults can perceive themselves to be easy targets and not feel safe to be physically active in their own neighborhoods (Gallagher et al., 2010).

1.3 Specific aims and hypotheses

1.3.1 Specific aim 1

To conduct a community food assessment in the city of Flint, MI and a 2-mile buffer region beginning at the city limits (i.e., Suburban area) to assess and compare the variety and accessibility of Flint and Suburban food stores to consumers, as well as the availability, price and quality of selected foods within those stores.

1.3.1.1 Research question 1.1

Are there differences in: 1) the mean food availability and food price scores of dairy foods, protein-rich foods, beverages, fruit, vegetables and grains in smaller food stores compared to larger grocery stores within Flint and Suburban area; and 2) the mean food quality score of fresh fruit and vegetables in smaller food stores compared to larger grocery stores within Flint and Suburban area?

H1.1a: The mean food availability and food price scores of dairy foods, protein-rich foods, beverages, fruit, vegetables and grains will be lower at smaller food stores compared to larger grocery stores within the city and within the Suburban area.

H1.1b: The mean food quality scores of fresh fruit and vegetables will be lower at smaller food stores compared to larger food stores within the city and within the Suburban area.

1.3.1.2 Research question 1.2

Are there differences in: 3) the mean food availability, food price, and food quality scores between Flint and Suburban food stores?

H1.2a: Suburban food stores will have higher mean food availability and food price scores of dairy foods, protein-rich foods, beverages, fruit, vegetables and grains compared to stores within Flint.

H1.2b: The mean food quality scores of fresh fruit and vegetables will be lower at stores within Flint compared to Suburban food stores.

1.3.1.3 Research question 1.3

Controlling for store size and location, what are the associations among food availability, food price and food quality of dairy foods, protein-rich foods, beverages, fruit, vegetables, and

grains and: 1) race within census tracts; and 2) median household income of residents within census tracts?

H1.3.a: Food availability and food price scores of dairy foods, protein-rich foods, beverages, fruit, vegetables and grains decrease² as percent Black in census tracts increases.

H1.3.b: The food quality scores of fresh fruit and vegetables decrease as percent Black census tracts increases.

H1.3.c: Food availability and food price scores of dairy foods, protein-rich foods, beverages, fruit, vegetables and grains increase as median household income in census tracts increases.

H1.3.d: The food quality scores of fresh fruit and vegetables increase as median household income in census tracts increases.

1.3.2 Specific aim 2

For African American women with limited resources, to describe the perceptions of food access for: 1) women ages 21-50 years with children under 18, and 2) senior women, ages 60 years and older.

1.3.2.1 Research question 2

For African American women, what are the perceptions about the ease of acquiring healthy food for 1) women 21-50 years of age with children under 18, and 2) women, ages 60 and older?

H2: Within the city of Flint, Michigan, African American women with limited resources between the ages of 21-50 years with children under 18 years old and women, 60 years and older, will perceive the absence of large grocery stores, poor availability of healthy foods and limited income as barriers to accessing healthy food within the city. Conversely, receiving food

² Having a lower score is worse for food availability, food price and food quality.

from food pantries, friends and family will be perceived as facilitators to accessing food within the city.

CHAPTER 2

LITERATURE REVIEW

Each topic in this literature review relates to those presented in the Introduction or to the Methods section. This literature review begins with some background on the city of Flint and of its community activities relating to food access of nutrient-dense foods. Next, are brief descriptions of why nutrient-dense foods are important to health and current trends in food consumption. Then, the review moves to a discussion of the food environment and its measurement—the most intensive section—before touching on statistical methods employed in those studies and people’s perceptions of the food environment. The last section outlines the two theoretical approaches that support the research design and methods.

2.1 Flint, Michigan’s deindustrialization and a response: *edible flint*³

This study will be conducted in Flint, Michigan—a mid-sized Midwestern city that has experienced deindustrialization and economic depression, resulting in major jobs loss (Smith, 2011). Once primarily reliant on one automotive industry—General Motors, Flint lost 53,000 manufacturing jobs between 1980 and 2005 (Jacobs, 2009). With the reduction in manufacturing jobs many supporting businesses and residents left as well. These departures reduced not only the quantity and quality of remaining services available, but also left neighborhoods with inadequate social organization (Wilson, 1996). Those left behind were unable to move and were poorer than those able to relocate for new employment. In fact, Flint’s population has decreased every decade since the 1940s (Longley, 2012).

Such changes in the economy and subsequent population losses are important because they are aspects of neighborhoods and communities that affect health. Neighborhood conditions

³ *edible flint*’s proper name is lower case.

and people's perceptions of safety affect both physical activity (Wilson, Kirtland, Ainsworth, & Addy, 2004) and mental health (Wandersman & Nation, 1998). In addition to affecting physical activity and mental health, perceptions of safety affect access to already limited resources, such as food stores. One study with African American women found that concerns of safety and poor customer service or treatment hindered their ability to purchase healthy food in an acceptable environment (Zenk et al., 2011). Issues surrounding resources, safety and access to healthy food are of particular importance in a city like Flint. Indeed, members of a community collaborative called *edible flint* (discussed next) have raised these very issues with this researcher and their community concern leads to one of the main reasons for conducting this study, as well as, the second Specific Aim.

2.1.1 *edible flint*, a community's response to food access issues

Due to the types of issues just discussed, in 2009 Flint residents, public and private organizations, and institutions formed within the city a community collaborative called *edible flint* (<http://edibleflint.org>). The collaborative supports Flint residents in growing and accessing healthy foods and reconnecting with the land and with each other. With this mission, *edible flint* created five different workgroups to address specific issues within the local food system: Garden Starters Workgroup; Food Garden Tour; Co-Op; Organizational Workgroup; and Access and Education Workgroup. The Access and Education Workgroup organized to increase both people's knowledge and consumption of healthy food for improved health. This group specifically prioritized learning how and where people in Flint accessed nutrient-dense foods. This researcher has been a member of the Access and Education Workgroup since 2011. This group has met and still meets regularly every two weeks, alternating between in-person meetings and conference calls.

This group developed and conducted a preliminary food store assessment in 2011 that is later described in Methods, Phase I. It was from the experience of this preliminary study that residents requested several changes in reformatting of the data collection instrument and results that could be reported in ways meaningful to the community.

2.2 Benefits of nutrient-dense foods for disease prevention

Healthy, nutrient-dense foods, such as fruits and vegetables, provide water, fiber, antioxidants, vitamins and minerals—all components that constitute a nutrient-dense diet. Fruit and vegetables are an important part of a healthy diet, but Americans do not eat enough (Blanck, Gillespie, Kimmons, Seymour, & Serdula, 2008), and this deficiency of fruit and vegetables is associated with diet related diseases. Low consumption is associated, as well, with chronic kidney disease (Krishnamurthy et al., 2011), risk of some cancers (Annema, Heyworth, McNaughton, Iacopetta, & Fritschi, 2011) and an increased risk of cardiovascular disease (Bazzano et al., 2002); conversely, diets rich in fruit and vegetables were associated with a reduced prevalence of hypertension (Appel et al., 1997) and a reduced incidence of developing diabetes, particularly among women (Ford & Mokdad, 2001).

2.3 Consumption of healthy foods

In the United States, most people consume less than the minimum recommended amounts of nutrient dense foods, except for total grains and meats and beans (Krebs-Smith, Guenther, Subar, Kirkpatrick, & Dodd, 2010). However, total grain consumption suggests that Americans ate mostly refined grains and less than one percent ate the recommended amount of whole grains (Krebs-Smith et al., 2010). Total fruit, orange and dark green vegetables were low as well (Bachman, Reedy, Subar, & Krebs-Smith, 2008; Krebs-Smith et al., 2010). Michigan residents did not fare much better than the nation as a whole. Based on Behavior Risk Factor

Surveillance System data, the authors showed a significant decrease in fruit consumption and meeting the Dietary Guidelines for Americans over time (Centers for Disease Control and Prevention, 2010). Nationwide, income is a factor that relates to food intake. For example, when examining associations between PIR (Poverty to Income Ratio) and fruit and vegetable intake, Casagrande, Wang, Anderson, and Gary (2007) showed that adults in the lowest PIR categories consumed significantly fewer fruit and vegetables than did those in higher PIR groups. The literature also showed a slight reduction in fruit and vegetable consumption for men and women over time (Blanck et al., 2008). Thus, the consumption of nutrient-dense foods, like fruits and vegetables relates to many factors and is a consequence, in part, of the food environment. Food insecurity and how the food environment has been conceptualized are discussed next. The context of each relates to the rationale for this study.

2.4 Food security

The United States Department of Agriculture defines food insecurity along a range of severity. “Low food security” describes reports of reduced quality, variety, or desirability of diet” with “little or no indication of reduced food intake.” “Very low food security” describes “reports of multiple indications of disrupted eating patterns and reduced food intake” (Definitions of Food Security, 2014, para. 4). In regards to food security, food availability and food access are integral components and are two of three pillars upon which food security is built. Community food security and its opposite, food insecurity, are concerned with the underlying social, economic and institutional factors affecting the quantity, quality, and affordability of food in the community (Cohen, Andrews, & Kantor, 2002). Community level availability of healthy foods is a construct measured by the assessment instrument in Phase I of this proposal.

In the United States, several demographic groups are at higher risk for household food insecurity than are other groups. Compared with the national average for food insecurity in *all* households those with children, those headed by a single man or woman, those that are African American, non-Hispanic or Hispanic are at greater risk (Coleman-Jensen, Nord, & Singh, 2013). How people in these demographic groups perceive facilitators and barriers to accessing healthy food is an important area to investigate. Phase II of this proposal will target African American women—those who are mothers of children in the home up to 18 years of age and senior women over the age of 60 years as explained in the Introduction.

2.5 Measuring the food environment

The earliest mention of food access, that this researcher could find, outlined five dimensions (Penchansky & Thomas, 1981). Although, first used to describe the hospital environment, these dimensions are articulated here to depict measurable aspects of the nutrition environment: 1) availability is the amount and types of food resources; 2) accessibility is the relationship between location of the food supply and the location of clients or customers; 3) accommodation is how the supply food resources are organized; 4) affordability is the relationship of food prices and services to people's ability to pay; and 5) acceptability is peoples' attitudes and responses to the food resources physically available (Penchansky & Thomas, 1981). These dimensions incorporate the constructs explored through this research project—availability, price and quality.

Availability, price and quality are integral components of food security access by all people at all times to enough food for an active lifestyle (Coleman-Jensen et al., 2012) and are necessary for the health of a population. Food insecurity is positively associated with adult obesity (Martin & Ferris, 2007) and with prevalence of chronic diseases (Seligman, Laraia, &

Bushel, 2010). Food quality is important because it can influence shopping habits, particularly of older adults (Munoz-Plaza et al., 2013). Availability, price and quality of foods and food outlets in the environment are of such significance that they have been studied from various perspectives and disciplines including geography (Thornton, Pearce, & Kavanagh, 2011); human nutrition (Story et al., 2008); and agricultural economics (Chen, Florax, Snyder, & Miller, 2010) among others. This diverse interest in these three main constructs supports their importance and the role they play in food access and health outcomes.

Reviews of the literature about the food environment illustrate a diversity of instruments to measure it, and an increasing interest in finding those most suitable instruments to assess various facets of the food environment. McKinnon, Reedy, Morrisette, Lytle, and Yaroch (2009) reviewed instruments and methods for assessing the food environment in food stores, restaurants, schools and worksites. The instruments included inventories, checklists, market basket surveys, and questionnaires that covered geographic mapping, food sales, as well as, nutrient and menu analyses. Specifically, regarding the consumer nutrition environment, most studies have involved measuring food availability, prominence and their accessibility (Kelly, Flood, & Yeatman, 2011). These components incorporate the constructs explored through this research project—availability, price and quality.

Multiple studies have recognized the need for improved rigor of study designs of the food environment. In explicating measurement issues of the food environment Lytle (2009), suggested approaches to improve the rigor of study designs to help establish relationships between the food environment and health, such as including measurements of validity and reliability, the quantification of obesogenic environments and assessment of the food environment that included constructs of the socio-ecological model (Lytle, 2009). Regarding specific improvements, the Lytle review explored the use of reliable and valid measures (Kelly

et al., 2011; McKinnon et al., 2009), particularly when measuring the food environment of communities of color (Odoms-Young, Zenk, & Mason, 2009) and the social aspect of the food environment (Cummins, Curtis, Diez-Roux, & Macintyre, 2007). The importance of methodically measuring the food environment cannot be understated, as it is integral in supporting or hindering healthy eating, particularly for populations who are disproportionately affected by limited access to healthy food.

2.6 Instruments to measure food availability, food price, and food quality

Relevant literature, both peer-reviewed and non-peer-reviewed, were identified using a search strategy that included electronic databases (PubMed, ProQuest, Web of Science, Google Scholar). Citations from review articles, other key articles and references were chosen from articles between 1990 and April 2014. Key search words included *food deserts*, *food stores*, *food environment*, *food*, *poverty*, *environment*, *spatial correlation* and *store assessment*. Search results yielded approximately 1,500 articles and of these about 40% were relevant. Additionally, the National Cancer Institute (NCI) has a database of articles measuring the food environment. Although the food environment includes food stores, restaurants, schools and worksites, this search included only those for food stores in domestic urban environments since 1990.

In domestic, urban environments, the literature revealed few instruments that assessed food availability, price and quality in concert. All of the instruments used checklists, or a list of food available items, although formats differed. This section is organized by the following construct domains—availability, price and quality; availability and price; availability and quality; and finally just food availability. Each section includes a table of the 25 instruments reviewed by these categories and a discussion of each follows next. Because one cannot measure food price and quality without knowing its availability, a few instruments that cited only food

price and quality were still grouped within an availability category, even though availability was not measured or reported outright.

2.6.1 Food availability, food price, and food quality

Food availability, food price, and food quality provide a wide range of information on the food environment when measured together. Considering the cost of conducting a study and the amount of information garnered from the community, research in this area benefits most when these constructs are measured in concert.

Ten studies were located that examined all of these domains together. Two of these used the USDA's Thrifty Food Plan as a foundation for the checklist (Block & Kouba, 2006; Short, Guthman, & Raskin, 2007), as did some in other studies examining only one or two domains of the food environment. The Thrifty Food Plan (TFP) is a standard market basket of foods to feed a family of four for one week and is the basis for the Supplemental Nutrition Assessment Program (SNAP) food subsidies to needy families (USDA, n.d.). The Thrifty Food Plan food categories include fresh, frozen and canned fruit and vegetables, bread and grains, dairy, meat and protein, and others. Block and Kouba in 2006 selected 63 TFP items for examination in Chicago, but had no scoring schema nor conducted validity and reliability testing. Short and colleagues examined an unreported number of TFP items in Oakland, CA with a special focus on Latin American and generic foods and ranked the quality of each from 1=bad to 5=excellent (Short et al. 2007). Food price was calculated separately for a subsample of stores, but again no validity or reliability testing was conducted.

Three studies only examined food availability, food price and food quality of fruits and vegetables. Cole, Filomena, and Morland (2010) examined 18 fresh fruits and 21 fresh vegetables in Brooklyn, NY. They used an equivalent quality ranking scale to Short et al., but

reported no validity or reliability. Investigators averaged the food price, however, for each food in each store. Zenk and colleagues examined how food availability, food price, and food quality of 80 fruit and vegetables related to racial composition, socioeconomic status by neighborhood in three communities in Detroit and adjacent suburbs (Zenk et al., 2006). They assessed food quality for a subset of 20 fresh fruit and vegetables using a 4-point scale for the percentage of items *not* meeting high quality standards. A weakness of this study was using 80 fruit and vegetables, because of the length of time to locate this number. It is not likely that 80 fruits and vegetables illustrate much more variability than would 40 fruits and vegetables. A strength of the study was the inclusion of reliability testing for food quality. Cole and investigators examined 18 types of fruit and 21 types of vegetables in Brooklyn, NY (Cole et al., 2010). Food quality was assessed using a 5-point scale where 1=poor and 5= excellent. They reported no assessments for reliability or validity. Weaknesses of the above studies by Cole et al. (2010) and Short et al. (2007) include the use of a 5-point scoring system for quality, when a two or three-point system would have sufficed to describe the quality of items. A 5-point scale increased the time burden to conduct the assessment.

The remaining five studies within this group all at least reported inter-rater reliabilities for the checklist instrument. Zenk et al. (2006) examined availability for 80 fresh, frozen and canned fruits and vegetables, but also quality and price for 20 fresh fruits and vegetables. Food quality was based on a convoluted scale based on the proportion of the total that *did not* meet high quality standards where excellent was (0-4%) of items=1 to poor (50-100%) =4. In 2007 Glanz et al. (2007) published their seminal study funded by Robert Wood Johnson Foundation on the Nutrition Environment Measures Survey in Stores (NEMS-S) in Atlanta, GA metro area using a list of 66 foods. Glanz et al. (2007) developed a rubric awarding points for availability (0

to 27), quality (0 to 6) and price (-8 to 17), subtracting points only for high price. This NEMS-S had maximum score of 50. Test-retest reliability was reported as was construct validity.

Next, Andreyeva, Blumenthal, Schwartz, Long, and Brownell (2008) used the NEMS-S to assess an unreported number of food items in New Haven, CT and reported test-retest reliability and construct validity. Interestingly, these authors did not use the NEMS-S scoring rubric, but merely reported the percentage of stores with the foods and made absolute price comparisons by income area and type of store. The last two studies within this tripartite group also used NEMS-S and reported inter-rater reliability, test-test reliability and construct validity; however, each research group adapted the original NEMS-S scoring schema as have many others. Cavanaugh, Mallya, Brensinger, Tierney, and Glanz (2013) examined 61 food items in Philadelphia, PA and scored availability from 0-37, quality from 0 to 6 for fresh fruit and vegetables, and price from -9 to 18 points. Horacek et al. (2013) examined 47 food items at 11 state university campus areas—AL, FL, IN, KS, ME, MI, NJ, NY SD, WI and WV. Fruits and vegetables were scored 0 to 24 for availability, quality 0 to 6 for fresh fruit, and vegetables and -9 to 18 for price. A new category was developed for healthy food comparisons and scored 0 to 33. See Table 1 for instruments reviewed for food availability, food price and food quality.

Table 1.

Comparisons of Published Instruments (Checklists) in Urban Environments in the US to Assess Food Stores Organized by the constructs Food Availability, Food Price, and Food Quality
(Continues on following page)

	Type /Title	Author, Year	Foods Assessed	Scoring	Reliability/Validity
1	Checklist	Block & Kouba, 2006	Thrifty Food Plan (TFP) Foods including community based additions of sweet potatoes, greens and baby food. 63 items	No score.	None/None
2	Checklist	Zenk et al., 2006	Fruit and vegetable availability (80 items). Quality and price based on a subset of items (quality of 20 fruit and vegetables, price of 20. Authors did not report specific fruit and vegetables.	Quality based on the proportion of items that did not meet high quality standards: 1 to 4. 1= excellent (0-4%), 2= good (52-49%), 3=fair (25-49%), 4= poor (50-100%)	No, but inter-rater reliability was assessed for quality /None
3	Checklist NEMS-S	Glanz et al., 2007	Milk, Fruit, Vegetables, Ground Beef, Hot Dogs, Frozen Dinners, Baked Goods, Beverages, Bread & Baked Chips. 38 items	Rubric for points in each construct and subtracted points and price. Availability (0 to 27), Quality (0 to 6) & Price (-8 to 17)	Inter-rater and test retest, Percent agreement/ Face and construct
4	Checklist	Short et al., 2007	TFP foods, a culturally appropriate Latin American Food Basket (40) and a Generic Food Basket (47). Specific number of items not listed.	Based on a 2 part questions quality is ranked 1 to 5: 1=bad, 2= poor, 3=neutral, 4= good, 5=excellent.	None/None
5	Checklist/ NEMS-S (modified)	Andreyeva et al., 2008	Milk, cheese, fresh fruit and vegetables, frozen and canned vegetables, meat, meat alternatives, bread, grains, cereal, potato chips, and beverages. Specific number of items not listed.	No score.	Inter-rater and test retest /Construct

Table 1 (cont'd).

6	Checklist	Cole et al., 2010	18 Fresh fruits and 21 Fresh vegetables. 39 items	Quality is 1 to 5 and based on all fruits and vegetables: 1=poor, 2=mediocre, 3=average, 4=good, 5=excellent. Average price was calculated for each item per store	None/None
7	Checklist/ NEMS- CS	Cavanaugh et al., 2013	Milk, Fruit, Vegetables, Ground Beef, Hot Dogs, Frozen Dinners, Baked Goods, Beverages, Bread & Baked Chips. To the original NEMS-S added frozen and canned fruits and vegetables. 38 items plus additional frozen and canned fruits and vegetables	Availability= 0 to 37. Price= -9 to 18 points. Quality is 0 to 6	Inter-rater and test retest/ Construct
8	Checklist/ NEMS-S (modified)	Horacek et al., 2013	Milk, fresh fruit and vegetables, canned and frozen fruit and vegetables, meat, frozen dinners, baked Goods, beverages, grains, baked Chips. Researchers added cereal, milk alternatives, meat alternatives for hot dogs & hamburgers. 43 items	0 to 24 (All Fruit and Vegetables). 0 to 6 (Quality of Fresh F & V). 0 to 33 (Healthy food comparisons): Ground beef and lean beef, Whole wheat bread, milk, 100% juice, diet soda. -9 to 18 price	Inter-rater and test retest /Construct

2.6.2 Food availability and food price

Food availability and food price are key components of the nutrition environment (Glanz, Sallis, Saelens, & Frank, 2005). Food price is so important, in fact that it is the second most common factor influencing what people eat after taste (Glanz, Basil, Maibach, Goldberg, & Snyder, 1998). Together, food availability and food price represent two vital components influencing food choice, thus consumption. Unfortunately, none of the instruments for food availability and price reported tests of reliability or validity. Except for one instrument that used a score to report prominence of items on the shelf (Hosler, Varadarajulu, Ronsani, Fredrick, & Fisher, 2006), none of the instruments even reported scores.

Three of the instruments used the United States Department of Agriculture's (USDA) TFP as a foundation for the checklists (Cassady, Jetter, & Culp, 2007; Chung & Meyers, 1999; Jetter & Cassady, 2006). Chung and Meyers selected 42 TFP items to assess in Minneapolis and St. Paul, Minnesota. Two other studies based on the TFP foods assessed 40 items (Jetter & Cassady, 2006) and 35 items (Cassady et al., 2007) in Los Angeles and Sacramento, California (Jetter & Cassady, 2006) compared a market basket of foods to a market basket of healthier foods. Cassady et al. (2007) in their analysis compared cost differences between TFP foods and foods recommended in the 2005 Dietary Guidelines for Americans. Investigators also further separated vegetables into four separate groups—orange, legumes, starchy, and other. None of these instruments were relevant or useful for the research study proposed.

Sadler, Gilliland, and Arku (2013) assessed 62 food items before and after the establishment of two new grocery stores in a former food desert in Flint, Michigan. No measures of reliability and validity were reported nor was a score. Interestingly, this study was conducted in Flint, MI where the current study will occur. The primary author completed a graduate degree from a Canadian university used a Canadian market basket survey to assess food availability in Flint. In Albany, NY, Hosler and colleagues assessed low-fat milk and high fiber bread (Hosler et al., 2006). The presence of fruit and vegetables were reported though specific fruits and vegetables were not assessed and the scoring schema was used not to report availability, but was used to report shelf placement of items. Specific amounts of fruit and vegetables could have been included in addition to low-fat milk and high fiber bread, particularly considering the importance of fruit and vegetables to maintaining a healthy diet.

The studies in this subsection provided information on the availability and price of foods, but did not report a scoring schema directly reflecting availability or price, nor did they report reliability and validity. While it is important to assess the availability of foods and their costs in the community, it is as equally important to know the consistency and accuracy of instruments. See Table 2 for instruments reviewed for food availability and food price.

Table 2.

Comparisons of Published Instruments (Checklist) in Urban Environments in the US to Assess Food Stores Organized by the Constructs Food Availability and Food Quality

	Type	Author, Year	Foods Assessed	Scoring	Reliability/Validity
1	Checklist	Chung & Meyers, 1999	Thrifty Food Plan Foods. Fruit, fresh, canned and dried vegetables, meat and protein, grains, oils and fats, baby formula, condiments, sugar and syrup, dairy. 47 items	No score.	None/None
2	Checklist	Hosler et al., 2006	Low- fat milk and high fiber bread. Also included percentage of stores selling any fresh fruit and vegetables. 2 items	Used score to describe placement of item on shelf from 1 to 3: 3 as prominent and 1 as obscure	None/None
3	Checklist	Jetter & Cassady, 2006	Thrifty Food Plan (TFP) and a healthier market basket of foods. Grains, dairy, canned fruit, vegetables, meat and protein, oils and spreads and salad dressing. 40 items	No score.	None/None
4	Checklist	Cassady et al., 2007	Thrifty Food Plan and 2005 Dietary Guideline foods. Fresh and canned fruit, fresh, frozen and canned vegetables, fruit juice. Vegetables split into groups: orange, legumes, starchy, other. 35 items	No score.	None/None
5	Checklist	Sadler et al., 2013	Price and availability of market basket items before, during and after the food assessment. Milk, meat and proteins, grains, fruit and vegetables, others (fats and sugars). 62 items	No score.	None/None

2.6.3 Food availability and food quality

Though only one study measured food availability and food quality, it occurred in a prime environment for measuring food access for needy residents. This study was conducted in three communities with higher rates of residents below the poverty line compared to those in the

U.S. overall. Using mixed methods, Freedman (2009) inventoried the availability of an unreported number of fruits, vegetables, meats, grains, juice, and dairy foods and used an overall quality score. Freedman unfortunately did not report measures of reliability or validity or used a score to report results. See Table 3 for instruments reviewed for food availability and food quality.

Table 3.

Comparisons of Published Instruments (Checklist) in Urban Environments in the US to Assess Food Stores Organized by the Constructs Food Availability and Food Quality

	Type	Author, Year	Scoring	Reliability/Validity
1	Checklist	Freedman & Bell, 2009	Overall store composite quality score was based on the availability of food items (+ tobacco and alcohol).	None/None
	Foods Assessed	Fresh fruit and vegetables, lean meats, low-fat milk, and whole-grain breads. Assessed number of items within each category and not specific items.		

2.6.4 Food availability

As a construct, food availability requires the least amount of information compared to food price and food quality to evaluate and describe the food store resources within a community environment. While food availability provides insufficient information to fully describe the food store environment availability, it does provide enough to begin elucidation. There are 11 studies in this section.

In the oldest study, Wechsler, Basch, Zybert, Lantigua, and Shea (1995) measured the food availability of three kinds of milk (i.e., whole, reduced fat, and low-fat) in a Latino neighborhood. Though validity was not reported, inter-rater and test-retest reliability were measured in bodegas (i.e., small stores in Latino neighborhoods). No score was reported.

The next four studies measured only fruits and vegetables. Eighteen fresh fruits and 21 fresh vegetables (39 items) were examined in Brooklyn, New York (Morland & Filomena, 2007). Reliability, validity, and scoring schema were not reported. In the next study, fresh fruit and vegetables were measured in urban and rural communities in New York. Investigators measured the number of fruits and vegetables to classify businesses as a fruit and vegetable store (i.e., stocked at least two types of fresh fruit, excluding limes and lemons, and at least three types of fresh vegetables), a super produce store (i.e., supermarkets with a produce department), a year-round produce store (i.e., non-supermarket fruit and vegetable stores operating year-round), a seasonal produce store, a fruit-for-snack store (i.e., stores not meeting other criteria though carried at least one type of ready-to-eat fresh fruit) or a non-fruit and vegetable store (Hosler, Rajulu, Ronsani, & Fredrick, 2008). Specific fruits and vegetables were not measured. While novel, this study had no scoring schema, nor reported measures of reliability and validity.

The next study measured commonly consumed fruit and vegetables (25), as well as, culturally specific fruit and vegetables for African Americans (16) and Latinos (18) (Grigsby-Toussaint, Zenk, Odoms-Young, Ruggiero, & Moise, 2010). The focus on culturally recognized fruits and vegetables was an interesting study component, considering that taste preferences are an important factor in food consumption (Glanz et al., 1998). Neither a scoring schema nor validity was reported, but percentage agreement between observers was. Lastly, 16 dark green and orange vegetables (Izumi, Zenk, Schulz, Mentz, & Wilson, 2011) were measured as part of a larger assessment of 80 fruits and vegetables (Zenk et al., 2006). Neither a scoring schema nor measures of reliability and validity were assessed.

The next three studies in this subsection on food availability assessed a wide range of foods, although two did not use a scoring schema or report reliability and validity. The first study was conducted in four locations—Baltimore, MD, Minneapolis/St. Paul, MN, Oakland,

CA, and Philadelphia, PA. Investigators selected 28 food items for assessment, because these items were more nutrient dense and less energy dense than what was normally available in small urban markets (Laska, Borradaile, Tester, Foster, & Gittelsohn, 2009). Neither scoring schema nor measures of reliability or validity were reported. This study included peanut butter, though, which is often an excluded food item.

Peanut butter was included as well in a study of 28 items in Oakland, CA. A five domain scoring schema was used based on five food groups: fresh fruit and vegetables scored 0 to 3; processed fruit and vegetables scored 0 to 3; healthy beverages scored 0 to 5; healthy snacks scored 0 to 8; and healthy household items scored 0 to 9 (Tester, Yen, Pallis, & Laraia, 2011). Scores from each domain were averaged for an overall score. Measures of reliability and validity were not reported.

Hosler and Dharssi (2011) measured 45 items using the FROST (Food Retail Outlet Survey Tool). The FROST instrument was formatted for rapid assessment of the consumer nutrition environment. The study reported inter-rater and inter-method reliability, and made a justification for the support of construct and criterion validity. Because of its ease of use, the FROST was used to guide the formatting of the instrument used in this proposed study. The last three instruments in this review either used the NEMS-S instrument or based their instrument on the NEMS-S. Franco, Diez-Roux, Glass, Caballero, and Brancati (2008) and Casagrande et al. (2011) used NEMS-S Healthy Food Availability Index in two different studies using the same data. The first study was part of the Multi-Ethnic Study of Atherosclerosis (Franco et al., 2008) study and the second was part of the Healthy Aging in Neighborhoods of Diversity across Life Span study (Casagrande et al., 2011). Using the same instrument for each study, both reported NEMS-S inter-rater and test-retest reliability as well as construct validity. Specific food items were not listed though a scoring schema was used

for both and scores ranged from zero to 27. The Texas Nutrition Environment Assessment of Retail Food Stores was based on the NEMS-S and the Dietary Guidelines for Americans, although modified to reflect the food of Texas and its environment (Gloria & Steinhardt, 2010). Researchers assessed 10 foods. Interrater and test-retest reliability and face validity were reported, but no scoring schema. See Table 4 for instruments reviewed for availability. It should be noted: that the assessment by Cole et al. (2010) in the availability, price and quality section and Morland and Filomena (2007) in the availability section used the same tool and were part of the same study; Franco et al. 2008 and Casagrande et al. (2011) used the same tool and were part of the same study.

Table 4.

Comparisons of Published Instruments (Checklist) in Urban Environments in the US to Assess Food Stores Organized by the Construct Food Availability (Continues on next pages)

Type/ Title	Author, Year	Foods Assessed	Scoring	Reliability/Validity
Checklist	Wechsler et al., 1995	Skim Milk, 1% and 2 % milk. 3 items	No score.	Inter-rater reliability of shelf milk count & test retest /None
Checklist	Morland & Filomena, 2007 *	18 Fresh fruits and 21 Fresh vegetables. 39 items	No score.	None/None
Checklist (NEMS-S= HFAI)	Franco et al., 2008 β	Dairy, fresh fruit and vegetables, low-fat meat, frozen foods, low-sodium soups, 100% whole wheat bread and low sugar cereals. Excluded hot dogs, snacks and hot dogs. Specific number of items not listed.	Based on availability score ranged from 0 to 27.	Inter-rater and test retest /Construct
Checklist	Hosler et al., 2008	Fresh fruit and vegetables. Measured based on number (below 10) and large (above 10). Also noted dark green or orange vegetables. Specific number of items not listed.	No score.	None/None
Checklist (TxNEA-S)	Gloria & Steinhardt, 2010	Fresh, canned and frozen fruit, fresh, canned and frozen fruit, fresh, canned and frozen vegetables, dairy, protein, grains. 83 items	No score.	Inter-rater and test retest reliability/Face
Checklist	Grigsby-Toussaint et al., 2010	Commonly consumed fresh fruits and vegetables (25 items). Culturally specific fruit and vegetables for African Americans (16 items). Culturally specific fruit and vegetables for Latinos (18 items).	No score.	Percent agreement across observers /None

Table 4 (cont'd).

Checklist	Laska et al., 2009	Fresh fruit and vegetables, canned and frozen fruit and vegetables, low-fat dairy, healthy beverages, healthy snacks (i.e. nuts, crackers, pretzels), additional staple food such as peanut butter, brown rice, lentils and Jello. 28 items	No score.	None/None
Checklist	Tester et al., 2011	Fresh, canned and dried fruit, fresh, frozen and canned vegetables, beverages, dairy, healthy snacks, grains, proteins. 28 items	5 domain score ranges: Fresh F & V: 0-3, Processed F & V: 0-3, Healthy Beverage: 0-5; Healthy snacks: 0-8, Healthy Household Items: 0-9. Authors summed the number of items available in each domain.	None/None
Checklist (NEMS-S=HFAI)	Casagrande et al., 2011 β	Dairy, fresh fruit and vegetables, low-fat meat, frozen foods, low-sodium soups, 100% whole wheat bread and low sugar cereals. Excluded snacks and hot dogs. Specific number of items not listed.	Based on availability score ranged from 0 to 27.	Inter-rater and test retest /Construct
Checklist (FROST)	Hosler & Dharssi, 2011	Fresh/canned and frozen, fresh/canned and frozen vegetables, dairy, grains, meat and protein, beverages. 45 items	No score.	Inter-rater and inter-method / Construct and criterion
Checklist	Izumi et al., 2011	Dark green and orange vegetables. 16 items	No score.	None/None

*, β = use of the same tool. Abbreviations: NEMS-S (Nutrition Environment Measurement Survey of Stores), NEMS-CS (Nutrition Environment Measurement Survey of Corner Stores), HFAI (Healthy Food Availability Index), TxNEA-S (Texas Nutrition Environment Assessment of Retail Stores) and FROST (Food Retail Outlet Survey Tool).

Since the creation of NEMS-S in mid-2000's it has been used both in urban and rural environments and is regularly used to assess constructs of the consumer food environment. Strengths of the NEMS-S instrument include testing for reliability and validity, which is often missing in other food store assessments (Kelly et al., 2011; McKinnon et al., 2009; Ohri-

Vachaspati & Leviton, 2010). Weaknesses of NEMS-S include: the focus on brand specific foods which exclude cheaper local brands; the emphasis on high fat foods, but not on added sugars or sodium; the exclusion of canned and frozen fruits and vegetables; and the absence of community perceptions. The latter is part of the justification for the qualitative component of this research study.

Overall, the majority of the instruments reviewed here implemented NEMS-S or the TFP Market Basket to assess food availability, price and/or quality of foods. Other instruments have been created based on range of criteria including previously conducted assessments (Izumi et al., 2011), cultural relevance based on the population (Grigsby-Toussaint et al., 2010), or reflected the Dietary Guidelines for Americans and other reasons (Hosler et al., 2006; Morland & Filomena, 2007). Few instruments reported measures of reliability and validity, or used scoring schemas. The creation of the Flint Food Store Assessment was done to address some of the issues reported here concerning the consumer nutrition environment of urban communities.

2.7 Statistical analyses used in assessing food availability, food price, and food quality

The literature discussed in this section reflects the types of statistical analyses used to evaluate different aspects of the food environment. Those different aspects are food availability, food price, food quality and race and income. Eight of these studies used some type of regression analysis; two used Poisson regression; two used ordinary least squares (OLS) regression; and four used linear or multilevel regressions. Sixteen studies conducted *t*-tests, Analysis of Variance (ANOVA) and/or Chi-square, McNemar's Chi-square or Chi-square goodness of fit analyses. Finally, two studies reported only descriptive statistics.

2.7.1 Types of statistical analyses

Poisson regression uses counts of items per some constant unit like a fixed interval of time or space. Such counts might be the number of grocery stores per census tract; this is also called a prevalence rate. Poisson regression is appropriate for the kinds of data that are count data. Count data can only be positive, whole numbers and arise from counting rather than ranking, as in ordinal data (Anselin, 2005). The dependent variables for the present study will consist of scores for food availability and quality combined, and one score for price; therefore, Poisson regression is not appropriate. Ordinary least squares (OLS) is a type of log linear modeling and it is the starting point for data involving spatial analysis (Anselin, 2005). Because in the present study, the food scores per store are spatially dependent on the other types of stores in adjacent census tracks, OLS is more appropriate for the data analysis than is Poisson or multilinear regression. A detailed description of how OLS will be used in the present study can be found in Methods under statistical analysis. Multilinear regression is a type of regression with two or more independent variables and was utilized in some of the more statistically robust studies reviewed here. It does not however, address spatial dependency.

T-tests assess whether means of two groups or populations are statistically different from each other. Instead of using *t*-tests when comparing three or more variables, one-way ANOVA is used. Chi-square, Chi-square Goodness of Fit (Pearson's Chi-square) and McNemar's Chi-square are all Chi-square tests appropriate for categorical data that differ from each other, like types of stores. In the present study, I will run some of these types of analyses preliminary to running OLS.

Next, the studies on the food environment are organized by the types of statistical analysis used. The first section includes regression analysis and any additional analysis

conducted within the same study. Additional studies, not including regression, are described after that.

2.7.2 Regression studies on the food environment

Returning now to the studies that examined the food environment and shown in Tables 1-4, the first two used Poisson regressions to explore availability of healthy foods and type of food stores as dependent variables between the predominant neighborhood race as an independent variable at the census tract level (Morland & Filomena, 2007) or between availability of food and store size (Laska et al., 2009). Morland and Filomena examined two economically and racially diverse communities in New York City for availability of fruits and vegetables and the prevalence of fruit and vegetables from 166 stores in aggregated census tracts. These investigators used Poisson regression to determine the differences in density of different types of foods per census tracts according to the predominant race in the tracts (Morland & Filomena, 2007). They found that predominant Black census tracts had no supermarkets, but more corner stores compared to the predominantly white census tracts (Morland & Filomena, 2007). A limitation of this study was that the prevalence value for racially mixed census tracts had the second highest standard error, which may indicate that when comparing the availability of supermarkets between racially mixed census tracts to predominantly white census tracts, the prevalence was less comparable to US population.

Laska et al. (2009) used Poisson regressions to compare five groups of healthy food items using store size as the requisite count data needed. They found that across store sites in Baltimore, MD, Minneapolis/St. Paul, MN, Oakland, CA, and Philadelphia, PA the availability of healthy snacks and other healthy staple foods were significantly different, with the largest food availability in Minneapolis/St. Paul and Philadelphia (Laska et al., 2009). Also as stores increased in size, availability of healthy snacks and other healthy staple foods increased as well

(Laska et al., 2009). Limitations of this study included the exclusion of gas stations and drug stores and the use of aisle size to determine the size of stores. The present study will include gas stations and drug stores.

Zenk et al. (2006) and Chung and Meyers (1999) both used OLS regressions to explore availability, price and quality of healthy food and neighborhood race (Zenk et al., 2006), or to explore food availability and price of healthy food and store size and neighborhood income (Chung & Meyers, 1999). The first study was conducted in Detroit, MI where the food environment has declined over decades due to disinvestment, similarly to Flint, MI. When four racially and economically different communities in Detroit were examined, results showed that compared to the racially heterogeneous community, the African American low-income community had significantly poorer quality of fruits and vegetables. Not surprisingly, smaller stores, liquor and convenience stores showed significantly lower quality of fruits and vegetables (Zenk et al., 2006). Quality of healthy foods, particularly perishable fruits and vegetables, is important because poor food quality can deter people from purchasing them.

Chung and Meyers (1999) examined differences in food prices and food availability in chain stores in poor neighborhoods in St. Paul/Minneapolis, MN. The chain stores had a lower average price for a market basket of foods by \$11.81, but greater food availability compared to where there were no chain stores (Chung & Meyers, 1999). *T*-tests showed that poor areas had lower availability of foods compared to non-poor areas, but results were not significant (Chung & Meyers, 1999). These OLS findings are important because the research questions are similar to one in the current study regarding the association of food availability, price and quality to predominant race and median household income in census tracts. It is important to note, however, that neither of these two OLS studies reported using a spatial autocorrelation component to account for the dependency of observations. Spatial autocorrelations will be

examined in the current study. Multilevel linear regression coefficients were estimated between availability of healthy foods from 34 census tracts in Baltimore and the BMI (Body Mass Index= kg/m^2) of residents at the census tract level. In Baltimore, Casagrande and colleagues used the NEMS-S instrument to explore the associations between availability of foods and the BMI of 2,616 African American and white adults aged 30 to 64 who lived in census tracts where stores were located. Their findings showed that living in a predominantly white neighborhood with medium to high food availability was associated with higher BMI, when compared to neighborhoods with low food availability (Casagrande et al., 2011). A limitation of this study was the absence of comparisons between African American and white neighborhoods. Strengths of this study included the examination of the effect of transportation, perceptions of crime and dietary intake as potential mediators between food availability and BMI.

A study by Franco and colleagues using multi-level regressions, similar to the study above, was conducted in Baltimore, MD. The NEMS-S was also used to explore race and income and the availability of healthy foods. Results showed that convenience stores, grocery stores and behind-glass⁴ stores had significantly less healthy food compared to supermarkets (Franco et al., 2008). When income and race were added to the model, lower income communities compared to higher income communities and predominantly African American compared to predominantly white communities had significant fewer healthy foods (Franco et al., 2008). *T*-tests showed also that predominantly white and predominantly higher income neighborhoods had a higher average food availability scores compared to predominantly African American and lower income neighborhoods (Franco et al., 2008). A limitation for this study was that the data collected at the census tract level were not reported or corrected for potential

⁴ "Behind glass" stores are corner stores with plexiglass between customers and cashier and product.
<http://gogreen.umaryland.edu/tools-and-resources/food-maps/>

autocorrelation of stores' NEMS-S scores, which would invalidate the assumption of independence of observations.

Izumi and colleagues conducted a study using multilevel regression examining the availability of dark-green and orange fruit and vegetables and their intake by 919 African American, Latino and White adults ≥ 25 years old in Detroit. The examination of availability and intake of fruit and vegetables in urban environments such as Detroit, MI are of particular importance, considering that more impoverished people live in urban areas than in suburbs, at least at that time (Glaeser, Kahn, & Rappaport, 2008). Findings by Izumi and colleagues showed that residents consumed fewer servings of dark-green and orange vegetables when living in neighborhoods without stores carrying five or more varieties, compared to those in neighborhoods with two or more stores (Izumi et al., 2011).

Hosler and colleagues used multiple logistic regression to explore the association between low-fat milk and high-fiber bread and percentage of minorities at the census block group level in urban Albany, NY and rural Columbia and Green Counties. Compared to census blocks that were $\geq 50\%$ minorities, census groups with 10-19% minorities were significantly more likely to have stores selling low-fat milk and high-fiber bread (Hosler et al., 2006).

Collectively, the studies using regression analyses showed the expected results, that is, lower consumption in neighborhoods without stores carrying much variety (Izumi et al., 2011), and lower availability of healthy foods at smaller stores compared to larger supermarkets, even after the addition of income and race to regression models (Franco et al., 2008). The ranges of results show the importance of examining a wide range of foods in a variety of communities with different predominant races and incomes. Moreover, regression analyses are important statistical analyses to conduct because they are more robust than other statistical methods such Chi-square, ANOVA, and *t*-tests that are discussed next.

2.7.3 ANOVA, *T*-test, or chi-squares

The final group of inferential statistics studies used only Chi-square, ANOVA and/or *T*-tests, to examine differences of food availability, price and quality. Two studies used Chi-square, *t*-test and ANOVA in the same study (Cavanaugh et al., 2013; Horacek et al., 2013). In the first study, Horacek and colleagues used ANOVA with post hoc Tukey's-B and *t*-tests to compare mean scores between store types, and to make comparisons by university community and region. They also used Chi-square to examine the percentage of store venues with each food item assessed. ANOVA and *t*-tests results showed that grocery stores had significantly higher average scores than convenience stores, indicating higher food availability, price and quality (Horacek et al., 2013). Chi-square results showed that grocery stores had the highest significant percentage of fruits and vegetables (Horacek et al., 2013). Next, Cavanaugh and colleagues conducted McNemar's Chi-square test to examine differences in the availability of regular vs. healthier food items, paired *t*-tests to test for differences in the availability of healthy vs. less healthier items and ANOVA to test for differences in the NEMS-CS summary scores by store characteristics in low-income urban communities in Philadelphia, PA (Cavanaugh et al., 2013). Results of the McNemar's Chi-square, used for paired nominal data, showed that healthier versions of some of available foods were significantly less available than less healthier items (Cavanaugh et al., 2013). Paired *t*-test results showed similar results for price as well, with healthy juice, bread and chips significantly more expensive than unhealthy options (Cavanaugh et al., 2013). A limitation of both studies was limited generalizability of findings beyond those in university towns or urban areas. This limitation extends to most all studies on food access in that they are site-specific by design.

Glanz and colleagues conducted Chi-square and *t*-tests to explore food availability, food price and food quality by store type and neighborhood SES in metro Atlanta. Results of the Chi-

square analysis showed that healthier foods were significantly more available at grocery stores and in high income areas (Glanz et al., 2007). Paired *t*-test results showed that overall scores for food availability and quality were significantly higher in grocery stores than convenience stores and in high income neighborhoods than low-income neighborhoods (Glanz et al., 2007). Food price, not surprisingly, was significantly higher in convenience stores and in low-income neighborhoods (Glanz et al., 2007).

The next study used ANOVA to examine average food availability and store types, and *T*-tests to look at the average food prices between two racially and economically different neighborhoods in Chicago. Block and Kouba (2006) found that with the exception of chain convenience stores and liquor stores, the higher income communities had significantly higher average prices. Investigators also found differences in store type and the availability of foods, with chain and independent supermarkets having the highest food availability and specialty stores and dollar stores having the lowest (Block & Kouba, 2006). The inclusion of dollar stores in this assessment is important, because nationally since the 2008 recession, these have increased in number and the breadth of food items they carry.

Flint, MI was the site of the next study that used ANOVA with Tukey's-*T* and *t*-tests to examine the cost of groceries by access to public transit and type of store over a three-year period. Results of the *t*-tests showed that there were not significance differences in food prices between stores located near public transit lines versus those not near public transit lines, while ANOVA Tukey's-*T* showed that in 2009, national food store chains had significantly lower prices than other stores (Sadler et al., 2013). This study included an analysis of areas designated

as food deserts⁵, but failed to report or discuss tabular significance results of *t*-tests and ANOVA results.

A study in Texas used ANOVA to examine differences in food availability by store type and income (Gloria & Steinhardt, 2010). Results showed that low-income neighborhoods had more convenience stores than grocery stores, by nearly 3:1, compared to high income neighborhoods. Also, there was a significant relationship between healthy food availability and store type and neighborhood income (Gloria & Steinhardt, 2010) is study used a modified version of the NEMS-S that was tailored to represent foods available locally. This study would have benefited from a more robust analysis with regression to explore associations between food availability and income while controlling for additional variables.

Chi-square was used to examine the proportion of small stores selling four types of milk in a predominantly low-income urban Latino community in New York City. Chi-square results showed that the stores west of Broadway Avenue, a community almost 1:1 of Latinos and Whites, were more likely to sell all types of milk than the stores east of Broadway, a community with a 7:1 ratio of Latinos and Whites (Wechsler et al., 1995). Boys and Girls Clubs in Nashville, TN were the study locations where Chi-square goodness of fit (Pearson's Chi-square) test was used to examine participants' perceptions and availability of healthy foods. Goodness of fit tests for Chi-square can be used when one of the variables is categorical, in this case, the participants' perceptions. Study results showed that there was no difference between perceptions about the ease of buying healthy food and the actual availability of these foods (Freedman,

⁵ Food deserts are defined as urban neighborhoods and rural towns without ready access to fresh, healthy, and affordable food. Instead of supermarkets and grocery stores, these communities may have no food access or are served only by fast food restaurants, convenience stores and gas stations that offer few healthy, affordable food options. The lack of access contributes to a poor diet and can lead to higher levels of obesity and other diet-related diseases, such as diabetes and heart disease. <http://apps.ams.usda.gov/fooddeserts/foodDeserts.aspx>

2009). The finding suggests that availability of healthy foods and residents' perceptions of their availability do not differ.

Chi-square was used again to examine the availability of commonly consumed and culturally specific fruits and vegetables for African Americans and Latinos in Chicago. Results showed that Latino neighborhoods were significantly more likely to carry cucumbers and oranges in grocery stores, and convenience stores carried more bananas, carrots, corn and tomatoes than either store did in African American neighborhoods (Grigsby-Toussaint et al., 2010).

In order to examine the food environment surrounding public elementary schools in Oakland, CA, Tester et al. (2011) conducted two-sided *t*-tests of the mean scores by food domain in food stores, stratified by income status of schools and by store acceptance of WIC⁶ vouchers. The largest differences were seen when examining healthy snacks and healthy beverages. Results showed that when comparing healthy snacks between WIC and non-WIC participating stores near high income schools, WIC accepting stores had significantly higher mean scores, which indicated higher availability healthy foods (Tester et al., 2011). For healthy beverages, stores accepting WIC near low-income schools had significantly higher mean scores as well (Tester et al., 2011). This study would have benefited from other statistical analyses to control collinear variables, especially considering results of the *t*-tests, which showed that stores accepting WIC vouchers surrounding low and high income schools had significantly higher availability of healthy beverages and snacks.

⁶ The Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) provides Federal grants to States for supplemental foods, health care referrals, and nutrition education for low-income pregnant, breastfeeding, and non-breastfeeding postpartum women, and to infants and children up to age five who are found to be at nutritional risk.

<http://www.fns.usda.gov/wic/women-infants-and-children-wic> The food vouchers can be used to redeem only certain foods considered nutrient-dense such as low-fat milk and whole grain bread since 2012.

The next two articles from one study conducted in Sacramento and Los Angeles, CA both used *t*-tests. The first study found that total vegetables, dark green, orange vegetables, legumes and other vegetables were significantly higher when buying fruits and vegetables than the 2005 Dietary Guidelines for Americans recommends to increase (Cassady et al., 2007). The second study showed that healthier market basket foods of TFP foods were all significantly more expensive than the TFP foods amongst all incomes and stores in both cities (Jetter et al., 2006).

Hosler and colleagues used simple weight adjusted z-scores to examine store density per 10,000 residents in rural and urban communities. Investigators found a higher density of supermarkets in mixed neighborhoods than in minority neighborhoods, due in part to the absence of supermarkets in minority neighborhoods (Hosler et al., 2008).

2.7.4 Descriptive observations

The final and smallest group of studies used only descriptive statistics or no inferential statistics. Cole et al. (2010) examined food availability, price and quality as part of the study by Morland and Filomena (2007) reported above. Predominantly African American neighborhoods had lower average costs for fruit and vegetables than did predominantly white neighborhoods (Cole et al., 2010). However, average food quality did not differ between predominantly white versus African American neighborhoods (Cole et al., 2010). The last study reported the same constructs using a community food security approach. Investigators reported that smaller markets had lower prices than chain stores, and that food quality was variable, with small markets providing culturally specific foods (Short et al., 2007).

This section illustrates the range of statistical analyses used to examine food availability, price and quality and socioeconomic characteristics. Of the 25 studies reviewed that examined urban food environments in the US, only 7 used any type of regression. Most used less powerful analyses that could not account for covariates. It is not clear to what such difference can be

attributed, although the variety of investigators from diverse disciplines, the different number of dependent variables and the nature of independent and dependent variables provides some explanation.

2.8 Community perspectives on food availability, food price, and food quality

Food availability and other related constructs are integral to measuring potential influences on food choice, particularly for African American women. The following review includes three qualitative and three mixed method studies, all fairly recent, exploring perceptions of the nutrition environment and access to foods by African Americans in urban environments in the US. People's perceptions of food availability, cost, and quality are important factors to consider when exploring the availability of healthy food. As a lone construct, perception of food availability contributes to people's self-efficacy to eat well. Self-efficacy sometimes called self-confidence to perform a specific behavior was first proposed by Bandura, but is considered a key construct of several behavioral theories (Bandura, 1989).

A study on dietary choices in both urban and rural environments used semi-structured in-depth interviews to elucidate women's perceptions of the community food environment (Jilcott, Laraia, Evenson, & Ammerman, 2009). Of the 28 low to moderate-income women ages 37 to 67 years, 19 were African American and 15 lived in urban/metro areas. Results showed that perceptions of food stores affected participants' food use and food choices, differing by whether they were urban or rural. Whereas both groups reported living far away from supermarkets, one urban resident felt that lack of transportation, and living far away from a supermarket limited her options (Jilcott et al., 2009). Discount superstores containing full sized grocery stores yielded mixed experiences. Although fully stocked with a large variety, respondents felt the discount environment was a hassle, "Walk a long time, you know it's better prices but it's more of a

hassle, noisier” (Jilcott et al., 2009). Interviews also revealed that families had a major influence on home food availability, particularly the perceived impact on diet and health. This study revealed similarities in barriers to access between both rural and urban food environments. Rose (2011) studied the relationship between agency and social structures in food acquisition in two Detroit neighborhoods using semi-structured interviews with 47 African American men and women, aged 18 to 56 years. Participants reported dissatisfaction with cleanliness, service, food selection, food quality and prices at local grocery stores. Few people relied exclusively on options either just within their neighborhood (11%) or outside their neighborhood (19%) (Rose, 2011). As facilitators to food access, respondents reported shared transportation to grocery stores, carefully inspecting produce and meat before purchasing, biking to stores proximal to their homes and shopping at multiple locations within walking distance (Rose, 2011). Food banks also played a role in reducing costs, in terms of access to canned goods. This study was informative because it reflected the difficulties and strategies residents used to acquire healthy and safe food. It also may parallel experiences of residents in the research community of this current study, which is a smaller city in Michigan still recovering from corporate disinvestment and population decline.

A study in four cities—Baltimore, MD, Birmingham, AL, Chicago, IL and Durham, NC—to assess African Americans’ perceptions of their food marketing environment used both interviews and focus groups with 42 young adults and their 75 parents. Price was a factor in all locations and a hindrance to buying healthy food, but an advantage when buying prepared foods such as Big Macs® or fried chicken (DiSantis et al., 2013). Participants also acknowledged and lamented that some of the low priced foods were not healthy options, which made it difficult to

obtain foods that they wanted for their families (DiSantis et al., 2013). It will be interesting to see if similar reports are elicited in the proposed study.

A study to describe African Americans' perceptions of a limited food resource environment and strategies for acquiring food in a low-income community in Chicago, IL used in-depth interviews with 30 women, ages 21-45 years who had a child younger than 18 years old at home (Zenk et al., 2011). Environmental barriers included material barriers to food availability, quality and store availability, while economic barriers were related to food prices at both supermarkets and smaller stores. Socio-interactional features included safety concerns and poor customer service (Zenk et al., 2011). The adaptive strategies of *optimizing* and *settling* referred to ways in which participants decided how best to acquire what they wanted and needed. Proactive and advocating strategies were about minimizing problems to maximize safety and enhance the food available from patronized food store environments, all vital skills to navigate difficult food environments (Zenk et al., 2011). This study is pertinent to the proposed study in that the focus group had the same demographic characteristics as one of the two proposed focus groups—that of caregivers of children under age 18 years.

In addition to qualitative studies, the literature on perspectives of food by African Americans included three recent ones using mixed methods. These studies had either a qualitative phase or a qualitative component as part of a much larger quantitative assessment. An early study by Freedman (2009) explored perceptions in low-income communities of access to healthy food from 20 participants, of which 90% and 70% were African American and female, respectively. Participants completed in-depth interviews regarding factors influencing changes in healthful food consumption and perceptions of food access. They reported that local markets were not “real” stores and that they had to go beyond local stores to access healthy food

(Freedman & Bell, 2009). In fact, over half reported being unsatisfied with the stores in their neighborhood (Freedman & Bell, 2009).

In North Carolina access to food by African American seniors, 60-89 years of age, used a combination of focus groups and mapping (Waites, 2013). Focus group participants represented communities that were urban/suburban, suburban/rural and predominantly female (85%), similar to the second demographic group for Phase II of the proposed study except that all will be urban. Subthemes from the focus groups revealed that seniors attempted to eat a well-balanced diet, but access to healthy foods was challenging. When results were combined with that from maps consolidated themes revealed, “They wanted healthful diets, but found it difficult due to transportation barriers, cost and overall lack of access to helpful information and assistance, difficulty navigating the barriers to accessing health supporting amenities and wanting health promotion programs that were easier to access” (Waites, 2013). Triangulation of results from this consolidated ecological analysis provided a framework for analyzing mixed methods studies with older adults, particularly of adults with issues surrounding physical mobility, fixed incomes and geographic accessibility. All of these factors directly affect healthy aging.

A study in Pittsburgh on the reasons underlying dietary behavior and choice of supermarket included 10 focus group participants as part of a larger survey regarding perceptions of local supermarkets. Findings revealed that these 10 participants were dissatisfied with the quality of food and selection of produce and that they perceived unjustified price disparities between local chain supermarkets (Kumar, Quinn, Kriska, & Thomas, 2011). Survey respondents were 84.5% African American and results were combined into subthemes created from both quantitative and qualitative studies. With a sample size of only 10 participants though, this study may not have reached data saturation.

These studies about African Americans' perceptions of their food environments living in urban communities reveal that both African American women and men in urban environments perceived barriers to healthy foods as issues around food safety, price, availability, quality, and transportation. Exploration of a community's perceptions to purchasing healthy foods is imperative to understanding facilitators and barriers, which in turn affect consumption. None of these studies, however, reported using a Womanist or a related Feminist theory, as this study.

2.9 Theoretical frameworks

2.9.1 Socio-ecological model of the nutrition environment

Both phases of this research are undergirded in part by the socio-ecological model of the nutrition environment. Uri Bronfenbrenner developed the socio-ecological model of the ecological environment, originally to understand child development, as nested structures interacting directly and indirectly with each other (Bronfenbrenner, 1977). The microsystem details the relationship between the person and the environment in their immediate setting. The mesosystem comprises the interrelations in settings containing that person at the time. The exosystem is an extension of the mesosystem and includes social structures influencing people's experiences, both formal and informal, such as government agencies and goods and services. Finally, the macrosystem is the large overarching practices and sectors of the environment including social, educational, legal and political systems (Bronfenbrenner, 1977).

The socio-ecological model and its variants, have served as the framework in the review by Robinson (2008) to explore fruit and vegetable intake in low-income African Americans. The model has also undergirded: 1) an examination of school health promotions to improve food consumption (Moore, de Silva-Sanigorski, & Moore, 2013); 2) focus group questions to explore adolescent eating behavior (Verstraeten et al., 2014); and 3) an examination of the perceptions,

preferences and practices influencing healthy aging of African American seniors (Waites, 2013). Story and colleagues (2008) adapted the socio-ecological model for nutrition to elucidate the multiple influences that affect what people eat. These include the macro-level environments (sectors), physical environments (settings), social environments (networks), and individual factors (personal) (Figure 1). In the proposed study, the socio-ecological model of the nutrition environment, which is how Story and colleagues refer to it, informs research by explicating the potential connections between store type, food availability, and location within individual factors (microsystem), the social environment (mesosystem), and the physical environment (exosystem). An individual patronizing food stores interacts at several system levels, which in turn affects access to and what they consume. The macro level environment shown in Figure 1 is not directly addressed in this study. Phase I of the study related most to the physical environment, but also some to the individual in terms of income and race/ethnicity. The individual factors and social environment of the model related most to Phase II of this study.

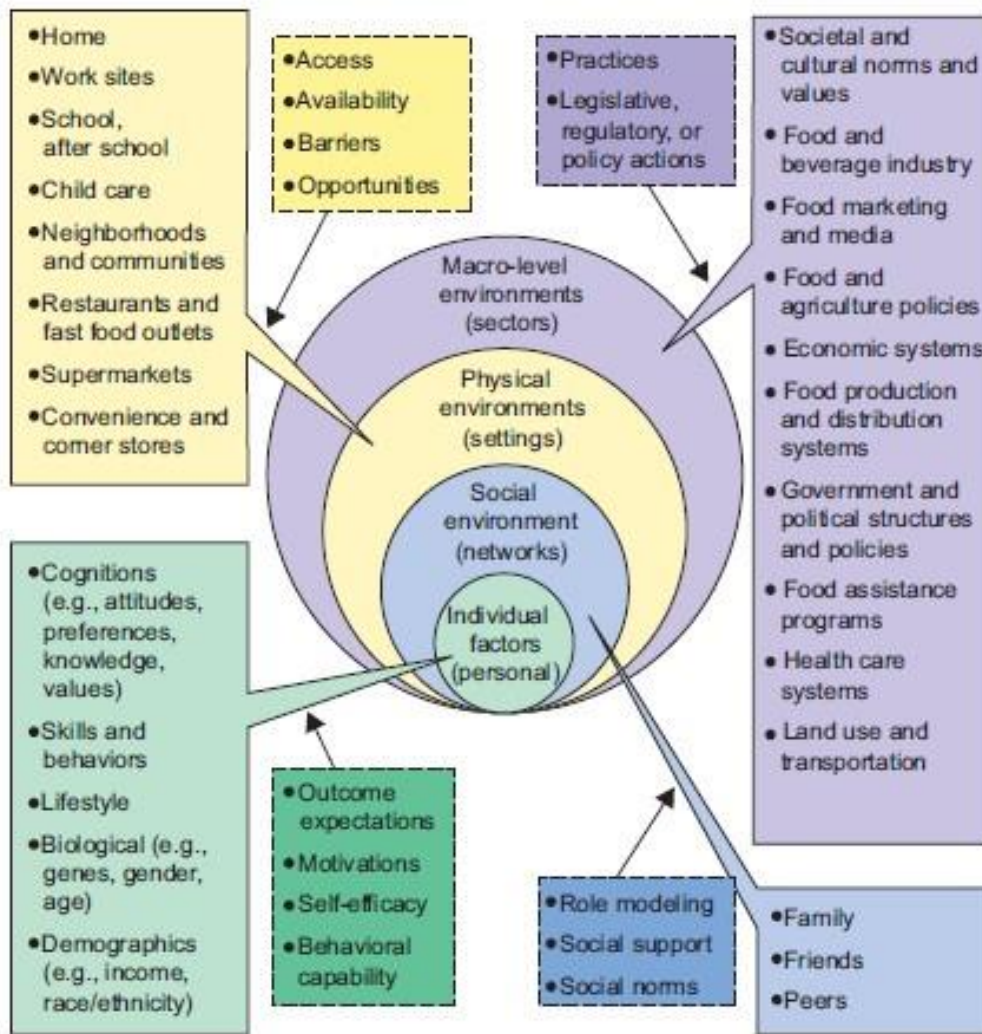


Figure 1. A socio-ecological framework depicting the influences of what people eat (Story et al., 2008).

2.9.2 Womanism

In search of a framework in which to explore African American women's perceptions of their experiences in an urban food environment, Womanism, also called Black Feminist Theory or Womanist Theory in some disciplines, was selected as a lens to differentiate African American women's reality from that of white women in Phase II of this research study. The literature search yielded far more books than articles exploring Womanism and multiple

disciplines and fields are included in the theories' feminist progenitors. Some authors of *whitestream* or mainstream Feminism included Gloria Steinem from publishing, and Patricia Hill Collins and Nancy Chodorow from sociology. Because this early Feminist Theory did not reflect the experience of African American womanhood in America, Womanism was seen as a necessity. Some progenitors of Womanism included Kimberlé Crenshaw from law, and Audre Lorde and Alice Walker, both authors. JoAnne Banks-Wallace, Valerie Borum and others have applied Womanism in relation to physical and mental health. Womanism places African American women's ideas, knowledge and experiences at the center of the analysis, because their experiences are shaped by not just by race, but also their sexual orientation, class and gender (A. Y. Davis, 1981).

Collins delineates four dimensions of a Womanist belief system with the intention of confirming and acknowledging African American women's realities. The dimensions are: 1) lived experience as criteria of meaning; 2) the use of dialogue in assessing knowledge claims; 3) the ethics of caring; and 4) the ethic of personal accountability.

Many African American women view their lived experience as a determining factor between knowledge and wisdom (Banks-Wallace, 2000). African American women view wisdom as essential to their survival as an oppressed group (Collins, 2000). On the other hand, knowledge, without wisdom, is considered sufficient for those who are in power. Collins notes that "individuals who have lived through the experiences about which they claim to be experts are more believable than those who have merely read or thought about such experiences" (p. 257). Of course, one also needs to reflect upon lived experiences in order to gain wisdom.

African American women's conversations with each other are a way of sharing, verifying and reflecting on experiential knowledge, leading to perspective and wisdom. African American

women's central position within their communities, families and churches supports this use of conversation as a mode of gaining and verifying knowledge (Collins, 2000). It is also a mode of establishing and maintaining connectedness and integral to the development and testing of knowledge claims within the Womanist framework (Banks-Wallace, 2000).

The ethics of caring consists of three interrelated components—individual expressiveness, appropriateness of emotions, and empathy with women of other races (Collins, 2000). This aspect of Womanism relates well to issues of health care (Banks-Wallace, 2000) and implies that one's own well-being is connected to that of others. It is also antithetical to paternalism and promotes the improved well-being of the collective (Banks-Wallace, 2000).

The fourth aspect, the ethic of personal accountability, says that one's claims cannot be separated from their personal experiences and beliefs, and that knowledge is based on realities and not abstraction (Collins, 2000). In other words, the views expressed by an individual are expected to be based on their core beliefs (Banks-Wallace, 2000). Collins stated "that, assessments of an individual's knowledge claims simultaneously evaluate an individual's character, values and ethics. For example, many African Americans reject prevailing beliefs that probing into an individual's personal viewpoint is outside the boundaries of discussion" (p. 264).

Womanism has been used as a guiding theory for a variety of research explorations, particularly to explain African American women's health, to explore their perceptions of suicide, depression and protection (Borum, 2012). It has also been used to explain generational caregiving (Wells-Wilbon & Simpson, 2009), and self-management practices guiding older African American women's health behavior (Harvey, Johnson, & Heath, 2013). For this dissertation, the first three aspects of Womanism will be used, along with the socio-ecological model, to guide the focus group questions relating to African American women's perceptions of

food access. It should be noted, however, that as a result of coding the responses all four aspects of Womanism might be relevant.

As described briefly in the literature review, this study and research questions were developed over several years of working with *edible flint*, and as such is a direct response to the Flint community's expressed needs. The purpose of this study was twofold: to comprehensively assess food stores, including a variety of foods sold; and to explore African American women's perception of food access in the city representative of a multi-generational range of ages. This study was conducted in two phases using mixed methods. Phase 1 used quantitative methods for the food store assessments and Phase II uses qualitative methods for focus group assessments of African American women residents' perceptions about food access. Each phase is described separately.

2.10 Rationale for qualitative research

Qualitative methods were used to explore the perceptions of a group of mostly low-income African American women living in Flint using an ethnographic approach wherein the researcher describes and interprets shared and learned patterns of values, behaviors and beliefs, and emphasizes and builds on the perspectives of those in the target group (LeCompte & Schensul, 2010). Qualitative research is used for several important reasons: 1) to empower individuals to share their experiences, insight and to minimize power differentials between participant and researcher; 2) to acquire a detailed and complex explanation of an issue only offered by talking directly to people, allowing for an unencumbered expatiation of experiences and avoiding preconceived ideas from the researcher; 3) when statistical analysis and quantitative measures are an inadequate fit for the research problem (Creswell, 2007).

According to Denzin and Lincoln (2011),

Qualitative research is a situated activity that locates the observer in the world. Qualitative research consists of a set of interpretive, material practices that make the world visible. These practices transform the world.... This means that qualitative researchers study things in their natural settings, attempting to make sense of or interpret phenomena in terms of the meanings people bring to them (p. 3).

This type of research requires patience, time, resources and a commitment to study the problem in the natural setting of the research participants. These conditions are an integral facet of qualitative research, and are often lacking in solely quantitative studies.

Focus groups were used in Phase II to collect qualitative data (Morgan, 1993) because focus groups use a more natural setting than do surveys. Also, in focus groups, as opposed to interviews, people recall thoughts and feelings about topics elicited both by the moderator and other group participants (Morgan, 1993). Open-ended questions were used because they encourage participants to become involved with a research process and to articulate their thoughts in ways they see fit (Kitzinger, 1995).

The qualitative research methods in the current study do not neatly fit within commonly understood approaches to qualitative inquiry. They are not grounded theory, which intends to “generate or discover a theory” based on participants who have experienced similar processes (Creswell, 2007); not phenomenology, which describes the meaning of lived experiences for a group in relation to a particular phenomenon (Creswell, 2007); not narrative research capturing chronological sequence of events by a person or small group (Creswell, 2007; Daly, 2007); and not case study research, which entails detailed data collection of a case (i.e. a system or a several programs) using multiple sources of information (Creswell, 2007). The current study is most similar to ethnography, which typically involves long term observation of a group through participant observation, interviews with research participants and immersion in day-to-day activities in order to understand shared experiences of the cultural group. However, this study

involves the researcher in non-consecutive immersion with a community collaborative edible flint that represents residential interest in healthy food access and Flint residents' overall welfare, a community food store assessment and focus group interviews with research participants.

Ethnography is an approach wherein the researcher describes and interprets the shared and learned patterns of values, behaviors and beliefs and emphasizes and builds on the perspectives of those being researched (LeCompte & Schensul, 2010). To some, the current study might fail the criteria of being imbedded within the researched community. However, it will describe the learned patterns, behaviors, beliefs and cultural patterns of African American women through a place-based and the theoretical lens of African American woman's experiences. The qualitative inquiry within the current study is based on the researchers' more than three-year involvement and participation with activities of the community collaborative, edible flint.

“Critical ethnography is conventional ethnography with a political purpose” (Thomas, 1993, p. 4). The current study borrowed components of critical ethnography through the theoretical lens exploring the perceptions of food access of African American women at two nutritionally vulnerable times of life—those with children under 18 years old and those over 60 years of age—living in an urban post-industrial Mid-Western city. This sample exists at the intersection of race, gender and religion in order to explore how these factors affect perceptions of access to food.

Positionality, a key fixture of critical ethnography, forces us, the researcher(s), to acknowledge our concomitant power, privilege and biases while revealing the power structures surrounding our subjects (Madison, 2005). This concern for our subjects (here, the focus group

participants) means that the researcher maintains awareness of her positionality while engaging in a deep exploration of the experiences of the *Other*. Madison (2005) writes,

Subjectivity is certainly within the domain of positionality, but positionality requires that we direct our attention beyond our individual or subjective selves. Instead, we attend to how our subjectivity in relation to the *Other* informs and is informed by our engagement and representation of the Other. We are not simply subjects, but we are subjects in dialogue with the *Other*. We understand that our subjectivity is an inherent part of research, but in critical ethnography it is not my exclusive experience—.... I contend the critical ethnography is always a meeting of multiple sides in an encounter with and among the *Other(s)*, one in which there is negotiation and dialogue toward substantial and viable meanings that make a difference in the Other's world. (p. 9).

Such positionality demands that the researcher acknowledge and address this subjectivity, which was done in several ways such as reflexivity, positionality, and trustworthiness. Each of these components is explained below.

The practice of **reflexivity** is a process wherein the researcher(s) reflects critically on their role as researcher (Denzin, & Lincoln, 2011) and where the researcher is conscious of biases, values and the experiences they bring to a qualitative research study (Creswell, 2007). The inclusion of a reflexive practice, as part of the audit trail, is integral because a researcher's biases and experiences can shape the research outcome.

Perspective refers to my status as both insider and outsider with respect to this research. I am an insider because of my long term involvement with the edible flint Access and Education workgroup, meeting attendance and other edible flint events; an outsider, because I am not a Flint native and I do not live in or near the city of Flint. Also, as an African American woman who grew up spending a great deal of time with great-grand parents, I identify with the cultures of both younger and older African American women, but not necessarily the subculture of African American women living in Flint, MI, a post-industrial North Central city environment, further demonstrating my status as an insider/outsider. The ultimate goals of this ethnography

were threefold: 1) to provide opportunities for African American women to share their experiences acquiring food and navigating the food system using their own words and experiences; 2) to elucidate African American women's experiences that may impede and complicate the acquisition of healthy food, thus their consumption; 3) and to improve the access to variety and healthy food for the residents of Flint, particularly African American women.

CHAPTER 3

METHODS

Methods are divided, beginning with the quantitative section then the qualitative section. Each section details the sampling frame and—where applicable— recruitment, procedures, measures of reliability and validity, instruments used for data collection and data analysis. The organization of the quantitative and qualitative sections are parallel, and are organized based on steps that are specific for each respective exploration.

3.1 Phase I. Quantitative food store assessment

3.1.1 Sampling frame

In this study the researcher assessed food stores both within the city of Flint and those within a two-mile buffer of the city. The buffer area outside the city limits was set at two miles to ensure the inclusion of stores that city residents could patronize, especially the Wal-MartTM store. The Michigan Department of Agriculture provided the data on all licensed stores within these areas in March 2012. A trained Flint resident verified each location through in-person, direct observation, i.e., *ground-truthing* (Hillier et al., 2012; Powell et al., 2011; Sharkey & Horel, 2008). New stores discovered during this verification and during the assessment were added to the list. Within the city of Flint, 161 stores were assessed, because they sold food and agreed to permit an internal assessment in the summer of 2012. There were 89 similar stores assessed within a two-mile buffer surrounding the city. See Figure 2 for the Sampling Schematic.

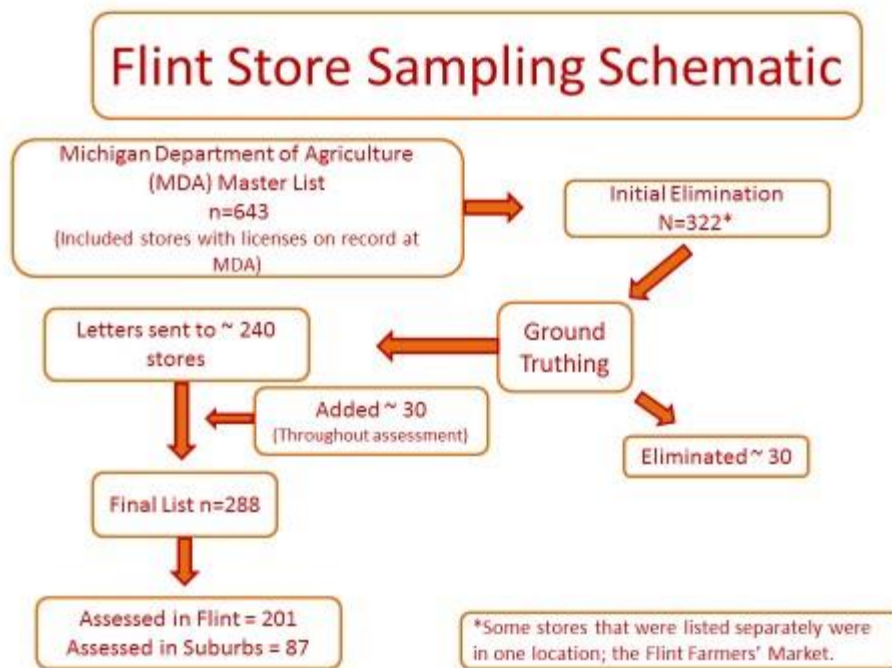


Figure 2. Sampling schematic of Flint Food Store Assessment.

3.1.2 Procedures

A faculty member trained in Geographic Information Systems from the Department of Geography at Michigan State University created a map of Flint that included a three-mile buffer beginning at the city boundaries using ArcMap 10.1 (ESRI, Redlands, CA) and publicly available data sources. See Figure 3 for the map of Flint, so defined. Next, the researcher obtained a list of stores from the Michigan Department of Agriculture and a post-baccalaureate Flint resident proceeded to *groundtruth* each store location as described in the section on Sampling Frame. Because Arab-Americans owned many food stores in Flint, the researcher held a meeting with the Executive Director of the Arab-American Heritage Council and a member of *edible flint*, who was a key informant in the community. At the same time the researcher advertised for food store assessors through VISTA/AmeriCorps. Out of approximately 30 applicants, two were hired to work fulltime and two from another location worked part-time.

After training with the instrument, adapted from other instruments for this study (and described later in Methods), these four assessors worked in pairs to assess Flint stores from the third week in June to the third week in August 2012. Prior to conducting the store assessment phase of this study, the researcher mailed announcements to selected food store addresses in both English and Arabic. See Appendix A and B for the English and Arabic documents. On the day of the assessment for each store, assessors also presented these letters to store employees. See Appendix C for the combined Arabic and English document. The data resulting from these assessments will be analyzed using a score for food availability, price and quality.

3.1.3 Training of food store assessors

The researcher trained the four assessors both in-house and in the field over eight days. On the last two days of training, the assessors worked in pairs and assessed the same stores at different times of day to conduct reliability testing of their scoring. Each pair scored five store types that were representative of stores encountered out in the field, ranging from small to large types of food venues.

3.1.4 Reliability and validity

Percent agreement to measure the internal consistency of assessors should be between 0.61 and 1.00 for substantial to almost perfect (0.61 to 0.80) and substantial agreement (0.81 to 1.00) (Landis & Koch, 1977). Percent agreement ranged from 0.68 to 1.00 for the two pairs.

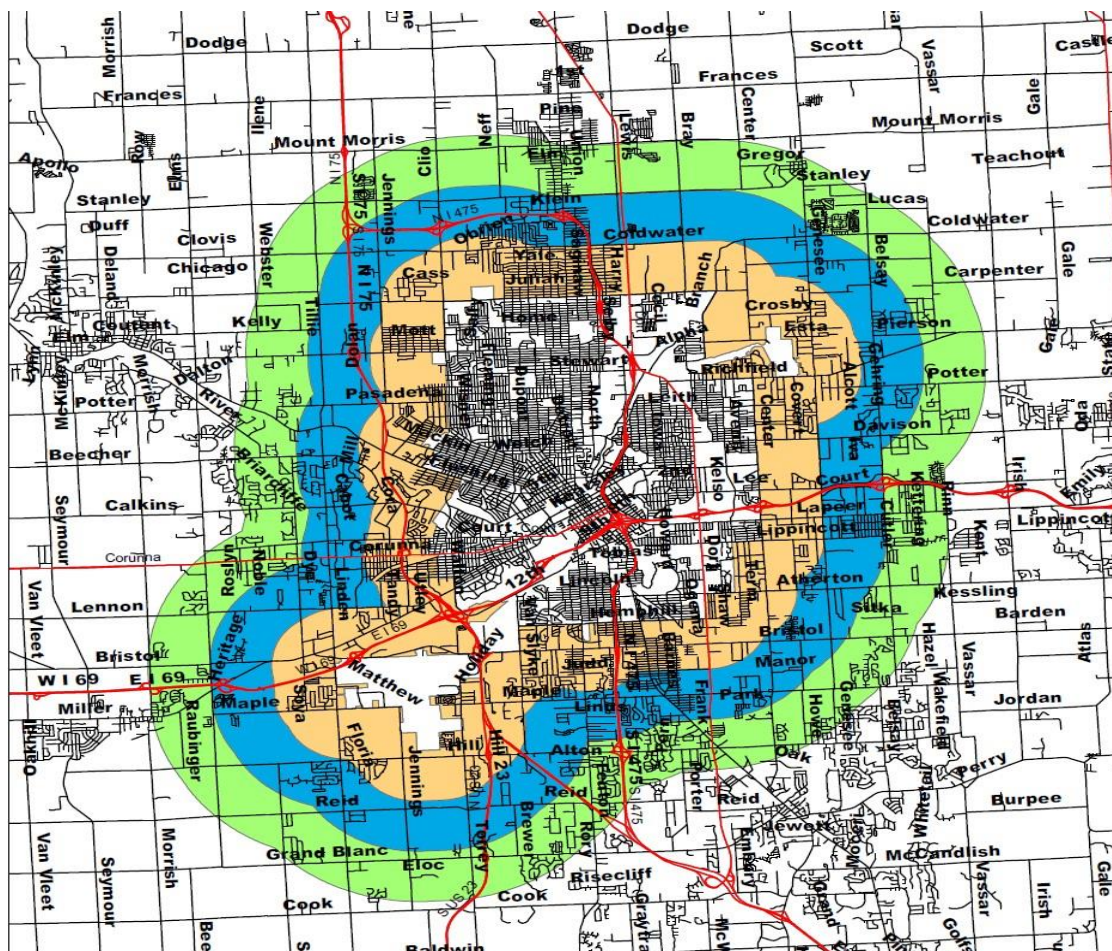


Figure 3. Map of Flint city including three-mile buffer.
Yellow = 1 mile buffer; blue = 2 mile buffer; green = 3 mile buffer

3.1.5 Flint food store assessment instrument

3.1.5.1 Preliminary development and testing

Prior to data collection for this study, the community partner, *edible flint*, and researcher conducted an initial store assessment in spring, 2011. The members of the Access and Education Workgroup of *edible flint* searched the literature for food store assessments and created a four-page instrument from items used in several published instruments and other items of interest to workgroup members. For the 19 stores assessed in 2011, the youth and adult assessors recorded store type, physical accessibility (i.e., parking, ramp curb cut, handicap parking and automatic

door), store hours, signage, services offered, payment and goods and services offered. This initial store assessment demonstrated the community's interest in food store assessment, but also weaknesses in the instrument's usability, formatting, reliability, validity, and breadth of available foods.

3.1.5.2 Final instrument—Flint Food Store Assessment (FFSA)

Following the 2011 initial store assessment, this researcher in collaboration with the Access and Education Workgroup created an improved instrument for the 2012 assessment based primarily on the Nutrition Environment Measurement Survey of Stores (NEMS-S) (Glanz et al., 2007), but also using formatting from the Food Retail Outlet Survey Tool (FROST) instrument by (Hosler & Dharssi, 2011). Glanz, a health educator, originally developed NEMS-S to focus on the percentage of calories from fat in foods due to concern for obesity (Glanz et al., 2007). The NEMS-S has been tested for validity and reliability and has often been used or adapted for food store assessments. Therefore, the NEMS-S comprised the majority of items used in the FFSA for ease of comparison of sub-constructs.

The final FFSA had 63 foods and beverages organized into 11 groups, 32 food items were identical to the NEMS-S. See FFSA instrument Appendix D. These were fresh fruit (10 items); fresh vegetables (10 items); milk and alternatives (4 items); ground beef (2 items); sweet beverages (4 items); and breads (2 items). Because this researcher was most interested in including foods to reflect the 2010 Dietary Guidelines for Americans (Cleveland, Moshfegh, Albertson, & Goldman, 2000; C. G. Davis & Lin, 2005; US Dept. of Health & Human Services, 2011) and those in the Dietary Approaches to Stop Hypertension (DASH) diet (Karanja et al., 1999), some food items were added to the FFSA. Added categories were frozen and canned fruits and vegetables, dried fruits, nuts and seeds, and cheese and eggs. Other added items were bagged salad, juice mimics like Sunny Delight™, and dairy milk alternatives to address needs

of those lactose intolerant. Items removed from the NEMS-S to reduce the length of time to collect data in each store included frozen meals, baked goods, and chips. Like similar food store environment instruments and the NEMS-S, the FFSA assessed availability, price and quality of foods (Franco et al., 2009; Glanz et al., 2007). Store assessors also reported handicap parking, wheelchair curb access and automatic door entry (Hosler & Dharssi, 2011) to measure the physical accessibility of food stores. Additional information for each store included parking, store hours, signage, services offered, goods, and forms of payment.

During Access and Education meetings and in breakout sessions at the Food for Change Summit in 2012 and 2013, organized to engage community partners to create approaches to issues around food accessibility in Flint, residents of Genesee County mentioned interest in increased access to healthy food and fresh fruit and vegetables. This research is particularly timely. Beginning in December 2013 five large grocery stores have closed in the city of Flint and an approximate four-mile radius around the city (VG's, stores one and two, closed in December 2013 in Flint Township; Kroger, store 3, at 2629 Pierson Road in Flint on August 16, 2014; Kroger, store 4, at 1916 Davison Road in Flint closed on March 28, 2015; and Meijer's, store 5, at 4333 Pierson Road in Mount Morris Township closed on May 22, 2015). Excluded from this list is Witherbees, which opened before this research started in 2011, and closed in 2012. For a map of closed stores including Witherbees, see Figure 13.

3.1.5.3 Food assessment categories

See Table 5 for a list of the six food groups used for the analysis. The items included on the Flint Food Store survey are representative of those foods and include foods that can contribute to creating a meal (i.e., pasta, rice) and may be inconsistently available in smaller stores, such as convenient and corner stores (i.e., alternative milk, canned tuna, oats). Prices

were recorded for each of the food categories but not each item. Items without prices include lactose free milk, bottled water, pretzels, chips, ground turkey, lean hot dogs, chicken, seafood, meat alternative, canned tuna, and peanut butter. The next section includes a detailed explanation of the 11 original food groups, which were further aggregated into six food categories for the data analysis, and are aggregated into six groups below. They are listed below with accompanying justifications. Also, for a detailed list of the original eleven food groups please see the manual used by the food store assessors in Appendix E.

Table 5.

Flint Food Store Assessment Food Categories and Constructs

11 Original Groups	Food Categories	Food Components	No. of items	Constructs: Availability, Quality and/or Price
1. Milk 2. Cheese (included eggs)	Dairy	Low-fat Milk, Reduced Fat Milk, Whole Milk, Reduced Fat Cheese, Full Fat Cheese, Alternative Milk and Lactose Free Milk	7	Availability and Price
2. Cheese (included eggs) 5. Dried Fruit, Nuts/Seeds & Snacks 6. Meat 10. Canned Beans, Peas & Tuna	Protein	Nuts and Seeds, Regular Ground Beef, Lean Ground Beef, Ground Turkey, Chicken without Skin, Seafood, Meat Alternative (i.e., Boca Burger), Canned Tuna in Water, Peanut Butter, Canned Beans and Dry Beans, Fresh Eggs	11	Availability and Price
4. Beverages	Beverages	100% Juice and Diet Soda	2	Availability and Price
3. Fresh Fruit 5. Dried Fruit 8. Frozen Vegetables & Fruits 9. Canned Fruit and Vegetables	Fruit	10 Fresh Fruits (Bananas, Apples, Grapes, Oranges, Pineapple, Peaches, Strawberries, Blueberries, Watermelon, Pears), Dried Fruit, Canned Fruit, Frozen Fruit	13+	Availability, Price and Quality
7. Fresh Vegetables 8. Frozen Vegetables & Fruits 9. Canned Fruit and Vegetables	Vegetable	10 Fresh Vegetables (Carrots, Potatoes, Cabbage, Tomatoes, Broccoli, Lettuce, Corn, Onions, Dark Leafy Greens, Sweet Potatoes), Canned Vegetables, Frozen Vegetables and Bagged Salad	13+	Availability, Price and Quality
11. Grains	Grains	Whole Grain Cereal Low Sugar, Oats, White Rice, Brown Rice, White Bread, 100% Whole Grain Bread, White Pasta, Whole Grain Pasta	9	Availability and Price

3.1.5.3.1 Dairy

Dairy milk was assessed based on fat content in half gallon and gallon sizes. Low-fat milk includes 1%, 0.5% and 0.4 % (skim) fat content. Reduced fat milk contains 2% fat content by weight and whole milk is 3%. Lactose free milk was listed as a “yes” or “no”

item Dairy milk alternatives were assessed at half-gallon size, as commonly found in stores. Dairy milk alternatives included soy, almond and coconut milk and were included because a portion of the population is lactose and we wanted to assess the presence of other types of non-dairy milk. If half gallon was not available, it was noted in the comment section. Cheese (cow's milk) was assessed as fat free, 2% (reduced fat) and full fat. Cheese is consumed in large amounts by Americans, primarily as an addition to foods, like pizza and nachos.

3.1.5.3.2 Protein

Protein category included multiple animal and plant proteins. Sources of protein such as ground beef and chicken (without skin) are representative of a variety of commonly consumed meat in the United States. Ground beef is especially important because it makes up a largest portion of the fresh beef market (42%) and because it is consumed by low-income consumers more than their middle or high-income counterparts (C. G. Davis & Lin, 2005). It is also sold in range of fat content that includes lean, greater than or equal to 90/10 lean/fat and regular, 80/20% lean/fat, etc. The range of lean/fat for ground beef is important because availability of lean ground beef at food stores varies.

Chicken available without skin, ground turkey with $\leq 10\%$ fat and seafood can be lower fat alternatives to regular ground beef and were also assessed for availability. Meat alternatives included Boca Burger® and other types of non-meat analogues. Lean hot dogs included those labeled and fat free, reduced fat or made with turkey. Items in the meat/protein category were chosen to be representative of the variety of the items available for purchase and as well as items that would contribute to creating a balanced meal. Canned tuna in water and peanut butter are both good sources of protein, do not need to be

refrigerated and are allowed foods on the Michigan WIC (Michigan Department of Health & Human Services, 2013). Items availability was the only construct assessed.

Canned and dried beans, peas and lentils are constituents of a healthy diet and constitute the rest of the protein category. They are non-animal sources of protein, and provide fiber and nutrients, and are components of the DASH (Dietary Approached to Stop Hypertension) diet. Beans and peas, along with grains, contribute to necessary amino acids to create a complementary protein. Per pound, they are also less expensive than meat, which could be important for residents with limited funds. Nuts and seeds, in addition to bean, peas and lentils are all components of the DASH diet (Svetkey et al., 1999). Also, canned and dry foods may be more available at smaller corner stores than fresh foods. Fresh eggs, seafood, alternative meats such as Boca Burger ®, canned tuna in water and peanut butter were also assessed for availability.

3.1.5.3.3 Beverages

Beverages assessed included 100% juice, juice drink, soda, diet soda and plain bottled water. Juice drinks and sodas are forms of sugar sweetened beverages (SSB) that are increasing in consumption in the United States, particularly in Blacks and young adults (Bleich, Wang, Wang, & Gortmaker, 2009). The increase in consumption and availability of SSB are important because they illustrate the range of purchasing options for residents in the city and the potential effect on health. For example, fruit punch consumption in women is positively associated with type 2 diabetes risk when consuming one or more drink per day than when consuming less than one drink per month (Schulze et al., 2004). Juice drinks, and similar tasting/looking sports drinks with juice added as a flavoring, are often consumed in place of 100% juice. Soda is one of the other sugar-sweetened beverages whose consumption has increased. Bottled water is an alternative to sugar sweetened beverages and contributes to

staying hydrated. Standards sizes for beverages were half-gallon of orange juice for 100% juice and half-gallon Sunny Delight ® for the juice drinks.

3.1.5.3.4 Fruit

Fruit was assessed as fresh, frozen, canned and dried. Ten fresh fruits included bananas, apples, grapes, oranges, pineapple, peaches, strawberries, blueberries, watermelon, and pears. The list of fruit and vegetables were guided by consumption patterns and included input from the community collaborative *edible flint*. The numbers of affirmative responses were counted and additional items were counted up to eleven or more. The price, amount, size and quality of each item were assessed. Bagged salad was assessed as a yes or no item. Frozen and canned fruit provide nutrients and fiber and are more available in smaller convenience stores in lieu fresh fruit. It is also important to mention that the original NEMS-S tool does not include frozen fruit. There are a range of sizes available for canned and frozen fruit which can make standardizing an assessment difficult. Canned fruit can be available in single serve and family size containers without an average size for a can (i.e., 15.2, 15.5, 14.5 ounce, etc.). The standard can size was up to approximate 15 ounces. If an approximate 15 ounce can was not available, then the size was scaled up to the next largest size, which was usually 20 ounces. The lowest priced item was chosen at the approximate 15-ounce size.

Assessment of frozen fruit had similar issues as canned fruit except there was a smaller range of sizes. Frozen fruit were typically available in 16, 12 ounces, and personal size of approximate six ounces. Plain fruit with no added sugar was assessed. Sixteen-ounce bags were the standard size, then 12 ounce if 16 ounces were not available. Canned and frozen fruit was assessed on availability, the number of types (up to 6 or more), price, and size bag in ounces. One-quarter cup of dried fruit is equivalent to a one-half cup serving of fresh fruit. Dried fruit

was included in this assessment because, while it is a concentrated source of sugars they provide vitamins, minerals and can contribute to the daily intake of fruit. Upon review of instruments gathered by the National Cancer Institute few instruments assessing the food store environment include dried fruit.

While the total availability fruit and vegetables have increased in the US from 1970 to 2005, the estimated amount of consumed canned fruit and vegetables has decreased by 35% between 1970 and 2005 (Buzby, Lin, Wells, Lucier, & Perez, 2008). According to the United States Department of Agriculture, the amount spent varies demographically, with Blacks spend the most on canned vegetables and households with 1 or more adult aged 65 or older spending more on canned fruits and vegetables than households without adults 65 years old or older (Buzby et al., 2008).

3.1.5.3.5 Vegetables

Vegetables were assessed as fresh, frozen, and canned. Ten fresh vegetables included carrots, potatoes, cabbage, tomatoes, broccoli, lettuce, corn, onions, dark leafy greens and sweet potatoes. The list of vegetables was guided by consumption patterns and included input from the community collaborative *edible flint*. The numbers of affirmative responses were counted and additional items were counted up to eleven or more. The price, amount, size, and quality of each item were assessed. Bagged salad was assessed as a yes or no item. Frozen and canned vegetables provided nutrients and fiber and are more available in smaller convenience stores in lieu fresh vegetables. It is also important to mention that the original NEMS-S tool does not include frozen vegetables.

There is a range of sizes available for canned and frozen vegetables, which can make standardizing an assessment difficult. Canned vegetables are available in single serve and family size containers without an average size for a can (i.e., 15.2, 15.5, 14.5 ounce, etc.). In

this assessment, the standard can size was up to approximate 15 ounces. If an approximate 15-ounce can was not available, then the size was scaled up to the next largest size, which was usually 20 ounces. The lowest priced item was chosen at the approximate 15-ounce size. Plain canned vegetables were chosen excluding varieties that added additional sauces, thus adding calories (varieties with added salt were included because the addition of salt is normally ingredient in canned vegetables).

Assessment of frozen vegetables had similar issues as canned vegetables except there is a smaller range of sizes. Plain vegetables with no added sauce or fat were assessed. Sixteen-ounce bags were the standard size, then 12 ounce if 16 ounces were not available. Canned and frozen vegetables were assessed on availability, the number of types (up to 6 or more), price, and size bag in ounces. For a more detailed explanation of the guidelines for selecting food items please see the Flint Food Store Assessment manual in the Appendix E.

Grains include whole grain/low sugar cereal, oats, white rice, brown rice, white bread, whole grain bread, white pasta and whole grain pasta. The whole grain/low-sugar calculation was based on the amount of sugar per serving, and was calculated as:

$$\frac{\text{Serving Size (g)}}{28.35} = \frac{X}{6}$$

For example, a 20-gram serving of whole grain cereal has 4.23 grams of sugar.

According to NHANES data, total grains are one of the few food groups Americans are consuming (Krebs-Smith et al., 2010). The grains category was created to represent the ability to create a meal with rice or pasta and for whole grain and higher fiber options to be represented in the scoring schema. Grains are an important component of the DASH diet as well (Svetkey et al., 1999). The availability of food that make up the DASH diet are

important because it is a healthy diet recommended for adults and for the potential, in the short term, to improve health outcomes for type 2 diabetics (Azadbakht, Surkan, Esmailzadeh, & Willett, 2011).

3.1.5.4 Flint food store assessment scoring schema

A scoring schema is an important mode of reporting results, which reflect an instrument's constructs. In keeping the community in mind, the scoring schema was created for accessibility to residents. The scoring schema was created by the researcher and community-based Associate Professor and Professors in Human Nutrition. Seventy-eight points were allotted for availability, 20 points represented total quality of fresh fruit and vegetables and 20 points were allotted for price, for a total of 118 points. The next section details scoring for availability, price, and quality constructs of foods.

3.1.5.4.1 Food availability

The availability of foods was scored seventy-eight points. Most foods were scored for availability as yes, available =1 and no, not available=0. If the available foods were the healthier options, for example lean ground beef, then availability was scored as 2. Items deemed to be of greater importance that were given two points included dairy milk alternatives, lactose free milk, lean ground beef, fresh eggs, 100% juice, oats, brown rice, whole grain bread and whole grain pasta.

A portion of food items were scored based on the availability of the range of items. For example, nuts/seeds types' availability was scored zero if none were available, one point if one to three were available and two points if four or more were available. Canned and dried beans variety received zero if none were available, one point if one to three varieties were available, two points if four to five were available and three points if six or

more were available. Lastly, frozen and canned fruit and vegetables were scored zero to four, skipping number one. The item received zero points if none were available, two points if one to three were available, three points if four to five were available and four points if six or more were available.

See Table 6 for a breakdown of the availability scoring schema. Fresh fruit and vegetables availability was scored based on a standard 10, and additional fruit and vegetables beyond 10. For example, fruit and vegetables were scored 0 if none were available, 3 points if 1 to 2 were available, 4 points if 3 to 4 were available, 5 points if 5 to 6 were available, 6 points if 7 to 8 were available, 7 points if 9 to 10 were available and 8 points if 11 or more were available.

Table 6.

Flint Food Store Assessment Scoring Schema for Food Items by Category for Food Availability
(Continues on following pages)

Food category, items scored	Points	Max score by item	Total max score
1) Dairy, Availability			
Low-fat/Skim (Y/N)	1/0	1	
2% Milk (Y/N)	1/0	1	
Whole Milk (Y/N)	1/0	1	
Dairy Milk Alternatives (Y/N)	2/0	2	
Lactose Free Milk (Y/N)	2/0	2	
Full Fat Cheese	1/0	1	
2% Reduced Fat Cheese	1/0	1	
Total Dairy Score			9
2) Proteins, Availability			
Nuts/Seeds, #of Types			
0 Varieties	0		
1 to 3 Varieties	1		
4 + Varieties	2	2	
Meat			
Lean Ground Beef (Y/N)	2/0	2	
Regular Ground Beef (Y/N)	1/0	1	
Ground Turkey (Y/N)	1/0	1	
Chicken w/o Skin (Y/N)	1/0	1	
Seafood (Y/N)	1/0	1	
Meat Alternative (Y/N)	1/0	1	
Fresh Eggs	2/0	2	
Tuna/ Peanut Butter			
Canned Tuna (Y/N)	1/0	1	
Peanut Butter (Y/N)	1/0	1	
Canned Beans/Legumes, #of Types			
0 Varieties	0		
1 $\geq$ 3 Varieties	1		
4 to 5 Varieties	2		
6+ Varieties	3	3	
Dry Beans/Peas/Lentils, #of Types			
0 Varieties	0		

Table 6 (cont'd).

1 $\geq$ 3 Varieties	1		
4 to 5 Varieties	2		
6+ Varieties	3	3	
Total Protein Score			19
3) All Fruit, Availability	Fresh Fruit		
0 Varieties	0		
1-2 Varieties	3		
3-4 Varieties	4		
5-6 Varieties	5		
7-8 Varieties	6		
9-10 Varieties	7		
11 or more Varieties	8	8	
Dried Fruit, #of Types			
0 Varieties 0			
1 to 3 Varieties 1			
4+ Varieties	2	2	
Frozen Fruit, #of Types			
0 Varieties 0			
1 $\geq$ 3 Varieties 2			
4 to 5 Varieties	3		
6+ Varieties	4	4	
Canned Fruit, #of Types			
0 Varieties 0			
1 $\geq$ 3 Varieties 2			
4 to 5 Varieties	3		
6+ Varieties	4	4	
Total Fruit Availability			18
4) Beverages, Availability	Juice		
YES 100% Juice	2	2	
Soda			
YES Diet Soda	1	1	
Total Beverages Availability			3
5) All Vegetables, Availability	Fresh Vegetables		
0 Varieties	0		
1-2 Varieties	3		
3-4 Varieties	4		
5-6 Varieties	5		
7-8 Varieties	6		

Table 6 (cont'd).

9-10 Varieties	7		
11 or more Varieties	8	8	
Bagged Salad (Y/N)	1/0	1	
Frozen Vegetables, #of Types 0			
Varieties	0		
1 $\geq$ 3 Varieties	2		
4 to 5 Varieties	3		
6+ Varieties	4	4	
Canned Vegetables, #of Types 0			
Varieties	0		
1 $\geq$ 3 Varieties	2		
4 to 5 Varieties	3		
6+ Varieties	4	4	
Total Vegetables Availability			17
6)Grains, Availability			
YES Healthier Cereal (Y/N)	1/0	1	
Oats (Y/N)	2/0	2	
White Rice (Y/N)	1/0	1	
Brown Rice (Y/N)	2/0	2	
White Bread (Y/N)	1/0	1	
Whole Grain Bread (Y/N)	2/0	2	
White Pasta (Y/N)	2/0	1	
Whole Grain Pasta (Y/N)	2/0	2	
Total Grains Availability			12
Total Points		78	78

3.1.5.4.2 Food quality

Quality total for fresh fruit and vegetables was 20 points and was scored *only* for fresh fruits and vegetables. One point was given for each of the available fruit had acceptable quality and if each available vegetable had acceptable quality. If 50% or more fruits and vegetables were in “acceptable condition,” they received a score of 1.

“Acceptable” means a majority (>50%) were in peak condition, top quality, good color, fresh, firm and clean. If 50% or more were in “unacceptable” condition this was scored as 0. Unacceptable meant bruised, old looking, mushy, dry, overripe, dark sunken spots in irregular patches or cracked or broken surfaces, signs of shriveling, mold or excessive softening. Each of the 10 fruits and 10 vegetables was scored as acceptable or unacceptable, for a quality range of zero to 20. See Table 7 for a breakdown of the quality scoring schema.

Table 7.

Flint Food Store Assessment Scoring Schema for Food Items by Category for Food Quality

Food category, items scored	Points	Max score for each food item
Quality of 10 Fruit		
Unacceptable	0	
Acceptable	1	1(10)
Quality of 10 Vegetables		
Unacceptable	0	
Acceptable	1	1(10)
Total Points Quality		20

3.1.5.4.3 Food price

Price was calculated for dairy, protein, grains, fruits and vegetables. In order to standardize price, the most consumed five fruit and vegetables were averaged based on the size of the store, that is, large or small. The largest stores were chain stores with larger inventory, thus buying power, and presumably cheaper fresh fruit and vegetables. These stores in town and within the two-mile buffer were included, consisting of Kroger, Meijer, Aldi’s, Save-A-Lot, VGs and Wal-Mart (n=15 stores) are used as the benchmark and considered standard stores. Selected nutrient dense and energy dense items from the dairy, protein and grain group were compared to the mean value of the same items from the 15

standard stores. Items included low-fat and whole milk, lean ground and regular ground beef, whole wheat/whole grain and white bread, brown and white rice and whole grain and white pasta. If the price was lower or the same than the mean value, one point was awarded. If the price was higher than the mean value, zero points were awarded.

Five fruits and vegetables were chosen to represent the price of fresh fruit and vegetables. Yearly, the US Department of Agriculture Economic Research Service (ERS) government measures the availability of hundreds of processed and raw food commodities to assess loss adjusted food availability. Loss-adjusted food availability adjusts for damaged products, plate waste, spoilage and other losses can be used as a proxy for per capita consumption. According to the ERS, in 2012 the seven most commonly consumed vegetables among US consumers were potatoes, tomatoes, onion, head lettuce, sweet corn, romaine and leaf lettuce and Chile peppers (United States Department of Agriculture, 2015). The seven most consumed fruit were oranges, apples, bananas, grapes, watermelon, strawberries and peaches and nectarines.

The National Health and Nutrition Examination Survey are a group of studies that measures the health and nutritional status of adults and children in the US combines both physical examinations and interviews. It examines a national representative sample of approximately 5,000 people every year (Centers for Disease Control and Prevention, 2015). Based on data from 2000 to 2004, the 10 top reported fruit were orange juice, apples, apple juice, banana, orange, fruit juice drink, grapes, watermelon, cranberry juice drink and orange juice (Kimmons, Gillespie, Seymour, Serdula, & Blanck, 2009; Kutner, Nachtsheim, Neter, & Li, 2005). The top 10 reported vegetables were: white potato, French fries, chips, hash browns, home fries; white potato baked and boiled; lettuce, mixed salad, greens, raw

spinach; pasta sauces; pizza; tomatoes; tomato catsup; salsa; cucumber raw and pickled (Kimmons et al., 2009).

Five fruit and vegetables were chosen to represent fruits and vegetables consumed by Americans excluding juice, juice drink, processed and prepared foods. Based on these sources and the items included in the tool, the top five fruit representing price were oranges, apples, bananas, grapes and watermelon. The top five vegetables representing price were white potatoes, tomatoes, onions, head lettuce and sweet corn.

In order to create a score that represented prices for half and whole gallon of milk, the prices of both whole and half gallons of milk were combined, thus scores were based on the combination of half gallon and gallon of low-fat and whole milk. Ground beef was based on the price per pound. See Table 8 for a breakdown of the pricing scoring schema.

Table 8.

Flint Food Store Assessment Scoring Schema for Food Items by Category for Food Price
(Continues on following page)

Food Category, items scored Points Max Score Dairy, Price (Low-fat and Whole Milk)		
Low-fat Milk is Lower/Same \$ as Avg. ⁷ \$ of Low-fat Milk at 15 Large Stores (Lg. S)	1	1
Higher \$ of Low-fat Milk than Avg.\$ of Low-fat Milk at 15(Lg. S)	0	0
Whole Milk is Lower/Same \$ as Avg.\$ of Whole Milk at 15(Lg. S)	1	1
Higher \$ of Whole Milk than Avg.\$ of Whole Milk at 15(Lg. S)	0	0
Proteins, Price		
Lean Ground Beef is Lower/Same \$ as Avg.\$ of Lean Ground Beef at 15 Large Stores	1	1
Higher \$ Lean Ground Beef than Avg.\$ of Lean Ground Beef at 15(Lg. S)	0	0
Reg. Ground Beef is Lower/Same \$ as Avg.\$ of Reg. Ground Beef at 15(Lg. S)	1	1
Higher \$ of Reg. Ground Beef than Avg.\$ of Reg. Ground Beef at 15(Lg. S)	0	0
Grains, Price		
Whole Grain Bread is Lower/Same \$ as Avg. \$ of WGB at 15(Lg. S)	1	1
Higher \$ of Whole Grain Bread than Avg. \$ of WGB at 15(Lg. S)	0	0
White Bread is Lower/Same \$ as Avg. \$ of WB at 15(Lg. S)	1	1
Higher \$ of White Bread than Avg. \$ of WB at 15(Lg. S)	0	0
Brown Rice is Lower/Same \$ as Avg. \$ of BR at 15(Lg. S)	1	1
Higher \$ of Brown Rice than Avg. \$ of BR at 15(Lg. S)	0	0
White Rice is Lower/Same \$ as Avg. \$ of WR at 15(Lg. S)	1	1
Higher \$ of White Rice than Avg. \$ of WR at 15(Lg. S)	0	0
Whole Grain Pasta is Lower/Same \$ as Avg. \$ of WGP at 15(Lg. S)	1	1
Higher \$ of Whole Grain Pasta than Avg. \$ of WGP at 15(Lg. S)	0	0
White Pasta is Lower/Same \$ as Avg. \$ of WP at 15(Lg. S)	1	1
Higher \$ of White Pasta than Avg. \$ of WP at 15(Lg. S)	0	0
Fruit		
Orange Lower/Same Price as Avg.\$ of Orange a 15(Lg. S)	1	1
Higher \$ of Orange than Avg.\$ of Orange at 15(Lg. S)	0	0
Apple Lower/Same Price as Avg.\$ of Apple at 15(Lg. S)	1	1
Higher \$ of Apple than Avg.\$ of Apple at 15(Lg. S)	0	0

⁷ Average price refers to the average price of an item from the largest grocery stores assessed, which includes 15 large stores.

Table 8 (cont'd).

Banana Lower/Same Price as Avg.\$ of Banana at 15(Lg. S)	1	1
Higher \$ of Banana than Avg.\$ of Banana at 15(Lg. S)	0	0
Grapes Lower/Same Price as Avg.\$ of Grapes at 15(Lg. S)	1	1
Higher \$ of Grapes than Avg.\$ of Grapes at 15(Lg. S)	0	0
Watermelon Lower/Same \$ than Avg.\$ of Watermelon at 15(Lg. S)	1	1
Higher \$ of Watermelon than Avg.\$ of Watermelon at 15(Lg. S)	0	0
Vegetables		
Potato Lower/Same \$ as Avg.\$ of Potato a 15(Lg. S)	1	1
Higher \$ of Potato than Avg. Price of Potato at 15(Lg. S)	0	0
Tomato Lower/Same \$ than Avg. \$ of Tomato at 15(Lg. S)	1	1
Higher \$ of Tomato than Average Price of Tomato at 15(Lg. S)	0	0
Onion Lower/Same Price as Avg.\$ of Onion at 15(Lg. S)	1	1
Higher \$ of Onion than Avg.\$ of Onion at 15(Lg. Stores)	0	0
Head Lettuce Lower/Same \$ as Avg.\$ of Head Lettuce at 15(Lg. S)	1	1
Higher \$ of Head Lettuce than Avg. \$ of Head Lettuce at 15(Lg. S)	0	0
Corn Lower/Same \$ as Avg. \$ of Corn at 15(Lg. S)	1	1
Higher \$ of Corn than Avg.\$ of Corn at 15(Lg. S)	0	0
Total Points Price		20

3.1.6 Data analysis

Sixty-three foods and beverages were grouped into six categories: dairy, protein, beverages, fruit, vegetables and grains. The software used for statistical analyses was R 3.2.2 and R Studio (R Development Core Team, 2010). In R, libraries were downloaded and used for different components of the quantitative analysis. The following libraries were used: “descr” (Aquino, 2015), “ggplot2” (Wickham, 2009), “Hmisc” (Harrell & Dupont, 2012), “lattice” (Sarka, 2008), “stats” (R Core Team, 2014), “car” (Fox & Weisberg, 2010), “spdep” (Bivand & Piras, 2015) and “rgdal” (Keitt, Bivand, Pebesma, & Rowlingson, 2011).

Before running regressions, score data for stores (store-score) were evaluated for missing data and patterns of missingness. Missing data were an issue and were addressed by

the researcher by creating codes in the statistical software that accounted for values left blank for each of the variables used in the data analysis.

Data analysis begins with tests of assumptions: 1) that error terms have a mean of zero: 2) homoscedasticity (e.g. consistent variance of error terms); 3) that independent variables and error terms are independent; 4) absence of multicollinearity (e.g., if race and median household income are highly correlated); 5) error terms are normally distributed (Poole & O'Farrell, 1971). Assumptions were tested and are detailed in the Results section.

Regression analysis begins with Ordinary Least Squares (OLS) regression (Kunter et al., 2005) (Step 1 in Figure 4) and model selection. If variables are not significant, indicating non-autocorrelation, then results of the OLS regression are kept. If at least one of the variables is significant, indicating autocorrelation of variable(s), spatial regression is conducted (Anselin, 2005). A spatial regression analysis as shown in Figure 4 will be conducted to evaluate the relationship between store-scores availability, price and quality, and independent variables (race and median household income).

Tests for AIC are implemented to direct model selection. As a test for bias selection and for evaluating models from a set of models, Akaike information criteria (AIC) will be conducted (Akaike, 1981; Gelman & Hill, 2007). If a model reduces prediction error, then the AIC value will be lower (Gelman & Hill, 2007).

Multi-collinearity was addressed by selecting the most important variables (Hession & Moore, 2011) and evaluating variance inflation factors (Kutner et al., 2005). To test for the presence and the source of spatial autocorrelation, Lagrange Multiplier (LM) diagnostic tests were run (Step 2 in Figure 4). The LM-error (LM-err) diagnostic tests for autocorrelation of the residuals or error terms, while the LM-lag diagnostic tests for autocorrelation of the dependent variable (i.e., store scores). The results determined whether

to keep the OLS model results or to run the full spatial regression. If neither LM-lag nor LM-error are significant, results of the OLS regression are kept.

If the LM-error is significant, the researcher will estimate a spatial error model (Step 3A in Figure 4). On the other hand, if the LM-lag is significant, the researcher estimates a spatial lag model that assumes that dependencies exist among the levels of the dependent variable. If neither is significant the OLS results are kept (Step 3B in Figure 4). But, if both LM results are significant, then a Robust LM diagnostics will be considered. The model with the most significant statistic is estimated and the spatial regression is run for either the robust spatial error model or the robust spatial lag model (Step 4 in Figure 4).

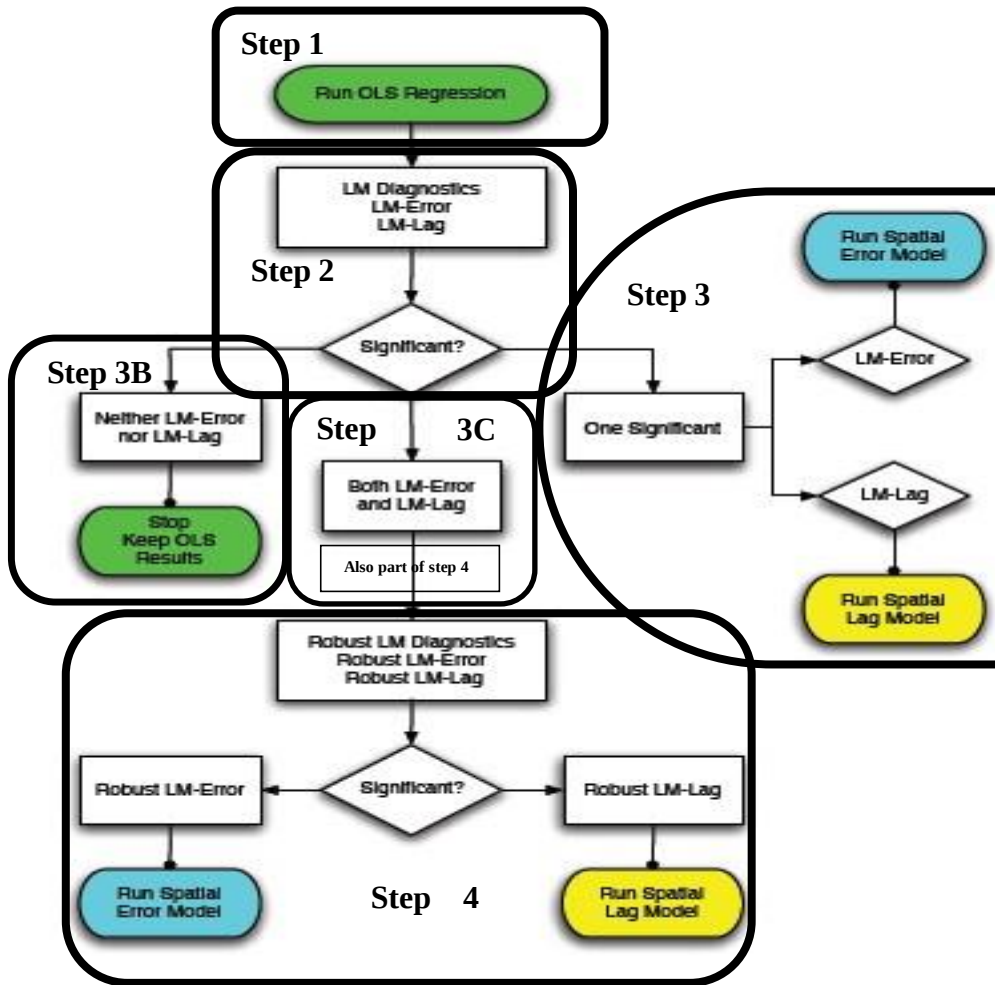


Figure 4. Visual representation of spatial regression analysis for Phase I modified from Anselin (2005).

Many data are correlated in space, some spatially autocorrelated, which violates the independence of variables assumption of linear regressions (Hession & Moore, 2011). Before conducting any analysis, tests of autocorrelation between total availability, total quality and total price and stores were conducted using distance-based spatial weights and k-nearest neighbor weights.

Distance-based spatial weights and k-nearest neighbors' weights will be based on meters and store points, respectively (Anselin, 2005). Spatially weighting is important, because if

unaccounted spatially autocorrelated data (i.e., stores) may be erroneously identified as independent. This assumption of independence incorrectly estimates p-values and standard errors, thereby concluding incorrect significances and biasing results.

Research question 1.3 consists of multilevel data at both the store and census tract level, which could be correlated. To test for independence of store and census tract level variances, intraclass correlation (ICC), ranging from zero, indicating not correlated, to one indicating correlation, will be conducted (Gelman & Hill, 2007).

3.2 Phase II. Qualitative assessment of African American women residents' perceptions

3.2.1 Sampling frame and recruitment

For the qualitative portion of this study, a purposive sample of two groups of African American women residing in the city of Flint, Michigan were recruited using criterion sampling (Sandelowski, 2000). Seventeen women were in the 21 to 50 years of age group participated in one of four focus groups, and 13 women 60 years of age and older were in one of four focus groups. Eligibility criteria included being an African American mother between the ages of 21 and 50 with children 18 years old and younger, or “senior” African American women aged 60⁸ and older. The duration of each focus group was approximately 35 to 75 minutes.

Participants were identified through the researchers' years of working in the community, by key informants working in community organizations, and by posting fliers in the community, emails to community organization listservs and word of mouth.

Participants were also recruited through snowball sampling from focus group participants,

⁸ As an example of community involvement, during a meeting with Community Based Organization Partners (CBOP) regarding participant recruitment, a group member asked about why the age group of older women started at 65. She noted that at 63 she deals with some of the same issues as her older friends. Upon her and another members' insistence, the age was lowered to 60 for the older group of women.

where participants told relatives, friends and shared information and/or flyer with fellow patrons at area food banks.

3.2.2 Procedures

Five to 10 participants are an appropriate number for a focus group, with five to eight participants being ideal (Morgan, Krueger & King, 1998). Focus group recordings were conducted separately with each group of African American women ranging in ages from 28 to 50 years old for the 21 to 50-year-old with children under 18 years old and younger group, and 60 to 75 for the 60 years old and older group. Focus groups were conducted with each age group until the researcher achieved data saturation, a common practice in qualitative inquiries (Creswell, 2007). The researcher created focus group questions and consent forms that were edited by the dissertation committee prior to submission to MSU's Institutional Review Board (IRB). Prior to any recruitment, IRB exemption and approval was received. Research assistants, African American undergraduate MSU students, also completed the MSU IRB required Human Research Protection Program training and were trained in preparation for focus groups.

Potential participants contacted the researcher by email or by telephone for explanation of the study, participant criteria and day and time availability. The researcher scheduled a focus group when at least five women of the same age group were available on the same time and day, and sent reminders to them one or two days beforehand. The researcher conducted the focus groups at two central locations in the city: 1) Michigan State University (MSU) Extension Genesee County offices; and the 2) Flint Public Library.

The researcher and/or the research assistant welcomed participants. Participants were given a group of forms to sign including the consent form, background information form and

nutrition form requested by community partner. A focus group interview guide was followed during the focus groups (Appendix H). Research assistants helped participants complete consent forms, recorded the discussion for later transcription and took detailed notes that included the layout of the room using note-taker forms (Appendix I for note taker forms).

Once forms were completed the audio recorders were turned on and the research assistant took notes. Participants were briefly (re)told information about the study, and the focus group began. The researcher started asking the focus group questions following the focus group guide, asking probes when necessary.

Participants were incentivized for their time with \$20 cash or a \$20 gift card to a local grocery store. Early participants mentioned having inadequate transportation or preferring cash, thus cash was offered as an option to the gift card so hardships were not created to redeem gift cards.

3.2.3 Focus group questions

Focus group topics suggested by *edible flint's* Access and Education Workgroup members aligned with the study's specific aims and undergirded by Womanist Theory and/or the Ecological Model were used. See Figure 5 for focus group questions listed with theories, research question and hypothesis.

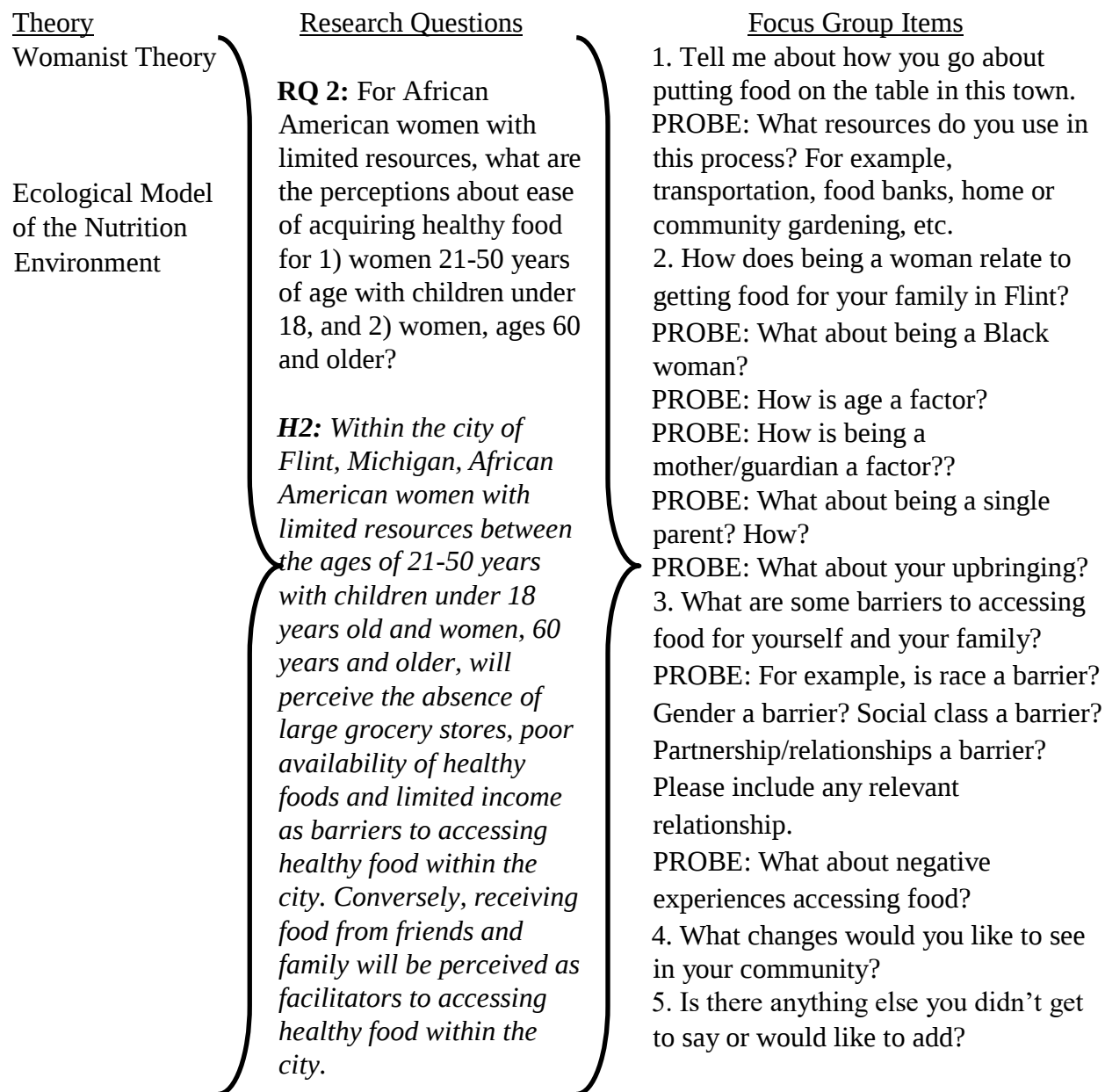


Figure 5. Relationships among theoretical frameworks, research questions and focus group items.

3.2.4 Data analysis

Focus groups were recorded, downloaded from recorders then uploaded to two transcribing companies. Two companies were used because of issues with transcribing quality and lengthy turn-around time of the first company. They were asked to transcribe

each focus group verbatim and to label each voice heard. Upon receipt of the transcriptions participant names were de-identified and given code names. The researcher listened to each focus group recording and read transcriptions simultaneously a minimum of three times to check for accuracy. Half of the transcripts were checked with the audio recording by a second person. Corrections were made to transcriptions as needed.

Qualitative data were entered into the qualitative data management software Atlas.ti, version 7.5.6. Data were analyzed using qualitative thematic analysis, where data were coded into explicit categories and coded similarly to content analysis, but allowed for analysis of the meaning of codes within context (Joffe & Yardley, 2004) which can be lacking from content analysis. Each concept was connected to one or multiple codes. A codebook was created in Microsoft Excel to record code names. In Atlas.ti query reports were conducted based on the main, secondary, tertiary and quaternary level themes. Codes and the codebook were modified as needed. All notes, transcripts and data were stored on a password protected computer and remain confidential.

3.2.5 Trustworthiness in qualitative research

The researcher has taken various steps to enhance the trustworthiness of this study. Trustworthiness in qualitative research is sometimes equated with validity and reliability in quantitative research (Guba, 1981). There are multiple ways to establish and enhance trustworthiness, several of which were used in the research project such as prolonged engagement, relevant literature review, including theoretical perspectives, consensus of multiple coders, thick description and use of key informants, theoretical sampling and acknowledgement of perspective.

In the current study **prolonged engagement** entailed active involvement with the community collaborative *edible flint* Access and Education Workgroup, with which I have

been involved officially since spring 2011. Involvement with the Access and Education Workgroup included co-creation of a food store assessment instrument used for the initial food store assessment, co-participation in creating published documents for *edible flint*, attendance at workgroup and select *edible flint* meetings, assistance at the Genesee County Food For Thought Summit 2012, Corner Store presentation at the Genesee County Food For Thought Summit 2013 and a similar community meeting in March, 2014. I also volunteered with the Flint City Urban Garden tour in 2011, 2012 and 2014. Involvement with the collaborative and the workgroup will continue until the researcher graduates.

Theoretical sensitivity entails the ability to apply meaning to data according to the research questions and theoretical frameworks, and to isolate pertinent data from irrelevant data. Detailing my personal and professional experiences as they relate to my research questions for Phase II, as well my experience with qualitative methods further demonstrate my ability to be theoretical sensitive during this qualitative inquiry. My qualifications to conduct the focus groups for Phase II include completing a graduate course in qualitative methods, wherein I learned qualitative techniques and methods. I also have experience with qualitative methods from conducting and taking notes for several other different focus groups.

The **theoretical frameworks** guiding Phase II are the Womanist Theory (Collins, 2000; Walker, 1983) and used to undergird the exploration of African American in a post-industrial urban Midwestern city, and the socio-ecological model (theory), also used for Phase I. Womanism's four dimensions of 1) criterion of lived experiences, 2) dialogue with each other, 3) ethics of caring and its three interrelated components and 4) ethics of personal accountability guided the focus group questions as well as the coding and theme

development to elucidate perceptions of African American women acquiring food in this environment.

Multiple coders were used during the coding process to enhance trustworthiness. This researcher acted as a coder, as did a second expert coder who has taught qualitative methods for over 20 years. Multiple coders increase the consistency of coding, what would be the equivalent to inter-coder reliability in quantitative research. The understanding of Womanist Theory and the African American female experience by coders is a relevant factor in this study. As a type of feminist theory that focuses on articulating and interpreting African American women's perspectives, the addition of a second expert coder offered a knowledgeable perspective. Concurrent coding occurred following the first three focus groups, wherein the researcher and the expert coder read through and coded the first two focus groups separately. Upon completion of coding, we met for a few hours and discussed codes and how we made meaning from the data. Both found similar themes in the data. The researcher continued conducting focus groups, recruiting participants, coding and theming data.

The use of quotations (raw data), full descriptions of focus group participants and inclusion of coding tables showing connections between final themes and raw data all contributed towards a thick description, thus illustrating the trustworthiness of the qualitative process. Thick descriptions are integral to the details these women provide about their experiences putting food on the table.

Key informants were individuals the researcher involved in data collection, because they were accessible, well informed and provided leads about other information. In this study, members of Access and Education Workgroup, *edible flint* and other contacts through other organizations provided access to potential focus group participants, and also assisted with the

dissemination of data following conclusion of the study. This community integration of key informants who are Flint residents enhanced the trustworthiness of this study.

Theoretical sampling occurs during the focus group process where no new data are presented from further focus groups. Essentially, the participants provided no new insights. Theoretical saturation, drawn from grounded theory, when using ethnographic explorations is more along the lines of looking for patterns from focus group participants that represent the “group culture.” This process was used in this study to enhance trustworthiness.

CHAPTER 4

RESULTS

4.1 Phase I. Quantitative food store assessment

Of the 288 stores included in the final database, 12 were excluded because they were farmers' markets (n=3) or were miscellaneous stores not fitting store criteria (n=9, e.g., kiosk selling snacks inside an office building) (Table 9). Three additional stores were excluded from the analysis because they were in uninhabited census tracts that did not have race and median household income data. Most of these 273 stores were in Flint (n= 190, 70%), and included mostly small stores (n=176, 93%). Of the 83 stores in the Suburban area, most were small stores, as well (n=70, 84%).

Table 9.

Location and Size of Stores in Flint, Suburban 2-Mile Buffer and 273 Stores Included in Statistical Analysis

Category	N		
Total store locations	288		
Large Stores	27		
Small Stores	246		
Miscellaneous Stores and store w/o census tract data	15		
Stores included in analysis	273		
Flint	190		
Suburban Area	83		

Location	Store Size		
	Large	Small	Total
Flint	14 (7%)	176 (93%)	190 (70%)
Suburban Area	13 (16%)	70 (84 %)	83 (30%)
Total	27 (10%)	246 (90%)	273 (100%)

Table 10 shows the mean, range, and median scores for food availability, food price, and food quality. The maximum numbers of points possible for each food construct was as

follows: availability, 78; quality, 20; and price, 20. The highest total store-score for these 111 stores belonged to a store in the suburbs, but none of the stores received the full 118 points.

Descriptive statistics are also shown for the potential predictors of store score being examined in RQ 1.3: race (represented by percent Black in the census tract corresponding to each store location) and median household income for the corresponding census tract.

Table 10.

Descriptive Statistics for Store Scores for Food Availability, Food Price and Food Quality for Race and Median Household Income

Category	Mean	Min	Max	Median
Availability	21.65	0	78	19
Price	0.53	0	14	0
Quality	2.01	0	20	0
% Black	47.3	0.04	97.69	42.61
Median Household Income, USD	29,814	8,570	77,353	27,355
Median Household Income, Black	24,140	8,570	38,610	24,200
Median Household Income, White	33,520	15,230	77,350	34,330

Possible points for each construct: Availability scores of 63 items within six food groups =0 to 78; Price scores of 10 items within five food groups =0 to 20; Quality scores of 20 fresh fruit and vegetables =0 to 20. USD=US Dollars

As shown in Table 10, median scores for price and quality are zero (i.e., at least 50% of the scores for these constructs are zero), and mean scores are low, particularly for price. Histograms of food availability, food price and food quality are shown in Figure 6 to better describe the distribution of these scores.

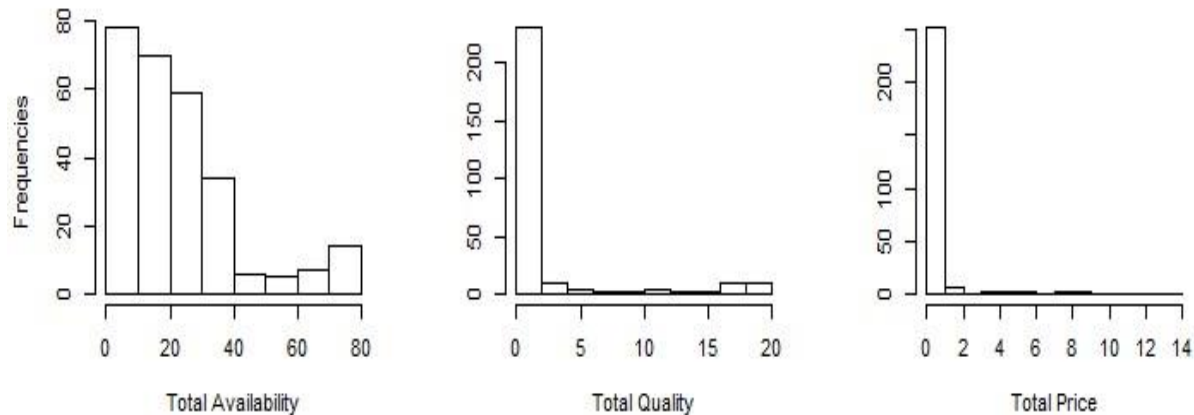


Figure 6. Histograms of food availability, food quality and food price store scores. Possible points for each construct: Availability scores of 63 items within six food groups =0 to 78; Price scores of 10 items within five food groups =0 to 20; Quality scores of 20 fresh fruit and vegetables.

Because so few price scores were greater than zero, a dichotomous price variable was created for statistical analysis, coded 0 for stores with a price score of zero, and 1 for stores with a price score greater than zero. Of the 273 price scores, 28 (10.3%) were greater than zero.

4.1.1 Statistical analysis of research question 1.1 and 1.2

Results of Research Questions 1.1 and 1.2 are reported together for each of the constructs, i.e. availability, price and quality, with each hypothesis discussed separately. Price was evaluated using both price scores and the dichotomized price variable. Initial model selection was performed for each construct and each hypothesis using OLS regression to identify a “best model.” Diagnostic testing was performed on each “best model” to confirm that underlying assumptions were met before interpreting models.

4.1.1.1. Food availability

Table 11 shows regression models selection for mean food availability. Model 1 included only store size as a predictor, independent of store location. Similarly, Model 2 included store location only. Model 3 included both predictors to test for the main effects of store size and location in the same model. Model 4 included an interaction term, allowing for the estimation of mean food availability separately for each combination of store size and location. Model 4 was selected as the best model to test Hypotheses 1.1 and 1.2 for mean food availability since it had the lowest (i.e., best) AIC value and the highest adjusted R^2 .

Table 11.
Summary of Regression Models Considered for Mean Food Availability

Model	Predictors	Adj. R^2	AIC	Comments
1	Store size	0.4126	2270.5	
2	Store location	0.0112	2412.7	
3	Store size Store location	0.4120	2271.7	
4	Store size Store location Store size X Store location	0.4404	2259.2	Lowest AIC and highest adjusted R^2 , indicating the best model.

Adj. R^2 =adjusted R^2 , AIC= Akaike information criteria. Store size is coded as 0= large and 1=small. Store location is coded as 0= In Flint and 1= Suburban area buffer.

Before interpreting Model 4, diagnostic testing was completed to confirm that the underlying assumptions for OLS were met (Poole & O'Farrell, 1971). No significant violations were identified for assumptions concerning error terms regarding a zero mean, homoscedasticity (i.e., constant variance), or normality. Variance inflation factors indicated that the independent variables were not multicollinear. Availability scores were further evaluated for independence using Moran's I tests at several possible ranges of influence (100,

500, 1000, 1500 and 2000 meters) and nearest neighbor configurations (one to nine, 16 and 24 nearest neighbors) (See Appendix K). Moran's I was not significant for any neighbor configuration or distance cutoff, indicating that total food availability scores were not significantly autocorrelated over space.

Additional tests of spatial autocorrelation were conducted on the error terms from Model 4 according to (Anselin, 2005) to evaluate the need for spatially explicit regression models rather than OLS. Tests of spatial autocorrelation indicated that neither spatially explicit regression model (i.e., spatial error model or spatial log model) was needed since both p-values were greater than the 0.05 level of significance (spatial error model $p=0.638$; spatial lag model $p=0.620$).

Having verified that the underlying assumptions of OLS were met by Model 4, Hypotheses 1.1 and 1.2 for mean food availability were evaluated by testing each term of Model 4 for significance. Model 4 is summarized in Table 12.

Table 12.
Summary of Best Model for Mean Food Availability

Model	Predictor	Est.	SE	t-stat.	p-value	Adj. R ²	AIC	Comments
4	(Intercept)	49.71	4.01	12.40	<2e-16***	0.440	2259.2	Lowest AID and highest adjusted R ² , indicating the best model
	Store size	-32.03	4.17	-7.69	2.76e-13***			
	Store location	22.52	5.78	3.90	1.23e-4***			
	Store size X store location	23.57	6.15	-3.83	1.59e-4***			

Signif. codes: 0 '***'

Est=estimate, SE=standard error, t-stat=t statistics, Adj. R²=adjusted R², AIC= Akaike information criteria. Store size is coded as 0= large and 1=small. Store location is coded as 0= In Flint and 1= Suburban area buffer.

Each term in the model was significant at a 5% level of significance (i.e., p-value < 0.05). Consequently, Hypotheses 1.1 and 1.2 for mean food availability were supported. Smaller stores in this study were concluded to have lower availability scores for dairy foods, protein-rich foods, beverages, fruit, vegetables and grains compared to larger grocery stores within the city and the surrounding Suburban area. Model 4 also showed that suburban food stores had a higher mean availability score for all food groups compared to stores within Flint. The interaction term in Model 4 was also significant, indicating that mean food availability scores were different for each combination of store size and store location.

4.1.1.2 Food price

Table 13 shows regression models selection for mean food price. Model 1 included only store size as a predictor, independent of store location. Similarly, Model 2 included store location only. Model 3 included both predictors to test for the main effects of store size and location in the same model. Model 4 included an interaction term, allowing for the estimation of mean availability separately for each combination of store size and location. Model 4 was selected as the best model to test Hypotheses 1.1 and 1.2 for mean food price because it had the lowest (i.e., best) AIC value and the highest adjusted R^2 .

Table 13.
Summary of Regression Models for Mean Food Price

Model	Predictors	Adj. R ²	AIC	Comments
1	Store size	0.5080	971.01	
2	Store location	0.0340	1155.20	
3	Store size Store location	0.5169	967.00	
4	Store size Store location Store size X store location	0.5912	922.41	Lowest AIC and highest adjusted R ² , indicating the best model.

Adj. R²=adjusted R², AIC= Akaike information criteria. Store size is coded as 0= large and 1=small. Store location is coded as 0= In Flint and 1= Suburban area buffer.

Before interpreting Model 4, diagnostic testing was completed to confirm that the underlying assumptions for OLS were met (Poole & O’Farrell, 1971). No significant violations were identified for assumptions concerning error terms regarding a zero mean, homoscedasticity (i.e., constant variance), or normality. Variance inflation factors indicated that the independent variables were not multicollinear. Food price scores were further evaluated for independence using Moran’s I tests at several possible ranges of influence (100, 500, 1000, 1500 and 2000 meters) and nearest neighbor configurations (1 to 9, 16 and 24 nearest neighbors) (See Appendix K). Moran’s I was not significant for any neighbor configuration or distance cutoff, thus indicating that total availability scores are not significantly autocorrelated over space.

Additional tests of spatial autocorrelation were conducted on the error terms from Model 4 according to (Anselin, 2005) to evaluate the need for spatially explicit regression models rather than OLS. Tests of spatial autocorrelation indicated that neither spatially explicit regression model (i.e., spatial error model or spatial log model) was needed since

both p-values were greater than the 0.05 level of significance (spatial error model p=0.886; spatial lag model p=0.728).

Having verified that the underlying assumptions of OLS were met by Model 4, Hypotheses 1.1 and 1.2 for mean food price were evaluated by testing each term of Model 4 for significance. Model 4 is summarized in Table 14.

Table 14.
Summary of Best Model for Mean Food Price

Model	Predictors	Est.	SE	t-stat.	p-value	Adj. R ²	AIC	Comments
4	(Intercept)	3.07	0.35	8.87	<2e-16***	0.591	922.41	Lowest AIC, indicating the best model.
	Store size	-3.03	0.36	-8.40	2.49e-15***			
	Store location	3.78	0.5	7.56	6.36e-13***			
	Store size X Store location	-3.76	0.53	-7.08	1.29e-11***			

Signif. codes: 0 '***'

Est=estimate, SE=standard error, t-stat=t statistics, Adj. R²=adjusted R², AIC= Akaike information criteria. Store size is coded as 0= large and 1=small. Store location is coded as 0= In Flint and 1= Suburban area buffer.

Each term in the model was significant at a 5% level of significance (i.e., p-value < 0.05). Consequently, Hypotheses 1.1 and 1.2 for mean food availability were supported. Smaller stores in this study were concluded to have lower price scores for all food groups compared to larger grocery stores within the city and the surrounding Suburban area. Model 4 also showed that suburban food stores had a higher mean food price score for all food groups compared to stores within Flint. The interaction term in Model 4 was also significant, indicating that mean food price scores were different for each combination of store size and store location.

4.1.1.3 Food quality

Table 15 shows regression model selection for mean food quality. Model 1 included only store size as a predictor, independent of store location. Similarly, Model 2 included store location only. Model 3 included both predictors to test for the main effects of store size and location in the same model. Model 4 included an interaction term, allowing for the estimation of mean quality separately for each combination of store size and location. Model 4 was selected as the best model to test hypotheses 1.1 and 1.2 for mean food quality since it had the lowest (i.e., best) AIC value and the highest adjusted R^2 .

Table 15.
Summary of Regression Models for Mean Food Quality

Model	Predictors	Adj. R^2	AIC	Comments
1	Store size	0.6710	1367.2	
2	Store location	0.0274	1663.2	
3	Store size Store location	0.6750	1364.9	
4	Store size Store location Store size X Store location	0.7081	1336.6	Lowest AIC and highest adjusted R^2 , indicating the best model.

Adj. R^2 =adjusted R^2 , AIC= Akaike information criteria. Store size is coded as 0= large and 1=small. Store location is coded as 0= In Flint and 1= Suburban area buffer.

Before interpreting Model 4, diagnostic testing was completed to confirm that the underlying assumptions for OLS were met (Poole & O'Farrell,1971). Variance inflation factors indicated that the independent variables were not multicollinear. Quality scores were further evaluated for independence using Moran's I tests at several possible ranges of influence

(100, 500, 1000, 1500, and 2000 meters) and nearest neighbor configurations (one to nine, 16 and 24 nearest neighbors) (See Appendix K). Moran's I was not significant for any neighbor configuration or distance cutoff, thus indicating that total availability scores are not significantly autocorrelated over space.

Additional tests of spatial autocorrelation were conducted on the error terms from Model 4 according to (Anselin, 2005) to evaluate the need for spatially explicit regression models rather than OLS. Tests of spatial autocorrelation indicated that neither spatially explicit regression model (i.e., spatial error model or spatial log model) was needed since both p-values were greater than the 0.05 level of significance (spatial error model $p=0.866$; spatial lag model $p=0.586$).

Having verified that the underlying assumptions of OLS were met by Model 4, Hypotheses 1.1 and 1.2 for mean food availability were evaluated by testing each term of Model 4 for significance. Model 4 is summarized in Table 16.

Table 16.
Summary of Best Model for Mean Food Quality

Model	Predictors	Est.	SE	t-stat.	p-value	Adj. R ²	AIC	Comments
4	(Intercept)	11.57	0.74	15.64	<2e-16***	0.7081	1336.6	Lowest AIC indicating the best model.
	Store size	-10.96	0.77	-14.26	<2e-16***			
	Store location	6.43	1.07	6.03	5.40e-09***			
	Store size X Store location	-6.38	1.14	-5.62	4.83e-08***			

Signif. codes: 0 '***' Est=estimate, SE=standard error, t-stat=t statistics, Adj. R²=adjusted R², AIC= Akaike information criteria. Store size is coded as 0= large and 1=small. Store location is coded as 0= In Flint and 1= Suburban area buffer.

Each term in the model was significant at a 5% level of significance (i.e., $p\text{-value} < 0.05$). Consequently, Hypotheses 1.1 and 1.2 for mean food availability were supported. Smaller stores in this study were concluded to have lower food quality scores for all food groups compared to larger grocery stores within the city and the surrounding Suburban area. Model 4 also showed that suburban food stores had a higher mean food quality score for all food groups compared to stores within Flint. The interaction term in Model 4 was also significant, indicating that mean food availability scores were different for each combination of store size and store location.

4.1.2 Statistical analysis of research question 1.3

Research Question 1.3 will also be reported based on the construct, i.e. food availability, food price and food quality, with each hypothesis discussed separately. Price was evaluated using both food price scores and the dichotomized price variable. In addition to store size and store location, race and median household income (both at the census tract level) were included as independent variables in the analysis. Race at the census tract level was represented as percent Black, a continuous variable. Median household income at the census tract level was also represented as a continuous variable.

For each construct, hypotheses related to race were tested independently of those related to median household income. This was necessary to avoid multicollinearity in the regression models since percent Black and median household income are not independent: percent Black was negatively correlated with median household income ($r = -0.55$, $p < 0.05$).

Similar to the previous research questions, initial model selection was performed for each construct using OLS regression to identify a “best model.” Diagnostic testing was

performed on each “best model” to confirm that underlying assumptions were met before interpreting models.

4.1.2.1 Food availability

Table 17 shows regression model selection for percent Black versus food availability. Each model controls for store size since this was found to be a significant predictor of availability score. Although store location was also identified as a significant predictor of availability, it was excluded from the model used to test the significance of percent Black due to significant correlation between the variables. A two-sample t-test indicated that the percent Black was significantly different for each store location. Accordingly, Model 1 included percent Black and store size as predictors of availability score. Model 2 included percent Black, store size, and the interaction between these two terms. Inclusion of an interaction term between a continuous variable (percent Black) and a categorical variable (store size) allowed the estimation of two different regression lines (intercept and slope) for small stores and large stores. In other words, the effect of percent Black on availability on the intercept and slope was allowed to differ for small and large stores. Model 2 was selected as the best model to test Hypothesis 1.3 regarding the effect of race on availability scores because it had the lowest (i.e., best) AIC value and the highest adjusted R^2 .

Table 17.

Summary of Regression Models of Percent Black and Food Availability

Model	Predictors	Est.	SE	t-stat	p-value	Adj. R ²	AIC	Comments
1	(Intercept)	61.78	3.20	19.29	<2e-16***	0.4126	2271.46	
	%Black	-0.03	0.03	-1.00	0.32			
	Store size	-43.12	3.12	-13.84	<2e-16***			
2	(Intercept)	76.57	4.62	16.58	<2e-16***	0.4487	2255.13	Lowest AIC and highest adjusted R ² , indicating the best model
	% Black	-0.35	0.08	-4.42	143e-05***<			
	Store size	-59.79	4.90	-12.21	2e-16***			
	% Black X	0.37	0.08	4.32	2.17e-05***			
	Store size							

Signif. codes: 0 ‘***’

Est=estimate, SE=standard error, t-stat=t statistics, Adj. R²=adjusted R², AIC= Akaike information criteria. Percent Black is continuous. Store size coded as 0= large and 1=small. Percent Black is continuous.

Before interpreting Model 2, diagnostic testing was completed. No significant violations of assumptions were identified. Because census tracts and store data in Research Question 1.3 were hierarchical/ multilevel data that may be correlated, which would violate the assumption of independence, additional testing for independence of error terms was completed. In order to test for correlation among store level (e.g., availability, price and quality) and census level data (e.g., race and median household income), intraclass correlation (ICC) tests were conducted. Tests of intraclass correlation indicated no correlation or clustering of store and census level data. Intraclass correlations p-value was 0.000 for food availability. Moran’s I values were not statistically significant for availability scores, indicating a lack of spatial autocorrelation. Further tests of spatial autocorrelation in the error terms for Model 2 were not significant, indicating that spatially explicit models are not necessary to test this hypothesis (spatial error model, p=0.590; spatial lag model, p=0.550).

Interpretation of Model 2 for the effect of percent Black versus food availability showed that as availability of all food groups increased, the percent Black of the census tracts in which the stores were located decreased. The rate of decrease was different for small and large stores, as shown in Figure 7.

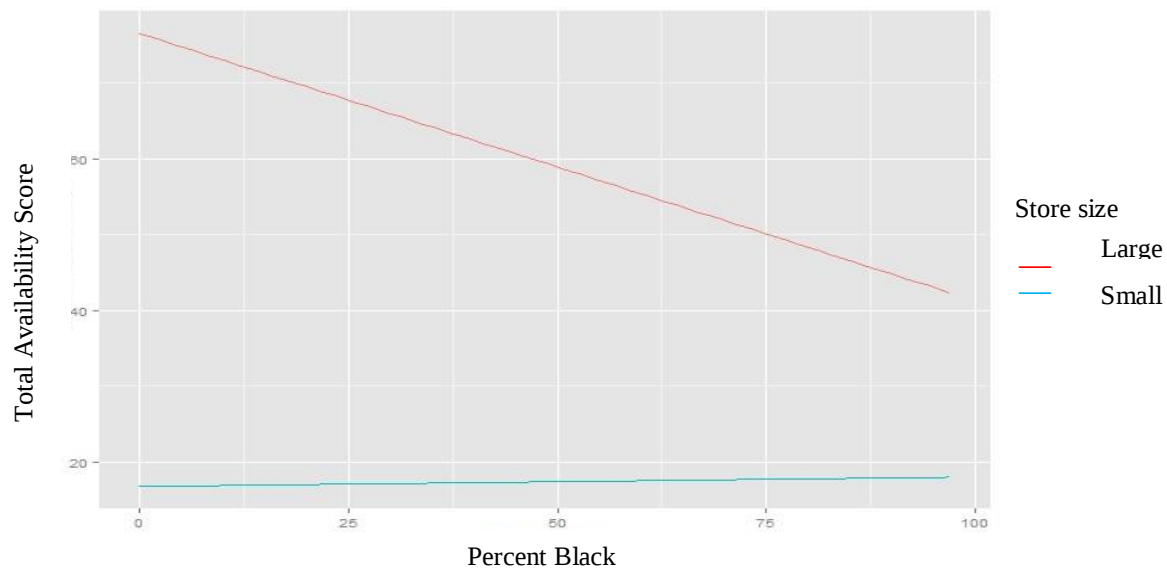


Figure 7. Plot of food availability score, percent Black in census tracts and store size.

See Table 18 for results of median household income versus food availability. Based on Model 2 with the highest AIC value, Hypothesis 1.3 was statistically significant and supported. Results showed that as food availability of all food groups increases, the median household increases, but not by much.

Table 18

Summary of Regression Models of Median Household Income and Food Availability

Model	Predictor	Est.	SE	t-stat	p-value	Adj. R ²	AIC	Comments
1	(Intercept)	60.35	4.17	14.49	<2e-16***	0.4105	2272.46	
	MHH\$	0.00	0.00	0.07	0.945			
	Store size	-43.16	3.13	-13.80	<2e-16***			
2	(Intercept)	39.62	9.24	4.29	2.5e-05***	0.4218	2268.15	Lowest AIC and highest adjusted R ² , indicating the best model
	MHH\$	0.00	0.00	2.39	0.0175*			
	Store size	-20.05	9.72	-2.06	0.0400*			
	MHH\$ x	-0.00	0.00	-2.51	0.0127*			
	Store size							

Signif. codes: 0 '***' 0.001 '**' 0.01 '*'

Est=estimate, SE=standard error, t-stat=t statistics, Adj. R²=adjusted R², AIC= Akaike information criteria. Store size coded as 0= large and 1=small. Median household income is continuous.

Before interpreting Model 2, diagnostic testing was completed. No significant violations of assumptions were identified. Because census tracts and store data in Research Question 1.3 were hierarchical/ multilevel data that may be correlated, which would violate the assumption of independence, additional testing for independence of error terms was completed. Moran's I values were not statistically significant for food availability scores, indicating a lack of spatial autocorrelation. Further tests of spatial autocorrelation in the error terms for Model 2 were not significant, indicating that spatially explicit models are not necessary to test this hypothesis (spatial error model, p=0.628; spatial lag model, p=0.507).

The rate of decrease was different for small and large stores, as shown in Figure 8.

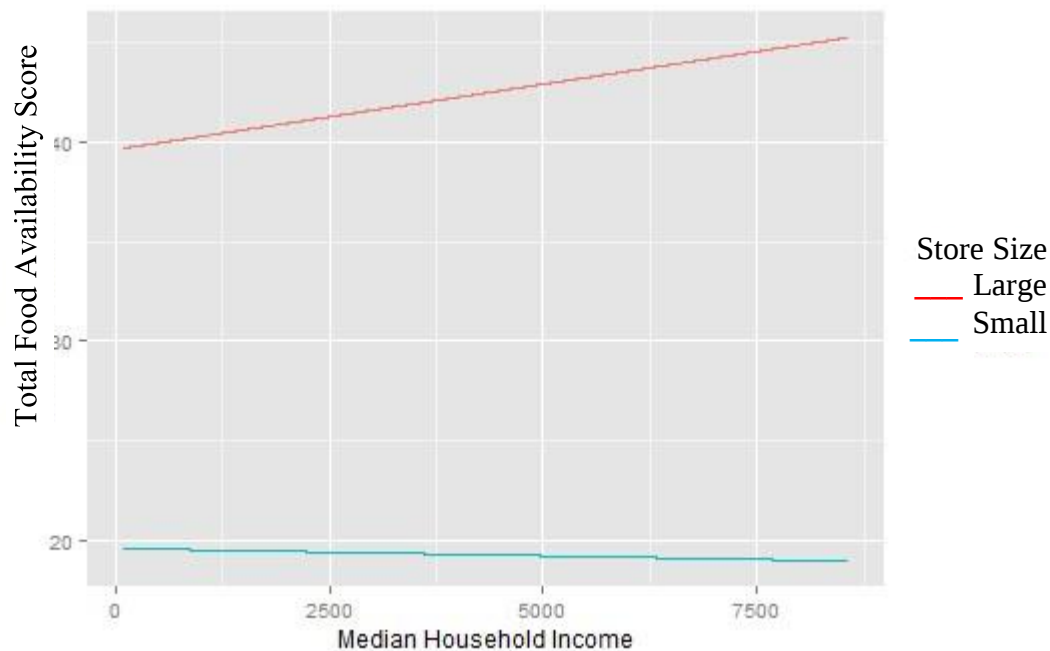


Figure 8. Plot of food availability score, median household income in census tracts and store size.

4.1.2.2 Food price

Table 19 shows regression model selection for percent Black versus food price. Each model controls for store size since this was found to be a significant predictor of availability score. Although store location was also identified as a significant predictor of food availability, it was excluded from the model used to test the significance of percent Black due to significant correlation between the variables. A two-sample t-test indicated that the percent Black was significantly different for each store location. Accordingly, Model 1 included percent Black and store size as predictors of price score.

Model 2 included percent Black, store size, and the interaction between these two terms. The effect of percent Black on food price on the intercept and slope is allowed to differ

for small and large stores. Model 2 was selected as the best model to test Hypothesis 1.3 regarding the effect of race on food price scores since it had the lowest (i.e., best) AIC value and the highest adjusted R^2 .

Table 19.

Summary of Regression Models of Percent Black and Food Price

Model	Predictor	Est.	SE	t-stat.	p-value	Adj R^2	AIC	Comments
1	(Intercept)	5.202	0.293	17.76	<2e-16***	0.5199	965.3	
	% Black	-0.007	0.002	-2.78	0.00582**			
	Store size	-4.824	0.285	-16.9	<2e-16***			
2	(Intercept)	7.868	0.378	20.84	<2e-16***	0.639	887.8	Lowest AIC and highest adjusted R^2 , indicating the best model
	% Black	-0.066	0.007	-10.1	<2e-16***			
	Store size	-7.831	0.4	-19.6	<2e-16***			
	% Black	0.066	0.007	9.54	<2e-16***			
	X Store size							

Signif. codes: 0 '***' 0.001 '**'

Est=estimate, SE=standard error, t-stat=t statistics, Adj. R^2 =adjusted R^2 , AIC= Akaike information criteria. Percent Black is continuous. Store size coded as 0= large and 1=small.

Before interpreting Model 2, diagnostic testing was completed. No significant violations of assumptions were identified. Tests of intraclass correlation indicated no correlation or clustering of store and census level data. Intraclass correlations p-value was 0.017 for food price. Moran's I values were not statistically significant for price scores, indicating a lack of spatial autocorrelation. Further tests of spatial autocorrelation in the error terms for Model 2 were not significant, indicating that spatially explicit models are not necessary to test this hypothesis (spatial error model, $p=0.974$; spatial lag model, $p=0.629$).

Interpretation of Model 2 for the effect of percent Black on food price showed that as food price scores of all food groups increased, the percent Black of the census tracts in

which the stores were located decreased. The rate of decrease was different for small and large stores, as shown in Figure 9.

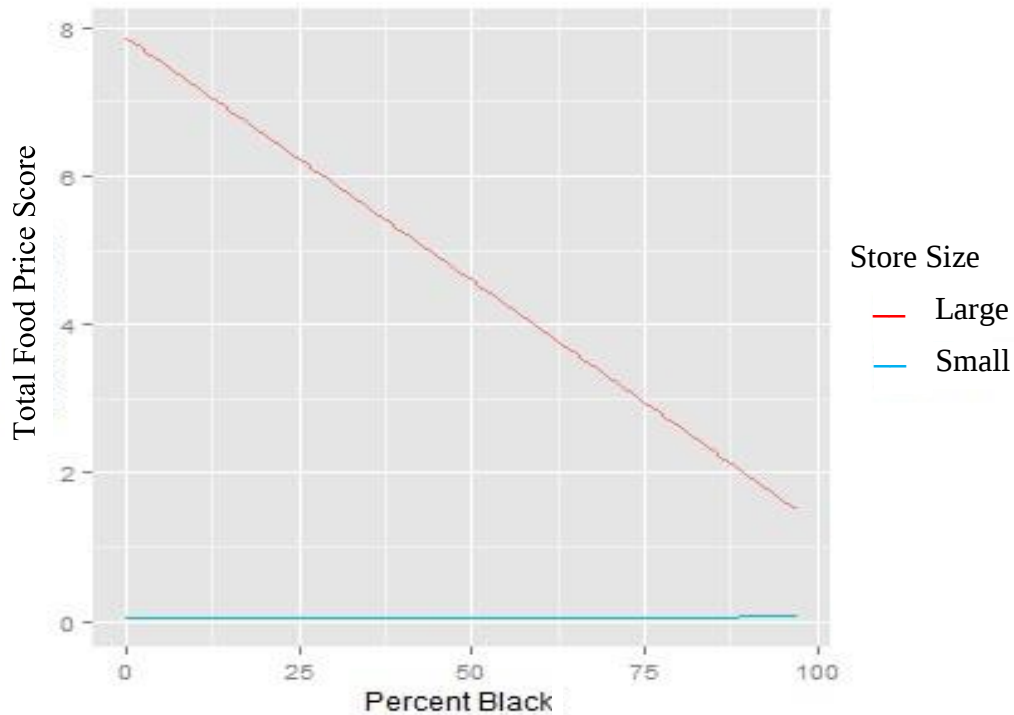


Figure 9. Plot of food price score, percent Black in census tract and store size.

See Table 20 for results of median household income and food price. Based on Model 2 with the highest AIC value and adjusted R^2 , Hypothesis 1.3 was statistically significant and supported. Results showed that as food price scores of all food groups increases, the median household income increases, but not by much.

Table 20.

Summary of Regression Models of Median Household Income and Food Price

Model	Predictor	Est.	SE	t-stat.	p-value	Adj. R ²	AIC	Comments
1	(Intercept)	4.570	0.385	11.88	<2e-16 ***	0.5087	971.60	
	MHH\$	0.000	0.000	1.180	0.239			
	Store size	-4.817	0.289	-16.68	<2e-16 ***			
2	(Intercept)	1.807	0.842	2.15	3.28e-02 *	0.5304	960.28	Lowest AIC and highest adjusted R ² , indicating the best model.
	MHH\$	0.000	0.000	3.86	1.41e-04***			
	Store size	-1.738	0.886	-1.96	5.074 e-02			
	MHH\$ X	0.000	0.000	-3.67	2.94e-04***			
	Store size							

Signif. codes: 0 '***', 0.01 '**'

Est=estimate, SE=standard error, t-stat=t statistics, Adj. R²=adjusted R², AIC= Akaike information criteria. Median household income is continuous. Store size coded as 0= large and 1=small.

Before interpreting Model 2, diagnostic testing was completed. No significant violations of assumptions were identified. Tests of intraclass correlation indicated no correlation or clustering of store and census level data. Intraclass correlations p-value was 0.017 for food price. Moran's I values were not statistically significant for food price scores, indicating a lack of spatial autocorrelation. Further tests of spatial autocorrelation in the error terms for Model 2 were not significant, indicating that spatially explicit models are not necessary to test this hypothesis (spatial error model, p= 0.906; spatial lag model, p= 0.633).

Interpretation of Model 2 for the effect of median household income on food price showed that as food price score of all food groups increased, the median household income of the census tracts in which the stores were located increased. The rate of decrease was different for small and large stores, as shown in Figure 10.

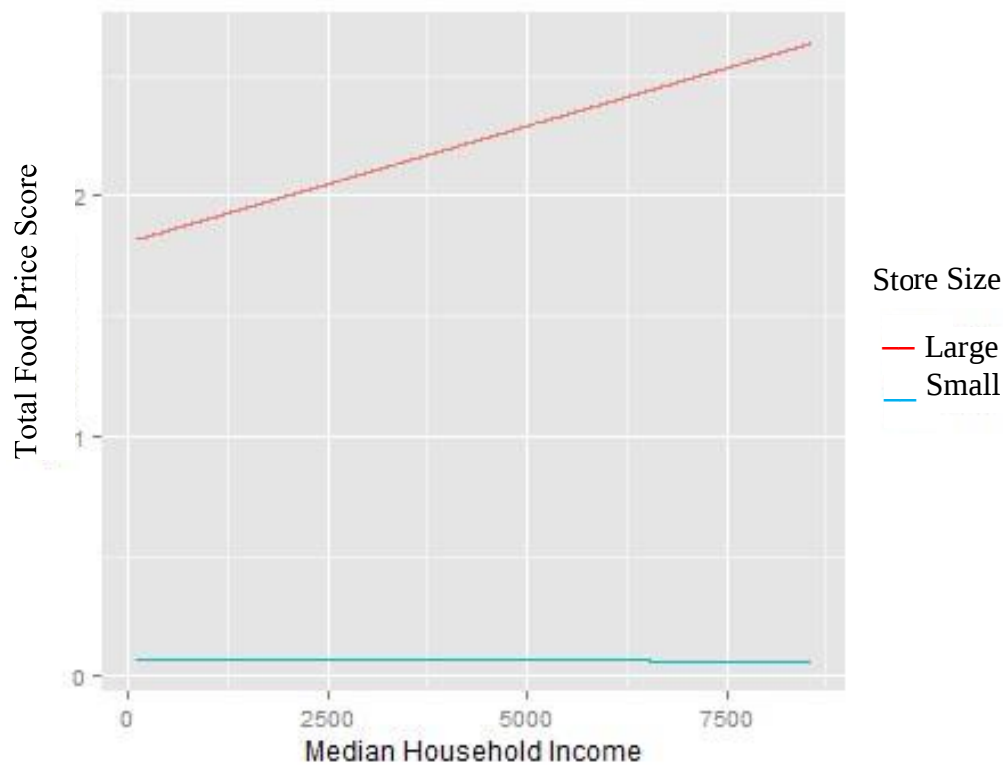


Figure 10. Plot of food price score, median household income and store size.

4.1.2.3 Food quality

Table 21 shows regression model selection for food quality versus percent Black. Each model controls for store size since this was found to be a significant predictor of availability score. Although store location was also identified as a significant predictor of availability, it was excluded from the model used to test the significance of percent Black due to significant correlation between the variables. A two-sample t-test indicated that the

percent Black was significantly different for each store location. Accordingly, Model 1 included percent Black and store size as predictors of food quality.

Model 2 included percent Black, store size, and the interaction between these two terms. The effect of percent Black on food quality on the intercept and slope is allowed to differ for small and large stores. Model 2 was selected as the best model to test Hypothesis 1.3 regarding the effect of race on food quality scores since it had the lowest (i.e., best) AIC value and the highest adjusted R².

Table 21.
Summary of Regression Models of Percent Black and Food Quality

Model	Predictors	Est.	SE	t-stat.	p-value	Adj.R ²	AIC	Comments
1	(Intercept)	15.00	0.61	24.53	<2e-16***	0.6722	1367.26	
	% Black	-0.01	0.01	-1.40	0.162			
	Store size	-14.03	0.59	-23.59	<2e-16***			
2	(Intercept)	19.60	0.83	23.64	< 2e-16***	0.7279	1317.45	Lowest AIC and highest adjusted R ² , indicating the best model.
	Percent Black	-0.11	0.01	-7.59	5.37e-13***			
	Store size	-19.22	0.88	-21.86	< 2e-16***			
	Percent Black X Store size	0.11	0.02	7.50	9.44e-13***			

Signif. codes: 0 ‘***’

Est=estimate, SE=standard error, t-stat=t statistics, Adj. R²=adjusted R², AIC= Akaike information criteria. Percent Black is continuous. Store size coded as 0= large and 1=small.

Before interpreting Model 2, diagnostic testing was completed. No significant violations of assumptions were identified. Tests of intraclass correlation indicated no correlation or clustering of store and census level data. Intraclass correlations p-value was 0.017 for food price. Moran’s I values were not statistically significant for food price scores, indicating a lack of spatial autocorrelation. Further tests of spatial autocorrelation in the error terms for Model 2

were not significant, indicating that spatially explicit models are not necessary to test this hypothesis (spatial error model, $p = 0.974$; spatial lag model, $p = 0.629$).

Interpretation of Model 2 for the effect of percent Black on food price showed that as quality score of all food groups increased, the percent Black of the census tracts in which the stores are located decreased. The rate of decrease was different for small and large stores, as shown in Figure 11.

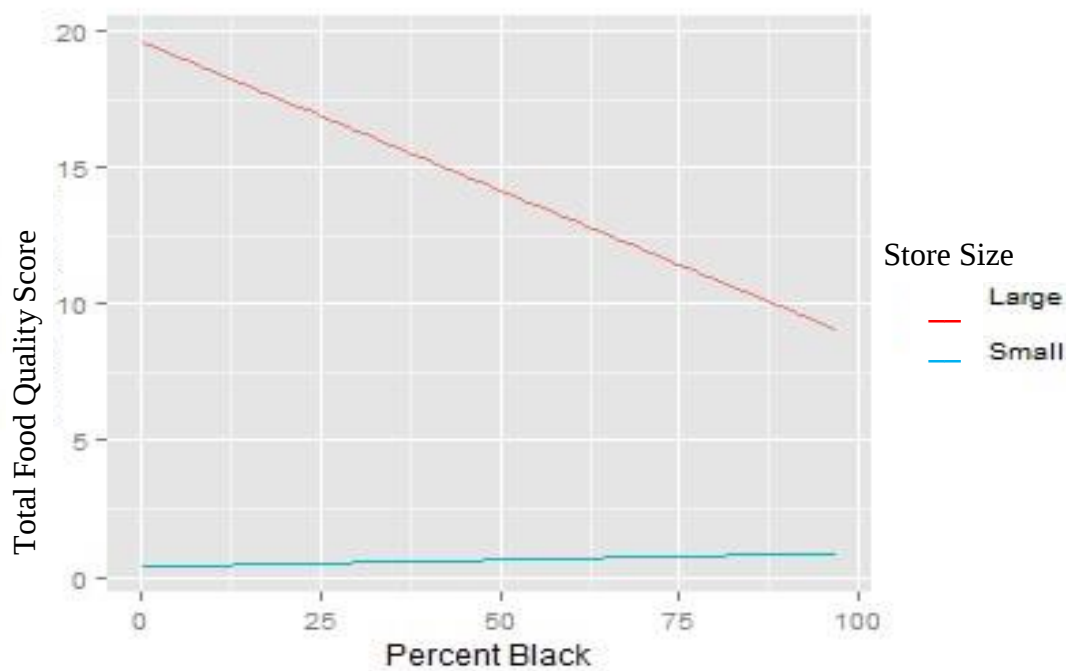


Figure 11. Plot of food quality score, percent Black in census tract and store size.

See Table 22 for results of median household income and food quality. Based on Model 2 with the highest AIC, Hypothesis 1.3 was statistically significant and supported. Results showed that as food quality of fruit and vegetables increases, the median household income increases, but not by much.

Table 22.

Summary of Regression Models of Median Household Income and Food Quality

Model	Predictors	Est.	SE	t-stat.	p-value	Adj. R ²	AIC	Comments
1	(Intercept)	14.360	0.796	18.029	<2e-16***	0.6702	1368.94	
	MHH\$	0.000	0.000	0.551	0.582			
	Store size	-14.020	0.598	-23.456	<2e-16***			
2	(Intercept)	7.410	1.722	4.303	2.36e-05***	0.6922	1351.04	Lowest AIC and highest adjusted R ² , indicating the best model.
	MHH\$	0.000	0.000	4.444	1.29e-05***			
	Store size	-6.280	1.812	-3.466	0.000614***			
	MHH\$ X	0.000	0.000	-4.509	9.71e-06 ***			
	Store size							

Signif. codes: 0 '***'

Est=estimate, SE=standard error, t-stat=t statistics, Adj. R²=adjusted R², AIC= Akaike information criteria. Median household income is continuous. Store size coded as 0= large and 1=small.

Before interpreting Model 2, diagnostic testing was completed. No significant violations of assumptions were identified. Tests of intraclass correlation indicated no correlation or clustering of store and census level data. Intraclass correlations p-value was 0.000 for food quality. Moran's I values were not statistically significant for food quality scores, indicating a lack of spatial autocorrelation. Further tests of spatial autocorrelation in the error terms for Model 2 were not significant, indicating that spatially explicit models are not necessary to test this hypothesis (spatial error model, p= 0.640; spatial lag model, p= 0.529).

Interpretation of Model 2 for the effect of median household income on food quality showed that as food quality of fruit and vegetables increased the median household income of the census tracts in which the stores are located increased. The rate of increase is different for small and large stores, as shown in Figure 12.

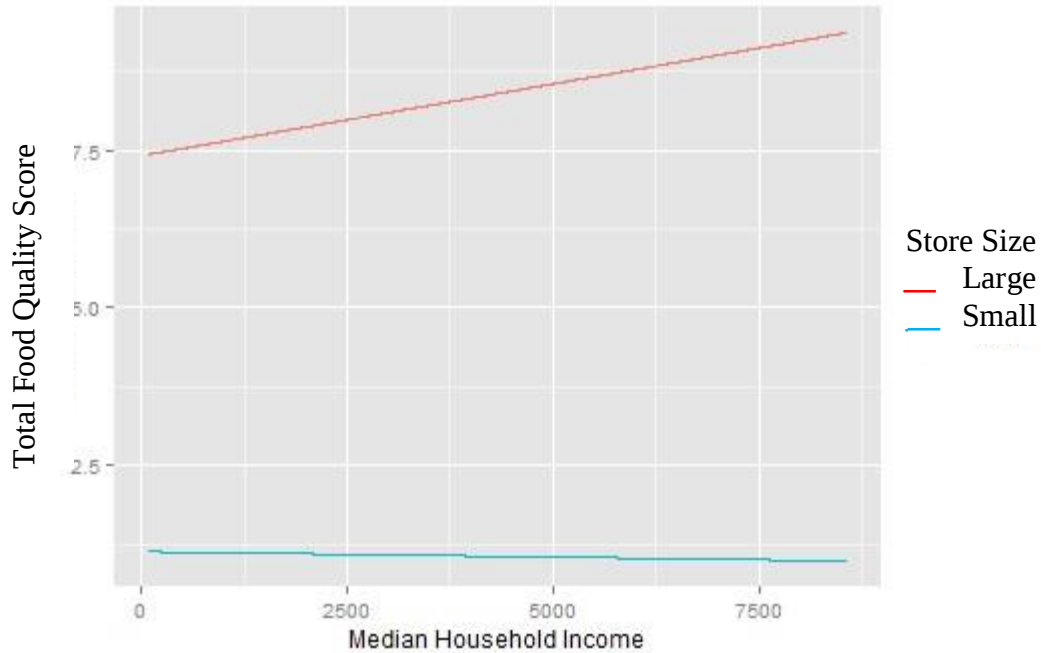


Figure 12. Plot of food quality score, median household income in census tract and store size.

4.1.3 Logistic regressions for total food price score

Alternate analyses of logistic regressions were conducted for Research Questions 1.1, 1.2 and 1.3 for total food price scores. Results of the analyses with total food price as a dichotomous variable are included in this section as an addition to the OLS regression analyses above. See Table 23. The results showed that the odds of small store having a total price score above zero is 96.5% lower than that of a large store. They also showed that the odds of a suburban store having a total food price score above zero is 12 times that of a Flint store.

Table 23.

Summary of Logistic Regression for Mean Food Price and Store Size, Store Location, and Their Interaction

Model	Predictor	Est.	SE	z-value	p-value	OR	CI
1	(Intercept)	1.964e-15	0.535	0.000	1.000	1.000	(0.34, 2.92)
	Store size	-3.344	0.677	-4.940	7.82e-07***	0.04	(0.01, 0.13)
	Store location	2.485	1.170	2.124	0.034*	12.00	(1.65, 249.9)
	Store size X Store location	-2.247	1.375	-1.634	0.102	0.11	(0.004, 1.22)

Signif. Codes: 0 '***', 0.05 '**'

Est=estimate, SE=standard error, t-stat=t statistics, Adj. R²=adjusted R², OR= odds ratios and CI=confidence interval. Store size coded as 0= large and 1=small. Store location is coded as 0= In Flint and 1= Suburban area buffer.

Research Question 1.3 explored the associations of total price and predominant race and median household income. See Table 24. The results showed that the odds of a store in a predominantly Black census tract having a total food price score above zero was 3.5% lower than that of a store in a predominantly white census tract. They also showed that the odds of a small store having a food price score above zero was 0.002 (0%) times that of a large store, essentially zero percent. The significant interaction shows that there is an increase of 1 in the total price depending upon the store size and the race of the census tract.

Table 24.

Summary of Logistic Regression for Percent Black, Store Size, and Their Interaction

Model	Predictors	Est.	SE	z-value	p-value	OR	CI
1	(Intercept)	2.754	1.003	2.747	0.006**	15.71	(2.94,181.32)
	Percent Black	-0.035	0.014	-2.475	0.013*	0.97	(0.94, 0.99)
	Store size	-6.093	1.165	-5.231	1.69e07***	0.00	0.000,0.02)
	Percent Black X Store size	0.037	0.017	2.112	0.035 *	1.04	(1.00, 1.08)

Signif. Codes: 0 '***', ' 0.001 '**', 0.05 '*'

Est=estimate, SE=standard error, t-stat=t statistics, Adj. R²=adjusted R², OR= odds ratios and CI=confidence interval. Percent Black is continuous. Store size coded as 0= large and 1=small.

Median household income and predominant race were shown to be multicollinear, therefore violating the assumption of independence and were analyzed separately. See Table 25 for summary estimates, odds ratios, and confidence intervals. The results showed that the odds of a suburban store having a total food price above zero was 4.4 times higher than that of Flint stores.

Table 25.

Summary of Logistic Regression for Percent Black, Store Location, and Their Interaction

Model	Predictors	Est.	SE	z-value	p-value	OR	CI
1	(Intercept)	-2.717	0.580	-4.687	2.78e-06 ***	0.07	(0.018, 0.184)
	% Black	0.002	0.009	0.213	0.831	1.00	(0.985, 1.020)
	Store location	1.484	0.708	2.096	0.036*	4.41	(1.170,19.585)
	% Black X Store location	-0.014	0.016	-0.853	0.394	0.99	(0.953, 1.016)

Signif. Codes: 0 '***', 0.05 '**'

Est=estimate, SE=standard error, t-stat=t statistics, Adj. R²=adjusted R², OR= odds ratios and CI=confidence interval. Percent Black is continuous. Store location is coded as 0= In Flint and 1= Suburban area buffer.

The interaction terms for total food price, median household income, store size, and store location were not significant and therefore not listed here. See Table 26. The results showed that the odds of a small store having a total food price score above zero are 0.02 times higher than that of a large store. See Table 27. Store location was also significant, but much higher. Results also showed that the odds of a suburban store having a total food price score above zero was almost 3 times that, 2.86, of a Flint store.

Table 26.

Summary of Logistic Regression for Total Food Price, Median Household Income, and Store Size

Model	Predictors	Est.	SE	z-value	p-value	OR	CI
1	(Intercept)	7.710e-02	8.664e-01	0.089	0.929	1.08	(0.210, 6.429)
	MHH\$	2.520e-05	2.465e-05	1.022	0.307	1.00	(0.999, 1.000)
	Store size	-4.125e+00	5.451e-01	-7.568	3.79ee-14 ***	0.02	(0.005, 0.045)

Signif. Codes: 0 ‘***’

Est=estimate, SE=standard error, t-stat=t statistics, Adj. R²=adjusted R², OR= odds ratios and CI=confidence interval. Median household income is continuous. Store size coded as 0= large and 1=small.

Table 27.

Summary of Logistic Regression for Total Food Price, Median Household Income, and Store Location

Model	Predictors	Est.	SE	z-value	p-value	OR	CI
1	(Intercept)	7.710e-02	8664e-01	0.089	0.929	0.064	(0.018,0.213)
	MHH\$	2.5203-05	2.465e-05	1.022	0.307	1.000	(0.999,1.000)
	Store	-4.125e	5.451e-01	-7.568	3.79e-14***	2.855	(1.163,7.017)
	location						

Signif. codes: 0 ‘***’

Est=estimate, SE=standard error, t-stat=t statistics, Adj. R²=adjusted R², OR= odds ratios and CI=confidence interval. Median household income is continuous. Store size coded as 0= large and 1=small.

Results of the logistic regression are similar to those of the OLS regression above, except that interaction terms were not significant and there were fewer significant associations. Logistic regression, identifying food price as a dichotomous variable, showed similar results as the OLS regression.

4.2 Phase II. Qualitative assessment of African American women residents' perceptions

Participants 21-50 years old with children under 18 years living at home were mostly under 40 years ago age and had lived in Flint for 40-50 years (65%) had three or more children and had completed some college or high school equivalency (Table 28). Most of the women were single parents, not working outside the home, and received federal or local assistance. Participants from the 60 and older group were mostly “young old” aged 60 to 69, had lived in Flint over 40 years, had a college degree and were not on federal or local assistance (Table 29).

Table 28.

Background Information of African American Women Focus Group Participants (n=17) Ages 21 to 50 with Children 18 Years Old and Younger

Category	N
Age	
28 to 39	11
40 to 50	6
Years in Flint 1	
year	1
10 to 38	5
40 to 50	11
Number of Children	
0	0
1	3
2	1
3	5
4	4
5 or 6	4
Household Structure Two	
Parent	4
Single Parent	13
Education Unanswered	
	1
High School Degree, GED or less	7
Some College	6
Technical School	1
College Degree	2
Employment Status	
Full Time	2
Part Time	2
Not Working	13
Not Working(Sick Leave & Disability)	2
Receive Federal or Local Assistance Yes	14
Medicaid	8
WIC	2
SNAP Benefits	11
Other	2

Table 29.

Background Information of African American Women Focus Group Participants (n=13) Ages 60 and Older

Category	N
Age	
60 to 68	10
72 to 75	3
Years in Flint Empty	
	1
6	1
29	1
40 to 50	5
60 to 63	5
Number of Children	
0	2*
1	2
2	3*
3	4
4	1
10	1*
Household Structure	
NA	
NA	
Education	
High School Degree	4
Some College	1
College Degree or More	7
Employment Status Not	
Working *	9
Retired	3
Part Time	1
Receive Federal or Local Assistance Yes	
Medicare	2
SNAP Benefits	2
	1

An * indicates that older participants may have been retired but instead entered not working for the employment question. Where participants stated they were “not working” (retired) they were counted as retired.

Tables 30 and 31 illustrate the primary, secondary, tertiary, and quaternary themes and dimensions of Womanism as elicited during the focus groups. Dimension 1—experiences as a criterion of meaning—described participants having particular information based on a set of experiences. Such experiences were based on being an African American woman within their respective age group, having a limited income, and, for one group, having children under 18 living at home. Perhaps because the majority of each group had lived in Flint most of their lives and had experienced their city’s economic changes, such experiences were how they tested and developed knowledge as reflected in the dialogue that lead to the creation of primary themes. Dimension 2—use of dialogue in assessing knowledge claims—described participants’ use of dialogue in sharing their experiences within the focus group setting and in learning from and verifying information with others. Dimension 4—ethics of personal accountability—described participant discussions of their responsibility for their own health, usually as food and diet related. These dimensions comprise the primary themes, with some primary themes incorporating more than one dimension and shortened for clarity. Dimension 3—ethics of caring that included individual expressiveness, appropriateness of emotions and empathy with women of other races —did not correspond with larger primary themes and was thus excluded from this analysis. Secondary, tertiary and quaternary themes were further classified as facilitators or barriers where applicable. Facilitators and barriers described perceived positive (facilitator) and negative (barriers) experiences.

Table 30.

Constructs that Describe Perceptions of Food Access of African American Women Living in Flint, Michigan Ages 21 to 50 Years with Children in the Home 18 Years Old and Younger (n=17) (Continues on following pages)

2° Level Themes	No. of Times	No. of Women	3° Level Themes	No. of Times	No. of Women	4° Level Themes	No. of Times	No. of Women
Dimension 1: Experience as Criterion of Meaning and Dimension 2: The use of dialogue in assessing knowledge claims								
Primary Theme: Physical resources that were facilitators and barriers to accessing food								
1.21 Food stores frequented by women	35	14	1.211 Food stores frequented by women (Facilitator)	18	11			
			1.212 Food stores frequented by women (Barrier)	21	11			
1.22 Beneficial farmers' market ⁹ (Facilitator)	6	5						
1.23 Experiences with free food locations	16	12	1.231 Family & friends gardens* (Facilitator)	4	4			
			1.232 Experiences with food pantries (FP)	12	10	1.2321 FP (Facilitator)	12	9
						1.2322 FP (Barrier)	16	9
						1.2323 FP (Frequent Trips)	2	2

⁹ Farmers' markets were located within and outside of Flint.

1°, 2°, 3° and 4°=Primary, Secondary, Tertiary and Quaternary Themes.

Table 30 (cont'd).

1.24 Specialized markets are different from food stores (Facilitator)	9	8		
1.25 Accessible gardens (Facilitator)	2	2		
1.26 Mentions of convenience stores/dollar stores	5	3		
Dimension 2: Use of dialogue to assess knowledge claims				
Primary Theme: Role of transportation				
2.21 Driving to the store (Facilitator)	6	6	2.211 Gas/Cost of driving (Barrier)	7 5
2.22 Accessing public transportation	3	3		
2.23 Walking to the store (Facilitator)	2	2		
2.24 Dependent upon others to get to the store (Barrier)	2	2		
Dimension 2: Use of dialogue to assess knowledge claims				
Primary Theme: Multiple facilitators and barriers to accessing food				
3.21 Potable water (Barrier)	13	9		
3.22 Limited income (Barrier)	6	4		
3.23 Necessary skills (Facilitator)	22	15	3.231 The importance of balancing meals (Facilitator)	3 3

Table 30 (cont'd).

	3.232 It's vital to plan meals (Facilitator)	4	4		
	3.233 Mentions of cooking/ baking (Facilitator)	7	7		
	3.234 Buying practices help to manage food costs (Facilitator)	9	8	3.2341 It's cheaper to buy in bulk (Facilitator)	2 2
				3.2342 Coupons cut costs (Facilitator)	6 5
				3.2343 Comparing prices & store ads saves money (Facilitator)	1 1
				3.2344 I like to grocery shop early in the morning (Facilitator)	1 1

Table 30 (cont'd).

Dimension 2: Use of dialogue to assess knowledge claims					
Primary Theme: Experiencing multiple perceived forms of discrimination: intersectional discrimination					
4.21 Intersectional discrimination income (social class)/ race/ gender/ religious practice/ maternity (Barrier)	23	4			
Dimension 2: The use of dialogue in assessing knowledge claims and Dimension 4: The ethic of personal accountability					
Primary Theme: Health concerns regarding food access					
5.21 Mentions of diet related disease	2	2			
5.23 Interested in gardening (Facilitator)	4	3			
5.24 Interested food attributes	2	2	5.241 Prefer fresh foods over canned	1	1
			5.242 The importance of local/ Michigan made (Facilitator)	1	1

Table 31.

Constructs that Describe Perceptions of Food Access of African American Women Living in Flint, Michigan Ages 60 and Older (n=13) (Continues on the following pages)

2° Level Themes	No. of Times	No. of Women	3° Level Themes	No. of Times	No. of Women	4° Level Themes	No. of Times	No. of Women
Dimension 1: Experience as Criterion of Meaning and Dimension 2: The use of dialogue in assessing knowledge claims								
Primary Theme: Physical resources that were facilitators and barriers to accessing food								
1.21 Food Stores Frequented by Women	53	13	1.211 Food stores frequented by women (Facilitator)	30	11			
			1.212 Food stores frequented by women (Barrier)	18	7			
			1.32 Food store location (Facilitator)	6	5			
			1.33 Food store location (Barrier)	7	4			
			1.31 Food stores as a social outlet (Facilitator)	3	2			
1.22 Beneficial farmers' market ¹⁰ (Facilitator)	11	8						
1.23 Experiences with free food locations	11	6	1.231 Family & friends gardens* (Facilitator)	5	4			
			1.232 Experiences with food pantries (FP)	6	4	1.2321 FP (Facilitator)	7	3

¹⁰ Farmers' markets were located within and outside of Flint.

1°, 2°, 3° and 4°=Primary, Secondary, Tertiary and Quaternary Themes.

Table 31 (cont'd).

			1.2322 FP (Barrier)	7	3
			1.2323 FP (Frequent Trips)	1	1
	1.24 Specialized markets are different from food stores (Facilitator)	4	3		
	1.25 Accessible gardens (Facilitator)	5	5		
	1.26 Mentions of convenience stores/dollar stores	12	7		
Dimension 2: The use of dialogue in assessing knowledge claims					
Primary Theme: The Role of Transportation					
	2.21 Driving to the store (Facilitator)	7	6	2.211 Gas/Cost of driving (Barrier)	2
				2.212 Frequent Trips	3
	2.22 Accessing public transportation	2	2		
	2.23 Walking to the store (Facilitator)	1	1		
	2.24 Dependent upon others to get to the store (Barrier)	1	1		

Table 31 (cont'd).

Dimension 2: The use of dialogue in assessing knowledge claims						
Primary Theme: There are multiple facilitators and barriers to accessing food						
3.21 Potable water (Barrier)	11	4				
3.22 Limited income (Barrier)	12	9				
3.23 Necessary skills (Facilitator)	44	10	3.231 The importance of balancing meals (Facilitator)	3	3	
			3.232 It's vital to plan meals (Facilitator)	1	1	
			3.233 Mentions of cooking/ baking	8	5	
			3.234 Buying practices help to manage food costs (Facilitator)	14	8	3.2341 It's cheaper to buy in bulk (Facilitator)
						6 4
						3.2342 Coupons cut costs (Facilitator)
						7 5
						3.2343 Comparing prices & store ads saves money (Facilitator)
						2 2
						3.2344 I like to grocery shop early in the morning (Facilitator)
						2 2

Table 31 (cont'd).

Dimension 2: The use of dialogue in assessing knowledge claims					
Primary Theme: Experiencing multiple perceived forms of discrimination: intersectional discrimination					
4.21 Intersectional Discrimination Income (Social Class, Race/Gender)	17	8			
Dimension 2: The use of dialogue in assessing knowledge claims and Dimension 4: The ethic of personal accountability					
Primary Theme: Health concerns regarding food access					
5.21 Mentions of Diet Related Disease	18	6			
5.22 Interested Food Attributes	14	7	5.221 The importance of organic food and antibiotic & hormone free food	7	4
			5.222 Prefer fresh foods over canned	5	4
			5.223 More fruits & veggies	2	1

4.2.1 African American women ages 21 to 50 with children up to 18 years old

4.2.1.1 Physical resources that were facilitators and barriers to accessing food

The primary theme of *physical resources facilitating or interfering with access to food* described the experiences or the perceptions by participants in a variety of food related locations in the city. This primary theme fell under Dimensions 1 and 2. Food access perceptions of six food related locations were dominated by these second-level themes including: 1) food stores frequented by women, 2) beneficial farmer markets, 3) specialized markets differ from food stores, 4) experiences with free food locations, 5) accessible gardens and 6) mentions of convenience/dollar stores. Some themes were further categorized into tertiary and quaternary level themes. The focus group moderator was also the researcher and is listed as Moderator in focus group quotes.

The second level theme of *food stores frequented by women* was the largest category and included any mention of food stores by name or generic mention of a grocery store. Most women (n=14 of 17) mentioned *food stores frequented by women* for a total of 35 times. This theme was further categorized to tertiary level *facilitators and/or barriers* experiences, with experiences that were perceived to be *barriers* recalled most. Two examples, one each of a *facilitators and barrier*, are next.

Facilitator: “When you get your meat from Bilbo’s and you throw it in the water and just pull it out, your stuff is clean. It’s just a big difference to me.”

Barrier: “Our kid’s father’s mom is Hispanic and I take her to the grocery store, before I even take her she ax[sic] me to go the grocery store and if I say I’m going to any grocery store that’s around here she say that okay.”

Moderator: “She won’t go with you?”

Samantha: “We go way up somewhere [north of the city]. She don’t do these grocery stores around here.”

The second-level theme *beneficial farmers’ market* referred to the farmers’ market in downtown Flint (n=5 of 17, 6 times). Less than one-third of participants patronized farmers’ markets, but saw them as a good source of quality fresh fruit and vegetables:

“Yeah, because they are fresher at the farmer’s market, you know.”

The second level theme of *experiences with free food locations* referred to the use of free food locations in the city, such as food pantries at churches or non-profit organizations and food from friends and family gardens (n=12, 71%, 16 times). Free food was mentioned most, second to food stores frequented by women. Tertiary level themes of *experiences with food pantries* (n=10, 59%, 12 times) and *family and friend’s gardens* (n=4, 24%, 4 times) perceived as a facilitator were a steady source of vegetables from relative’s gardens and provided a full meal for their family:

“As far as the summertime, from like my family members, I do get a lot of vegetables from them – cabbages, tomatoes – you know, basically the whole time. There’s you know, fresh vegetables.”

“Well, I figure like this – if one food bank gives me one loaf of bread, one pack of hot dogs, and some lettuce, I can go to another food bank, get the same thing. And, with my family being so big – hey, that’s one whole meal.”

Fourth level themes included specific *experiences with food pantries perceived to be facilitative or barriers*. They were mentioned almost as much as general category of food pantries (n=9, 12 times; n=9, 16 times, respectively):

Facilitator: “I try to go to all these free communities that be giving out food and stuff and I go over there first (inaudible) before I even go to the grocery store.”

Barrier: “Yeah, they give you the – the fruit that they have in the containers is all expired. But, they – it’s always...”

Moderator: “Is it always expired?”

Jasmine: “They never give you anything without [it being expired].”

The second level theme *specialized markets differ from food stores* were clustered into a theme because they were mentioned more (n=8) than farmers’ markets and convenience/dollar stores. Possibly because of the social importance placed on meat in the diet and the sheer visibility of quality issues on meat (i.e., smell and color).

“Me, myself, um, I go to a Halal store because I’m Muslim.”

4.2.1.2 The role of transportation

The second primary theme of transportation described different modes of transport participants engaged when accessing food stores. This primary theme fell under dimension 2, the use of dialogue in assessing knowledge claims. The second level themes included: 1) driving to the store, 2) accessing public transportation, 3) walking to the store, and 4) depend on others to get to the store. Driving to the store, the only second level theme mentioned here, referred to participants who drove in order to get to food stores and was seen as a facilitator (n=6).

Moderator: “Do you take the bus? Do you drive? Do you have access to a car?”

Jade: Both. It determines the weather. If it’s freezing outside, I’m definitely going to drive.”

Third level themes for *the role of transportation* included the *gas/cost of driving* (n=5, 7 times) and was generally seen as a barrier. Often, the cost of gas was referred to as an unfortunate additional cost in part because of the lack of larger and higher quality food stores in the city necessitating traveling further away from home:

“You have to drive way out to get your family the best, like that’s crazy.”

4.2.1.3 There are multiple facilitators and barriers to accessing food

The third primary theme of *multiple facilitators and barriers to accessing food* described personal and environmental factors that facilitated or hindered participants in their practice of

acquiring food and preparing food. The second level themes included: 1) potable¹¹ water, 2) limited income, and 3) necessary skills. Most participants mentioned water (n=9 of 17, 13 times) and as a barrier:

“They [water bills] have skyrocketed. I’m talking about completely skyrocketed. I had a \$345.00 bill for one month, and two of those weeks we couldn’t even use the water. But they’re not gonna prorate it, but they were running those hydrants trying to flush the water out. And they charged us for all them [sic] hydrants, they charged us for that.”

Four participants mentioned limited income six times as a barrier. Participants referred to their need to use food stamps (i.e. Bridge Card) and Social Security:

“Even though I’m employed I get no benefits or anything from them. And, it made a big difference going from making \$3,000 every two weeks to getting basically nothing - \$157.00 a month is what I get. You know? Well, \$158.00 a month. And, that’s a big difference. I have to let my car go back. I have to get something used that I could afford. It was just terrible.”

“And, I do get stamps, also. We try to make them stretch through the month, which is really hard to do with the amount that they give and the price of food, especially when you’re paying almost three dollars for a loaf of bread.”

Necessary skills were the largest second level category (n=15 of 17, 22 times) and considered a facilitator. Tertiary level themes included the importance of 1) balancing meals, 2) planning meals, 3) cooking and 4) buying practices to manage food costs. Seven participants mentioned cooking and baking as a skill:

“My daily meals at my house always involve your vegetables and some kind of potatoes or rice or something and your meat. And I try to make it colorful as possible, that’s my thing.”

Buying practices were further categorized into quaternary level themes as 1) buying in 2) using coupons, 3) comparing prices and store ads, and 4) shopping early in the day. Mentioned most were the use of coupons and the (former) practice of doubling coupons:

¹¹ Potable refers to water that is fit or suitable for drinking (<http://dictionary.reference.com/browse/potable>)

“And I used to go to Simon’s, and I do the digital coupons, and whatever coupons I can get.”

4.2.1.4 Experiencing multiple perceived forms of discrimination: Intersectional discrimination

Experiencing multiple perceived forms of discrimination: intersectional discrimination describes the intersection of forms of oppression or discrimination for Black women, included, but are not limited to, race and gender (Crenshaw, 1991). In this study, intersectional discrimination described race, gender, income/social class and other categories of identity like religious practice and maternity (i.e., the presence of mother and children together) as relating to participants’ perceptions of discrimination (n= 4 of 17, 23 times).

The example below is an important because it details a participants’ perception of multiple types of discrimination experienced at a grocery store with her children:

Darnita: “Yeah, I ran to grocery shopping and having my little ones with me, and I grabbed a little too much, and I told the lady there may be some stuff you might have to put back because I might go over. She’s like, all right. But the guy behind me – it’s the checkout line where you could do it yourself, but he kind of behind me and see what I got, and don’t want to stand in line and be looking at – “What did you get the frozen stuff for if you’re gonna have to put it back?” I’m trying to stay calm because I’ve got my kids.

Because I already told her, and it’s her job anyway, but I let her know. Probably only three or four things, or whatever. So he turn around, and I was thinking maybe because I’m Black, maybe because I’m covered too. He got to talking to me, and he I see there’s a Black guy or other people they see, I’m minding my business and trying to stay calm. I got my kids and everything. And I’m still trying to just, you know, just to really ignore him, and I’m trying to, but he just hit a button at me. And I’m getting my stuff, and I’m trying to get on down, but he got to talking to me sideways a little louder. And then the next thing I know, Darnita Johnson came out, and I just started going back with him, but I’m trying not to cuss.

But he, I’m like “mind your business. You got ain’t got nothing to do with over here. I’ve got this. Worry about yourself. You wanna go-its other lines”. Before I know, my daughter, she like 20-something, she’s pregnant, she comes over there – because you know [inaudible] go into labor. But this lady, and other people seen he started bothering me. So when I get up and start tripping, then my daughter come(s) along, and they make it seem like it’s my fault.”

Moderator:” Ahh, okay. “

Darnita: “But y ’all weren’t trying to say nothing when this man was coming at me. And I’m like here, you won’t saying nothing. Right. You know what I’m saying? So when it was all over, the next thing I know, here comes some White lady coming. “You’re not showing a good example of your kids.”

Experiences of discrimination were not rare occurrences. Another example of perceived discrimination is described below:

“Yeah, and they even have milk. The other day we went to the store to get milk, the milk was outdated and the guy’s like, “Well, we just charge you half price.” Half price for some milk that’s outdated? And it’s not even just fruits and vegetables it’s other things on the shelves, the cookies, the snacks, I mean even that’s outdated. I mean their stuff is outdated and they’re trying to give it-sell it.”

4.2.1.5 Health concerns regarding food access

Compared to the group of older women, younger women rarely mentioned diet-related diseases. Regardless, there were some second level themes of health concerns relating to food access which included: 1) mentions of diet related diseases (n=2), 2) interest in gardening and 3) interest in food attributes. *Diet related diseases* were as a consequence of overconsumption of sweet foods or as a factor in paying medical costs:

“My mom – she worked for General Motors and retired from General Motors. And, with her insurance, which was Blue Cross, they no longer covered her diabetes supplies. So, I had to come out of my pocket to buy her insulin, and her syringes, and everything. So, it makes it hard for women to make ends meet.”

Interest in gardening referred to participants’ interest in growing their own food to facilitate food access:

Jade: “I’m facing the same barriers in that assessing food too. It’s again goes about that we’re forced to go to different places that we don’t want to go. If you don’t have a vehicle, transportation, I’m just speaking on those people they are forced to go to these places because they don’t have transportation. So, they’re forced to eat foods that are unhealthy. Me, I’m blessed to have transportation to

go to other places and I still don't trust those other places either. I don't know, you know I'm getting to a point where I want to personally I want to have my own garden. I've been seeking out help with that area. I'm glad that the farmers market came and I would like to have classes of having my own, you know us having our own here. That's what I seeking out getting help to produce our own food here in Flint because I mean you can't really trust any of these places. "

Samantha: "I believe that be a good idea too to have people come and find out more research on how to grow their own, you know, product [sic] they own."

Moderator: "To have their own gardens?"

Samantha: "Yeah. If there's more of that then you probably wouldn't have half the problems that we have."

Two women mentioned interest in food attributes. Food attributes included preferring fresh over canned foods (n=1) and the importance of local/Michigan made (n=1).

4.2.2 African American women ages 60 and older

4.2.2.1 Physical resources that were facilitators and barriers to accessing food

The primary theme of *physical resources that were facilitators and barriers to accessing food* described the experiences or the perceptions of them by participants in a variety of food related locations in the city. This primary theme fell under Dimensions 1 and 2. Food access perceptions were dominated by these second-level themes included. The second-level themes included: 1) food stores frequented by women, 2) beneficial farmer markets, 3) specialized markets differ from food stores, 4) experiences with free food locations, 5) accessible gardens and 6) mentions of convenience/dollar stores. The focus group moderator was also the researcher and is listed as Moderator in focus group quotes.

The second level theme of *food stores frequented by women* was the largest category and included any mention of food stores by name or generic mention of a grocery store. All of the women (n=13, 100%) mentioned *Food stores frequented by women* for a total of 53 times. This

theme was further categorized to tertiary level *facilitators and/or barriers* experiences and perceptions of those experiences, with *facilitative* experiences recalled most. Two examples, one each of a *facilitators and barriers*, are next:

Facilitator: “But fortunately, Simons is my next door neighbor. I can walk to Simons and be up in there every day. Every day I have something I can find that I can get at Simons.”

Barrier: “Even Washington’s, it’s in the neighborhood but the quality of stuff they sell is inferior. [Group agreement]. It stinks when you go in their stores. Their stores are not clean.”

Third level themes of *food store location* were categorized as *facilitative and barriers* (n=5, 6 times; n=4, 7 times, respectively). An example of facilitative experiences is mentioned first:

Facilitators:” I live real close to a Simon’s and I used to go 7:00am/8:00am in the morning and that was how I would get a lot of meat, because it would be marked down.”

Barriers: “They’re not in my neighborhood now, so that makes a big difference.”

Food stores were also a way to alleviate boredom. They were perceived as a social outlet for some of the participants (n=2, 3 times). An example of one women’s use of food stores is below:

“I just go to the stores because it’s something to do. It’s something to do. If I have my grandbabies over we’ll walk to the stores and I’ll get them some goodies or something.”

The second-level theme *beneficial farmers’ market* were the second largest category (n=8, 62%, 11 times). The second-level theme farmers’ market referred primarily to the farmers’ market in downtown Flint. It was seen as place to patronize often and as a source of quality fresh fruit and vegetables:

“Farmers’ market’s my best friend. I’m always there.”

“I like to go to the farmers’ market and get fresh vegetables and freeze them.”

The second level theme of *experiences with free food locations* referred to the use of free food locations in the city, such as food pantries at churches or non-profit organizations and food from friends and family gardens (n=6, 46%, 11 times). Use of the food bank also provided an opportunity for culinary experimentation:

“...the cost of food, medicine, my light bill, and all of those things, and so I couldn’t buy groceries. And when I started going to the food banks, then I was able to eat healthy foods I never would buy due to the cost. By them being free, I experimented.”

Third level theme *family & friends gardens* (n=4, 31%, 5 times) referred to free food from others’ gardens. These gardens contributed a variety of vegetables to participant’s diets:

“My sister-in-law had a garden and I got that from her, green peppers and cabbage.”

The last tertiary level theme of *experiences with food pantries* food pantries described participants’ general discussion of food pantries, which were considered neither a facilitator nor a barrier (n=4, 31%, 6 times). However, quaternary level themes described perceived facilitative and barrier experiences at food pantries (n=3, 75%, 7 times; n=3, 75%, 7 times, respectively). While food pantries were a place where participants were able to *stretch* limited funds, they were also locations replete with what participants’ viewed as unhealthy foods and sometimes questionable food offerings. Examples of a facilitative and barrier experience are listed below:

Facilitator: “My primary food source [are] the food bank giveaways West Martian Food Bank. I go to giveaways. And I have three days that I call my grocery shopping days: Tuesday, Friday and Sunday, and these are the places that let you choose what you want, or what you can use.”

Barrier: “Ya know, and for a diabetic, I mean that’s just not good.”

One woman mentioned making frequent trips to food pantries one time. Though mentioned once, this and the facilitative and barrier experiences at food pantries collectively describe many experiences experienced by participants.

The final second level themes of physical resources that were facilitators and barriers to accessing food resources included: 1) specialized markets differ from food stores, 2) accessible garden and 3) mentions of convenience stores/dollar stores. *Specialized markets differ from food stores* (n=3) were discussed by less than one-quarter of participants. They described locations, other than grocery stores, where specialty foods were sold:

“I go to the fish market and buy my fish and package it up individually for a couple days. I like to buy in the bulk and cook in the bulk too so I don’t have to cook every day.”

Accessible gardens (n=5, 38%, 5 times) were mentioned by participants as a physical resource. Participants either observed others in their community engage in, or occasionally engaged in gardening themselves:

“I have a greenhouse that I purchased last year and I grow some greens and onions and I did prepare the greens from it.”

Convenience stores were mentioned by over half of participants (n=7, 54%, 12 times). Convenience stores were perceived to occasionally be unsafe, be purveyors primarily of alcohol and have high prices.

“And so therefore, if you can get to a major grocery store, supermarket and such, Simon’s or Smith’s or Bilbo’s, it’s a whole lot different than going to the little corner stores. And even though the corner store has been turned into a grocery store, they still have corner store prices. So you can’t go and make your dollar stretch.”

“Now we only have those little party stores and whatever that charging those exorbitant prices for [foods].”

4.2.2.2 The role of transportation

The second primary theme of transportation described different modes of transport participants engaged when accessing food stores. The second level themes included: 1) driving to the store, 2) accessing public transportation, 3) walking to the stores and 4) depend on others to

get to the store. Driving to the store referred to participants who drove in order to get to food stores.

Moderator: “Do you drive or take the bus? “

Jennifer: “I drive.”

There were few participants in this age group who used public transportation when accessing food stores or food locations (n=2, 2 times). Some of the transportation used was specifically for senior citizens and disabled residents: “For transportation, I use the Your Ride¹² or the bus.”

One resident, not the same participant, either walked to the local grocery store, which was perceived as a facilitator, or occasionally depended on others to get to the grocery store, which I identified as a barrier. A number of participants walked to food store locations. Third level themes for transportation included the *gas and cost of driving* (n=2, 15%, 2 times), which was viewed as a barrier, and making frequent trips to food stores (n=3, 30.8%, 3 times).

Examples of each are below:

“And then with gas prices, and you set up your schedule for today, okay, I gotta go over here to pay this bill. I gotta go to—I gotta go to these different places. And so therefore, I’m going centered around that [activity].”

“And with Simon’s in my neighborhoods, I went everyday too. Every day they have mark downs.”

4.2.2.3 There are multiple facilitators and barriers to accessing food

The tertiary main theme of *multiple facilitators and barriers* described personal and environmental factors that facilitated or hindered participants in their practice of acquiring preparing food. The second level themes included 1) potable water, 2) limited income, and 3)

¹² Your Ride transportation is provided through local service centers for residents in the service area with disabilities and senior citizens (<http://mtaflint.org/yourride/>).

necessary skills. *Potable water* was mentioned by almost one-third of participants (n=4, 31%, 11 times) and was considered a barrier. *Limited income* was mentioned by most of the participants (n=9, 69%, 12 times) and was also considered a barrier. Examples of each are listed below:

Carolyn Johnson: “And I buy it by the case and then I buy it by the gallon [water].”

Regina Johnson: “I cook with that.”

Carolyn Johnson: “To cook with. I forget to boil [water]-I never lived like that. The cost of food, medicine, my light bill, and all of those things, and so I couldn’t buy groceries.”

Necessary skills were the largest category (n=10, 77%, 44 times), were perceived to be facilitators and included multiple tertiary-level themes. The category included 1) the importance of balancing meals, 2) it’s vital to plan meals, 3) mentions of cooking/ baking and 4) buying practices help to manage food costs. *The planning of meals* was mentioned by only one participant one time and *the importance of balancing meals* was mentioned by three people three times (both were considered facilitators). *Mentions of cooking and baking* as a skill was mentioned by more than one-third of the participants (n=5, 38%, 8 times):

“I go to the fish market and buy my fish and package it up individually for a couple of days. I like to buy in bulk and cook in the bulk too, so I don’t have to cook every day.”

Buying practices help to manage food costs described necessary skills and tools utilized to plan, purchase, and prepare foods. It was mentioned by over half of the participants (n=8, 62%, 14 times).

Fourth level themes further described the different buying practices participants used and included 1) it’s cheaper to buy in bulk, 2) coupons cut costs, 3) comparing prices and store ads save money, and 4) I like to grocery shop early in the morning. All of the quaternary level

themes were perceived to be facilitators. *It's cheaper to buy in bulk* described participants who occasionally made purchases in large amounts, often because they perceived that they were saving money (n=4, 31%, 6 times): “When I buy rice, I go to AFD’s and buy a big thing of rice.”

Coupons cut costs described how participants were able to purchase more food more often than normal with their income. It served as a mode of making their money stretch (n=5, 38%, 7 times):

“I would go everyday then, when they were in the neighborhood, you know? Go early and see what I could get a good deal on, for you know, salads every day. If I want salad I could go in the morning and I could get reduced salads.”

4.2.2.4 Experiencing multiple perceived forms of discrimination: Intersectional discrimination

Intersectionality describes the intersection of forms of oppression or discrimination for Black women included, but are not limited to, race and gender (Crenshaw, 1991). The primary theme of *experiencing multiple perceived forms of discrimination: intersectional discrimination* described the same experiences as the younger group of women, except for perceptions of discrimination based on maternity and religious practice. Examples of *intersectional discrimination* (n=8, 62%, 17 times) reflect multiple perceptions of discrimination by participants. Examples from are detailed below:

“Even now. Even now you’ll find that, even Simons. The Simons that was in my neighborhood. But if I went little further down, they had better Simons, better meat, and you could tell the difference. And they shipped the other stuff to our neighborhood and because we could get to there we buy it, but it’s – not the same.”

Carolyn Johnson: “What I wanted to add is where we can get collard greens, mustard greens and turnip greens in the stores, they’re higher. It seems like our ethnic food is much, much more – yeah the price of it. Is much, much higher than...”

Regina Johnson: “But then they don’t look good.”

Carolyn Johnson: “Yeah, the quality is not there.”

The last quote was from a participant who had a part-time job scanning the endcaps in area chain grocery stores. Her perceived experiences were based on observations as an employee and not necessarily as a customer, and provided a different experience than a “normal” person patronizing a food store:

Rita Johnson: “Mm-hmm. Okay. Just a little job I was doing.”

Moderator: “Okay. And you would scan the endcaps?”

Rita Johnson: “I just noticed the quality from store-to-store.”

Donna Johnson: “And they say the one off Marietta Road is really nice. It’s pretty much all White. They have some good buys I’ve heard early in the morning.”

Rita Johnson: “Yeah, that’s what I’m talking about. You have a difference in the price.”

Donna Johnson: “Oh, okay.”

Moderator: “So when you said quality, so what would be –?”

Rita Johnson: “Well, the one on Marietta Road has a much better quality of vegetables and everything than the one probably on Marshall. They would have more of a selection.”

4.2.2.5 Health concerns regarding food access

Health concerns regarding food access described participants mentioning foods resources, and foods consumed and purchased in order to manage and control diet related diseases and/ or to prevent disease. Regardless, there were some second level themes of health concerns relating to food access which included: 1) mentions of diet related diseases and 2) interest in food attributes. *Diet related diseases* were mentioned more times than food attributes and were considered as a consequence of race related/genetic inheritance.

“How it has affected me being Black? I’ve inherited all of the Black family diseases. I have the high blood pressure, the diabetic, the cholesterol, thyroid, and the heart. So I have to watch what I eat. The high blood pressure, cholesterol and sugar are the worst ones for me to manage, because I can’t eat the sweets and a lot of the bread. Like she said, we have to watch the sodium, the salt, and the fat.”

Third level themes further described food attributes such as *the importance of organic food and antibiotic and hormone free food and prefer fresh foods over canned foods*. Examples of these two themes are below:

“I had an organic banana and I got it from Simons, it tastes cleaner. It tastes – it’s different. You can tell because somebody asked me, “What kind of banana is this?” And I said, “It’s organic.” But you can tell the difference.”

“I like going to bigger grocery stores so I can get the fresher food, the fresh vegetables and fruit. And I learned – I am a diabetic and I found out that canned foods have too many preservatives and salt in ‘em, so I very seldom do anything in the can. Very seldom. And so that keeps me going to the stores, but to buy fresh vegetables or frozen vegetables are much more expensive. And so I’m limited because of the expense. But I still buy that instead of buying canned vegetables because I am concerned about my health.”

Mentions of diet related diseases were referred to as something that participants were working to correct and/or to prevent. Participants connected their ability to manage and control diseases based on foods available in the community.

CHAPTER 5

DISCUSSION

The purpose of this study was to explore food availability, price and quality of food stores in Flint and to qualitatively describe residents' experiences accessing food. It was anticipated that through this mixed methods approach, insights would emerge to describe food stores in the city and a specific group of residents' perceptions navigating this environment. This section starts with quantitative then qualitative discussions, each beginning with an evaluation of findings in comparison to relevant literature followed by limitations and strengths. Finally, the Discussion concludes with a theoretical evaluation of the findings through the socio-ecological model of the nutrition environment and its placement within relevant dimensions of Womanist theory.

5.1 Phase I. Quantitative food store assessment

5.1.1 Specific aim 1

The first aim of this dissertation was to explore the availability, price and quality of selected foods within Flint and a 2-mile buffer referred to as the Suburban area. Findings supported all the hypotheses in Aim 1 with a few differences in the strength of the associations, particularly for race and median household income. The overarching findings in this study revealed what you would expect from an assessment of a post-industrial urban disinvested city, i.e., that (mean) availability food scores for groups of foods were highest at large stores, (mean) food price scores and quality were higher in suburban stores, and (mean) food availability and price were higher in communities with fewer Blacks and higher median household incomes compared to census tracts that were predominantly Black and had lower incomes. Although no

studies were located that assessed food availability, price and quality exactly as designed for this study, some comparisons are possible and are outlined below.

5.1.1.1 Food availability

One of the earliest studies to compare food availability to store location found that inner-city residents in Minneapolis and St Paul had less availability of specific food groups than did suburban residents (Chung & Meyers, 1999). Other studies in Baltimore, likewise found predominantly Black urban areas to have significantly less mean food availability (Franco et al., 2008; Franco et al., 2009). Contradictory to these studies, however, Krukowski, Smith West, Harvey-Berino, and Prewitt (2010) failed to find either race or store size associated with food availability, in either Burlington, Vermont or Little Rock, Arkansas.

Other studies also using instruments adapted from the NEM-S like the one used in the present study found associations between mean food availability and store size (Andreyeva et al. 2008; Block & Kouba, 2006; Glanz et al., 2007). Glanz et al. who established validity and reliability for the original NEMS-S instrument, found that for nearly all food categories, grocery stores had significantly higher food availability scores. While not surprising or an exact comparison to the current study, the two groups of store categories grocery and convenience store are similar to this study's categories of large and small.

Compared to higher income census tracts, lower income areas had lower food availability (Franco et al., 2008; Franco et al., 2009). In the study by Bertoni et al. (2001), African American communities had lower overall NEMS-S scores compared to White communities. This low overall score was driven by low availability of food items in predominantly Black areas. The aggregate reporting of NEMS-S scores makes comparing specific constructs impossible and offers less detailed information about the food environment.

Food availability is one of the simplest ways to assess food variety at food stores and is the starting point for other important determinants of food purchasing such as food price, quality, taste and preferences. Future studies would benefit from the creation of a standard group of response variables to assess food availability. Doing so would create an *a priori* and standard measure of key constructs of the food environment.

5.1.1.2 Food price

Similar to what Andreyeva et al. (2008) found in New Haven, Connecticut, this study found that as median household income increased in Flint, food prices significantly increased, but at a negligible amount. Glanz et al. (2007), however, demonstrated that higher income areas of Atlanta had lower food prices compared to lower income areas. Median household income was at the census tract level in Flint, which might not have been the best estimate/denominator in which to measure proximal food mean price. Other studies have used Census block group and zip codes.

Other factors could also be responsible for this contradictory finding in income and food prices. For example, Chung and Meyers (1999) found that some foods were less expensive in inner-city St Paul, MN, like ribs, but had higher prices for milk compared to higher income areas. Findings in this study can support that the poor pay more for food, *but* this is assuming that residents in low-income areas only shop where they live, which the literature does not completely support (Hillier, Cannuscio, Karpyn, McLaughlin, & Chilton, 2011; LeDoux & Vojnovic, 2013).

5.1.1.3 Food quality

The finding in this study of an inverse relationship between the quality of fruits and vegetables and the percentage of Blacks in census tracts was supported in part by several studies.

Cole et al. (2010) found higher quality of fruit and vegetables in predominantly white communities compared to predominantly Black communities. These race comparisons were complicated, however, because predominantly Black communities had lower availability of fruits and vegetables making quality comparisons difficult. In Detroit, assessment of fruit and vegetables showed poor quality in predominantly low-income African American communities when compared to the mixed suburban communities (Zenk et al., 2006). In Atlanta, however, predominantly Black communities had the highest quality fruits and vegetables 48% of the time, but fewer fruit and vegetables available for comparison (Glanz et al., 2007). Likewise, in Flint there were few stores with fruits and vegetables for comparison.

The quality of fruits and vegetables did decrease significantly in Flint as the median income of the census tract increased, but the difference was so small as to be negligible.

Andreyeva et al. (2008) and Glanz et al. (2007) likewise found significantly worse produce quality in lower income communities and that higher income area had higher quality and lower prices.

5.1.1.4 Quantitative strengths and limitations

5.1.1.4.1 Limitations

Availability, quality and price were standard measures when assessing the status of food in the food environment, however price and quality data were based on 10 things representing five food groups and 20 fresh fruit and vegetables, respectively. While foods within the quality and price group were justifiably grouped together, small stores and large stores could have had their own price and quality schema. Small stores far outnumber the large stores, and such changes probably would continue to reflect the larger differences of availability, quality and

price based on store size and store location. Reliability of the instrument was tested, but not validity. The quality components were influenced by the NEMS-S tool, deemed both reliable and valid, which extends credence to this assessment. However, validity testing of the food store assessment instrument could be considered for future research.

Additionally, the assessment could have also benefitted from a measure of store cleanliness, which was mentioned as being an issue during the focus groups and also in the literature (Rose, 2011; Zenk et al., 2011). The store assessment was conducted during the summer months. An assessment conducted during the fall and early winter would be useful to show seasonal variability in foods available, and the different shopping experiences of participants as seasons change in the part of this US. Also, data were collected in the summer of 2012, with the final analysis completed three years later. The time between data collection and analysis were unable to assess any changes in food stores that occurred during that time.

5.1.1.4.2 Strengths

Also, this study illustrates differences in food availability, quality and prices that some residents have discussed for years that were not believed by other members of the community. The Flint Food Store Assessment instrument included approximately 63 items and a wide range of store information, some of which was included based on community partners' involvement with community block groups and input from residents who were members of the Access and Education workgroup. Each of the constructs were reported separately, which allowed for clear comparisons between variables.

One of largest strengths of this study is that the methods were spatially explicit, which if unaccounted could erroneously estimate significance values of research questions 1.1, 1.2 and 1.3. Only two of the food store assessments mentioned anything about conducting a study that

accounted for potential clustering of store data (Morland, Wing, & Diez-Roux, 2002; Zenk et al., 2005), which assumes it was not accounted for. Not accounting for the autocorrelation of stores could produce significances where they were not.

5.2 Phase II. Qualitative assessment of African American women residents' perceptions

This portion of the Discussion chapter is comprised of comparisons of both groups of participants based on second, tertiary and quaternary level themes, dimensions of Womanism theory that best described participant descriptions and relevant systems of the socio-ecological framework of the nutrition environment found in primary, secondary, tertiary and quaternary level themes. Whereas the Results chapter presented a detailed accounting of themes from the focus groups of African American women aged 21 to 50 with children in the home up to age 18 and women 60 years and older, this chapter constructs a more complete understanding and synthesis of the results.

The overarching findings revealed that African American women between the ages of 21 to 50 years with children under 18 years old and women, 60 years and older, perceived that a range of factors were involved in accessing food, and that physical resources and facilitators and barriers having the greatest effect, some of them facilitative and barriers. Only the most relevant and highest frequency themes were included in the discussion section, with each group of women discussed together within the same theme.

5.2.1 Physical resources that were facilitators and barriers to accessing food

Food stores frequented by women were the largest second level theme under the main theme physical resources for both groups of women. It was mentioned by all of the 60 years and older women, and more number of times, which suggested the perceived importance of food stores in acquiring food for these women. Logically, food stores would come up when asked

about resources used in acquiring food, but I was not expecting it to be 93% of all women (82% of younger women and 100% of older women).

As tertiary level themes, *facilitators and/or barriers* experiences were also one of the largest groups. In younger women, experiences that were considered facilitators included shopping at stores for what were considered “good” prices on meat and spices, and included looking for price matching and price markdowns. “Good” pricing allowed them to afford more with their money and to purchase larger cuts of meat. It also meant driving out of town to access lower prices, typically from larger stores with greater variety and buying power. Their reality is reflected in the literature, which showed that urban, low-income and Black residents had concerns about store cleanliness, have further to travel in order to purchase the same foods as and engage in adaptive strategies to manage the shortcomings of food available in the community (Alkon et al., 2013; Kumar et al., 2011; LeDoux & Vojnovic, 2013; Rose, 2011; Zenk et al., 2011).

Having a framework for where to buy groceries and traveling plan to access food stores is imperative, particularly when managing a constrained budget. Similarly, the older women reported lower prices as a determining factor in their positive experiences, as well as frequent price markdowns, familiar relationship with store employees, improvements on offerings, convenience, proximity, acceptance of food stamps, availability of organic/natural foods and good store practices. While the literature identifies taste and cost as the top factors driving food-purchasing behavior (Glanz et al., 1998), there were additional, equally important factors driving food purchasing behavior. This is particularly true of an older woman who perceived store employee recognition as an important component of her food shopping experience. After suffering a stroke, she was no longer able to drive and walked to a nearby grocery store, which

also acted an opportunity for socialization. The proximity of food stores selling reliable quality and economical foods were important, as research has shown that older adults will walk further distances to access perceived better quality, cost and variety of produce (Munoz-Plaza et al., 2013), even with physical impairments.

Regarding *negative food store* experiences, the younger group of women perceived more negative experiences, but this could be due in part to a larger number of participants leading to more opportunity for negative experiences (they were experienced by 79% of younger women and 54% of older women). In the younger group, negative food store experiences included the perceived expensiveness of meat, high price and poor quality of meat, spoiled produce, lack of store cleanliness, closing of proximal stores and distance to an adequately stocked store. In the older group of women their perceptions mostly parallel the younger women's experiences with the addition of recurrent removal of local stores, the absence of "good quality" stores in their neighborhood with concurrent poor quality of food at proximal stores, higher prices at perceived "nicer" stores, distance to purchasing culturally appropriate foods and poor customer treatment at stores.

Interestingly, meat quality and price were oft mentioned by both groups of women. This could be because perceived poor quality/spoiled meat has a smell and color unlike that of similarly spoiled produce, and cost significantly more. The importance of meat in the diet of participants is also supported by the literature that showed high purchases and consumption of meat and beef by low-income households (C. G. Davis & Lin, 2005; Diez-Roux et al., 1999; Wiig & Smith, 2009) and African Americans (C. G. Davis & Lin, 2005). Also, qualitative and quantitative studies conducted in Oakland, California and Chicago, Illinois point to the importance and frequent mention of meat by low-income, urban and minority residents when

discussing food quality, availability (absence of) and price (Alkon et al., 2013; Zenk et al., 2011).

Free food was the largest second level theme in physical resources, and was mentioned by more of the younger group of women than the older group of women (71% vs. 46%). *Food pantries* as a third and fourth level theme was mentioned by more of the younger more times, which could be indicative of having children in the home. As a positive and negative theme, *positive food pantry* experiences were mentioned by almost all of the younger women (90%), where most mentioned using them as a way to “make ends meet” even though receiving food stamps, sometimes offered non-perishable toiletries, a needed relief in winter or when a spouse becomes underemployed, a way to create multiple meals by going to different food pantry locations and were plentiful and appreciated.

One woman who spoke of attending multiple food pantries had six children and discussed being able to make multiple meals by combining food purchased and food acquired from several food pantries. This suggests that the city and surrounding area has multiple locations to access free food. A personal conversation with Sara Heirman in 2013, who at the time was the Director of Food Programs at the Greater Foodbank in Eastern Michigan, mentioned that there were approximately 140 varied free food locations in the city of Flint and the surrounding area. The experiences of the older group of women generally paralleled those of the younger women, in that they received a “good source of fresh vegetables” from the food pantries and that they would not be able to eat as well without them. One resident who relocated from western Michigan to Flint within the past seven years talked about using the food giveaway days as her “grocery shopping days”. The cost of household expenses, utilities and medicine limited her ability to purchase groceries: Going to multiple locations allowed her to “eat healthy.”

Negative food pantry experiences were mentioned more times by the younger women than positive experiences. Generally, the negative experiences included expired food, moldy bread and rotten fruit and vegetables. Type of food available at food pantry is important because the literature suggests that limited variety, insufficient produce and expired food can limit food pantry participants from eating nutritiously (Algert, Agrawal, & Lewis, 2006). Similarly, older participants felt that food pantries offered expired foods, and too much sweet food and bread, which for those who were improving their diet or living with diabetes was sometimes frustrating.

5.2.1.1 The role of transportation

Second level themes *of the role of transportation* included different ways participants discussed acquiring food, which included driving, public transportation, walking or depending on others. Driving was the largest theme for both groups and was mentioned by six participants (35% and 46%, 21 to 50 years old, and 60 years and older respectively). The younger women drove, carpooled, seasonally used both public transportation and their cars, depended on family members and used public transportation. While at work, one participant even walked to the area Flint Farmers' Market. Another woman with six children discussed taking public transportation and depending on family to run her errands. The importance of the ability to access food stores and to be able to run errands in a timely manner cannot be understated, as the literature show that for some low-income Black families transportation is a hindrance to buying groceries (Morland et al., 2002; US House Select Committee on Hunger, 1990). Two women lamented the poor quality and variety of foods in her neighborhood, "Like I said, I don't like shopping in the neighborhood. I notice that it's like a waste of money. It is. Everything go bad fast." Another woman at the same focus group further explained a similar experience going to Grand Blanc, which is southeast of the city and a suburb of Flint:

“But I like to eat different types of foods and I feel that in the Black, being a Black woman it’s kind of hard because they’ll shop differently because of the food that they have in the grocery stores. I don’t want to use all my gas to go to Grand Blanc to get something different for my family to eat.”

The older women discussed similar experiences, with age related differences, that highlighted the importance of familial and community relationships. Two of them could no longer drive because of strokes and diminishment of vision, leaving one dependent on her husband. The other walked to her local grocery store multiple times during the week to get things she needed.

In addition to driving further out of the city to grocery shop, this year residents were struck by an additional insult: Within two weeks of each other in March 2015, two large grocery stores were announced to be closed at the end of March and the end of May. This led to a public outcry and for the Genesee County Mass Transportation Authority to increase bus routes to access food stores called “Ride to Groceries” (Nagl, 2015). While Flint, and presumed similarly disinvested and post-single industry cities, have new residents, current older residents were mostly those who do not want to leave their beloved city or cannot leave. The closing of stores in the city limits creates further hardship for residents, particularly older residents, those without access to personal transportation, single parents and those with children. One older woman said it best:

“You got to pick another day to go to the store which you could have been doing something at home or doing something else. You got to go back to another store to get exactly what you need... [in order to prepare Sunday dinner].”

5.2.1.2 There are multiple facilitators and barriers to accessing food

Third level themes of *there are multiple facilitators and barriers to accessing food* included water, income and skills, which was the largest group and will be discussed at length.

The topic of water in the city of Flint was and continues to be a complex issue that will be discussed later in this section.

Skills were an integral aspect for both groups of women, and was mentioned by over 75% of each group (88% and 77%, 21 to 50 years old and 60 years and older respectively). Third level themes included the women discussing creating balanced meals, planning their meals ahead of time, cooking and baking their meals and buying practices. Cooking and baking and buying practices were mentioned by almost half of the younger women. They were skills that facilitated in preparing food for their families and for managing their money, which was often limited.

Buying practices were mentioned by 53% of the younger women. The two largest groups of buying in bulk and using coupons indicated a process of planning and organizing in order to save money and making it stretch, requiring additional planning and organizing. More of the older women (80%) used buying practices such as buying in bulk (50% vs. 20%) and buying discounted food (and buying discounted food was not a theme for the younger women and was mentioned by 63% of older women), which could be indicative of wisdom with age and accrued learning over time. Buying practices were important skills to have and showed a level of organization and forethought engaged by women with lower incomes. Studies conducted in Oakland, California and Chicago, Illinois in similarly low income communities with majority African American participants were reflective of the same managing challenges and development of skills (Alkon et al., 2013; Kumar et al., 2011; Zenk et al., 2011).

Income and water were perceived as barriers by both groups of women, in that income, or the lack there of, kept them from buying certain foods they wanted and also limited their overall ability to make purchases. Regarding income, a study that conducted focus groups and a food store (NEMS-S) and restaurant (NEMS-R) assessment noted participants' difficulty in affording

healthy foods. When the participants, African American with low incomes, were asked about their perceptions of the DASH diet, staying within budget was mentioned as a limiting factor for purchasing DASH diet related foods (Bertoni et al., 2011). Interestingly, the price of water for residents was also discussed as a barrier, in part because they paid more for it than normal, raising their overall bill, and because it was perceived to be expensive.

The water in Flint has been an issue since the city switched from the Detroit River water to the Flint River water while a pipeline to Lake Huron was waiting to be finished, slated for 2016. Beginning in at least 2014, Flint residents have experienced multiple boil drinking water notices due to high levels of bacteria (Fonger, 2014) and brown drinking water (Carmody, 2015). In fact, in Genesee County where Flint resides, Flint has the highest water bill (Adams, 2014), illustrated by a focus group participant who shared having water bill over \$300 dollars. Water woes in the city have also affected cooking and income because of the boil water notices and because some residents purchased bottled water with money allotted for other needs. In addition to the boil water notices, color and the cost of water, Flint's water was later discovered to have been contaminated with lead. This led to a statistically significant increase in elevated blood lead levels in Flint children; an increase not seen in children outside of Flint water service area (Hanna-Attisha, LaChance, Sadler, & Schnepf, 2016). Access to healthy food is of particular importance post revelation of lead exposure, in adults and particularly children. Due to their role in ameliorating lead poisoning, the availability of foods that contain key nutrients of calcium, vitamin C, and iron are integral due to their role in ameliorating lead poisoning (United States Environmental Protection Agency, 2001). It is also important to note that diets lacking in calcium and iron enhance lead absorption, which leads to a higher uptake of lead (Mahaffey, 1995).

Intersectionality describes the intersection of forms/systems of oppression/discrimination for Black women including, but are not limited to, race and gender (Crenshaw, 1991). Thus, intersectional discrimination described the participants' perceptions of being discriminated against based on at least race, gender, age, sexual orientation, and religious practice.

Microaggressions could also describe their perceived experiences, which are “subtle, stunning, often automatic, and non-verbal exchanges that are ‘put downs’ of blacks...the offensive mechanisms used against blacks often are innocuous” (Pierce, Carew, Pierce-Gonzalez, & Wills, 1977, p. 65). In other words, microaggressions are “brief, everyday exchanges that send denigrating messages to certain individuals because of their group membership” (Sue, 2010, p. xvi).

5.2.2 Qualitative limitations and strengths

Limitations inherent in research are important to assess, particularly for qualitative studies engaged with vulnerable or marginalized participants. Limitations of the study included use of focus groups, the range of participants in each focus group and the generalizability of results. Dominant personalities may hinder the free flow of discussion by other participants, which can be ameliorated by conducting smaller focus groups of four to eight participants. One of the aged 21 to 50 years old women with children up to age 18, focus group included nine garrulous participants, which contributed to more than the usual side conversations and crosstalking. Nine potential participants were contacted for this particular focus group, because scheduled participants do not always participate. Of eight focus groups this was the *only* one where all potential participants participated, contributing to a larger than normal size focus group.

In addition to one focus group having more participants than expected, focus groups ranged from two to nine participants. According to Daly (2007, p. 154), “Usually three to five are required in order to identify recurring themes and issues”, with the author conducting a successful revelatory focus group with three women. While approximately five or more participants were scheduled for each focus group, unforeseen circumstances, transportation and familial obligations dictated their ability to participate, therefore the researcher conducted some focus groups with fewer than the ideal number of participants. The community of study was an urban Midwestern post-industrial city. Focusing on a specific city and on two age groups of African American women limited the broad generalizability of and may not be reflective of experiences of women living in rural locations, less segregated cities or of non-African American women.

There were multiple benefits and strengths to conducting focus groups, especially marginalized groups with a history of being denied various rights. This study included women from multiple marginalized groups: senior women over the age of 60, younger women on some form of public assistance, women with children, women without a college degree and African American women. Community based and qualitative research often attempts to “give voice” to marginalized groups (Morgan et al., 1998), which this study was successful in doing.

In addition to including marginalized participants, the focus groups were an environment where participants shared similar experiences, felt supported and at least heard (Daly, 2007) and benefited from sharing experiential knowledge with peers during focus groups by “querying and explaining themselves to each other” (Morgan, 1996, p. 139). In addition to benefitting from sharing experiential knowledge, following the focus group two older participants continued to

talk and decided to attend an internationally known, nationally bestselling author's discussion who was visiting Flint that evening (Chimamanda Ngozi Adichie, author of *Americanah* and *Half of a Yellow Sun*).

The importance of sharing lived experiences with demographically similar women cannot be overstated, because of the importance of knowing one is not alone in their experiences. Most of the focus groups ended with participants saying thank you the researcher, that they really enjoyed the experience, exchanging contact information and with participants continuing conversations as they departed the building.

The most important strength of this research, second to sharing the lived experiences of perceptions of African American accessing food in a focus group setting, is that this was a community based research project. The researchers' community partner *edible flint* is a collaborative community based entity incorporating local agencies, organizations/foundations and residents. Also, Flint as a research community that has long been post-industrial and economically disinvested, has been over-researched and inadequately involved with the collection and dissemination of results, something I was told on multiple occasions by different members of the community over approximately four years. Results of this study will be, and have been, shared with the community partner to house data collected during this project, in continuing with the collaborative nature of community based research and the relationship with the researcher and research community.

5.2.3 Associated theory: Womanism

In the literature, there were studies undergirded by Womanism that included African American and African women in social settings and in nursing, some cited in the literature

review. I did not find a parallel study employing Womanism to explore the perceptions of food access in African American woman, and did not include comparative studies in this section.

Lived experience as criteria of meaning was evident in the participation of focus groups where they discussed their perceptions of accessing food while living in the city. Participants shared, verified and reflected on experiential knowledge, leading to rich and multifaceted conversation/data. Verification and reflection on their experiences were important components of participation in focus groups, because it is a level of engagement born from the interest of participants in the conversations and focus group questions, instead of being forced upon them by the moderator. This is also one of the ways participants used dialogue in assessing knowledge.

Ethics of caring was evident when participants from earlier focus groups shared their participant experiences, and encouraged participation of other African American women they thought would be interested. Also, an example of snowball sampling, sharing information about participating in the focus groups was not a requirement of participation, nor always explicitly requested. When the relationship was mother daughter, each daughter or mother said that their mother or daughter should participate in the focus group. One daughter was initially particularly dubious of whether the focus group was going to be worth her time. Following the focus group, she admitted that she enjoyed it and that she was wrong about her assumptions; that her mother suggested she do something that was going to be boring and a waste of time. When the relationship was that of a woman and a family friend, she mentioned that her aunt, e.g. family friend, regularly shares information with her she believes could be useful, which included my focus groups.

Additional displays of ethics of caring included multiple mentions of community; Flint as a city they lived in and as a once more vibrant, connected community and a community recently bereft of services. Services included local grocery stores, a bank that was attached to one of the grocery stores and community organization that hired local youth and conducted job training. In some instance when I asked for clarification on a statement from a participant, other participants assisted in explaining her experience when she had difficulty explaining it herself.

Ethic of personal accountability was displayed by both groups of women, but in different ways. Most of the older women discussed making health based changes because of a medical diagnosis or an ailment (e.g., hypertension, diabetes, and stroke), or because they were on the borderline of having a diagnosis. Included in these discussions was an awareness of decisions, some poor, made when they were younger women and younger mothers. They discussed sharing their wisdom with their children, grandchildren, and extended family.

The younger women's accounting of personal accountability could be aggregated into two groups: 1) concern for themselves and community and 2) economic hurdles. Two younger women, one with six children and five of them in the home, talked about bringing neighborhood children into their home who did not received regular meals and where not taken care of by their parent(s). One child's mother worked third overnight shift, her much older brother was not responsible and she came home from school to a locked house with no way inside. She often welcomed this child into her home and fed her. The story is important because it also shows how for some of these women personal accountability extends to being personally accountable to members of their community, especially children.

While all focus groups possessed some version of this experience, one discussion with a focus group containing nine participants was particularly poignant. They were knowledgeable

about creating a balanced meal or “eating from the food pyramid,” but felt that their knowledge was stymied by insufficient income, inadequate public services and exhaustion. Insufficient income is especially difficult to manage in an area with limited access to healthy foods, such as Flint. Regarding inadequate public services, one mother told a story of being on food stamps (SNAP benefits) and other benefits, only to have them taken away removed once she gained employment. The SNAP benefits created a financial cushion that permitted consistency. Rescinding SNAP benefits meant less money for rent, utilities, and other incidentals that negated any financial benefit received via her new job. She put it best, when talking about the confusion of her children, “The children are confused...[they’d say] I thought when you get a job, things would get better”. Lastly, exhaustion was caused by working long shifts, managing a home with children with different needs and spending a lot of time away from their children. This meant they were too busy working and too tired to enjoy them. Another participant perfectly captured the physical and emotional exhaustion,

“Since I’ve been off of work, he likes it better. Mommy, you’re not stressed out. Even though he don’t know at night I’m crying, you know? There’s food here, lights on, we got water. But to me he’s confused, because I still want him to know [to] get the education, work the job, pay your bills and hopefully it’ll get better.”

5.2.4 Associated theory: Socio-ecological framework of the nutrition environment

Results from Phase I of this research suggest that the physical environments, the **exosystem**, is the most relevant system of the interconnected microsystem, mesosystem, exosystem and the macrosystem. Majority of the socio-ecological model involves findings from the qualitative section. Some are interrelated and were included in this section. Measures of the food store constructs, that is, availability, price, and quality, only exist if they are contained within structures, such as food stores. Within the **exosystem** were the neighborhoods and

communities, containing supermarkets, convenience store and corner stores accessed in this study, of which patronage is influenced by accessibility, availability, barriers and opportunities. Influences of particular importance measured in research questions 1.1, 1.2 and 1.3 were availability, price and quality, which directly affect residents' ability to purchase foods.

According to the socio-ecological framework of the nutrition environment, race and median household income were biological factors within the **microsystem**, which were influenced by self-efficacy, outcome expectations and behavior capability (Story et al., 2008). In this study self-efficacy, the belief in one's ability to execute behaviors to succeed in specific outcomes (Bandura, 1997), is integral in navigating the food environment in accessing healthy food. It operates together with outcome expectations, behavior capability and perceptions of the food environment to influence how residents feel about purchasing food in their community.

The **mesosystem**, the social environment, networks, and social support were what participants regularly depended on, especially when they were without personal transportation or when accessing fresh produce from acquaintances gardens. Qualitatively, these relationships were visible in the Free Food theme (1.23) and the Depended on Others theme (2.24). While less involved, the **macrosystem** played a direct and indirect role in influencing, manipulating and controlling access to and perception of healthy food and will be discussed further in the Future Research. The social environment and their relationships were key components of recruitment for this study, whereby participants engaged in sharing recruitment information regarding this study.

When conducting literature reviews before, during and after this research, I did not find application or an explicit statement of the incorporation and or an undergirded analysis of the food store environment using the named Ecological framework of the nutrition environment

(Story et al., 2008), which is a modified interpretation of the socio-ecological model (SEM) by Bronfenbrenner (1977). However, the traditional SEM has been used for literature reviews investigating improving fruit and vegetable intake among low-income African Americans (Robinson, 2008), school based behavioral interventions influencing food choice (Moore et al., 2013) and a review of small food stores interventions to alter the food environment and risk of chronic disease (Gittelsohn, Rowan, & Gadhoke, 2012). Incorporation of the socio-ecological framework, as it pertains to the food store nutrition environment, would be a worthwhile addition to scaffold future research studies. In my opinion, the inclusion of this and other appropriate theories creates a more comprehensive perspective of the research environment than atheoretical research explorations.

CHAPTER 6

IMPLICATIONS, FUTURE RESEARCH, AND CONCLUSION

The research conducted to measure foods in stores, types of food stores and the exploration of perceptions of food access by African American women from two nutritionally important periods of life, collectively offer diverse viewpoints. First, results from Phase I demonstrated that smaller stores in Flint had lower availability, lower quality and higher price for selected foods compared to larger stores. Also, food availability price and quality were associated with race and median household income, illustrating that as availability, price and quality increases, median household income and the percentage of Blacks increased. Findings from Phase II were used to develop a conceptual understanding of the multi-faceted and intersectional management African American women implored to navigate facilitators and barriers assessing food. Taken together, this knowledge of the local food environment can justify the need for improved transportation to larger stores, for larger food stores within the city of Flint, as well as for local food based grant opportunities and to engage the public in discussions about the food environment in Flint and the immediate surrounding area. Notably, the discovery of lead exposure in children and known differences in enhanced lead absorption further complicates the perception of food access by residents, and African American women, as well as food availability, food price and food quality.

6.1 Future research

Prior research of food environment studies has suggested future studies incorporate mixed methods (Odoms-Young et al., 2009), multi-dimensional research exploring different characteristics of the environment (Cumming et al., 2007) and incorporate a socio-ecological

model (Lytle, 2009). While this study contributes to the aforementioned areas of study, I will discuss three areas of research that would be easily incorporated in this study were it repeated.

First, measures of stress using psychometric and biological markers could be assessed of focus group participants. Psychometrically, stress could be measured using the John Henryism Active Scale of Coping (JHASC or JHAC-12), a survey tool that measures psychosocial stressors that may contribute to physiological stress. John Henryism, a strategy developed by, but not limited to, lower socioeconomic status persons—particularly African Americans—for coping with prolonged exposure to stressors that require additional energy to manage (James, 1994). Stressors include chronic financial strain, microaggressions, mentioned earlier, and job insecurity that accumulates in physiological harm (Whitfield et al., 2006). These experiences are not limited to African Americans, and have been applied to other minority groups such as Korean Americans (Logan, Barksdale, & Chien, 2014) and higher income Asian Americans (Haritatos, Mahalingam, & James, 2007).

Biological markers of stress include non-invasive salivary cortisol, which could be self-collected by participants (Dowd, Simanek, & Aiello, 2009). As a measure of allostatic load, salivary cortisol could measure physiological consequences of repeated or chronic stress (McEwen & Stellar, 1993), which contribute to cardiovascular disease. Stress also fits well into the microsystem and mesosystem levels of the socio-ecological model of the nutrition environment. Measuring levels of stress using the above methods would add an important psychosocial dimension to the participants' experiences, particularly perceptions navigating the food environment.

Second, in another study, it would be advantageous to assess household food security combined with a measure of childhood food insecurity, particularly for African American

women with children. In the United States Blacks, households with children and households headed by single women have some of the highest rates of food insecurity (Coleman-Jensen et al., 2012). The USDA Economic Research Service offers a shortened six-item survey to measure household food security (Blumberg, Bialostosky, Hamilton, & Briefel, 1999), much shorter than the 18 survey used to measure household food security. It could also be combined with a separate children's food security scale, which improves identification of child food security than the six-item short form survey (Nord & Bickel, 2002).

Next, a new study might use a smaller food store owner assessment than what was used in this study to determine availability of foods in the food environment. The Healthy Corner Store Initiative, an initiative supported by the non-profit Food Trust, has shown that on average stores participating at the basic level introduced 32 more new healthy items above the minimum required for basic participation (Philadelphia's Healthy Corner Store Initiative: 2010-2012, 2012). In Flint, there is some precedent for assessing store owners level of interest, knowledge and willingness to offer more perishable foods and fresh fruit and vegetables (Personal communication, summer 2012 Erin Caudell, a member of the *edible flint* Access and Education workgroup).

According to a key informant, some store owners expressed interest in the stocking fresh fruit and vegetables (Personal communication, Erin Caudell, 2013). Based on this conversation, there may be opportunities for local suppliers and farmers to coordinate with interested store owners. She also arranged a group meeting with Mona Sahouri, executive director of the Arab American Heritage Council (their AAHC logo appears at the top of the food store assessment). It is reported that over 60% of store owners in Flint and the surrounding area are Arab American or Asian American, some of which are familiar with the executive director and other members of

the organization. Potentially, these owners can assist with recruiting store owner and discussions with store owners.¹³

6.2 Conclusion

In this dissertation, at the census tract level, this researcher found the following results for availability, price and quality: that Suburban food stores had a higher mean availability score for all food groups compared to stores within Flint; smaller stores have lower price scores for all food groups compared to larger grocery stores within the city and the surrounding Suburban area; smaller stores have lower quality scores for all food groups compared to larger grocery stores within the city and the surrounding Suburban area; that suburban food stores had a higher mean quality score for 20 fruit and vegetables compared to stores within Flint; as availability of all food groups increased, the percent Black of the census tracts in which the stores were located decreased; that as availability of all food groups increased, the median household increased negligibly; as the price score of all food groups increased, the percent Black of the census tracts in which the stores were located decreased; as the price score of all food groups increased, the median household income of the census tracts in which the stores were located increased; as quality score of 20 fruit and vegetables increased, the percent Black of the census tracts in which the stores are located decreased; as quality of fruit and vegetables increased the median household income of the census tracts in which the stores are located increased.

Small stores and large stores in both Flint and the Suburban area had significantly different availability, price and quality of foods. The focus groups revealed that older African American women and mothers between 21 and 50 years old perceive inequality in food store availability *and* food availability, price and quality of foods. Moreover, to manage what they

¹³ Members of AAHC were also responsible for generating an Arabic translated version of the letter mailed to store owners and carried by assessors announcing and explaining the food store assessment.

perceived as challenges they, engaged in processes familiar to African American women.

Illustrating the absence of amenities within the community available to Flint residents and the immediate suburban area will offer more insight into understanding resources, or lack thereof.

Ultimately, this study improves upon food store data available to community organizations and city entities, the canon of community based mixed methods literature, the use of Womanist theory in elucidating the perception of the food environment by African American women and the strategies and skills African American women develop in order to deal with challenges acquiring food for their families. Importantly, it also adds another facet to the food environment of majority minority and lower income communities that much like Flint, have been exposed to lead.

CHAPTER 7

SUBMITTED QUALITATIVE MANUSCRIPT

Barriers and facilitators to food access for African American women in Flint, Michigan

7.1 Abstract

Background: Inequitable access to food contributes to food security and post-industrial cities like Flint, MI have been especially hard hit.

Objective: To explore the perceptions of food access by African American women.

Participants: Four focus groups were conducted with 17 mothers, 21-50 years of age with children under 18, and four with 13 women over the age of 60.

Analysis: Transcriptions were open coded within each focus group, and then axial codes were determined and compared across the focus groups. Two external coders came to consensus on recurring categories. The Social Ecological Model of the food environment and Womanist Theory undergirded women's perceptions of food access.

Results: Findings revealed that poor availability of healthy foods in inner city stores, limited transportation and the high cost of water were barriers to accessing healthy food. Conversely, receiving food from food giveaways, friends and family as well as access to transportation facilitated food access. These women also reported discriminatory experiences and the older women, diet-related health concerns. They were keenly aware of the free community resources available and the gender, racial and income barriers to access them.

Conclusion: Understanding these barriers and facilitators provides information to facilitate local food policy assistance decisions and inform community-based intervention, especially given the importance of a healthy diet to sequester lead.

7.2 Introduction

Inequitable access to food contributes to food insecurity (Coleman-Jensen et al., 2013) and has become an increasingly important concern in many inner city environments. Postindustrial cities like Flint, Michigan have been especially hard hit (Scorsone & Bateson, 2011), with problems of lead contamination in the city's water since April 2014 (Hanna-Attisha, et al., 2016). Others have noted differential access to healthy foods can contribute to chronic illness (Annema et al., 2011; Bazzano et al., 2002; Krishnamurthy et al., 2011) and overall health disparities. For example, fruit and vegetables are an important part of a healthy diet, but most Americans do not eat enough (Blanck et al., 2008; Krebs-Smith et al., 2010), and this deficiency of fruit and vegetables is associated with diet related diseases. Ready access to fruits and vegetables would be especially important in a community with lead contamination, due to their role in ameliorating lead poisoning (United States Environmental Protection Agency, 2001).

Only a few studies to date have focused on exploring African Americans' perceptions of the nutrition environment and food access in urban settings. Evidence from qualitative studies showed perceptions of food stores affected participants' food choices, differing by whether they were urban or rural (Jilcott et al., 2009) and that participants were dissatisfied with lack of cleanliness, poor service, food selection and quality, and the high prices at local grocery stores (DiSantis et al., 2013; Rose, 2011). Urban residents, thus, must use adaptive strategies to overcome environmental and socio-interactional barriers (Zenk et al., 2011). A recent mixed method study reported that urban residents did not consider small, local markets to be "real" stores and that customers were unsatisfied with the stores in their neighborhood (Freedman & Bell, 2009). Other studies have noted that senior adults had special challenges when attempting to eat a well-balanced diet (Waites, 2013). African Americans in Pittsburgh were mostly

dissatisfied with the quality of food, selection of produce and perceived unjustified price disparities among local chain supermarkets (Kumar et al., 2011). Such studies revealed that African Americans in urban environments perceived barriers to healthy foods as issues with food safety, price, availability, quality, and transportation.

Two research questions were addressed in this study for the city of Flint, Michigan. 1) What experiences impede and complicate acquisition of healthy food, thus its consumption, by African American women? 2) What factors improve access to a variety of healthful foods for African American women? The focus was on two groups of African American women in Flint Michigan most likely to be vulnerable to food insecurity—women with children in the household and women over age of 60 years (Coleman-Jensen et al., 2012). Exploration of a community's perceptions to purchasing healthy foods is imperative to understanding facilitators and barriers, which in turn affect consumption.

7.3 Methods

7.3.1 Theoretical frameworks and study design

This qualitative study draws upon Womanist Theory to privilege the voices of urban, African American women (Collins, 1986), as well as the social ecological model (SEM) of the food environment (Bronfenbrenner, 1977; Story et al., 2008). Use of the Womanist Theory recognizes women as the primary providers and gatekeepers of food for their families (Wansink, 2006). This theory also places African American women's ideas, knowledge and experiences at the center of the analysis, because their experiences are shaped not just by race, but also by the intersections of their location, social class and sexual orientation (A. Y. Davis, 1981). An SEM of the nutrition environment “emphasizes connections between people and their environment and

views behavior as affecting and being effected by multiple levels of interacting influence” (Bronfenbrenner, 1997).

Story and colleagues (2008) adapted the SEM for food to elucidate the multiple, systemic influences on food choices like, for example, culture and community among others. The systematic influences include the macro-level environments (sectors/macrosystem), physical environments (settings/exosystem), social environments (networks/mesosystem) and individual factors (personal/microsystem). In this study, the SEM of the food environment informed research by suggesting the potential connections between store type, food availability and location within individual factors (microsystem), the social environment (mesosystem), and the physical environment (exosystem).

Qualitative methods were chosen because they are flexible and open-ended to allow respondents to express themselves using their own words and their own logic. The focus group format encouraged reciprocal knowledge co-creation among the women participants. Their individual ecosystems and perspectives within the Flint community helped to create a Womanist inquiry space.

7.3.2 Sample

Participants were eligible for the study if they were an African American mother between the ages of 21 and 50 with children up to 18 years old in the household, or “senior” African American woman aged 60 and older. All resided within the city of Flint. After approval from the university’s Institutional Review Board, multiple recruitment methods were used. It is important to note here that the first author is engaged with a community collaborative call *edible flint* (proper name is lower case). *Edible flint* is a community collaborative to support residents in accessing and growing healthy food and its members assisted with participant recruitment.

Purposeful recruitment occurred via the community partner *edible flint*. Members of *edible flint* made announcements during monthly and bi-weekly meetings, sent fliers via their listserv and posted fliers announcing the study in the community. Participants were also recruited through snowball sampling from the focus group participants where they were encouraged to recruit others. Such methods yielded four focus groups of women (n=17) between the ages of 21 and 50 years with children 18 years old and younger, and another four focus groups of “senior” African American women aged 60 and older (n=13). There was total sample of 30 African American women.

7.4 Data collection and analysis

After participants signed consent forms and were guaranteed confidentiality, the first author, an African American woman, moderated all the focus groups from fall 2014 to spring 2015. Each focus group was conducted at one of two central community locations and lasted between 35-75 minutes. Examples of the focus group questions are shown in Table 1. Participants received a \$20 incentive upon completion.

Focus group discussions were audio recorded using two recorders and were fully transcribed. Atlas.ti qualitative data management software (Atlas.ti, version 7.5.6, 2014, Atlas.ti GmbH, Berlin, Germany) was used to code and analyze the transcripts. Initial codes were identified and grouped into categories, and then common themes were identified across the categories.

To enhance validity, multiple coders were used. The second coder, also a co-author, is a qualitative methodologist. Concurrent coding occurred following the first three focus groups, wherein the researcher and the expert coder read through and coded these focus groups separately. Both found similar themes in the data. The first author continued conducting focus

groups, recruiting participants, coding and analyzing data. Both coders understood Womanist Theory and one first author, the African American woman's experience. The addition of a second expert coder provided objectivity and a knowledgeable perspective as a woman in regards to Womanist Theory.

7.5 Results

Data saturation was achieved with the fourth focus group for each age group of women. Table 2 describes the participants' characteristics by group. It is notable that the older women appear to be slightly better educated than those younger. Also, the seniors were less likely to receive any governmental assistance other than Social Security and Medicare.

7.5.1 Theme 1. Barriers and facilitators to food access

Selected dimensions of Womanism—lived experience as criteria of meaning, use of dialogues in assessing knowledge claims, and ethics of personal accountability—were merged with SEM of the food environment to describe the primary themes. Where applicable, each level of themes was further categorized as facilitator, barrier or concern about food access, as informed by aspects of the SEM of the food environment, for example, store type and food availability, the social and physical environments. Results are presented to showcase the women's voices in each age group. Barriers and facilitators to food access included the accessibility of the store, accessibility of free food, the role of transportation, and availability of potable water.

7.5.1.1 Accessibility of food stores

Barrier: Even Washington's, it's in the neighborhood but the quality of stuff they sell is inferior. [Group agreement, i.e., "Mmm-hmm, Yeah"]. It stinks when you go in their stores. Their stores are not clean. (60 and over group) [Note that the names of all the stores like Washington and Simon's are pseudonyms and not the real store names.]

Facilitator: But fortunately, Simons is my next door neighbor. I can walk to Simons¹ and be up in there every day. Every day I have something I can find that I can get at Simons. (60 and over group)

Barrier: And the bell pepper, like I said, I got from there. I was gonna cook some stir fry. I don't know something about it told me just smash it a little bit to see if it was – as soon as I put my finger on it, it was like ugh, it was just mushy. It's always something when you go to the store and you gotta go back to the store and that's more gas. It's always something. (21 to 50 age group)

Facilitator: And I want to share, usually on Wednesdays at Simons, you can catch more of their manager markdowns on meats. (21 to 50 age group)

7.5.1.1.1 Free food access

Free food locations, the second largest primary theme, referred to the use of free food locations in the city, such as food pantries at churches or non-profit organizations and food from friends and family gardens.

Barrier: Yeah, they give you the—the fruit that they have in the containers is all expired... They never give you anything without [it being expired]. (21 to 50 age group)

Facilitator: I try to go to all these free communities that be giving out food and stuff and I go over there first... before I even go to the grocery store. (21 to 50 age group)

Facilitator: The cost of food, medicine, my light bill, and all of those things, and so I couldn't buy groceries. And when I started going to the food banks, then I was able to eat healthy foods I never would buy due to the cost. By them being free, I experimented. (60 and over group)

7.5.1.1.2 Role of transportation

Both groups of women described the transportation they used to access food stores at various food locations in and near Flint. The ability to drive to the store was perceived as a facilitator, however, the cost of gasoline, car maintenance, and driving further than normal to assess additional store resources after a store closed were seen as barriers. Transportation was

part of the larger macrosystem, in part, because of perceived inadequate public transportation in Flint. Often, the cost of gas was referred to as an unfortunate additional cost in part because of the lack of large and high quality food stores in the city. This perceived disparity necessitated traveling further away from home to access food.

Barrier: You have to drive way out to get your family the best, like that's crazy.
(21 to 50 age group)

Quotes from the younger group are from the same participant. They demonstrate that when a grocery store is removed from the community, adjacent core businesses are also removed causing additional hardships.

Barrier: And it's crazy cause we did have Simon's. We did have the bank. We did have all the stuff in the neighborhood. It was like they took it all away this year... now I have to drive way on the other side of town to go to the ATM or to withdraw money or put money in my account or anything, so that's gas. When I could've just went right up the street." (21 to 50 age group)

However, a number of the older women lived proximally to a grocery store and were able to walk, which was seen as a facilitator and a social outlet.

Facilitator: And with Simon's in my neighborhoods, I went everyday too. Every day they have mark downs. (60 and older age group)
The last two closed grocery stores were in walking distance to quite a few residents.

7.5.1.1.3 Potable water

About 80% of both groups of women perceived potable water as a barrier. This now has been well-documented among Flint residents for over two years, although it did not receive national recognition until fall of 2015 (Hanna-Attisha et al., 2016) after these focus groups were completed. City notices to boil water undermined confidence in this resource.

Barrier: They [water bills] have skyrocketed. I'm talking about completely skyrocketed. I had a \$345.00 bill for one month, and two of those weeks we couldn't even use the water. But they're not gonna prorate it, but they were

running those hydrants trying to flush the water out. And they charged us for all them hydrants, they charged us for that.
(21 to 50 age group)

Barrier: And I buy it [water] by the case and then I buy it by the gallon [water]...to cook with. I forget to boil [water], I never lived like that. The cost of food, medicine, my light bill, and all of those things, and so I couldn't buy groceries.
(60 and older age group)

7.5.2 Theme 2. Experiences of discrimination

Both groups of women described experiencing multiple forms of discrimination relating to limited food availability, poor food quality and poor service in the stores they could access easily. Intersectional discrimination describes the intersection of discrimination and their race, gender, and other things (Crenshaw, 1991). In this study, women described intersectional discrimination based on race, gender, income/social class and/or other categories of identity like religious practice and maternal status. Because people have multiple identities, it can be hard to tease out which factor to attribute the perceived discrimination. This discrimination occurred at all levels within the SEM.

Barrier: Yeah, and they even have milk. The other day we went to the store to get milk, the milk was outdated and the guy's like, "Well, we just charge you half price." Half price for some milk that's outdated? And it's not even just fruits and vegetables it's other things on the shelves, the cookies, the snacks, I mean even that's outdated. I mean their stuff is outdated and they're trying to sell it. (21 to 50 age group)

Barrier: How they gonna be treated when they go to these stores... It always worry me, I don't send my kids to the store no more but when I was staying back on the West Side it was I could send them to the store and it be fresher stuff. They don't cheat them out their money or stuff like that. (21 to 50 age group)

Barrier: They (store owners) don't care because they feel that we got to come to their store anyway. So it's a respect factor so it doesn't have to do with age at all it's just that they feel that we have nowhere else to go and they are about correct. Cause I've tried to go different places to get my things and I can't. (21 to 50 age group)

Barrier: I just feel like we've been targeted—all the Black community period. We've been targeted as far as our needs, you know. They know what we need and it's steadily being taking away from us. It's not fair, you know. (21 to 50 age group)

Barrier: Even now. Even now you'll find that even Simons, the Simons that was in my neighborhood. But if I went little further down, they had a better Simons, better meat, and you could tell the difference. And they shipped the other stuff to our neighborhood and because we could get to there we buy it, but it's not the same. (60 and older age group)

Barrier: And they (store owners) don't eat what we eat. They know what we want. They know what people what people of color want, and so they know that the accessibility to get where they need to go, they can't do it. So if I give you anything, you've gotta take it. (60 and older age group)

7.5.3 Theme 3. Related health concerns

Diet-related health concerns are within the SEM microsystem of demographics and biological factors, which can be influenced by the larger macrosystem. Both groups of women described health concerns regarding food access. Participants mentioned food resources, and foods purchased and consumed in order to manage, control or prevent diet-related diseases. Compared to the group of seniors, though, younger women rarely mentioned diet-related diseases. When young mothers did mention health concerns, it was as a part of their frustration with wanting to engage in better health practices, but feeling overwhelmed by transportation access barriers.

Concern: How it has affected me being Black? I've inherited all of the Black family diseases. I have the high blood pressure, the diabetic, the cholesterol, thyroid, and the heart. So I have to watch what I eat. The high blood pressure, cholesterol and sugar are the worst ones for me to manage, because I can't eat the sweets and a lot of the bread. (60 and older age group)

Concern: Like she said, we have to watch the sodium, the salt, and the fat. (60 and older age group)

Concern: Man, it's just overwhelming. So at the end of the day, yeah [we know to] incorporate fruits and vegetables in, but we've got canned vegetables... We

would love to be able to—even if it’s activity you’re doing with the children, taking them out to the farmers’ market or whatever. (21 to 50 age group)

7.6 Discussion

The experiences of African American women in Flint, MI that impeded their acquisition of healthy food showed that lack of access to large grocery stores with good quality foods at reasonable prices was the main, but not only barrier. Despite this already poor access, over an 18-month period from December 2013 to May 2015, another five large grocery stores closed within the city and within three miles of the city limits. Exemplifying the exosystem of the food environment, these store closings created additional barriers for residents, particularly those meeting criteria of the focus group participants. The proximity of food stores selling reliable quality and economical foods were important. Other research has shown that older adults will walk further distances to access perceived better quality, cost and variety of produce (Munoz-Plaza et al., 2013), even with physical impairments. Other findings also support the perceptions of these women in Flint in that urban, low-income and Black residents have concerns about store cleanliness and food quality and have further to travel to purchase foods (Alkon et al., 2013; DiSantis et al., 2013; Jilcott et al., 2009; LeDoux & Vojnovic, 2013; Rose, 2011; Waites, 2013). These women perceived that within the city of Flint they got the dregs or what was left over from other stores. They perceived this as a form of discrimination.

This study was unique, however, in finding that the lack of potable water and high water bills also affected food-purchasing ability. The high water bills for brown and non-potable water meant that families had to purchase water and had less money to spend on food. At the time of this study, the depth of the women’s concerns regarding potable water were unexpected. The high cost of the city’s non-potable water and the need to buy bottled water were additional

financial strains on their food budgets. At the time of the focus groups the lead contamination was unknown, but Flint's tap water appeared brown and the city had notices to boil water.

The importance of the ability to access food stores in a timely manner cannot be understated, and the literature supports that for some low-income African American families' transportation is a hindrance to buying groceries (Morland & Filomena, 2007; U.S. House Select Committee on Hunger, 1990). An adaptive strategy to manage the shortcomings of food available in the community included use of free food from food pantries, as well as finding someone with a car or taking a bus to access large grocery stores outside the city as other studies have found (Alkon et al., 2013; DiSantis et al., 2013; Jilcott et al., 2009; LeDoux & Vojnovic, 2013; Waites, 2013). This finding exemplified both the Womanist perspective in managing food access within limited resources, as well as, the intersectional nature of the SEM for the food environment.

African American women's conversations with each other are how they share, verify, and reflect on experiential knowledge, leading to perspective and wisdom (Collins, 2000). African American women's central position within their communities, families, and churches supports this use of conversation as a mode of gaining and verifying knowledge (Collins, 2000). It is also a way to establish and maintain connectedness and as such is integral to the development and testing of knowledge claims within the Womanist Theory (Banks-Wallace, 2000). Researchers have used this theory to guide research on African American women's health to explore perceptions of suicide, depression and protection (Borum, 2012); to explain generational caregiving (Wells-Wilbon & Simpson, 2009); and to explain self-management practices guiding older African American women's health behavior (Harvey et al., 2013). The Womanist Theory was useful in this study to frame the discrimination these women felt when local stores were not

clean, food was offered for sale past expiration dates and food selection was limited. To our knowledge, this is the first time this theory has been used in regards to food and food access.

Over half of the older women had college degrees compared to only two of 17 in the younger group. Although this could be a coincidence of the sample, when economic conditions existing several generations ago are compared to those now striking differences in opportunities are seen. Today, college students share a significantly higher percentage of tuition costs than 30 years ago (Oliff et al., 2013), an increase from 20 to 80% in some cases. Additionally, 44.8% of the jobs in Michigan were unionized in 1964 compared to 14.7% in 2014 (Bui, 2015; Hirsch, Macpherson, & Vroman, 2001). Such dramatic changes in economic opportunities for people to rise out of poverty might have contributed to these apparent educational differences over several generations.

All is not bleak in Flint, however, because there have been a few recent improvements in food access according to Flint community leaders. The diminished access to large grocery stores was enough of a hardship in Flint that the Genesee County Mass Transportation Authority created “Ride to Groceries” by increasing bus routes to access distant grocery stores (Nagl, 2015). A grocery store chain based near Detroit reopened one grocery store in Flint in 2015 (Adams, 2015). Local Flint residents and farmers opened another small grocery store in downtown Flint, in December 2015 on the site of another small grocery that had closed in 2011 (Tolan, 2016).

In addition to multiple coders, the researcher took various steps to enhance the trustworthiness of this study. Trustworthiness in qualitative research is generally equated with validity and reliability in quantitative research (Guba, 1981). These included prolonged engagement, theoretical sensitivity, thick description, and the use of key informants. Prolonged

engagement entailed active involvement with the community collaborative *edible flint* Access and Education Workgroup, with which the first author has been involved from spring 2011 to 2015. Theoretical sensitivity entails the ability to apply meaning to data according to the research questions and theoretical frameworks, and to isolate pertinent data from that irrelevant. The use of quotations (raw data) and descriptions of focus group participants demonstrate connections between final themes and raw data all contributed towards a thick description. Thick descriptions were integral to the details these women provided about their experiences to put food on the table.

A strength of this study was that it focused on women from marginalized groups—African American women in an inner city environment. These were seniors over the age of 60 years and younger women on some form of public assistance with children, most without a college degree, and single mothers of children. Community based and qualitative research strives to “give voice” to marginalized groups (Morgan, 1996), which this study did. In addition to including such participants, the focus groups were in an environment where participants shared similar experiences and benefited from sharing experiential knowledge with peers by “querying and explaining themselves to each other” (Morgan, 1996, p. 139). Integration of key informants who were Flint residents enhanced the trustworthiness of this study. The first author spent four years establishing a connection with women in the community and with an organization called *edible flint*.

Limitations of the study included the use of focus groups, because the diversity of participants in each group influenced the generalizability of results. Sometimes in focus groups, dominant personalities can hinder the free flow of discussion by others. Findings here might not reflect experiences of women living in rural locations, and in less racially segregated cities than

Flint, or of non-African American women. It might be viewed as a limitation that we did not know who chose not to volunteer to participate in the focus groups. Several young women who originally had volunteered, however, did not show up due to transportation problems. Finally, although the first author was both the primary researcher and conducted the focus groups, there was another expert coder who independently coded the transcripts to help reduce potential bias.

7.7 Conclusion

These African American women from Flint in this study were doing their best to put food on the table with very limited resources and in an unsafe environment with regards to drinking water. Lack of access to large grocery stores that sold high quality food at reasonable prices was the main barrier to food security. These women perceived unclean stores and outdated food to be a type of discrimination, yet this even was before the lead contaminated water in Flint received national wide attention (Craven & Tynes, 2016). The lead contamination in the city's water further complicates the task of women trying to provide healthy foods for themselves and their families. Findings of the limited food access in inner city Flint are especially troubling given the role that fruits and vegetables and dairy foods can play to ameliorate lead poisoning (United States Environmental Protections Agency, 2001). Results of this study have been and will be shared in depth with the community partner *edible flint* to organize efforts to nutritionally ameliorate effects of lead in city residents. Although this current research was designed in part by the concerns of *edible flint* in 2012, its findings related to the importance of affordable food access to not only health disparities, but to amelioration of lead poisoning occurring there too. Finally, dietitians and health professionals would be wise to inquire about access to food and potable water when doing diet counseling.

APPENDICES

APPENDIX A

Assessment Letter Mailed to Store Owners in English



June 28, 2012

Dear Store Owner/Manager,

We are visiting your store to collect information for a research project that is part of a collaborative of organizations including *edible flint* and Michigan State University, supported by the Arab American Heritage Council.

The information gathered will position Flint to receive funds and design programs that will increase the availability of fresh and healthy food to area residents, as well as potentially increasing profitability for your business.

Edible flint supports Flint residents in growing and accessing healthy food in order to reconnect with the land and each other. The Access and Education Work Group wants to improve community health through education as well as identifying and reducing barriers to fresh healthy foods.

This summer and fall, we are going to all of the food stores in the area. We want to find out if people in this area can buy foods to support good health. We will walk around in your store and look for certain foods. This will take about 30 to 45 minutes. We will not be talking to your customers or interfering with your business operation. We ask only that you or your staff welcome us and possibly answer 2-3 simple questions about the method of payment that your store accepts.

The name of your store will NOT be published or publicized. Information we collect at your store will be kept confidential. If you have any questions about the process, or would like to see the assessment, please feel free to contact Kellie Mayfield at (517) 355-8474, extension 167 or mayfiel6@msu.edu.

Sincerely,

Kellie Mayfield, Graduate Student, Michigan State University
edible flint Access and Education Work Group Participant
mayfiel6@msu.edu
(517)355-8474, Ext.167

Edible flint supports local residents in growing and accessing healthy food, in order to reconnect with the land and each other.

Figure 13. Assessment Letter Mailed to Store Owners in English

APPENDIX B

Assessment Letter Mailed to Store Owners in Arabic



عزيزي مالك/مدير المحل

سوف نرور المتجر الخاص بك لجمع معلومات عن مشروع بحث الذي يعد جزءا من برنامج تعاوني من منظمات مختلفة تضمن Edible Flint و جامعة ولاية ميشيغن، وبدعمها مجلس التراث العربي الأمريكي.

المعلومات التي يتم جمعها ستسمح لفننت بتلقي الأموال وتصميم البرامج التي من شأنها زيادة توفر الأغذية الطازجة والصحية لسكان المنطقة، وأيضاً لزيادة أرباح قطاع الأعمال الخاص بك.

بدعم Edible Flint المقيمين في فننت في زراعة وحصول الغذاء الصحي من أجل إعادة الاتصال مع طبيعة الأرض. مجموعة العمل Access and Education نطمح لتحسين عن طريق تعليم ثقافة الصحة للمجتمع وأيضاً عن طريق تحديد وتقليل الحواجز التي تحرض الأطعمة الصحية الطازجة.

هذا الصيف والخريف، سوف نذهب إلى كل من مخازن المواد الغذائية في المنطقة. نحن نريد معرفة إذا كان الناس في هذه المنطقة يستطيعون شراء الأغذية الصحية. سوف نتجول في متجرك ونبحث عن أطعمة مجانية. سوف يستغرق هذا الأمر حوالي 30 إلى 45 دقيقة. لن نتحدث إلى زبائنك أو نتدخل مع العمليات التجارية الخاصة بك. نحن فقط نطلب منك ومن طاقم العمل أن ترحبونا وربما الإجابة عن سؤالين أو ثلاثة حول أسلوب الدفع الذي يقبل المتجر الخاص بك.

لن نشر اسم متجرك إعلامياً. المعلومات التي نجعلها في متجرك ستبقى سرية. إذا كانت لديك أية أسئلة حول هذه العملية، أو تود أن ترى التقييم، لا تتردد في الاتصال بـ Kellie Mayfield على تليفون (517) 355 8474 تحويلة 167، أو عن طريق البريد الإلكتروني mayfiel6@msu.edu

مع خالص التقدير

صالح باب

Kellie Mayfield, Graduate Student, Michigan State University
edible flint Access and Education Work Group Participant

Figure 14. Assessment Letter Mailed to Store Owners in Arabic

APPENDIX C

Assessment Letter Carried Day of Assessment in English and Arabic



Access & Education
June 15, 2012

edible flint • c/o MSU • Ext • 605 N. Saginaw St., Ste. 1A • Flint, MI 48502
Kellie Mayfield • MSU FSHN Trout Building • 469 Wilson Road • East Lansing, MI 48824

Dear Sir or Madam:

حضرة السيد أو السيدة:

We are visiting your store to collect information for a research project that is part of a collaborative of organizations including *edible flint* and Michigan State University, supported by the Arab American Heritage Council.

سوف نزر المتجر الخاص بك لجمع معلومات عن مشروع بحث الذي يعد جزءا من برنامج تعاوني من منظمات مختلفة تضمن *Edible Flint* و جامعة ولاية ميشيغن، ويدعمها مجلس التراث العربي الأمريكي.

This summer and fall, we are going to all of the food stores in Flint. We want to find out if people in the city can buy foods to support good health. We will walk around in your store and look for certain foods. This will take about 30 to 45 minutes. We will not be talking to your customers or interfering with your business operation.

هذا الصيف والخريف، سوف نذهب إلى كل من مخازن المواد الغذائية في المنطقة. نحن نريد معرفة إذا كان الناس في هذه المنطقة يستطيعون شراء الأغذية الصحية. سوف نتجول في متجرك ونبحث عن أطعمة معينة. سوف يستغرق هذا الأمر حوالي 30 إلى 45 دقيقة. لن نتحدث إلى زبائنك أو نتدخل مع العمليات التجارية الخاصة بك.

The name of your store will NOT be published or publicized. Information we collect at your store will be kept confidential. If you have any questions about our study, contact Kellie Mayfield at the number below.

لن ينشر اسم متجرك إعلامياً. المعلومات التي نجمعها في متجرك ستبقى سرية. إذا كانت لديك أية أسئلة حول هذه العملية، أو تود أن ترى التقييم، لا تتردد في الاتصال بـ Kellie Mayfield على تليفون (571) 8474 355 تحويلة 167، أو عن طريق الإيميل mayfie16@msu.edu.

Thank you for your cooperation.

Kellie Mayfield, Graduate Student, Michigan State University
edible flint Access and Education Work Group Participant
mayfie16@msu.edu
(517)355-8474, Ext. 167

Figure 15. Assessment Letter Carried Day of Assessment in English and Arabic

APPENDIX D

Flint Food Store Assessment (FFSA) Instrument

Entered by _____
 Date: ____/____/____
 Checked by _____
 Date: ____/____/____



FLINT FOOD STORE SURVEY

Time In/Out: ____/____

Date: _____		Database ID: _____	
Store Name: _____			
Store Address: _____			
Assessor Initials: ____/____		Store Refused Assessment: _____ Store Closed: _____	

Store Type	Supermarket _____	Grocery Store _____	Convenience Store _____	Gas Station _____
Drug Store _____	Ethnic Store _____	Health Food Store _____	Dollar Store _____	Liquor Store _____
Other _____ Comment _____				
Parking	Off Street _____	Street _____	None _____	Handicap Parking Yes No
Ramp Curb Cut	Yes No	N/A		Automatic Door Yes No
Store Hours Open 24/7 _____ or				
Mon	Tues	Wed	Thurs	Fri Sat Sun

Signage Visible Outside the Store					
Check Cashing	Yes No	Lottery	Yes No	WIC	Yes No
EST	Yes No	Fruit/Vegetables	Yes No	Alcohol	Yes No
Chips/Savory Snacks	Yes No	Beverages	Yes No	Cigarettes	Yes No
Other _____					
Services Offered	ATM/BANK Yes No	Check Cashing Yes No	Lottery Tickets Yes No	Pharmacy Yes No	
Does the store sell alcohol?	Yes No	Tobacco Products Yes No	Cigarettes Yes No		

Payment (ask cashier if necessary)					
Credit Cards (Visa/MC/AE/ Other)	Yes No	Check	Yes No	WIC	Yes No
EST/Food	Yes No	EST/Cash	Yes No	Cash ONLY	Yes No
Other _____					
Goods & Services					
Self Serve Drinks	Yes No	Self Serve Foods	Yes No	Packaged Foods	Yes No

Comments _____

Store ID: _____

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FFSS Ver. 1.5

Figure 16. Flint Food Store Assessment (FFSA) Instrument

Figure 16. (cont'd)

ITEM	Availability	Price (\$)		Comments
1. Milk (fresh, cow's milk)				Measure Complete ☐
	Unit (oz)	½ Gallon (64 oz)	1 Gallon	Lactose Free Yes No
Lowfat (Skim/0.5%/1%)	Yes No			
Reduced Fat Milk (2%)	Yes No			
Whole Milk	Yes No			
Alternative Milk	Yes No			

ITEM	Availability	Price (\$)	Unit (oz)	Comments
2. Cheese (cow's milk)				Measure Complete ☐
Fat Free	Yes No			
2% Reduced Fat Cheese	Yes No			
Full Fat	Yes No			
Fresh Eggs	Yes No			

ITEM	Availability	Price (\$)	Amount (#)	Unit (pc / lb)	Quality	Comments
3. Fresh Fruit						Measure Complete ☐
Bananas	Yes No				☐ Acceptable ☐ Unacceptable	
Apples	Yes No				☐ Acceptable ☐ Unacceptable	
Grapes	Yes No				☐ Acceptable ☐ Unacceptable	
Oranges	Yes No				☐ Acceptable ☐ Unacceptable	
Pineapple	Yes No				☐ Acceptable ☐ Unacceptable	
Peaches	Yes No				☐ Acceptable ☐ Unacceptable	
Strawberries	Yes No				☐ Acceptable ☐ Unacceptable	
Blueberries	Yes No				☐ Acceptable ☐ Unacceptable	
Watermelon	Yes No				☐ Acceptable ☐ Unacceptable	
Pears	Yes No				☐ Acceptable ☐ Unacceptable	
Total Types: Count number of "yes" responses _____				Other Fruit (#) 0 0 0 1 0 2 0 3 0 4 0 5 0 6 0 7 0 8		

Store ID: _____

Figure 16. (cont'd)

				☐ 9 ☐ 10 ☐ 11+	
--	--	--	--	--	--

ITEM	Availability	Price (\$)	Unit (fl oz)	Comments
4. Beverages Measure Complete ☐				
100% Juice	Yes No			
Juice Drink	Yes No			
Diet Soda (2 liter)	Yes No			
Regular Soda	Yes No			
Bottled Water (Plain)	Yes No			

ITEM	Availability	# (Types)	Price (\$)	Unit (oz/lb)	Comments
5. Dried Fruit, Nuts/Seeds & Snacks Measure Complete ☐					
Dried Fruit (Plain)	Yes No	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4+			
Nuts/Seeds (Raw/Plain)	Yes No	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4+			
Pretzels ≤ 3 g fat/serving	Yes No				
Baked Chips ≤ 3 g fat/ 1.0g serving	Yes No				

ITEM	Availability	Price \$	Unit (lb)	Comments
6. Meat Measure Complete ☐				
Lean Ground Beef (≥90% Lean, ≤10% fat)	Yes No			
Regular Ground Beef (80% Lean/ 20 % Fat)	Yes No			
Ground Turkey ≤ 10% Fat	Yes No			
Lean Hot Dogs (Fat Free/Reduced Fat/Turkey)	Yes No			
Chicken, w/o skin	Yes No			
Seafood	Yes No			
Meat Alternative	Yes No			

Figure 16. (cont'd)

Initials: _____

ITEM	Availability	Price (\$)	Amount (#)	Unit (pc/ lb)	Quality	Comments
7. Fresh Vegetables					Measure Complete	☐
Carrots	Yes No				☐ Acceptable ☐ Unacceptable	
Potatoes (Bag)	Yes No				☐ Acceptable ☐ Unacceptable	
Cabbage Green	Yes No				☐ Acceptable ☐ Unacceptable	
Tomatoes Loose	Yes No				☐ Acceptable ☐ Unacceptable	
Broccoli (Crown)	Yes No				☐ Acceptable ☐ Unacceptable	
Lettuce (Green/Red leaf)	Yes No				☐ Acceptable ☐ Unacceptable	
Corn	Yes No				☐ Acceptable ☐ Unacceptable	
Onions	Yes No				☐ Acceptable ☐ Unacceptable	
Dark Leafy Greens (Collards, Kale, Mustard, Spinach, Turnip, etc.)	Yes No				☐ Acceptable ☐ Unacceptable	
Sweet Potatoes	Yes No				☐ Acceptable ☐ Unacceptable	
Total Types: Count number of "yes" responses _____				Other Vegetables (#) ☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ 11+		
Bagged salad (lettuce) Yes No						

ITEM	Availability	# (Types)	Price (\$)	Unit (oz/lb)	Comments
8. Frozen Vegetables & Fruit					Measure Complete
Frozen Vegetables (No added sauce or fat) (16 oz, then 12)	Yes No	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6+			

Store ID: _____

Figure 16. (cont'd)

Frozen Fruit (Plain)(16 oz, then 12)	Yes No	O 0 O 1 O 2 O 3 O 4 O 5 O 6+			
--	--------	------------------------------------	--	--	--

ITEM	Availability	# (Types)	Price (\$)	Unit (oz/lb)	Comments
9. Canned Fruit & Vegetables					Measure Complete ☐
Canned Fruit (~15 oz, scale up)	Yes No	O 0 O 1 O 2 O 3 O 4 O 5 O 6+			
Canned Vegetables (~15 oz, scale up)	Yes No	O 0 O 1 O 2 O 3 O 4 O 5 O 6+			

ITEM	Availability	# (Types)	Price (\$)	Unit (oz/lb)	Comments
10. Canned Beans/Peas/Tuna					Measure Complete ☐
Canned Tuna (in water)	Yes No				
Peanut Butter 18 oz Yes No	Yes No				
Canned Beans/ Legumes (~15 oz, scale up)	Yes No	O 0 O 1 O 2 O 3 O 4 O 5 O 6+			
Dry Beans/Peas/Lentils	Yes No	O 0 O 1 O 2 O 3 O 4 O 5 O 6+			

ITEM	Availability	# (Types)	Price (\$)	Unit (oz/lb)	Comments
11. Grains					Measure Complete ☐
Whole Grain/Low Sugar Cereal (<6 g sugar)	Yes No	O 0 O 1 O 2 O 3 O 4+			
Cereal	Yes No				
Oats	Yes No				
White Rice	Yes No				
Brown Rice	Yes No				
White Bread	Yes No				
100% Whole Grain/ Whole Wheat Bread	Yes No				
White Pasta	Yes No				

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Store ID: _____

FFSS Ver. 1.5

Figure 16. (cont'd)

Whole Grain Pasta	Yes No				
-------------------	--------	--	--	--	--

Comments _____

Store ID: _____

APPENDIX E

FFSA Assessor Manual

Store Information

This section should be filled out before you enter the store. To begin, first fill in the store's identifying information.

- Time In/Out. Time at the beginning and the end of the survey.

Store Type: check one. If it is a type other than what is listed, fill in the store type (i.e., fruit and vegetable stand, farmers market).

- Supermarket. A large, corporate-owned chain store that retails a general line of food, such as canned and frozen foods; fresh fruits and vegetables; and fresh and prepared meats, fish, and poultry. Examples would be Meijer and Kroger.
- Grocery store. A smaller non-corporate-owned store that retails a general line of food, such as canned and frozen foods; fresh fruits and vegetables; and fresh and prepared meats, fish, and poultry. An example would be a mom-and-pop type store that sells the foods listed above like Midways and D & R Market.
- Convenience store. Retails a limited line of goods that often include milk, bread, soda, and snacks. Also known as food marts and corner stores. Examples would be The Prince Party Store and 7-11 stores that do not have gas pumps.
- Gas station (Convenience Store). Retails automotive fuels in combination with a convenience store. Examples would be S & E Gas Station or Flushing Quick Stop with gas pumps.
- Ethnic Store. A store that serves a certain ethnic population, like as Asian Market or a Hispanic Market.
- Drug Store. Stores that primarily sells prescription and non-prescription items in addition to toiletries and perhaps tobacco. An example would be Rite Aid.
- Health Food Store. A store that is like a natural food market. You'll find fruits and vegetables but also more items that are organic as well bulk foods and supplements (note: GNC is not a health food store).
- Dollar Store. A store like the Family Dollar or Dollar Tree.
- Liquor Store. Store that primarily sells liquor.
- Other types. Make sure to write down exact nature of the store that does not fit into any of the above categories.

- Parking. Check one
 - Off street. There is a designated parking area located well off of the street. A grocery store parking lot would be an example.
 - Street. There is limited parking located between the store and the street. An example would be a small gravel area in front of the store and out of traffic. Other example of street parking would be metered parking available on the street in front of the store.
 - Note. The store does not have any designated parking area. An example would be a store on a city block.
- Handicap accessibility. Three yes or no questions
 - Are there handicap parking spots?
 - Look at the entrance of the store to see if can be accessed by someone with a handicap (i.e. someone wheelchair bound). Is there a ramp and curb cuts so that the ramp can be reached?
 - A store with an entrance level to the ground would be considered handicap accessible.
 - See if the door to enter the store is automatic or has to be opened manually. Some stores, such as farm stands, do not have doors and are open to the outside. In this case, you would circle yes and comment that the store was open or outdoors.
- Store hours.
 - Open 24 hours, 7 days a week: enter a check mark
 - If store is not open 24/7, fill in the store hours for each day of the week, including am and pm.
 - Note if there are summer hours.

Signage Visible Outside the Store

This refers to any signage/advertisement you see outside of the store. This includes signage on the store and on posts in the ground. Also include electronic signage.

- Does the store sell alcohol? Alcohol includes Beer, Liquor and Wine.

- Cigarettes. Circle Yes or no
- Tobacco Products. Circle Yes or No. Refers to additional tobacco items that are not cigarettes (i.e. cigars, chewing tobacco).
- Services offered
 - Pharmacy department present .Answer yes if they have prescription dispensing department with a pharmacist
 - ATM
 - Check cashing
 - Lottery Tickets

Payment Type

- Includes any type of payment option:
 - Credit Cards: MC= Master Card, AE= American Express, etc.
 - EBT (Electronic Benefits Transfer) card is the same as the Bridge Card
 - EBT can be EBT cash or EBT food
 - Check
 - WIC payment.
 - Cash only
 - Means that they take cash only.
- Goods and Services. Circle yes or no. Self-serve drinks are drinks that the customer fills themselves. Self-serve foods include hot foods such as nachos, hot dogs and taquitos. Packaged foods include premade sandwiches, wraps, sushi, etc. This does not include Lunchables.

Things to remember

- Remember to write legibly and to check your work. If an item is not available at all, in any package size, and is not usually stocked by the store, record an "NA" in the column labeled "Price." If the item is sold out, write "sold out" in the comments section and record the available information.

- There is a Measure Complete check box at the beginning of each food category for you to check off once you have completed that section of the assessment. Utilize to help you remember what you still need to assess and what you have completed.

1. Milk

Evaluate the lowest priced milk (store brand is usually the least expensive). Note if the store only sells flavored milk. Circle yes or no if there is lactose free milk. Note if only organic milk is sold. If you do not see refrigerated milk look for shelf stable milk (this may be the case at smaller stores). Do not count half and half, kefir, cream or buttermilk. Circle yes or no if they have alternative milk. Examples of alternative milk include soymilk, almond milk and rice milk. Make sure to note which type of alternative milk is the lowest price.

2. Cheese and Eggs

Circle yes or no. Record the lowest price and the size in ounces (the lowest price is usually the store brand). Eight (8) ounce block is the standard size. Note if there is not block cheese and only shredded or singles/individually wrapped cheese. Include whether or not the singles are imitation cheese. Imitation cheese will say imitation pasteurized cheese on the label.

Fresh Eggs. Note the carton size of chicken eggs (e.g. medium dozen) and the lowest price. Color of the egg is not important. If the store does not carry chicken eggs but carries another egg, record in comments.

3. Fresh Fruit

Circle yes or no. If the item is sold out, write "sold out" in the comments section and record the available information. Record the lowest price. Only assess organic fruit if it is the only option. Note in comments that it is organic. Include lemons and limes.

- Record the regular price and note the sale price in comments. If it is on sale and the regular price is not posted write "sale price, original price not posted".

- If the fruit is only available as pre-sliced and in a container, still circle “yes” for available and write “pre-cut in container” and size information in comments. If the fruit is available but mixed with other fruit in a container, mark “no” for available but note the fruit cup contents, price and size in comments.
- Note that if in addition to regular bananas if overripe bananas are sold at a reduced price.

Quantity

Record the lowest price for that item. Write the amount (#) of the fruit that is listed for the price. For example, if the sign says 4 for \$5, write “4” for the amount. If the sign says 3 lbs for \$1.99, write “3” for amount. If the sign says 3 lbs for \$0.99, mark lb for units. If the fruit is not loose but packaged (e.g. pint or container), count the amount as “1” and write the amount of the package in comments. Indicate if the of the fruit is calculated by the piece or pound by marking “pc” or “lb”. For example, if the sign says 2 for \$1.00. Write piece in the unit column.

- If packaging is other than pc/lb (e.g. per pint or bunch), mark under unit the size of the packaging.

Quality

Record the quality of the item by marking “A” for unacceptable or “UA” for unacceptable.

- The rating is based on the majority (>50%) of fruits. If it seems difficult to decide whether to mark “A” or “UA”, mark “UA” and describe in comments.
- Acceptable= peak condition, top quality, good color, fresh, firm and clean.
- Unacceptable=bruised, old looking, mushy, dry, overripe, dark sunken spots in irregular patches or cracked or broken surfaces, signs of shriveling, mold or excessive softening.

After completing the information for the 10 fruit items, count the number marked “yes” under available and record the total. Count additional fruit even if the store does not carry the standard ten items.

4. Beverages

Circle yes or no. Choose the lowest priced item.

100% Juice. This is natural fruit juice with no added sugars. Container must say 100% fruit juice on the label. The standard is orange juice, half gallon size in the refrigerator section. If there is not juice in the refrigerator aisle look on the shelf. If there is not orange juice then choose apple juice.

Juice Drink. The standard is refrigerated Sunny Delight ®64 ounce size. If they do not carry Sunny Delight look for Tampico ® or fruit punch, in that order, in the refrigerator section. *

Regular Soda. This is soda you buy that is not reduced in calories. For soda note the fluid ounce or the liter amount.

Diet Soda. Soda with zero calories. Soda available with fewer calories than regular is not considered diet (i.e. Pepsi Next ™).

Bottled Water: Is plain non-flavored water. This does not include tonic water.

5. Dried Fruit and Nuts/Seeds

Circle yes or no and choose the lowest priced item. Note the number of different types of dried fruit, nuts and seeds. You may find these items in more than one location, so be sure to check the snack chip aisle, at the register and the top of aisles.

Dried Fruit. Plain dried fruit without sugar added (may be sweetened with juice). You will have to refer to the nutrition label. Include freeze dried fruit. Count the varieties, stopping at 4 or more.

Nuts & Seeds (Raw, Plain). Raw nuts are uncooked without added salt or sugar. Plain nuts are cooked nuts without any added salt or sugar. At a natural foods or health store that sells them in bulk, note that price before looking for items on the shelf. If items are in bulk, please note it in comments. Include nuts in the shell. Note specialty items like boiled peanuts, if they are plain and unsalted, in comments. Count the varieties, stopping at 4 or more.

Pretzels. Circle yes or no. At convenience stores look for the smallest size.

Baked Chips. Look for baked chips or tortillas. Baked chips should have ≤3 g fat per serving. Look for the full size in the aisle at larger stores and at convenience stores look for the smallest size, not in multipacks.

6. Meat

Circle yes or no and choose the lowest priced item.

Lean Ground Beef. Beef that is 90% or more lean and 10% or less fat. Note the percentage of lean to fat in the comments (i.e. 95/5). Choose the lowest price.

Regular Ground Beef. Beef that is 80% lean and 20% fat and greater than 80/20, up to but not including 90% lean and 10% fat. If there is not 80/20 beef for sale, but there is 85/15, record that price and note it in the comments. If there is not 80/20 but a lower lean to fat ratio, note in the comments. Choose the lowest price.

Ground Turkey. This includes turkey that is 90%lean/10% fat, 93% lean/3% fat and 99% lean/1% fat.

Lean Hot Dogs. These include turkey, reduced fat and fat free.

Chicken w/o Skin. This includes white and dark meat without the skin.

Seafood. This includes fish, shrimp and shellfish. Do not include fried seafood. Note if there is only fried seafood.

Meat Alternative. Look for burgers and patties (i.e., "burgers" and "chicken" type).

7. Fresh Vegetables

Look for the vegetable listed and circle yes or no. Choose the lowest price item. Record the regular price and note the sale price in comments. If it is on sale and the regular price is not posted write "sale price, original price not posted".

- For carrots, look for whole carrots in a 1 lb bag. Only select baby or precut carrots as the last resort and make a note in the comments.
- For tomatoes, look for the least expensive loose tomatoes first. If not available look for the packaged tomatoes.

- If the vegetable is not specifically advertised listed as packaged (e.g. corn but is sold as packaged or loose) record the price of the one that is cheapest.
- If the cabbage is only sold as half of a head note the price and add to comments that it is half of a head. Make sure you check to see if the full sized head is available.
- If fresh broccoli is only available as chopped in a bag, note it in comments.
- Do not include iceberg for lettuce.
- Count onions only once, even if there are multiple types (i.e. green onions). Assess red onions only if white or yellow are not available.
- Dark leafy vegetable refers to the kind you would cook (though they can be eaten raw), such as collards, kale, Swiss chard, mustard greens, turnip greens, Spinach, bok choy. Choose loose pieces or bunches first and note if they are only available in bags.
- If sweet potatoes are available in other colors (i.e. yellow, purple or green) note in the comments.
- If the vegetable is available but mixed with other vegetables in a container, mark “no” for available but note the vegetable contents, price and size in comments.
- If counting herbs note it in comments. Include sprouts as a vegetable.
- Circle yes or no if there is bagged salad.

Quantity

Write the amount (#) of the vegetable that is listed for the price. For example, if the sign says 4 for \$5, write “4” for the amount. If the sign says 3 lbs for \$1.99, write “3” for amount. If the item is sold by the package (e.g. corn) count the amount as “1” and write the amount of the package in comments (e.g. 3 in a package). Indicate if the price of the vegetable is calculated by the piece or pound by marking “pc” or “lb” under the units column. For example, if the sign says 2 for \$1.00, circle “pc” for piece. If the sign says 3 lbs for \$0.99, mark lb for units.

- If packaging is other than pc/lb (e.g. per pint or bunch), mark it under units (pc/lb).

Quality

Record the quality of the item by marking “A” for unacceptable or “UA” for unacceptable.

- The rating is based on the majority (>50%) of vegetables. If it seems difficult to decide whether to mark “A” or “UA”, mark “UA” and describe in comments.
- Acceptable= peak condition, top quality, good color, fresh, firm and clean.
- Unacceptable=bruised, old looking, mushy, dry, overripe, dark sunken spots in irregular patches or cracked or broken surfaces, signs of shriveling, mold or excessive softening.

count the number up to 11 or more.

After completing the information for the 10 vegetable items, count the number marked “yes” under available and record the total. Count additional fruit even if the store does not carry the standard ten items.

8. Frozen Vegetables and Fruit

For frozen vegetables and fruit choose the lowest priced bag, using 16 ounces as the standard sized bag. If 16 ounce isn’t available choose 12 ounce. For frozen fruit count the total number up to 6 or more and note the lowest priced bag. Include mixed varieties of vegetables (i.e. Broccoli stir-fry and California blends). Count only fruit and vegetables that are plain without any added sauce or fat.

9. Canned Fruit and Vegetables

Choose the lowest priced item, using 15 ounces as the standard size. Note the total number of the different types of canned fruit without added sugar and in their own juice. Artificially sweetened fruit and fruit in water count. Do not count fruit in light syrup. Jarred applesauce, jarred citrus fruits, canned peaches and fruit cocktail are included in canned fruit. For applesauce, look for unsweetened apple sauce and not original, as original is usually sweetened. Count up to 6 or more. For canned vegetables include tomato sauce and tomato paste in your count. Count pasta sauce, tomato paste and canned tomatoes each as a separate item. Do not include pickles.

10. Canned Beans/ Peas/Tuna

Choose the lowest priced item. For canned tuna, if the only kind available is canned in another liquid besides for water, note it in comments. Note if there is peanut butter. Circle yes or no if there is an 18 ounce size jar. For canned beans/peas include beans, lentils and peas. If the list includes baked beans, chili beans or refried beans note it in comments. Dry beans and peas include dry beans such as black beans, chickpeas/garbanzo beans, navy beans, chili beans, pinto beans, kidney beans (white[cannellini] and red), black eye peas, pigeon peas, and mung beans. Include lentils as well. Do not include *green/string beans* or *green peas*.

11. Grains

Choose the lowest priced item.

Cereal. For cereal, look for whole grain and/or bran as the first ingredient. Grams of sugar must be ≤ 6 grams of sugar per dry ounce. Count up to 4 or more. Choose the lowest priced box. Non-whole grain cereal does not have whole grain listed as the first ingredient. Circle yes or no if there are non-whole grain cereals.

Oats. This means plain oatmeal. It can be instant or old-fashioned. At a health food or natural market that sells bulk foods note the bulk price before looking at the shelf price, as this is usually the cheaper price.

White Rice. Is listed in the ingredients as "rice". Unless they are the lowest price do not choose Jasmine or Basmati style rice. Include instant rice.

Brown Rice. Include wild rice, black, red and sweet black rice. Note in comments if it is rice other than brown rice. Include instant rice.

White Bread. This is non-whole grain bread and it does not have whole grain listed as the first ingredient. This type of flour may have enriched flour as first ingredient.

100% Whole Wheat Bread/Whole grain bread. This category includes bread that is made with unrefined grain. The grain is listed as the first ingredient. For bread note the loaf size in ounces.

*If you are at an ethnic market without loaf bread, assess the closest possible equivalent. i.e. Hispanic Market= Tortillas.

*Write NA if you are at a natural market or ethnic market where there might not be listed nutritional information on the bread or if there is not a bread equivalent.

White Pasta. Has wheat flour or enriched wheat flour (NOT whole wheat flour or other whole grain) as the first ingredient. Do not include quick cook pastas with flavor packets like Ramen. Add to the comments if this is the only kind available.

Whole Grain Pasta. This has whole grain listed as the first ingredient. Look for whole wheat pasta first.

Keep your personal safety in mind

- DO NOT SACRIFICE SAFETY FOR THE ASSESSMENT
- Do all parts of the survey in pairs and pay attention to your surroundings
- Do not go alone around corners looking for signage.
- Leave personal items, like purses, in the vehicle.
- Bring only what you need to do the survey- a blank form, clipboard, pen/pencil, time keeper, etc.
- Keep completed survey forms in a safe place. Do not carry from previous stores into a new store.
- Stores start to get busy around lunch time and managers are likely to be busy helping customers. This would be a good time to take your own lunch break.
- Keep a data collection log of things that are important to note during assessments.

Dress Code

Wear your name badge at every store

Business Casual

Limited discussion during assessment

Move swiftly but do not run around the store

Introduction to Staff

Do not mention the word *research*. Use terms like survey and assessment only.

You may not need to present the letter at larger stores.

"I am with edible flint and Michigan State University and we are conducting a survey. We are looking at the types of food available for purchase at stores throughout the city. We won't talk to the customers and won't take long."

Show them the letter you have with you. If they want, they can keep it.

- If the manager seems nervous remind them that nothing will be published identifying the store by name. See Appendix A for suggestions to questions.
- IF YOU HAVE QUESTIONS FOR THE STORE MANAGER ask them all at once and at the end. There will be 2 of you. Work with your partner to answer the question before asking the manager on duty. Remember, it is a business. If the manager seems nervous remind them that nothing will be published identifying the store by name. See Appendix A for suggestions to questions.

Miscellaneous instructions

Some survey preparation tips for dealing with store managers from the USDA Community Food Security Assessment Toolkit.

"Relieve any anxieties that the managers/owners may have about their participation by providing the following assurances: (1) the store name, policies, and prices will not be published or publicized; (2) the interviewers will not disrupt the normal flow of business by speaking with customers or employees; and (3) staff involvement in the survey process will be kept to a minimum."

"Inform store managers/owners that findings from individual stores will be completely confidential. Assure them that the information gathered from individual stores will be combined with that from many other stores and that the final results will be reported in statistical form only (i.e., percentages and totals). NOTE: Every member of the research team must adhere to the rules of confidentiality. This means that team members must never divulge names or factual information about any store survey."

APPENDIX F

Participant Recruitment Flier

African American women needed for study on the experiences of African American women living in the city of Flint!



Purpose of the Study
Learn more about your experiences as an African American woman in one of two different age groups living in Flint.

Eligibility Requirements

- ✓ African American woman
- ✓ Flint resident
- ✓ 21 to 50 years old with one or more children living at the home under 18 years old

OR

- 60 + years old

This study is supported by MSU and *edible flint* Access and Education Workgroup

Your participation includes:
Focus Group Interview (Receive \$20 gift card for participating)

For more information contact:
Kellie E. Mayfield at 517-353-3306



Figure 17. Participant Recruitment Flier

APPENDIX G

Consent Form with \$20 Gift Card and \$20 Cash



Informed Consent Form

Thank you for considering participation in this study! Purpose of this research project are to explore the experiences of acquiring healthy food by African American women who live in the city and to inquire about changes you might want to see in the community. This research project is sponsored by Michigan State University, in partnership with *edible flint* Access and Education Workgroup. You are being asked to participate in this study because you are a resident of Flint, an African American woman in one of two age groups: 1) 21 to 50 years of age with at least one child in the home under 18 years of age; or 2) 60 years plus.

You should know:

- Active participation includes a complete explanation of the study and this consent form for each participant. We do not expect any risk to you, but there is a chance you may feel uncomfortable sharing your experiences. You can choose not to answer any of the questions, if you are not comfortable.
- Your participation in this study is voluntary. You may also withdraw your participation from the study at any time without penalty or loss of benefit to which you are entitled. You will not directly benefit from your participation in this study. However, your participation in this study may contribute to the understanding of the experiences of African American women acquiring healthy food in the city of Flint.
- Your participation in this study will take about 45 to 60 minutes.
- Focus groups will be audio-recorded. Recordings will be used in order to recall correctly your statements. Recordings will be transcribed verbatim (typed word for word) and will be kept in a locked drawer in an office.
- Information collected about you is confidential to the maximum extent allowable by law. Your name will be removed from your consent form and will be replaced by a code number. The list of names and code numbers will be kept in a locked drawer in an office.
- The information you provide will be used to write a project report and other types of publications and presentations but not include your name. The reports will be designed to improve the access and awareness of healthy food in Flint. Although we will make every effort to keep your data confidential there are certain times, such as a court order, where we may have to disclose your data.
- Project results in summary form, but not your identifiable information, will be shared with groups who are helping in this research study (Michigan State University, *edible flint*) and the MSU Institutional Review Board.
- You will receive a \$20 gift card to a local store or 20 dollars cash for participating in the focus group.

Contact Information:
If you have any questions at any time related to this project you can contact: Kellie E. Mayfield, M. ENVS., Department of Food Science and Human Nutrition, Michigan State University GMTrouth Bldg., 469 Wilson Road Room 204, East Lansing, MI 48824, 517-353-3306.

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Figure 18. Consent Form with \$20 Gift Card and \$20 Cash

Figure 18. (cont'd)

If you have questions or concerns about your role and rights as a research participant, would like to obtain information or offer input, or would like to register a complaint about this study, you may contact, anonymously if you wish, the Michigan State University's Human Research Protection Program at 517-355-2180, Fax 517-432-4503, or e-mail lrp@msu.edu or regular mail at Olds Hall, 408 West Circle Drive #207, MSU, East Lansing, MI 48824.

Informed Consent Form

If you would like to take part in this study please complete and sign the form below.

Your signature below indicates your agreement to participate.

Printed Name

Signature

Date

Study Title: Food Access In a Post-Industrial Midwestern City
Researcher and Title: Kellie E. Mayfield, Doctoral Candidate
Sponsor: Sharon L. Hoerr, RD, PhD, Professor

APPENDIX H

Focus Group Interview Guide

Food Access in a Post-Industrial North Central City
Perceptions of food access by African American women in Flint, MI

Focus Group Interview

Introduce yourself and the research

Let them know “I really want to hear from everyone, and I ask that we keep in mind that everyone has something important to contribute. I want to make sure that everyone has an opportunity to speak. Please silence/turn off your phones. Also, feel free to use the paper on the table to note thoughts you want to discuss later. ”

Participant Introductions

Participants introduce themselves using their first and last name.

Moderator’s Script

1. Tell me about how you go about putting food on the table in this town.
 - a. PROBE: What resources do you use in this process? For example, transportation, food banks, home or community gardening, etc.
2. How does being a woman relate to getting food for your family in Flint?
 - a. PROBE: What about being a black woman?
 - b. PROBE: How is age a factor?
 - c. PROBE: How is being a mother/guardian a factor??
 - d. PROBE: What about being a single parent? How?
 - e. PROBE: What about your upbringing?
3. What are some barriers to accessing food for yourself and your family?
 - a. PROBE: For example is race a barrier? Gender a barrier? Social class a barrier? Partnership/relationships a barrier?
 - i. Please include any relevant relationship.
 - b. PROBE: What about negative experiences accessing food?
4. What changes would you like to see in your community?
5. Is there anything else you didn’t get to say or would like to add?

Research Question 1: For African American women with limited resources, what are the perceptions about ease of acquiring healthy food for 1) women 21-50 years of age with children under 18, and 2) women, ages 65 and older?

APPENDIX I

Focus Group Note Taker Form

Focus Group Note Taking Form

Instructions: Notes should be extensive and accurately reflect the content of the discussion, as well as any salient observations of nonverbal behavior, such as facial expressions, hand movements, group dynamics, etc. Capture key phrases or words, major themes and for identifying quotes. Watch for head nods, eye contact or other clues that would indicate the level of interest or agreement.

Date of Focus Group: _____

Location of Focus Group: _____

Start Time _____ End Time _____

Moderator's Name: _____

Which group are you recording (please check one)

☐ 21 to 50 w/Children in the home under 18

☐ 60 +

Name of Note Taker: _____ Number of Participants: _____

Diagram of table and seating of participants and moderator by first names and numbers:

APPENDIX J

Participant Background Information Form

Study Title: Food Access in Flint, MI

Directions: Please complete the following

1. Your Age _____ years
2. Number of children _____
 - a. Age of Children _____ years
3. What nationality are your parents, grandparents and great-grandparents?
 - a. Parents _____
 - b. Grandparents _____
 - c. Great-grandparents _____
4. Household Structure (please circle one)
 - a. Single parent household
 - b. Two-parent household
 - c. Single-parent but partner helps with children
 - d. Other Describe: _____
5. How long have you lived in Flint?
6. Highest Level of Education _____
7. Employment Status (please circle one)
 - a. Full time employment
 - b. Part-time
 - c. Not working
8. Full Address

9. Are you on federal or local assistance (circle one)? Yes No

Study Title: Food Access in Flint, MI

- a. If yes, what kind? Examples include Bridge Card, WIC (Women Infants and Children, Medicaid, etc.)

10. If you would like to be reached in order to share focus group results, please include your name, contact number and an email address (if you have one).

- a. Name Printed _____
- b. Contact Number _____
- c. Email address _____
- d. Name Signature _____
- e. Date _____

APPENDIX K

Error Terms Tests of Spatial Autocorrelation for Food Availability, Price and Quality

Table 32.

Monte-Carlo Simulation of Moran's I Tests for Spatial Autocorrelation of Mean Food Availability

Nearest neighbors	Moran's I	p- value	Distance cutoffs	Moran's I	p-value
1	0.0841	0.140	100 meters	0.045	0.165
2	0.0553	0.160	500 meters	0.0374	0.241
3	-0.0023	0.451	1000 meters	-0.022	0.650
4	-0.0031	0.467	1500 meters	-0.0282	0.768
5	-0.0275	0.682	2000 meters	-0.0318	0.917
6	-0.0294	0.720			
7	-0.0277	0.743			
8	-0.0137	0.590			
9	-0.0067	0.468			
16	-0.0224	0.789			
24	-0.0213	0.820			

Table 33.

Monte-Carlo Simulation of Moran's I Tests for Spatial Autocorrelation of Mean Food Price

Nearest neighbors	Moran's I	p- value	Distance cutoffs	Moran's I	p-value
1	-0.0092	0.267	100 meters	0.0359	0.063
2	-0.0280	0.516	500 meters	-0.0202	0.657
3	-0.0361	0.785	1000 meters	-0.0144	0.434
4	-0.0439	0.955	1500 meters	-0.0175	0.607
5	-0.0476	0.988	2000 meters	-0.0325	0.973
6	-0.0467	0.988			
7	-0.0440	0.987			
8	-0.0216	0.638			
9	-0.0217	0.661			
16	-0.0124	0.577			
24	-0.0095	0.539			

Table 34.

Monte-Carlo Simulation of Moran's I Tests for Spatial Autocorrelation of Mean Food Quality

Nearest neighbors	Moran's I	p- value	Distance cutoffs	Moran's I	p-value
1	-0.1002	0.913	100 meters	0.0015	0.300
2	-0.0432	0.676	500 meters	-0.0529	0.845
3	-0.0804	0.949	1000 meters	-0.0563	0.901
4	-0.0716	0.951	1500 meters	-0.0299	0.791
5	-0.0715	0.966	2000 meters	-0.0386	0.960
6	-0.0802	0.995			
7	-0.0791	0.997			
8	-0.0438	0.904			
9	-0.0442	0.915			
16	-0.0277	0.853			
24	-0.0230	0.871			

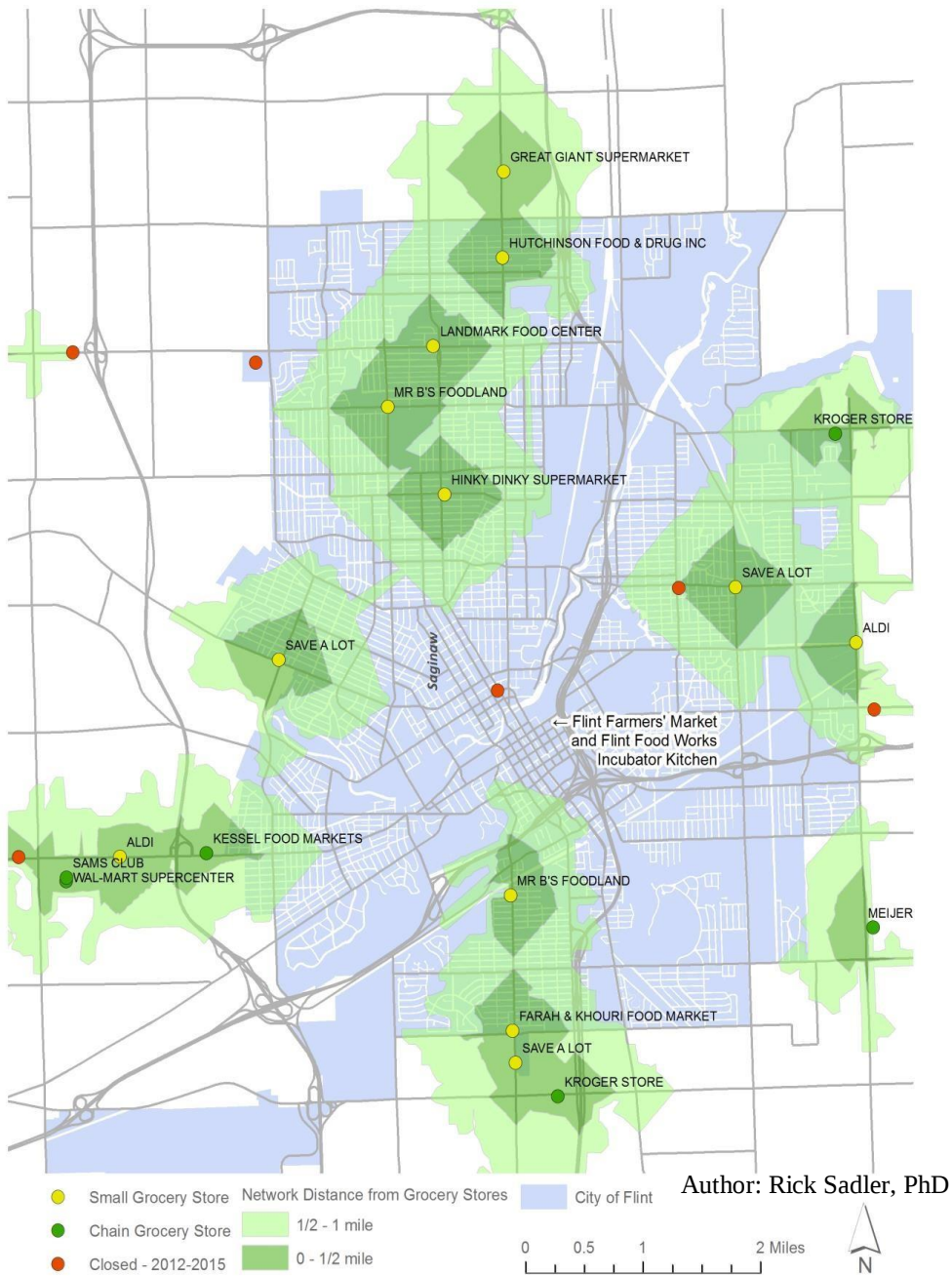


Figure 19. Closed food stores in the city of Flint and surrounding suburbs, including Witherbees.

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