

Measuring Micro-Level Effects of a New Supermarket: Do Residents Within 0.5 Mile Have Improved Dietary Behaviors?



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ABSTRACT

Background Local and national policies to encourage supermarket opening or expansion are popular strategies for improving access to healthy food for residents in neighborhoods lacking these types of stores, yet few evaluations of such initiatives exist.

Objective Our aim was to test whether a newly opened supermarket in the Bronx, NY, changed household availability of healthy and unhealthy food items and reported daily consumption of these items among respondents residing in close proximity (≤ 0.5 mile) to the new supermarket.

Design This quasi-experimental study evaluated changes in purchasing and consumption habits of residents within 0.5 mile of the new supermarket as compared to residents living more than 0.5 mile from the supermarket. Data were collected through street intercept surveys at three different times: once before the store opened (March to August 2011) and in two follow-up periods (1 to 5 months and 13 to 17 months after the store opened). This study analyzed a subset of successfully geocoded resident intersections from the larger study.

Participants/setting We surveyed 3,998 residents older than the age of 18 years in two Bronx neighborhoods about their food-purchasing behaviors before the store opened and in two follow-up periods. Responses from residents whose intersections were successfully geocoded ($N=3,378$) were analyzed to examine the consumption and purchasing behaviors of those in close proximity to the new store.

Intervention A new supermarket opened in a low-access neighborhood in the Bronx with the help of financial incentives through New York City's Food Retail Expansion to Support Health (FRESH) program.

Main outcome measures The primary outcome evaluated was the change in percent of respondents reporting that the following food items were "always available" in the home: milk, fruit juice, soda, pastries, packaged snacks, fruits, and vegetables. As a secondary outcome, we explored changes in self-reported daily servings of these items. **Statistical analysis performed** A difference-in-difference analysis was performed, controlling for age, education, marital status, income, sex, race, and ethnicity.

Results Residents within 0.5 mile of the store had increased household availability of both healthy and unhealthy foods. After the introduction of the supermarket, the percent of residents in close proximity to the store who reported always having produce available in the home increased by 8.8% compared to those living >0.5 mile from the store in the first post-period and by 10.6% compared to those living >0.5 mile from the store in the second post-period. A similar positive increase in household availability of salty snacks and pastries was observed. Residents living in close proximity also reported greater consumption of healthy foods like produce and water, and lower intake of soft drinks and pastries.

Conclusions Given the financial support at the national and local levels to encourage supermarket development and expansion in high-need communities, it is imperative to evaluate the impact of such initiatives. Although the findings have so far been equivocal, our findings give weight to the argument that, at a micro-level, the siting of a new supermarket can indeed impact local purchasing and consumption behavior. Although purchasing for both healthy and unhealthy food items increased, reported consumption showed an increase in servings of healthy items (water, vegetables, and fruit) and a decrease in servings of unhealthy foods (soft drinks, salty snacks, and pastries).

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RECENT STUDIES ON THE FOOD ENVIRONMENT IN the United States have found disparities in access to high-quality, healthful foods in low-income and minority neighborhoods.¹⁻⁴ Access to healthful food is often measured in terms of geographic proximity to stores offering healthy options, most commonly proximity to supermarkets.⁵ Although supermarkets carry a variety of nutritious foods, they also stock an abundance of high-calorie snack foods and other unhealthy items that can contribute to poor-quality diets associated with undesirable long-term health effects. As a consequence, evidence of the effect of neighborhood supermarkets on diet quality and obesity incidence is somewhat equivocal.⁶⁻⁸

Some research indicates that living >5 miles from one's usual store (ie, the store they choose to patronize) results in lower fruit consumption compared to people who live within 1 mile of their usual grocery.⁹ This finding was similar to that of a study of pregnant woman, for whom living >4 miles from any supermarket increased their odds of low diet quality compared to women living ≤ 2 miles from a supermarket.¹⁰ A pre–post study in Leeds, UK, after the opening of a large superstore, Tesco, in a low-income community reported that fruit and vegetable consumption improved for those who switched to the new store, those who were closest to the new store, and those with poor diets in the pre-intervention period.¹¹

Other studies are not so sanguine on the benefits of living near a supermarket. An evaluation of a supermarket intervention in Glasgow, UK, employed a prospective quasi-experimental design comparing baseline and follow-up data in a treatment and comparison community. The sample was small and the results revealed no impact of the store opening on fruit or vegetable consumption of participants.¹² More recently, a 2014 study in Philadelphia, PA, conducted a pre–post quasi-experimental study to evaluate the impact of opening a 41,000–square foot supermarket in an underserved area. Only one-quarter (approximately 26%) of the residents adopted the new supermarket as their main store and there were no significant differences between perceived access to produce or reported fruit and vegetable intake between the comparison and treatment groups.¹³

Despite the lack of clarity on the association between supermarket access and decreased obesity incidence, disparities in healthy food access, dietary patterns, and health outcomes have led to the development of policy solutions to improve the food environment in underserved communities. In New York City, such policies include the Green Carts program, which permits mobile vendors to sell fresh produce in areas where fruit and vegetable consumption is low; increasing the availability of healthy options in bodegas; and providing zoning and financial incentives to promote the establishment and retention of neighborhood supermarkets. The latter solution, known as the Food Retail Expansion to Support Health (FRESH) program, is similar to initiatives in New Orleans, LA; Philadelphia, PA; District of Columbia; California; and New Jersey. Support for food desert mitigation through supermarket development has also been taken up at the national level. In 2011, the Healthy Food Financing Initiative began offering financial assistance to projects throughout the nation. The most recent Farm Bill, passed in 2014, includes \$125 million for program authorization.

The lack of consensus that neighborhood supermarket access improves fruit and vegetable intake among residents, coupled with national and local policies to encourage supermarket development and expansion in select communities, calls for a controlled, experimental study to assess the impact of supermarket distance on purchasing and consumption behaviors of residents. A controlled quasi-experimental study was designed to test whether a newly opened tax-incentivized supermarket in the Bronx, NY, changed in-home food availability, food purchasing habits, and calorie and nutrient intake of neighborhood residents, and was a precursor to this study. The results demonstrated inconsistent or insignificant effects on access to and consumption of produce when residents of the intervention neighborhood were compared with a matched comparison neighborhood.^{14,15} This article examines successfully geocoded resident intersections from the larger study to determine whether living in immediate proximity—meaning 0.5 mile or closer—to the new supermarket influenced household food availability and consumption compared to those living >0.5 mile from the new store.

The new store, a 17,000 square-foot supermarket located in the Morrisania section of the South Bronx, received both tax and zoning benefits through New York City's FRESH program. The program aims to improve the food environment in underserved neighborhoods in the city by incentivizing supermarkets to open and expand. Applicants must dedicate at least 30% of their space to perishable food items, including at least 500 square feet to fresh produce.¹⁶ The tax credits for the store under study were on the order of \$450,000, or approximately 40% of the estimated cost of the store. Both Morrisania and its neighboring community, Highbridge, fall far below the recommended lower limit of 3 square feet of supermarket space per person and have been labeled as in high need of supermarkets by the city's Department of Planning.¹⁷

The larger study defined the intervention and comparison groups by administrative unit, that is, neighborhood (Morrisania vs Highbridge).¹⁴ However, using administratively defined neighborhoods to determine the intervention group introduces the possibility of spatial misclassification. For example, some residents in the Highbridge neighborhood live in closer proximity to the supermarket than some Morrisania residents. If proximity is considered the key driver of supermarket use, defining intervention and control groups via distance rather than neighborhoods is a more appropriate strategy. Furthermore, unlike previous studies—including Elbel and colleagues¹⁴—this study interrogates more closely the association between distance to supermarkets at a micro-level (<1 mile) and shopping and dietary behaviors. The findings are particularly relevant in highly urban areas such as New York City, where distance to the nearest supermarket tends to be significantly shorter than in less densely populated communities. This study directly assesses the relationship between near proximity to a supermarket and food purchasing and consumption in the Bronx, NY, a low-income, urban community.

At each time period, the analyzed sample consisted of fewer Hispanic and more black respondents than the populations of Morrisania and Highbridge. This is partly explained by the fact that the Hispanic category included black residents in the census data, whereas both groups were

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