



Accessibility Landscapes of Supplemental Nutrition Assistance Program—Authorized Stores



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ABSTRACT

Background The Supplemental Nutrition Assistance Program (SNAP) is the largest food assistance program in the United States. Participants receive electronic benefits that are redeemable at a variety of food stores. Previous research notes that low-income neighborhoods often lack supermarkets with high-quality, affordable food.

Objective The first aim of this study was to explore the number and spatial distribution of SNAP stores by type and to assess how SNAP benefit redemption is linked to store type in North Carolina in 2015. The second aim was to compare the demographics of populations living in areas with a high concentration of SNAP participants vs areas with a lower concentration of SNAP participants. The third aim was to test for disparities in the availability of and access to SNAP-authorized stores in areas with high vs low concentration of SNAP participants stratified by rural/urban status.

Design US Department of Agriculture and US Census data were used to explore the spatial distribution of SNAP stores at the census block group level utilizing a Geographic Information System.

Participants The 9,556 North Carolina SNAP stores in 2015 categorized into full-variety and limited-variety stores.

Outcome measures Proximity to limited-variety SNAP food stores and full-variety SNAP food stores within access range (1 mile in urban areas and 10 miles in rural areas).

Statistical analyses Wilcoxon rank sum and χ^2 tests are used to compare the distance to and concentration of SNAP stores by rurality and SNAP participant concentration at census block group scale.

Results Among the SNAP stores in North Carolina, 83% are limited-variety stores and 17% are full-variety stores. There are disparities in the demographics of individuals living in census block groups with a high proportion of SNAP participants compared to census block groups with a lower proportion of SNAP participants. More households in higher SNAP participant census block groups were non-white, did not have a car, and had children compared to census block groups with lower SNAP participation. Residents in high SNAP participant census block groups typically had access to 0 full-variety stores and 4 limited-variety stores in urban areas and 3 full-variety stores and 17 limited-variety stores in rural areas.

Conclusions SNAP participant access to a variety of stores should be considered when approving food stores for SNAP authorization. More research is essential to disentangle the relationship between access to SNAP store type and SNAP food choice and to estimate geographical disparities.

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THE SUPPLEMENTAL NUTRITION ASSISTANCE PROGRAM (SNAP) is the largest food assistance program in the United States, serving more than 44 million low-income Americans.¹ SNAP participants receive electronic benefits that are redeemable at an assortment of food stores, such as grocery stores, convenience stores, and drug stores. In 2016, approximately 19% of American households participated in SNAP, receiving on average \$255 per month in benefits, with an annual cost of approximately \$75 billion.¹ Most (84%) SNAP benefits are redeemed at supermarkets and super stores, while 64% of SNAP transactions take place

at supermarkets and super stores, therefore, about 36% of SNAP transactions take place at other types of SNAP stores, such as smaller grocery stores, and convenience stores.²

While research has explored the relationship between the food environment and obesity among low-income communities, one common finding is that low-income neighborhoods often lack access to supermarkets that offer high-quality affordable food.³ Reduced access to these full-variety supermarkets may increase exposure to energy-dense food and lead to diets high in processed foods, fat, sugar, and sodium.⁴⁻⁷ In addition, low-income communities typically have access to smaller food outlets,⁸ pay more for shopping locally,⁹ and have fewer healthy food options compared to higher-income communities.¹⁰

The topic of access to food has received considerable attention in the literature, and can be measured from several perspectives, including geographic, economic, and informational.¹¹ Geographic accessibility examines the relationship between the location of the store where food can be purchased and the individual in need. It incorporates structural barriers to food outlets, including transportation resources, travel time and distance, and travel costs.¹² Such geographic measures can further be employed to identify areas that are low income with limited access to healthy food retailers, referred to as “food deserts.”¹³ Recent advances in Geographic Information Systems have facilitated the modeling of geographic measures of food access and food availability.^{14,15} Three types of methods have been pervasively adopted to estimate food accessibility with Geographic Information Systems: the container method, the buffer method, and the network method.¹⁶ Although the first two techniques can be loosely categorized as “exposure” approaches, the latter one, which is used in this article, attempts to determine the ease of access to a food outlet.

To date there has been very little research exploring SNAP participants access to SNAP-authorized stores. Wood and Horner¹⁷ examined availability of SNAP stores among different types of neighborhoods in Leon County, FL. They found that most low-car-access census block groups (99%) contained a SNAP store accessible within a 20-minute drive of a SNAP store, while less than half (40%) of these census block groups contained a SNAP stores within a 20-minute walk.¹⁷ Two other studies, both conducted in urban counties, found that low-income communities with a high percentage of SNAP participants were more likely than higher-income communities to be populated with limited-variety SNAP-authorized stores and less likely to include full-variety stores.^{18,19} Limited-variety stores typically lack healthy products like fresh produce and lean, fresh meats.^{18,19} It is unclear whether this association between SNAP-authorized store type and concentration of residents participating in SNAP is limited to these counties.

The first aim of this study was to explore the number and spatial distribution of SNAP stores by type and to assess how SNAP benefit redemption is linked to store type in North Carolina in 2015. The second aim was to compare the demographics of populations living in areas with a high concentration of SNAP participants vs areas with a lower concentration of SNAP participants. The third aim was to test for disparities in the availability of and access to SNAP-authorized stores in areas with a high vs low concentration of SNAP participants stratified by rural/urban status.

MATERIALS AND METHODS

Data

Two primary data sources are used for this study. First, the US Department of Agriculture (USDA) Food and Nutrition Service provided a geolocated dataset of all SNAP-authorized stores in North Carolina from 2015 (hereafter “USDA data”). This dataset is available by request from the USDA. Second, 2011-2015 data estimates from the American Community Survey (hereafter “Census data”) were used at the census block group level.²⁰ The US Census also publishes population-weighted geographic centers, or centroids, after each decennial census. The 2010 population-weighted centroids are used as points of origin to estimate geographic access for each block group.^{21,22} This study was exempt from Institutional Review Board review because it is not human subjects research.

USDA Data

USDA data includes store type, latitude, longitude, address, and county. The USDA categorizes SNAP-authorized stores by 17 different types, which are summarized in [Table 1](#). When stores apply for SNAP authorization, the store self-selects store type based on instructions provided by USDA. USDA then reviews the store application and, at that time, can change the store type designation to align with the USDA definition. For this study, store types are grouped into binary categories: “full variety,” defined as offering a “wide” or “extensive” selection of fresh meat, dairy, produce, and grains (eg, super stores, large grocery stores, and supermarkets) and “limited variety,” defined as not offering a “wide” or “extensive” selection of fresh meat, dairy, produce, and grains (eg, drug-stores, convenience stores, small grocery stores, and dollar stores) or all other SNAP-authorized stores (see [Table 1](#)).

Census Data

The US Census American Community Survey provides 5-year estimates information at the census block group level for the years 2011 to 2015²⁰; the unit of analysis for this study. The census block group level was selected to best identify neighborhood characteristics, as census block group is the smallest geographic unit available with demographic information pertinent to this study. The following variables for each census block group in North Carolina are utilized for this analysis: population size, household size, number of households participating in SNAP (recoded into percent of households in the census block group on SNAP), urban/rural status, median household income, number of residents by race/ethnicity (recoded as percent of census block group that was non-Hispanic black, non-Hispanic white, Hispanic, and other based on the population size), percent of population with access to a vehicle, and percent of households with children.

Geographic Categories

To examine whether the SNAP food environment varies according to the concentration of SNAP participants, the North Carolina census block groups are divided into four categories based on the percentage of SNAP participants in each census block group and whether these census block groups are urban or rural. First, to examine the concentration of SNAP participants within the 6,092 census block groups in North Carolina by quartile; those ≥ 75 th percentile are considered census

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