



Changes in food and beverage environments after an urban corner store intervention[☆]



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ABSTRACT

Objective. In response to the obesity epidemic, interventions to improve the food environment in corner stores have gained attention. This study evaluated the availability, quality, and price of foods in Philadelphia corner stores before and after a healthy corner store intervention with two levels of intervention intensity (“basic” and “conversion”).

Methods. Observational measures of the food environment were completed in 2011 and again in 2012 in corner stores participating in the intervention, using the Nutrition Environment Measures Survey for Corner Stores (NEMS-CS). Main analyses included the 211 stores evaluated at both time-points. A time-by-treatment interaction analysis was used to evaluate the changes in NEMS-CS scores by intervention level over time.

Results. Availability of fresh fruit increased significantly in conversion stores over time. Specifically, there were significant increases in the availability of apples, oranges, grapes, and broccoli in conversion stores over time. Conversion stores showed a trend toward a significantly larger increase in the availability score compared to basic stores over time.

Conclusion. Interventions aimed at increasing healthy food availability are associated with improvements in the availability of low-fat milk, fruits, and some vegetables, especially when infrastructure changes, such as refrigeration and shelving enhancements, are offered.

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Introduction

Neighborhood food environments are getting increasing attention as intervention targets for addressing the obesity epidemic. Small neighborhood food stores are an obvious choice for intervention due to their convenience; their tendency to charge higher prices for healthier foods (Krukowski et al., 2010); limited availability of fruit, vegetables, and low-fat milk (Leone et al., 2011); and their contributions to daily caloric consumption (Borradaile et al., 2009). Reports on the feasibility and effectiveness of such interventions are now appearing in the literature (Adams et al., 2012; Dannefer et al., 2012; Gittelsohn et al., 2012)

with the majority focusing on increasing healthy food access and/or access to fresh fruit and vegetables (Gittelsohn et al., 2012). Still, reports are few, and based mainly on self-report of store owners/managers or customers from a small number of stores. More information on objectively measured outcomes is needed to establish the feasibility and effectiveness of these types of interventions.

This article describes the findings of store food environment assessments for more than 200 corner stores in Philadelphia, PA, conducted before and after a healthy corner store intervention as part of the Get Healthy Philly initiative (www.foodfitphilly.org) by an external evaluation team. Because stores received either a “basic” intervention or a more intensive “conversion” intervention, two evaluation questions were addressed: 1) do healthy food environments in participating stores improve over time, and 2) do stores receiving a more intensive intervention show greater improvement in their healthy food environments over time?

Methods

Evaluation design

Observational measures of food environments were completed in a sample of corner stores participating in the Healthy Corner Store Initiative intervention,

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at two time points approximately one year apart, using the Nutrition Environment Measures Survey for Corner Stores (NEMS-CS). This evaluation examined changes over time, and the difference between the “basic” and “conversion” (intensive intervention) stores over time.

Healthy Corner Store Initiative intervention

In March 2010, the Philadelphia Department of Public Health (PDPH) partnered with The Food Trust to implement the Healthy Corner Store Initiative (HCSI) on a city-wide scale in Philadelphia. The Food Trust's HCSI is a nationally recognized model to improve access to and availability of healthy foods in urban areas by providing technical assistance, training, and capital investments to store owners (The Food Trust, 2012). Corner stores were defined as businesses with food as their primary product, having less than 2000 square feet, fewer than 4 aisles, and 1 cash register (The Food Trust, 2012). Recruitments of stores began in areas of the city with high rates of poverty (>19% of the population living below the federal poverty level). Proximity to schools and other child-serving institutions was also considered. Store owners were approached individually to assess their willingness and ability to participate.

In exchange for a \$100 incentive, enrolled stores began by adding two new healthy products from two healthy food categories to their inventory and implementing a Healthy Food Identification marketing campaign, including window and door clings, in-store banners, shelf labels, and recipe cards. The seven healthy food categories include: fresh fruits and vegetables, canned/frozen fruits and vegetables, low-fat dairy, lean meats, whole grains, healthy snacks, and healthy beverages. The first five food categories were emphasized in the intervention. Next, stores were offered two business trainings conducted one-on-one at stores over 30–60 min and focused on product procurement, promotion, and pricing and, as needed, SNAP certification. This set of activities constitutes a “basic” intervention. Stores that met the basic intervention goals and demonstrated an ability to plan and execute larger inventory changes were recruited into the high-intensity intervention. These stores received mini-grants for shelving and refrigeration to help them store, display, and expand their inventory of healthy products; and individualized businesses training. These efforts, in addition to the basic intervention components, constitute a “conversion” intervention.

On average, the time from enrollment to completion of inventory and marketing changes was 3 months during which project staff made approximately 2 visits per store. Completion of the conversion intervention required an additional 2–3 months and 2–4 visits per stores. Business trainings occurred during the first 6–9 months after enrollment. To help store owners procure healthy foods, The Food Trust developed partnerships with local food distributors and suppliers that stock, identify, and sell new products at reasonable costs and volumes. A total of 630 stores were participating in the program by the end of the evaluation period.

Timing of measures

Funding for evaluation became available after the HCSI intervention began. Stores were selected for the evaluation to baseline as possible (see [Sample of corner stores](#) section below). Baseline data collection was completed between January and April of 2011 and a follow-up data collection was completed between January and April of 2012. The assessments were conducted approximately one year apart, to control for seasonality. Trained evaluation staff from the University of Pennsylvania completed all data collection at both time points.

Sample of corner stores

A multi-stage, stratified sampling procedure was used to achieve a sufficient sample of basic and conversion stores. The initial sample of 220 stores was chosen from all the stores enrolled in the intervention that were located in high-poverty areas (>19% of residents living below the federal poverty level, approx. 92% of participating stores). At that time, all stores were designated to receive the basic intervention, and determinations regarding receipt of the high-intensity intervention had not been completed. To ensure a sufficient sample of stores that would eventually receive the conversion intervention, the Conversion Potential Rating (CPR) was used as a proxy. The CPR was determined at the time of intervention enrollment by The Food Trust intervention staff. It estimated a store's potential to progress through the program, reflecting the degree of store owner commitment, the availability of space for new displays, and surrounding assets, such as schools. An additional 26 stores were chosen at a later date—for a total sample of 246 stores—to increase the sample of conversion

stores. At this point, these stores were still in the early stages of the basic intervention and had also been designated for future conversion intervention.

NEMS-CS measures were completed in 233 (94.7%) of the 246 stores at baseline (Cavanaugh et al., 2013). All stores that were assessed at baseline ($n = 233$) were included in the follow-up sample. Of these, only 211 were assessed at follow-up—161 were basic stores and 50 were conversion stores.

For evaluation purposes, a store was considered a conversion store if the NEMS-CS data were collected after the post-conversion completion date. This date was two weeks after equipment delivery and provided the store time to complete their training and stock healthier products before a conversion was considered ‘complete’.

Measurement tool: Nutrition Environment Measures Survey for Corner Stores (NEMS-CS)

The NEMS for Corner Stores (NEMS-CS) was adapted from the Nutrition Environment Measures Survey for Stores (NEMS-S) for use in corner stores (Cavanaugh et al., 2013). NEMS-S is a validated observational measure of retail store nutrition environments focusing on the availability of healthful food choices, quality of fresh produce, and price of healthy vs. comparable less healthy options, in 11 common categories (Glanz et al., 2007, www.med.upenn.edu/nems/).

Statistical methods

The main analyses and comparisons were limited to stores that were evaluated at both time points. Descriptive statistics on availability, pricing, and quality for all healthy and less-healthy options were computed for all stores, and by store type (basic or conversion store). A total NEMS-CS score (−9–49 points) and scores for the dimensions of availability (0–25 points), price (−9–18 points), and quality (0–6 points) were calculated for each store using a standard scoring system (available by request).

Means and standard deviations were used to summarize NEMS-CS scores. McNemar's test for matched pair data and paired t-tests were used to evaluate the changes in availability of healthy and less-healthy items, and the NEMS-CS scores and subscales for availability, quality and price at baseline and follow-up assessments. A time-by-treatment interaction analysis was used to evaluate the changes in NEMS-CS scores by intervention level (basic or conversion) over time (baseline to follow-up). Due to the number of outcomes tested, a threshold of 0.01 was used to assess statistical significance.

An exploratory analysis was also conducted to examine whether there was a systematic difference in NEMS-CS scores associated with time from enrollment to baseline assessment. This was important given that the interventions had begun before the evaluation, limiting our ability to have a ‘true baseline’.

Analyses were performed using SAS version 9.3 (SAS Institute, Cary, NC).

Results

Of the 233 stores rated at baseline, 211 of those stores were also rated at the follow-up time point (90.6%; $n = 161$ basic stores and $n = 50$ conversion stores). Seven stores (3.0%) were excluded at the store owner's request and 15 stores (6.4%) were found to have closed. There was no significant difference in the total NEMS-CS score at baseline for stores rated at baseline only (mean = 14.6, SD = 6.53) and those rated at both time points (mean = 16.5, SD = 5.57).

Characteristics of stores

Of the 211 stores that were rated at both time points, 76.3% ($n = 161$) were basic stores and 23.7% ($n = 50$) were conversion stores. More than 95% of the stores had only one cash register and used a majority (>50%) of the store space for food. The stores were located in various parts of the city, with 26.5% in Central Philadelphia ($n = 56$), 19.4% in West/Southwest Philadelphia ($n = 41$), 18.5% in North Philadelphia ($n = 39$), 18.0% in Northeast Philadelphia ($n = 38$), and 17.5% in South/South Central Philadelphia ($n = 37$). All 211 stores (100%) were located in high priority zip codes.

The number of days between enrollment into the intervention and the baseline assessment date ranged from 8 to 350 days, with a mean of 192.44 (SD = 83.7) days and a median of 211 days. There was a

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