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Where Are the Fresh Fruits and Vegetables?: A Systematic Exploration of Access to Food Stores Offering Fresh Fruits and Vegetables as Told by Midwestern African American Women

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Abstract

This exploratory study systematically examined Midwestern African American women's (n = 273) access to food stores offering more than 5 fresh fruits and vegetables daily. Access to potential (within 0.5 miles of household) and realized (where participant buys fruits and vegetables most often) food stores was assessed. Descriptive analyses revealed that participants lived closer to food stores not offering more than 5 fresh fruits and vegetables daily. Participants purchased fresh fruits and vegetables from food stores that were an average of 1.2 miles further than the closest food stores offering more than 5 fresh fruits and vegetables daily to their household. Results highlight complexities of the food environment and the need to further investigate factors influencing food-related behaviors.

Keywords

African American; women; fruits and vegetables; food environment; food access; GIS

INTRODUCTION

Evidence suggests that aspects of the food environment may contribute to diet quality and food-related behaviors, such as shopping patterns.^{1–4} The assessment of retail food environments is a growing research interest, with food store availability and access to healthy foods being a particular area of concern for ethnic/racial minorities and low-income populations.^{1,2,5–7} Yet, research on the impact of neighborhood food store availability and access to healthy foods on health and health behaviors (eg, food choice, consumption of healthy foods) has been inconsistent and at times contradictory.^{8–10} Variations in research findings may exist due to the inability to systematically assess environmental variables and

the lack of a gold standard for identifying, defining, and measuring food environment variables.^{11–14}

Recognizing the need for a systematic approach for examining elements of the food environment, Sharkey and Horel outlined a framework for systematically assessing spatial access to food stores based on the notion that individuals may not shop at food stores closest to their household or in their neighborhood.¹⁵ They argue instead that people may travel distances beyond their immediate food environment (ie, neighborhood). The framework is explained in terms of potential and realized access to food stores. *Potential access* is defined as “shopping opportunities that are available.”¹⁵(p4) In contrast, an individual’s preferred food store, or the food store in which one has *realized access* to, is defined as “shopping opportunities that are utilized.”¹⁵(p4)

Data from the Centers for Disease Control and Prevention revealed that Midwestern (29.4%) and Southern (29.5%) states have the highest obesity rates in the nation.¹⁶ Although the health benefits of regular fruit and vegetable consumption have been well documented, particularly for the prevention of overweight obesity, consumption among all Americans is low.^{16–20} In Indiana for example, two-thirds of adults (3.1 million) are overweight or obese and 44.6% and 27.3% report eating fruit and vegetables less than one time per day, respectively.^{21,22}

African Americans, compared to other racial/ethnic groups, have higher rates of overweight and obesity and related diseases and conditions (eg, cardiovascular disease, some cancers, etc) and consume fewer fruits and vegetables.^{16,23,24} Within this population, African American women have higher rates of overweight and obesity (54.2%) relative to their male counterparts.²⁴ Although the diets of all African Americans are not the same, historically, for many, food consumed, eating patterns, and dietary habits have been influenced by cultures in West Africa, post–Civil War American slavery, and the rural South.²⁵ Thus, the diets of many African Americans are deeply rooted in their history and culture. African American women play a significant role in the diets of their family members and have been said to “shape” household fruit and vegetable consumption through, for example, their purchasing and consumption practices.^{26–28}

Employing the approach of Sharkey and Horel,¹⁵ coupled with information gained from the use of geographic information systems, the current descriptive and exploratory study highlights the spatial accessibility of fruits and vegetables among a sample of African American women in Marion County, Indianapolis, Indiana, who buy and prepare food for their household. In this study, household proximity (distance) to potential and realized food stores is directly measured, with the aims of the study being to describe (1) potential access—the nearest type of food store (ie, full-service or limited-service) within (0.5 miles) and outside (>0.5 miles) participants’ neighborhood food environments and (2) realized access—the proximity from participant households to the food store where fresh and/or frozen fruits and vegetables are purchased most often.

METHODS

Setting and Sample

The cross-sectional study took place in Marion County, Indianapolis, an urban area located in central Indiana that is 27.5% African American.²⁹ Data were collected during the summer of 2010. Eligible participants were African American females residing in this community who were 18 years of age or older and primarily responsible for buying and preparing household food items. *Household* was defined as those individuals who live together in a single housing unit (eg, house, apartment, etc). Women in this sample of convenience were recruited from urban community centers, professional organizations, faith-based institutions, and local Supplemental Nutrition Program for Women, Infants, and Children) clinics. Participants were screened for eligibility and, if interested in participating, signed the study consent form and completed a self-administered survey that included demographic (ie, age, education, income, household), health status (weight, height, have you been told by a health care provider that you have a chronic condition or disease; eg, heart disease, cancer, diabetes, asthma, etc), behavioral (What type of food store do you buy fresh and/or frozen fruits and vegetables on most days of the week?), and spatial (ie, household address, food store locations) items. Survey items were developed from the relevant literature and previous pilot work with members of the target population not participating in the current study. Each participant was given a \$10 supermarket gift card once the survey was completed. Approval for this study was granted by the university Institutional Review Board.

Spatial Data Resources

US Census shape files for Marion County's census block groups and demographics linked to those census block groups were downloaded from Indiana Map.³⁰ Census block groups are subdivisions within census tracts that contain 600 to 3000 individuals and is the smallest unit of census data for which demographic data can be calculated.^{31,32} Geocoded food stores were obtained from the county department of health. The existence of food stores was verified by on-site observations conducted by county food inspectors. Google Street View (Google, Mountain View, CA) and on-site observations by members of the research team were used to verify the existence and location of participant households as well as their preferred foods stores. The utility of Google Street View in built environment research has been supported in relevant literature and has indicated that this methodology is not only appropriate for auditing features of the built environment, but is also reliable and cost-effective.^{33–35}

Classifying and Defining Food Stores

A system developed by the county health department was used to classify food stores as “full-service with healthy options” and “limited-service convenience marts and other stores.” This system was based on a one-time special assessment of all licensed food stores in Marion County, Indiana, by county food inspectors in 2009. One component of the assessment was to determine whether food stores met certain criteria. Full-service food stores with healthy options included national chain superstores and local nonchain grocery stores that carried at least 5 types each of fresh fruits and vegetables, meat, poultry, fish, and

a range of dairy products daily. Limited-service convenience marts and other stores included all food stores not meeting the criteria for a full-service food store with healthy options (eg, convenience marts with and without gas, general stores, and specialty stores; email communication, February 2010). For the purpose of this study, “full-service with healthy options” are referred to as “full-service” food stores; and “limited-service convenience marts and other stores” will be referred to as “limited-service” food stores.

Measure of Neighborhood and Food Store Access

Study participants were asked to provide their home address and the location (address and nearest intersection) of the food store where they purchased fresh or frozen fruits and vegetables on most days of the week. The geographic area for neighborhood used in this study was a one-half-mile radial buffer zone placed around each participant’s household. Though the definition of *neighborhood* has varied throughout the literature,³⁶ this method of using half-mile radial buffer zones has been used in other studies examining food environments and has shown increased measurement consistency.^{37–39} Potential access (ie, shopping opportunities that are available) was measured as the mean Euclidean distance (ie, straight line distance between 2 points,³² in miles) from each participant’s household to (1) food stores (full-service, limited service) within the participant’s neighborhood (half-mile radial buffers were placed around household) and (2) the nearest type of food store outside of the neighborhood (half-mile radial buffers around household removed). Realized access (ie, shopping opportunities that are utilized) was measured as the mean Euclidean distance (in miles) from participants’ households to the food store where they purchased fresh fruits and vegetables from most often.

ANALYSIS

Spatial statistics were conducted with ArcGIS 10.0 Service Pack (Environmental Systems Research Institute, Redlands, CA) and were used to obtain geolocation data, geocode each address to a census tract, create buffer zones and calculate the Euclidean distance from each household to each type of food store (ie, full-service, limited-service, food store where participant purchases fresh or frozen produce most often), respectively. Each participant’s geocoded household address was linked to his or her particular census block group. Descriptive statistics were conducted with SPSS 20.0 (IBM Corp., Chicago, IL) and used to describe the sample (eg, sociodemographic, health status), setting, census block group, and potential and realized access to food stores.

RESULTS

Description of the Sample, Purchasing Behaviors, and Census Block Group

Of the 416 participants surveyed, 34% were excluded because they lived outside of Marion County ($n = 6$) or did not provide complete location data for their preferred food store ($n = 137$). The remaining 273 women were included in the current analysis. Participant age ranged between 18 to 87 years, with the mean age being 43 years ($SD = 14.7$). Nearly two-thirds (63%) attended at least one year of college. Eighty-one percent of participants were overweight or obese, and half (52%) had been told by a health care provider that they had at

least one chronic condition or disease (eg, heart disease, cancer, diabetes, asthma, etc). Over half (57%) of women in the study had children 18 years of age or younger living in their household. Participants generally reported that their annual combined household income was \$44 999 or less (73%), with 39% of all participants receiving government assistance to pay for food items (eg, Supplemental Nutrition Program for Women, Infants, and Children, Senior Nutrition Assistance Program, Temporary Assistance for Needy Families). Most participants (94%) reported that they purchase fresh and/or frozen fruits and vegetables from supermarkets and grocery stores. Participant households were located in 154 different census block groups within Marion County. Nearly half (45%) of the study households were located in predominantly African American census block groups (ie, >50% of the racial distribution in each census block groups was African American). Regardless of their census block group's racial makeup, 61% of participants lived in census block groups with no full-service food store.

Potential and Realized Access to Food Stores

During the local health department's one-time assessment of food stores, there were 175 full-service food stores (national, local) offering fresh fruits and vegetables daily and 518 limited-service food stores located in Marion County. In measuring potential access (ie, shopping opportunities that are available), results indicated that only 23.4% of women lived within one-half mile of a full-service food store. When the half-mile radial buffer zones representing neighborhood boundaries were removed, sample households were an average of 0.80 miles ($SD = 0.52$) from the nearest full-service food store and 0.51 miles ($SD = 0.38$) from the nearest limited-service food store. Therefore, participants lived an average of 0.29 miles closer to limited-service food stores *not* offering a variety of fresh fruits and vegetables daily. In regard to realized access (ie, shopping opportunities that are utilized), participants lived an average of 2.0 miles ($SD = 2.26$) from the food store where they reported frequently buying fresh or frozen fruits and vegetables, which is 1.2 mean miles further than the full-service food store closest to their household as reported above.

DISCUSSION

Results from the current study are consistent with and further illuminate the complexity of understanding and examining food store access and the availability of fruits and vegetables within neighborhood built environments. In examining potential access (ie, shopping opportunities that are available) to food stores, results showed that on average, this sample of African American women lived closer to limited-service food stores—with or without the neighborhood boundary (ie, half-mile buffer). Full-service food stores were generally located further from participant households. Disparities in access to supermarkets in predominantly minority communities have been documented throughout the scientific literature.^{40,41} As reported earlier, most study participants lived in census block groups that did not have a full-service food store offering a variety of healthy options daily. Although the assessment of participants' fruit and vegetable consumption was beyond the scope of the current analysis, Morland et al⁴² found that African Americans residing in a census tract with a supermarket were more likely to meet national fruit and vegetable recommendations. Moore and Diez-Roux⁴³ concluded that adults with no supermarkets within one mile of their

household were 25% to 46% more likely to have unhealthy diets relative to adults with the most supermarkets near their household. Study results related to realized access (ie, shopping opportunities that are available) are particularly interesting because regardless of participants' proximity to food stores, they generally traveled to their preferred food store (outside of their neighborhood) to purchase fresh and/or frozen fruits and vegetables. Similar results have been found in other populations as well. For example, Hirsch and Hillier⁴⁴ found that among a sample of predominantly white adults, more individuals residing in census block groups with favorable food environments shopped within a one-half-mile radius of their residence relative to those who lived in a census block group with unfavorable food environments. However, African Americans and socioeconomically disadvantaged individuals have generally reported traveling further than other populations to purchase food items.^{45,46} Reasons cited for traveling beyond neighborhood boundaries for food shopping in the food access and food environment literature have included whether or not there was a food store present in their neighborhood/food store location, the type of food store closest to one's household, the availability, quality, freshness and healthfulness of foods, convenience, price, the selection of foods available, and social reasons.^{44,46} Finally, given the current study population's tendency to drive further than the closest full-service food store offering a variety of healthful food on a daily basis to their household, a more comprehensive assessment of their neighborhood food store's characteristics (price, quality, freshness, customer service, etc) and person-level factors (decisions, preferences) is warranted.

Strengths and Limitations

Although some of the current study's findings are consistent with the literature, the findings add value to the food environment evidence base because (1) a systematic framework for assessing the food environment was utilized and (2) multiple direct measures of food store access were examined. In addition, few studies have explored travel to preferred food stores and/or shopping patterns among minority populations^{2,15}—especially in regard to the purchasing of fruits and vegetables. A major methodological strength was the validation of geolocation data (ie, household, preferred food store) through ground-truthing methods including direct and on-site observations and the innovative use of Google Street View. Ground-truthing methods have been shown to provide greater accuracy in food environment research.¹⁵ The study did, however, have limitations. First, a cross-sectional design was utilized, although it has been suggested that food environment researchers should conduct longitudinal studies to assess causal relationships over time.¹³ Second, a sample of convenience was used, and therefore results cannot be generalized to other populations. Third, food store availability data were collected by food inspectors in 2009. Therefore, food stores opening after 2009 were not assessed by the health inspectors and it is unknown how many stores were closed at the time the study was conducted. Fourth, farmers' markets and food service facilities (eg, restaurants) were not included in this assessment. However, 94.2% of study participants regularly purchased fruits and vegetables from grocery stores and supermarkets. Finally, homogenous populations may live in closer proximity to one another, resulting in characteristics of the residential area possibly influencing households in similar ways.

CONCLUSIONS

Limited research exists on why or how a person chooses a particular food store.⁴⁷ The current study's findings suggest that the systematic assessment of potential and realized access to food stores is a worthwhile pursuit and can assist in examining food access and food-related shopping behaviors of Midwestern African American women. Further investigation into the relation(s) between where an individual lives, where they shop for fresh fruits and vegetables, and how they perceive, interact with, and navigate within their food environment is imperative.⁴⁸ Individual food-related decisions and behaviors can only occur in environments that support (eg, accessible and affordable healthy food choices) the behavior(s) of interests.⁴⁹ Thus, quantitative and qualitative explorations into these and other contributing factors to Midwestern African American women's experiences with the food environment will greatly inform this area of research. This study utilizes a systematic framework to assess food store access and builds on the existing food environment literature. Results may have lasting implications for future research and policy efforts to improve the diversity and availability of healthful foods options. For example, health policy and urban planning could be impacted through modifications to the built environment (eg, design and/or retrofit built environment features to ensure walkability and utilization of other modes of travel) and financial incentives (eg, through the provision of tax breaks and other incentives for the development and/or enhancement of new and existing food stores). Finally, public health nutrition interventions could be implemented through the development of local farmers' and/or produce markets, community gardens, services to assist individuals in accessing food stores offering a variety of healthy options, etc.⁵⁰

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