

Food Shopping Venues, Neighborhood Food Environment, and Body Mass Index Among Guyanese, Black, and White Adults in an Urban Community in the US

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ABSTRACT

Objective: To investigate relationships among food shopping venues, food environment, and body mass index (BMI).

Design: Cross-sectional survey data and directly assessed food environment data were linked at the neighborhood level.

Setting: Schenectady, NY.

Participants: A sample of Guyanese, black, and white adults (n = 226, 485, and 908, respectively).

Main Outcome Measures: BMI.

Analysis: Linear regression models were constructed with 10 food shopping venues and neighborhood food environment as explanatory variables, controlling for sociodemographics, dietary behavior, physical activity, and perception of healthy food access.

Results: On average, respondents used 3.5 different food shopping venues. Supermarkets and ethnic markets were associated with a lower BMI in Guyanese adults. Among black adults, farmers' markets were associated with a lower BMI, whereas supermarkets, wholesale clubs, and food pantries were associated with a higher BMI. Among white adults, food coops and supermarkets were associated with a lower BMI and wholesale clubs were associated with a higher BMI. Neighborhoods with less a favorable food environment (longer travel distance to a supermarket) were associated with a lower BMI in Guyanese adults.

Conclusions and Implications: Both primary (ie, supermarkets) and secondary food shopping venues could be independent determinants of BMI. The observed variations by race and ethnicity provided insights into a culturally tailored approach to address obesity.

Key Words: food shopping, body mass index, food environment, supermarket, ethnic market (*J Nutr Educ Behav.* 2016; ■:1-8.)

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INTRODUCTION

Research to understand the relationship between the food environment and obesity has progressed steadily. Evidence suggests that systematic disparities in food environments exist; socioeconomically disadvantaged communities have low availability of healthy foods and stores

likely to carry healthy foods.¹⁻³ It has been hypothesized that an unfavorable food environment is conducive to the development of obesity and obesity-related health risks. However, studies linking the food environment to individual-level obesity measures produce less conclusive results. Some earlier studies found expected associations, such as an in-

verse relationship between the number or density of supermarkets in proximity to home and body mass index (BMI) and a positive association between the density of convenience stores and obesity.⁴⁻⁶ Other studies reported insignificant or contrary results and showed that individuals do not necessarily shop for food at stores located closest to their homes or within their neighborhoods.⁷⁻¹⁰

Factoring in food shopping behavior such as the choice of food shopping venues is a logical next-step approach to investigating the complex relationship between the food environment and obesity. Supermarkets are usually primary food stores where most food in the household is purchased and/or the largest proportion of the food budget is spent.^{11,12} However, a qualitative study stated

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that Americans also shop at multiple “secondary stores” to “get fresh produce, ethnic food items, or specific brands that were not available, not of sufficient quality, or priced too high at the primary store(s).”¹² Furthermore, low-income individuals are becoming more dependent on food pantries to supplement their nutritional needs.¹³ Current research emphasizes primary food shopping venues as a key food environment determinant of obesity, but secondary food shopping venues, including food pantries, can also be significant sources of nutrition, and they may have an independent influence on obesity.

The purpose of this study was to investigate cross-sectional relationships among choices of food shopping venues, neighborhood food environment, and BMI in urban adults in the US. The research team was particularly interested in exploring racial and ethnic differences in these relationships, because the choice of food shopping venues can be socioculturally determined and distinctive in each racial and ethnic group.¹⁴

METHODS

Study Setting

The city of Schenectady, NY, was the setting of this study. This city was designated the priority community of the affiliated health coalition owing to elevated chronic disease risks among its residents. The 3 largest racial/ethnic groups were non-Hispanic white, non-Hispanic black, and Guyanese, which made up of approximately 54%, 20%, and 13%, respectively, the city's total population.¹⁵ The Guyanese population was predominantly composed of first-generation immigrants of Asian Indian descent (Indo-Guyanese).¹⁵

Sampling and Data Collection

A convenience sample of adult Schenectady residents was interviewed through a community health survey. Eligibility for survey participation required being a Schenectady County resident aged ≥ 18 years and being able to understand the informed consent form. To interview eligible adults, teams of trained community health workers systematically canvassed the entire city, which was composed of 10 administratively

defined neighborhoods. A target sample size (quota) was calculated for each neighborhood so that the total sample would have proportionately representative neighborhood sub-samples. Approximately 1,400 private homes and units within senior apartments, municipal housings, and commercial apartment complexes were visited door to door. Only 1 eligible adult was interviewed per household. In addition, 11 faith-based organizations, 7 social services organizations, 5 parks and recreational facilities, 5 personal service and retail stores, 3 cultural and educational facilities, 3 health care organizations, and 2 community events were visited for additional interviews. No food store was included in these venues. Data collection took place every day including weekends and holidays between late February and mid May, 2013.

The survey, which contained 283 health- and community-related questions, was administered by an interviewer using a tablet computer. A total of 2,234 eligible adults participated, 2,073 of whom (92.8%) were residents of the city of Schenectady (approximately 4.2% of the city's adult population). The Ellis Hospital Institutional Review Board approved the human subject protection protocol.

Self-Reported Measures

The outcome variable, BMI, was computed using self-reported height in inches, and weight in pounds. Food shopping venue information was obtained by a series of questions that started with How often do you shop for food at ...? Food shopping venues listed in the questionnaire were supermarkets, convenience stores, ethnic markets, food coops, wholesale clubs, dollar stores, drug stores, farmers' markets, and produce trucks. An ethnic market was defined as a retail store featuring foods from a specific country or region outside the US. Responses to food shopping venue questions were dichotomized into often and sometimes, and rarely and never, based on frequency distribution patterns and bivariate associations with BMI. Food pantry use was measured by a yes or no question. Names and locations of food shopping venues and food pantries were not asked in the survey.

Sociodemographic variables included in this study were age, sex, educational attainment, household income, and participation in the *Supplemental Nutrition Assistance Program* (SNAP). Dietary behavior was measured by the total number of times that fruits and vegetables were consumed on an average day. Physical activity was measured by participation in any physical activity or exercise in the previous week. Respondents were asked whether they had experienced barriers while trying to eat in a healthy way. Affirmative responses to the question items I can't get to a store with healthy food and Healthy food costs too much were used to indicate the perception of barriers regarding access to healthy food stores and affordable healthy foods.

Measures of height and weight, sociodemographics, dietary behavior, and physical activity were adopted from the Behavioral Risk Factor Surveillance System survey, an ongoing health survey of American adults conducted by the Centers for Disease Control and Prevention. Published studies reported that all of these measures have moderate to high reliability and validity.^{16,17}

Neighborhood Food Environment Measure

The food environment assessment was conducted in May through August, 2014. The study area was the entire city of Schenectady and its buffer area up to 1.0 street network mile beyond the city boundaries. The buffer area represented a walkable distance for residents near the city boundaries. Multiple administrative lists of retailers were initially used to identify locations of food stores. A team of trained survey takers ground-truthed the study community to verify stores' eligibility and to find stores not on the lists. An eligible food store was defined as a retail outlet that sold milk, loaves of bread, or fruits and vegetables that were fresh, frozen, or canned. A total of 176 stores were eligible; all of those stores granted permission to conduct the in-store assessment.

The availability or presence of fresh fruit and vegetable varieties was collected using the Food Retail Outlet Survey Tool, which had excellent

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