



Healthy store programs and the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), but not the Supplemental Nutrition Assistance Program (SNAP), are associated with corner store healthfulness☆

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ABSTRACT

In response to lack of access to healthy foods, many low-income communities are instituting local healthy corner store programs. Some stores also participate in the United States Department of Agriculture's Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) and the Supplemental Nutrition Assistance Program (SNAP). This study used two assessment tools to compare the healthfulness of offerings at stores participating in local healthy store programs (upgraded stores), WIC, and/or SNAP to that of similar non-participating stores.

Based on store audits conducted in 315 New Jersey corner stores in 2014, we calculated healthy food availability scores using subsections of the Nutrition Environment Measures Survey for Corner Stores (NEMS-CS-Availability) and a short-form corner store audit tool (SCAT). We used multivariable regression to examine associations between program participation and scores on both instruments.

Adjusting for store and block group characteristics, stores participating in a local healthy store program had significantly higher SCAT scores than did non-participating stores (upgraded: $M = 3.18$, 95% CI 2.65–3.71; non-upgraded: $M = 2.52$, 95% CI 2.32–2.73); scores on the NEMS-CS-Availability did not differ (upgraded: $M = 12.8$, 95% CI 11.6–14.1; non-upgraded: $M = 12.5$, 95% CI 12.0–13.0). WIC-participating stores had significantly higher scores compared to non-participating stores on both tools. Stores participating in SNAP only (and not in WIC) scored significantly lower on both instruments compared to non-SNAP stores.

WIC-participating and non-SNAP corner stores had higher healthfulness scores on both assessment tools. Upgraded stores had higher healthfulness scores compared to non-upgraded stores on the SCAT.

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1. Introduction

Efforts to combat the rise in obesity rates in the US have resulted in a close examination of the role of the food environment, including the availability of healthy foods across localities (Escaron et al., 2013; Gittelsohn et al., 2014; Centers for Disease Control and Prevention, 2015; Larson et al., 2013; Ohri-Vachaspati et al., 2013; Rimkus et al.,

2015; Zenk et al., 2014). Low-income and minority residents often suffer from obesity at higher rates than do higher income, non-minority residents, and as such, consideration of the food environment as it pertains to these higher risk groups is a priority. Recent data show that low-income and high-minority communities have an abundance of small retail food stores such as convenience and corner stores, but frequently lack supermarkets (Powell et al., 2007; Moore & Roux, 2006). Corner stores stock a greater proportion of energy-dense, nutrient-poor foods, combined with fewer fresh fruits and vegetables (FV), whole grains, and low-fat dairy than do supermarkets (Laska et al., 2010; Borradaile et al., 2009). As a result, low-income, high-minority neighborhoods often have limited access to healthy foods.

In response to these disparities, many communities have instituted healthy corner store programs that encourage and support healthy

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upgrades to corner stores. As interventions in small stores proliferate, early results, some assessed by validated, comprehensive store audits (Cavanaugh et al., 2014; Paek et al., 2014) and some assessed by study-specific measurement tools, (Song et al., 2009; Dannefer et al., 2012; Ayala et al., 2013) demonstrate good success at increasing the availability of healthy foods (Cavanaugh et al., 2014; Paek et al., 2014; Song et al., 2009; Dannefer et al., 2012; Ayala et al., 2013). Only a few evaluations, however, have compared corner stores involved in healthy initiatives to stores that are not (Song et al., 2009; Ayala et al., 2013).

Federal programs seek to provide additional food purchasing assistance to low-income families, but have been the source of ongoing debate and scrutiny. The Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), for example, provides vouchers for specific designated products based on their nutrient profile. Stores that accept WIC vouchers must stock a variety of healthy foods including reduced-, low-, or non-fat milk; 100% unsweetened juice; FV sold fresh, canned (in water or their own juice and with no added sodium), frozen (with no added sugars or sodium), or dried; and whole grains (USDA Food and Nutrition Service, 2014).

In contrast, the Supplemental Nutrition Assistance Program (SNAP) provides a source of funding for the purchase of almost any food or beverage with few exceptions. SNAP vendors must sell at least three varieties of foods in four staple food groups: meat, poultry, or fish; bread or cereal; vegetables or fruits; and dairy products. Nutrient requirements are currently not in place for SNAP-authorized foods. Grains are not required to be whole, fat content is not specified for any foods, and canned and frozen FV have no sugar or sodium restrictions (USDA Food and Nutrition Service, 2013).

Stores are required to receive state-administered certification as eligible vendors for these programs. Nationally, SNAP vendors outnumber WIC vendors 5:1 (USDA Supplemental Nutrition Assistance Program, 2014; USDA Food and Nutrition Service, Office of Policy Support, 2013). Corner stores that accept vouchers for WIC have been shown to stock a greater number of healthy foods compared to non-WIC stores (Tester et al., 2011), likely due to the federally-mandated stocking requirements for WIC vendors.

This study compared the availability of healthy foods in corner stores participating in WIC, SNAP, and/or a healthy corner store program to that of non-participating similar stores across four cities (Camden, Newark, New Brunswick, and Trenton) in New Jersey. Two related but distinct instruments were used to examine these differences.

2. Methods

The study design, sampling approach, and development of a reduced corner store audit instrument have been described previously (DeWeese et al., in press).

2.1. Audit instruments

Assessments of stores' healthy food offerings were made using subsections of an existing comprehensive audit tool, the Nutrition Environment Measures Survey for Corner Stores (Cavanaugh et al., 2013) (NEMS-CS) and the newly developed short-form corner store audit tool (SCAT) (DeWeese, Todd, Karpyn, Yedidia, Kennedy, Bruening, Wharton, Ohri-Vachaspati, 2016, unpublished data under review). The full NEMS-CS is intended for in-person appraisals of availability, quality, and prices of foods from 13 different categories (milk, fruit, frozen and canned fruits, vegetables, frozen and canned vegetables, ground beef, hot dogs, frozen dinners, baked goods, beverages, bread, baked chips and snacks, and cereal). Because one aim of the original project was to test the feasibility of administering the reduced audit over the phone, the NEMS-CS version used in the current study was constructed by retaining only items assessing availability of healthy foods, while NEMS-CS items related to price and quality, which are difficult to

administer reliably over the telephone, were excluded. The version used in this study is referred to as NEMS-CS-Availability.

The SCAT is a validated instrument (Pearson correlation of 0.79 between SCAT and NEMS-CS availability scores), developed using the NEMS-CS-Availability tool and store audits (DeWeese et al., in press). It requires fewer resources compared to comprehensive store audit tools to capture corner stores' healthfulness levels. Whereas the NEMS-CS measures the availability of over 50 individual items, the SCAT, a seven-item instrument, measures the availability of skim/1% milk, fresh fruits (five or more types vs four or fewer), fresh vegetables (five or more types vs four or fewer), frozen vegetables, and ground meat, as well as the presence of WIC signage and refrigeration for meat, fruits, or vegetables.

2.2. Sample and procedures

Corner store audits were conducted from June through December 2014 in 325 stores using the NEMS-CS-Availability and the SCAT. Auditors were trained and independently conducted practice audits in pairs to determine inter-rater reliability. Four items had kappa values under 0.7 and these were clarified during further training. Two independent auditors completed the audits in each store.

The sample size was based on simulation studies examining required sample sizes for exploratory factor analysis (Mundfrom et al., 2005), which was used in development of the SCAT. The sampling frame for data collection consisted of the 781 small food stores listed in 2013 InfoUSA and Nielsen commercial databases for the metro areas of Camden, Newark, Trenton, and New Brunswick, New Jersey, communities that are part of the New Jersey Child Health Study (NJCHS). These cities have received funding from various sources including, but not limited to, the Robert Wood Johnson Foundation and the American Heart Association to produce and support policy and environmental changes to increase access to healthy foods (Robert Wood Johnson Foundation, 2015). One strategy adopted by some community partners was to work with local small food retailers to upgrade their stores to stock and promote healthier options (Change Lab Solutions, 2014). A number of organizations, including The Food Trust (The Food Trust, 2012) and the New Jersey Partnership for Healthy Kids (Robert Wood Johnson Foundation, 2015), facilitate the corner store upgrades in these communities. The organizations work closely with the NJCHS, continually providing updates on their involvement in the healthy corner store programs. At the initiation of store audits 43 stores in the study areas were participating in upgrade programs. These 43 upgraded stores were included in the sample, in addition to 282 stores that were randomly selected from the pool of all non-upgraded stores in the four cities. Stores in which employees refused audits ($n = 2$), that could not be located in the field ($n = 7$), or that were found to be permanently closed ($n = 19$) were replaced in the sample by corner stores observed in close proximity (usually within a block) to the original store. This study did not involve human subjects and was therefore granted an exemption from review by the Arizona State University Institutional Review Board.

2.3. Audit instrument scoring

NEMS-CS-Availability audit scores were calculated using the product availability portion of the full NEMS-CS scoring algorithm (Center for Health Behavior Research - University of Pennsylvania, 2014). Product availability is scored on a scale of 0–34, and is calculated by adding scores from each of the 13 categories. While some items are scored solely on whether or not they are present, others are assigned differential weights based on their nutritional value (e.g., higher score for low-fat vs. whole milk) or on the number of varieties available. The higher the score, the more healthy items were observed during in-store audits. Scores on the SCAT were calculated by assigning one point for the

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