

Food Acquisition and Shopping Patterns among Residents of Low-Income and Low-Access Communities in South Carolina

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ABSTRACT

Background Little is known about the food acquisition and shopping habits of residents living in food deserts.

Objective To identify distinct food acquisition and shopping patterns among residents, most of whom (81%) live in food desert (low income and low access) census tracts, and characterize these patterns with respect to the residents' socioeconomic status, nutrition knowledge, and perceptions of their food environment.

Design This is a cross-sectional study.

Participants/setting Four hundred sixty-six primary food shoppers were included from two counties in South Carolina during 2013–2014.

Main outcome measures Participants' self-reported food acquisition and shopping habits, including shopping distance; frequency; store type; transportation mode; use of farmers' markets, food banks/pantries, and church/social service organizations, were used to develop shopping patterns and group residents. Supplemental Nutrition Assistance Program participation, food security, income, and education, nutrition knowledge, and perceptions of the food environment were used to characterize these groups.

Statistical analyses performed Latent class analysis and multinomial logistic regression were used to identify and characterize patterns, respectively.

Results Three patterns were identified, including those who use community food resources, are infrequent grocery shoppers, and use someone else's car or public transportation when shopping (Class 1) (35%), those who use community food resources and are more frequent and proximal shoppers (Class 2) (41%), and those who do not use community food resources and are distal shoppers (Class 3) (24%). Compared with Class 3, Class 1 had comparatively lower socioeconomic status. Class 2 also had comparatively lower socioeconomic attributes except for income. Class 2 was not significantly different from Class 1 except that a higher proportion in Class 1 saw food access as a problem. No significant differences across classes were found regarding fruit and vegetable recommendation knowledge.

Conclusions Shopping frequency, use of community food resources, transportation methods, and shopping distance were the key factors that defined distinct patterns among residents living in low-income areas. Future interventions to increase healthy food access in underserved areas should not only consider accessibility but also community food resource use.

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ELIMINATING NUTRITION-RELATED HEALTH DISPARITIES is an ongoing challenge. In addition to economic challenges, low-income populations may also be disadvantaged by living farther from a grocery store that sells healthful foods.¹⁻⁷ Therefore, the US government has made efforts to increase healthy food access among low-income and low-access populations through a number of policy initiatives.^{8,9}

Intervening the opening of a large grocery store or supermarket is one approach to improving healthy food access in disadvantaged areas because supermarkets are the major

grocery resources for US households.¹⁰⁻¹⁶ It is assumed that the presence of or proximity to a full-service supermarket in a disadvantaged area will increase the opportunity for residents to purchase healthy food and thereby reduce obesity or other chronic diseases. However, natural experiments suggest that establishing a new full-service supermarket in a low-income and low-access area does not necessarily increase use of such a store or influence dietary intake.¹⁷⁻²² Studies have also shown that residents often travel outside of their neighborhood for grocery shopping.²³⁻³² A better understanding of food acquisition and shopping habits in

low-income populations residing in food deserts would allow federal policies and local interventions to be more tailored to this population's specific needs.

Public health-oriented research on food shopping behaviors is a relatively new area of inquiry. A major gap in food access studies is lack of data on where people actually shop for food. Food shopping is an interaction of the individual with his or her food environment and thus has a multidimensional nature.³³ Furthermore, US households may not rely only on supermarkets for their grocery shopping, especially low-income households. A recent nationally representative study³⁴ using Nielsen's National Consumer Panel data found that food shopping involves a mixture of multiple store types, including grocery chain stores, non-chain grocery stores, ethnic and specialty stores, mass merchandisers, convenience stores, warehouse club stores, and others. Although US households primarily shop at grocery chain stores (50%) or mass merchandisers (23%), 27% of households split their food purchases among the different store types listed above.

The availability of farmers' markets and other types of local food outlets (such as food banks or pantries or food from churches or social services) has been increasing in recent years.³⁵ Research has focused on strategies to increase food access through local food systems.³⁶ Larsen and colleagues³⁷ found that a new farmers' market opened in a low-income area increased healthy food access. High satisfaction and positive changes in eating behaviors and physical activity have also been reported as a result of introduction of a farmers' market.³⁸ Thus, an understanding of how food is acquired from the local food system is needed that will further inform policy to determine intervention strategies in improving healthy food acquisition among low-income populations.

Although some previous studies have described real food shopping behaviors in terms of individual attributes; for example, the actual travel distance to the primary shopping store, shopping frequency, and store type used,^{3,23,24,26,28,39-43} very few studies incorporated multiple dimensions of shopping behaviors together.^{34,44} Stern and colleagues³⁴ employed cluster analysis and found three classes, including primarily grocery shoppers, primarily mass-merchandise shoppers, and shoppers who use a mixture of different store types. VanKim and colleagues⁴⁴ employed information on fruit and vegetable (F/V) purchases, frequency of shopping, type of purchasing location, and food and beverage purchases to identify food shopping patterns using a latent class analysis and defined eight shopping patterns among a sample of college students. These new applications of pattern techniques in epidemiologic studies are promising tools to describe the complex nature of food shopping behaviors.

The purpose of the current study is two-fold. First, it aims to identify distinct food acquisition and shopping patterns among residents living in low-income and low-access communities in South Carolina, using food shopping behavior information and latent class methods. Second, it aims to examine whether Supplemental Nutrition Assistance Program (SNAP) participation, food security, education, income, nutrition knowledge, and perception of healthy food access are associated with the identified patterns.

RESEARCH SNAPSHOT

Research Question: Are there any distinct food acquisition and shopping patterns among residents living primarily in food desert census tracts? Are these patterns associated with residents' socioeconomic status, nutrition knowledge, and perceptions of their food environment?

Key Findings: Three distinct patterns were identified. Shopping frequency, use of community food resources, transportation methods, and shopping distance were the key factors that defined distinct patterns among the residents living in low-income areas. The patterns were also characterized by socioeconomic status and residents' perceptions of their food environment.

MATERIALS AND METHODS

This cross-sectional analysis is a secondary analysis, using baseline data from a quasiexperimental study that has been described previously.^{45,46} In brief, the study evaluated the influence of a food hub to increase healthy food access with a longitudinal, quasiexperimental design among a low-income population. Baseline data were collected between November 2013 and May 2014 in two South Carolina counties, the community-designated service area of the planned food hub (four contiguous census tracts designated by US Census Bureau⁴⁷) (Location 1) and four tracts in a matched comparison community site (Location 2) with similar demographic, socioeconomic, and health-related characteristics as the food hub community. The target population of this study was the main family food shopper from households in Location 1 and residents of the matched community (Location 2). Recruitment focused on seven census tracts (six of which were US Department of Agriculture-designated urban food deserts in two locations (ie, four tracts in Location 1 and three tracts in Location 2) in South Carolina. Food desert is defined as an urban area with a low-income population and low access to a supermarket or supercenter.⁴⁸ A low-income/low access tract was defined as one with a poverty rate of at least 20% and $\geq 33\%$ of the census tract population residing >1 mile from a supermarket.^{49,50} Of note, food desert status was not a requirement for a tract's inclusion.

To accommodate local community definitions of neighborhoods, which may not match the geographic boundaries of census tracts, we extended the eligibility boundaries for participant recruitment to 1 mile past the seven recruitment tract boundaries into adjacent tracts, but only in the case that the adjacent tract had a poverty level greater than or equal to that of the state ($\geq 16\%$ of households below the federal poverty level⁵¹). This yielded an expanded participant recruitment area that included residents of 19 tracts, of which 12 were food deserts. Thus, the majority (ie, 89% of participants in Location 1 and 74% in Location 2) resided in food desert census tracts. Using purchased address lists from a survey sampling firm, letters addressed to the "Family Food Shopper" were mailed to all residential addresses in the recruitment area inviting them to call for information about a study of food access and food shopping. Multiple recruitment strategies (in-person, printed, and electronic) followed this initial letter and resulted in 527 participants. Participants

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