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Corner Store Inventories, Purchases, and Strategies for Intervention: A Review of the Literature

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Abstract

Introduction: An increasingly popular strategy to improve the food retail environment and promote healthy eating in low-income and minority communities is the corner store conversion. This approach involves partnering with small 'corner' food stores to expand access to high-quality fruits, vegetables, and other healthy foods. **Methods:** We conducted a structured review of the literature to assess inventories and sales in corner stores, as well as to identify intervention strategies employed by corner store conversions. **Results:** Our review returned eight descriptive studies that discussed corner store inventories and sales, as well as ten intervention studies discussing six unique corner store conversion interventions in the United States, the Marshall Islands, and Canada. Common intervention strategies included: 1) partnering with an existing store, 2) stocking healthy foods, and 3) social marketing and nutrition education. We summarize each strategy and review the effectiveness of overall corner store conversions at changing peoples' food purchasing, preparation, and consumption behaviors. **Conclusions:** Consumption of fresh, healthy, affordable foods could be improved by supporting existing retailers to expand their selection of healthy foods and promoting healthy eating at the neighborhood level. Additional corner store conversions should be conducted to determine the effectiveness and importance of specific intervention strategies.

Keywords: Corner store conversions; overweight; food environment; food deserts; health disparities

Introduction

The rapid rise in the prevalence of overweight is a public health crisis (Flegal, Carroll, Ogden, & Curtin, 2010). A number of studies have demonstrated that increased consumption of fruits and vegetables and other healthy foods is associated with decreased risk of overweight and related chronic conditions (Appel, 2003; Dauchet, Amouyel, & Dallongeville, 2005; Quatromoni, Copenhafer, D'Agostino, & Millen, 2002). Generally, peoples' fruit and vegetable consumption reflects their food environments: those with easy access to fruits and vegetables consume more of these foods than people with poor access (Moore, Diez Roux, Nettleton, & Jacobs, 2008; Morland, Wing, & Roux, 2002; Rosenkranz & Dzewaltowski, 2008). Many low-income and minority families live in "food deserts," or areas without access to comprehensive supermarkets or other sources of affordable, high quality, nutritious foods (Walker, Keane, & Burke, 2010). People living in food deserts are less likely than those in other neighborhoods to eat a nutritious diet and more likely to suffer from diet-related chronic diseases (Moore et al., 2008). Previous approaches towards improving food deserts include using zoning laws to restrict fast food restaurants, promoting community gardens and other urban agriculture, incentivizing the development of supermarkets in poor and minority communities, and expanding access to farmers markets (CDC, 2010)

An emerging strategy to improve unhealthy food environments is the "corner store conversion," which involves a partnership with small 'corner'

stores to expand access and quality of healthy foods (Bodor, Ulmer, Dunaway, Farley, & Rose, 2010). The California Endowment and other partners, for instance, recently announced that they will provide $221 million in funding as part of a statewide effort to increase access to healthy food by building new supermarkets and conducting makeovers at existing corner stores (California FreshWorks, 2011). Corner stores, which are typically located on prominent neighborhood corners, are often primary sources of food in neighborhoods lacking comprehensive supermarkets. A corner store conversion model could be particularly relevant in the many poor and minority neighborhoods that lack large supermarkets (Walker et al., 2010).

The Present Study

In this study, we expand on existing knowledge by conducting a structured review of the empirical literature related to corner stores and corner store conversions. First, we assess descriptive studies to understand the healthfulness of corner store inventories as well as typical food and beverage purchases in corner stores. This information will be useful for identifying the potential impact that corner store conversions may have on improving the healthfulness of the food environment. We then examine the corner store conversion literature in order to identify intervention strategies that have been employed in the limited number of corner store conversions that have been conducted to date. The identification and dissemination of common strategies will be useful for public health practitioners and other interventionists seeking to perform their own corner store conversions. Finally, based on the findings of reviewed studies, we summarize the impact of corner store conversions on healthy food knowledge and behaviors.

METHODS

Inclusion Criteria

We conducted a structured literature review between July and August 2010 in order to identify descriptive studies regarding corner store inventories and sales, as well as intervention studies regarding corner store conversions. To be included in the review, all articles had to be written in English and include original, empirical results. No constraints were placed on the year of publication, because the strategy and concept of corner store conversions are relatively new. To be included as a descriptive study, the study had to report findings related to the food inventories of corner stores or sales and purchases at corner stores. To be included as an intervention study, the study had to include an outcome evaluation of a corner store conversion intervention.

Figure 1:

The exterior of a local corner store in East Los Angeles, California before (above) and after (below) a "market makeover," a type of corner store conversion. Photo credit: Nathan Cheng Consulting (above) and Public Matters, LLC (below)

Figure 2:

The interior of a local corner store in East Los Angeles, California before (above) and after (below) a "market makeover," a type of corner store conversion. Photo credit: Nathan Cheng Consulting (above) and Public Matters, LLC (below)

Key Word Searches

To identify the most comprehensive list of references possible, we conducted keyword searches in the PubMed and Web of Sciences databases and searched reference lists of relevant articles. The following keywords were searched in multiple combinations: corner store, convenience store, grocery store, food store, food environment, store, and intervention.

Articles Retrieved

Our initial searches returned a total of 391 articles from the PubMed database and 316 articles from the Web of Sciences database. After reading article titles and abstracts, we determined that eight descriptive studies and ten intervention studies met the inclusion criteria. The intervention studies covered six distinct corner store conversions and were published between 2003 and 2010.

Analytic Plan

In this study, we used the 'matrix method' to abstract data from the retrieved studies (Goldman & Schmalz, 2004). As described by Goldman and Schmalz (2004), 'the matrix method is a structure and process for systematically reviewing the literature and a system for bringing order' to the resulting data. For the eight descriptive studies, our analyses consisted of summarizing data regarding corner store inventories, including food and beverage availability, quality, and shelf space, as well as sales. For the ten intervention studies, our analyses consisted of summarizing the intervention strategies, outcome evaluation strategies, and key findings of each corner store conversion. We also summarized perceived barriers and facilitators to each intervention strategy, as reported by the original studies' authors. We used content analysis to identify intervention strategies common across studies (Dixon-Woods, et al., 2005). Based on the findings of our analyses, we also discussed limitations of specific intervention studies as well as more broad gaps in knowledge in the corner store conversion literature.

RESULTS

Descriptive Corner Store Research

We reviewed eight descriptive studies in order to understand the healthfulness of corner store inventories as well as typical food and beverage purchases in corner stores. We consider inventories and purchases to be an important factor related to the need for interventions in corner stores. If healthy food inventories are limited in corner stores and the bulk of sales consist of unhealthy food items, this may suggest potential for intervention. The results of these studies indicate that typical corner store inventories include alcohol, cigarettes, packaged snack foods, unhealthy prepared foods, doughnuts, and some common staple foods such as milk, bread, cheese, and eggs (Bolen & Hecht, 2003; Public Health Law & Policy,

2009). Shelf space dedicated to fresh fruits and vegetables and other healthy foods is limited in most corner stores and those that are available tend to be expensive and of low quality compared to those sold at supermarkets (Bolen & Hecht, 2003; Everette & Brisson, 2009; Farley et al., 2009; Laska, Borradaile, Tester, Foster, & Gittelsohn, 2010; Public Health Law & Policy, 2009). The bulk of food and beverage purchases at corner stores consist of unhealthy, energy-dense snack foods, sugar sweetened beverages, and alcohol (Bodor et al., 2010; Bolen & Hecht, 2003; Borradaile et al., 2009; Lane et al., 2008).

Corner Store Conversions

The literature review included outcome evaluations of six unique corner store conversions in U.S. cities (Bolen & Hecht, 2003; Gittelsohn, Song, et al., 2010; Gittelsohn et al., 2009; Gittelsohn, Vijayadeva, et al., 2010; Song et al., 2009), the Marshall Islands (Gittelsohn et al., 2007; Gittelsohn et al., 2006), and Native American communities in Arizona (Curran et al., 2005; Gittelsohn et al., 2008) and Canada (Ho et al., 2008). Table 1 presents a summary of each of these corner store conversion interventions, including main intervention components, the outcome evaluation strategy, key findings, and notable limitations.

Across corner store conversions, the common goal was to transform a local business into a community asset that improved healthy food availability in the surrounding neighborhood (Bolen & Hecht, 2003; Curran et al., 2005; Gittelsohn et al., 2006; Gittelsohn et al., 2007; Gittelsohn et al., 2008; Gittelsohn et al., 2009; Gittelsohn, Song, et al., 2010; Gittelsohn, Vijayadeva, et al., 2010; Ho et al., 2008; Song et al., 2009). To achieve this goal, corner store conversions sought to increase sales of healthy foods, with benefits for both stores and their patrons. From the perspective of stores, increased sales of healthy foods lead to higher profits; which provides storeowners with an ongoing incentive to sustain the intervention. In this way, corner store conversions are a market-based solution to overcoming food access issues facing low-income and minority neighborhoods. From the perspective of store patrons, increased purchasing of healthy food options may lead to more healthful food preparation and consumption and, ultimately, better health. Across the reviewed interventions, three common strategies emerged: 1) partnering with an existing store, 2) stocking healthy foods, and 3) social marketing and nutrition education. We discuss the rationale for each of these strategies as well as key barriers and facilitators to implementing each.

Strategy 1: Partnering with an Existing Corner Store

All of the reviewed corner store conversions created a partnership with an existing corner store (Bolen & Hecht, 2003; Curran et al., 2005; Gittelsohn et al., 2006; Gittelsohn et al., 2007; Gittelsohn et al., 2008; Gittelsohn et al., 2009; Gittelsohn, Song, et al., 2010; Gittelsohn, Vijayadeva, et al., 2010; Ho et al., 2008; Song et al., 2009). This is a fundamental part of the corner store conversion, because corner stores are a primary food source in many low-income and minority neighborhoods. Further, existing stores have established client bases in their communities and are already economically viable. The store's established role in the neighborhood provides the intervention with access to residents, while the equipment, training, and support provided to the storeowners and employees help them to offer and promote a more healthful inventory and potentially become more profitable via increased sales.

In order to maximize the effectiveness and sustainability of a corner store conversion, selection of the partner store and storeowner buy-in is key. Partner stores should have a relatively large client base and strong ties to the communities in which they are located, both of which will increase the reach of the intervention. As discussed by Song and colleagues, storeowners may perceive several motivators and barriers that affect their willingness to adopt and sustain a corner store conversion (Song et al., 2010). Motivators to participation can include positive interactions with intervention staff, the desire to receive nutrition education and other training, the desire to have a healthy impact on the community, and financial incentives to participation. Barriers to

participation can include an unwillingness to disrupt the store's business, ineffective interactions with intervention staff, and lack of interest in the intervention.

Strategy 2: Stocking Healthy Foods

Another strategy common to all of the reviewed corner store conversions is that they encouraged stores to stock a greater variety of culturally-appropriate, high-quality healthy foods (Bolen & Hecht, 2003; Curran et al., 2005; Gittelsohn et al., 2006; Gittelsohn et al., 2007; Gittelsohn et al., 2008; Gittelsohn et al., 2009; Gittelsohn, Song, et al., 2010; Gittelsohn, Vijayadeva, et al., 2010; Ho et al., 2008; Song et al., 2009). The types of foods stocked included not only fresh produce, but also canned and frozen fruits and vegetables, low-fat milk, healthy grains, and healthier cooking oils. In most cases, intervention staff used community surveys to identify commonly consumed unhealthy foods and encouraged stores to expand their inventory and stock healthier alternatives (Curran et al., 2005; Gittelsohn et al., 2006; Gittelsohn et al., 2007; Gittelsohn et al., 2008; Gittelsohn et al., 2009; Gittelsohn, Song, et al., 2010; Gittelsohn, Vijayadeva, et al., 2010; Ho et al., 2008; Song et al., 2009). In addition to stocking healthy foods, store layouts were rearranged to increase the visibility of healthy food products to customers. The rationale behind this strategy is that by increasing the variety, quality, and visibility of healthy foods offered in local corner stores, the intervention reduces access barriers that can prevent community members from making healthy food choices.

In several cases, interventions provided staff and owners of participant stores with training, information, and equipment to overcome barriers to stocking and selling healthy foods successfully (Bolen & Hecht, 2003; Curran et al., 2005; Gittelsohn, Song, et al., 2010; Gittelsohn, Vijayadeva, et al., 2010). Such barriers included the absence of established relationships with produce distributors and limited shelving and refrigeration to expand their inventory or stock perishable items. Actions taken by interventions to reduce barriers to purchasing and stocking healthy foods included the following: 1) providing store owners with nutrition education (Gittelsohn, Song, et al., 2010); 2) conducting neighborhood surveys to inform store owners about customer shopping patterns and customer demand for healthy products (Curran et al., 2005; Gittelsohn, Vijayadeva, et al., 2010); 3) purchasing equipment (e.g., refrigerated produce displays) (Bolen & Hecht, 2003); 4) placing stores in contact with produce distributors with whom they can meet minimum order requirements and receive good prices (ideally at wholesale prices) (Bolen & Hecht, 2003); 5) providing store owners with an initial stock of fresh produce or gift cards to purchase produce (Gittelsohn, Song, et al., 2010; Gittelsohn, Vijayadeva, et al., 2010); 6) teaching store owners and staff to buy, handle, or market fresh produce (Bolen & Hecht, 2003), and 7) working with store owners to identify price points for fruits, vegetables, and other healthy foods that would keep prices competitive while still ensuring a reasonable profit margin (Bolen & Hecht, 2003). Assisting stores to overcome the barriers to purchasing and stocking a broader variety of healthy food items may be a key component in the successful implementation of a corner store conversion.

Strategy 3: Social Marketing and Nutrition Education

Community buy-in and support are important not only to promote strong sales of healthy food in the short term, but also to help ensure that healthy changes will be sustained over time in both corner store inventories and people's diets. With this in mind, every corner store conversion reviewed used some form of in-store or community-based social marketing or nutrition education to promote healthy foods in local stores (Bolen & Hecht, 2003; Curran et al., 2005; Gittelsohn et al., 2006; Gittelsohn et al., 2007; Gittelsohn et al., 2008; Gittelsohn et al., 2009; Gittelsohn, Song, et al., 2010; Gittelsohn, Vijayadeva, et al., 2010; Ho et al., 2008; Song et al., 2009). The social marketing campaign itself can be one of the primary motivators for corner store owners to partner with an intervention, because it is essentially free advertising for the store. Barriers to an effective social marketing campaign include the potentially high cost, as well as the difficulty of reaching all potential store patrons and developing effective and appropriate messages.

Table 1.1

Summary of Corner Store Conversion Interventions

Author (Year), Setting, # Stores	Intervention Components	Outcome Evaluation Strategy	Key Findings	Limitations
(Bolen & Hecht, 2003)[1] Oakland, CA 1 intervention	• Two month training & conversion period • Store stocked with 25 varieties of fresh fruits and vegetables • Owner/employee trained to purchase and sell produce • Refrigerated produce display purchased • Redesigned layout to promote healthy foods • Promotional flyers given out door-to-door and at community meetings • Produce giveaways and raffles to promote store • Partnered with local school	Pre/post evaluation of store produce sales	• Produce sales increased from $50/week pre-intervention to $500/week within one month and $600-700/week within two months • Milk sales increased five-fold	• Intervention is not described in any peer-reviewed publication • Weak evaluation strategy with no comparison store • No data regarding changes in individual-level food purchasing or consumption among consumer or overall population
(Curran et al., 2005; Gittelsohn et al., 2008) Two White Mountain and San Carlos Apache reservations, Arizona 11 intervention; 6 comparison	• 12-month intervention period • Promoted healthy eating through shelf labels, flyers, posters, and cooking demonstrations • Encouraged store managers to put healthier foods in stores • Worked with community members to develop messages to promote healthy foods	Longitudinal pre/post evaluation main food preparers/purchasers in a random sample of households in intervention and comparison areas (n=184)	• Food knowledge and frequency of purchasing of healthy foods increased significantly more among intervention than comparison respondents • Exposure to the intervention was significantly associated with healthy eating intentions and healthy food purchasing • No relationship between exposure and the use of healthy cooking methods • Exposure was associated with significant increases in the gram consumption of healthier cereals and lower-fat milks, and significant decreases in the consumption of unhealthy snacks, packaged/ canned noodles, and whole milk	• Outcome evaluation is only available in abstracts from conference presentations • Small sample size

[1]Data source is not from a peer-reviewed journal

Table 1.2

Summary of Corner Store Conversion Interventions

Author (Year), Setting, # Stores	Intervention Components	Outcome Evaluation Strategy	Key Findings	Limitations
(Gittelsohn et al., 2007; Gittelsohn et al., 2006) Marshall Islands 12 intervention stores, 11 control stores	• 10-week intervention period • Promoted healthy alternatives to common unhealthy foods • Storeowners encouraged to stock promoted foods • Promoted foods were advertised through mass media (radio, newspaper, video) and in-store (cooking demonstrations, taste tests, shelf labeling)	Pre/post comparison of convenience samples of consumers at intervention and comparison stores (n=102 at baseline; n=185 post-intervention)	• Consumer exposure to in-store and mass media advertising was relatively high • Increased exposure to program was associated with increased label-reading knowledge, diabetes knowledge, purchasing of some healthy foods, more healthful cooking methods • No change in purchasing of some healthy foods • Exposure was associated with significantly decreased purchases of several unhealthy foods, such as regular milk, regular soda, sugared cereal, potato chips, shortening and butter, candy, ice cream, and fried chicken	• No true comparison group of consumers • Evaluation based on convenience sample of consumers at two different time points • Pre/post samples differed on key variables (education) • Small sample of consumers • Not all intervention stores stocked all promoted foods • No evaluation of effects on overall population
(Gittelsohn, Song, et al., 2010; Gittelsohn et al., 2009; Song et al., 2009) Baltimore, MD 7 intervention corner stores, 2 intervention supermarkets, 8 comparison stores	**Summary of Corner Store Conversion Interventions**	Longitudinal pre/post evaluation of consumers at intervention and comparison stores (n=84)	• Moderate exposure to intervention materials in intervention area • Consumers at intervention stores showed no significant increase in overall healthy food purchasing, food knowledge, self-efficacy for healthy food purchasing compared to those at comparison stores • Consumers at intervention stores reported improved healthfulness of meal preparation • Intervention stores increased stocking of healthy foods and reported increased weekly sales of some healthy food	• High attrition (52% loss to follow-up) • Small sample size • Longitudinal evaluation was based on convenience sample of consumers at baseline • No evaluation of effects on overall population

Table 1.3

Summary of Corner Store Conversion Interventions

Author (Year), Setting, # Stores	Intervention Components	Outcome Evaluation Strategy	Key Findings	Limitations
(Gittelsohn, Vijayadeva, et al., 2010) Hawaii 5 intervention	• 11-month intervention period • Increased stocking of healthy foods • In-store advertising to promote healthy foods and healthy eating (shelf labels, recipe cards, posters, displays) • Interactive nutrition education sessions (cooking demonstrations, taste tests)	Longitudinal pre/post evaluation of a probability sample of caregiver/child dyads in 2 intervention and 2 comparison communities (n=116)	• Low exposure to intervention materials in intervention area • Significant increase in caregiver knowledge and belief healthy foods are convenient • No improvement in caregiver diet or food purchasing • Increased consumption of grains, water, and overall healthy eating among children as measured by Healthy Eating Index • No improvement among children in psychosocial factors or eating of fruit, vegetables, dairy, meat, fat, sodium, cholesterol, as measured by Healthy Eating Index	• High attrition (33% loss to follow-up) • Small sample size • Sampling strategy differed between intervention and comparison area
(Ho et al., 2008) First Nations communities in Ontario, Canada 8 intervention	• Nine-month intervention period • Promoted healthy alternatives to common unhealthy foods • Store managers encouraged to stock promoted foods • In-store advertising to promote healthy foods (cooking demonstrations, taste tests, shelf labeling, posters, flyers) • Store component was part of larger intervention with school and community components	Longitudinal pre/post evaluation of community members in intervention and comparison communities (n=95)	• Healthy food acquisition and food knowledge was higher in intervention communities than in control communities after the intervention • No significant difference between intervention and comparison communities in healthy food preparation, food intentions, physical activity, body mass index, or percentage of body fat	• Effects of store component were not separated from effects of overall intervention • Small sample size

Several social marketing and education strategies have been used in corner store conversions. In Oakland, for example, weekly flyers in English and Spanish were distributed in the neighborhood to promote the converted store and there was an open house shortly after the conversion where free produce was distributed to those who attended (Bolen & Hecht, 2003). The store also worked with a local elementary school, allowing students to paint a mural of fresh produce on the store's exterior and helping design a fresh produce buying and preparation activity for students in an after-school program.

Corner store conversions also used in-store promotional events to educate customers about unfamiliar healthy food and healthy food preparation. Projects in Baltimore, Ontario, Arizona, Hawaii, and the Marshall Islands conducted in-store promotional activities such as cooking demonstrations and taste tests (Curran et al., 2005; Gittelsohn, Vijayadeva, et al., 2010;

Ho et al., 2008; Song et al., 2009; Song et al., 2007). Some offered healthy recipes to customers to increase their ability to prepare healthy foods at home. The majority of interventions also used in-store advertising, including posters, shelf labels, and educational displays that made healthy foods more visible and highlighted their nutritional benefits (Bolen & Hecht, 2003; Curran et al., 2005; Ethelbah & Gittelsohn, 2005; Gittelsohn et al., 2007; Gittelsohn, Song, et al., 2010; Gittelsohn, Vijayadeva, et al., 2010; Ho et al., 2008; Song et al., 2009).

The social marketing component of corner store conversions is equally important as the stocking of healthy foods (Andreasen, 2005). Effective social marketing can increase the community's awareness of healthy foods in local stores, knowledge of healthy food preparation, and understanding of the nutritional benefits of a healthful diet. This can lead to an increase in the number of customers preferring healthy foods, subsequently resulting in higher profits for stores.

Effectiveness of Corner Store Conversions

In general, the corner store conversions reviewed in this study had mixed results at changing peoples' food purchasing, preparation, and consumption behaviors and their knowledge and attitudes regarding healthy eating. Most interventions reported improvements in psychosocial factors related to healthy food and healthy eating, including self-efficacy, knowledge, attitudes, and intentions (Gittelsohn et al., 2008; Gittelsohn et al., 2007; Gittelsohn, Song, et al., 2010; Gittelsohn, Vijayadeva, et al., 2010; Ho et al., 2008). Several of the interventions also reported increases in either overall sales of healthy food (Bolen & Hecht, 2003) or individual-level purchases of at least some health foods (Gittelsohn et al., 2008; Gittelsohn et al., 2007; Ho et al., 2008); however, two interventions saw no increases in overall healthy food purchasing (Gittelsohn, Song, et al., 2010; Gittelsohn, Vijayadeva, et al., 2010). Two studies reported that the intervention was associated with increased consumption of healthy foods or decreased consumption of unhealthy foods (Gittelsohn et al., 2008; Gittelsohn, Vijayadeva, et al., 2010) and two studies reported improved healthfulness of meal preparation (Gittelsohn et al., 2007; Gittelsohn, Song, et al., 2010). All of the reviewed interventions reported significant improvements in at least one psychosocial or behavioral outcomes related to food purchasing, preparation, or consumption, and many reported improvements across multiple outcomes.

DISCUSSION

This review has illustrated the potential of corner store conversions to increase the availability of healthy foods in communities lacking comprehensive grocery stores. Although each conversion successfully increased the stocking of healthy foods in corner stores, our review suggests that more healthful inventories did not always translate into increased purchase and consumption of every promoted food. Most of the interventions did, however, report increased sales or consumption of at least some healthy foods, indicating that the corner store conversion is a meaningful approach to increasing health food consumption in food deserts and other underserved communities.

Gaps in Knowledge

A notable limitation of the reviewed corner store conversions is that all were relatively short term, had intervention periods less than one year, and typically reported outcomes measured immediately post-intervention. It is therefore impossible to know whether the increased healthfulness of corner store inventories and customers' healthier purchasing and diet habits were sustained in the months and years following the interventions. Another limitation of the studies is that outcome evaluations were based on relatively small samples, ranging from a minimum of 84 total consumers at intervention and comparison stores in Baltimore (Gittelsohn, Song, et al., 2010) to a maximum of 184 caregiver-child dyads among a random sample of households in intervention and comparison areas in Hawaii (Gittelsohn, Vijayadeva, et al., 2010). These small sample sizes are particularly concerning among the two studies that used community-based sampling (Gittelsohn, Vijayadeva, et al., 2010; Ho et al., 2008) rather

than store-based sampling, because not all community members are likely to patronize the intervention stores.

A further limitation of the corner store conversion literature is that the intervention model is relatively new, a limited number have been conducted, and corner store conversion have not been conducted among many health disparities populations. The limited number of interventions that have been conducted makes it impossible to determine the relative effectiveness of individual interventions strategies (i.e., partnering with an existing store, stocking healthy foods, social marketing campaign) or whether these strategies can be implemented differently to improve their effectiveness. Corner store conversions in Latino neighborhoods have been noticeably absent, despite the fact that the Latino population had reached nearly 40 million by 2000 (Niner & Rios, 2009). Future research will be necessary to determine what, if any, impact corner store conversions have in predominately Latino neighborhoods.

Market Makeovers

One approach that holds promise in sustaining the healthful impact of corner store conversions is a "market makeover." Although this concept has not yet permeated the academic literature, market makeovers are an alternative conceptualization of the corner store makeover approach that focuses explicitly on long-term interventions and outcomes (Public Matters & South LA HEAC, 2010). The market makeover goes beyond the typical corner store conversion by placing increased emphasis on creating community buy-in in the intervention, via a partnership between the store, the surrounding community, and the public health practitioners and community organizations in the community. This partnership allows the makeover to be tailored to the needs of the community and creates a long-term sense of community ownership of the makeover project.

The market makeover approach also uses a sustained, community-developed social marketing campaign to create consistent and long-term consumer demand for the healthy foods sold by made over stores. The intent is not only to conduct a 'makeover' of corner stores themselves, but also to 'make over' the community's demand for healthy food. Strong community involvement in the development and production of the social marketing campaign helps ensure that materials and messages will be culturally appropriate and context-specific, and thus more likely to resonate with the target audience. Furthermore, messages and materials can be tailored towards the varying populations that frequent corner stores, including different age and social groups. For example, separate messages and materials may be needed to effectively communicate with children, adolescents, young parents, or the elderly. This type of social marketing has been used in a market makeover intervention conducted in East Los Angeles, California, and has proven very popular with community members (Public Matters, 2012).

Policy Implications

Future research will be necessary to determine what the long-term effects of corner store conversions and market makeovers are, both in terms of purchasing and consumption habits as well as more distal health outcomes such as obesity and cardiovascular disease. If corner store conversion and market makeovers do prove successful in the long term, there are several policy options that could be used to promote healthy corner store conversions on a larger scale. For example, tax incentives, healthy food stocking requirements, a healthy inventory certification system, or government-sponsored technical assistance could be used to encourage corner store owners to expand their healthy food inventories. Federal food assistance programs such as WIC, which now has minimum stocking requirements for vendors in many states, could also encourage stores to offer healthy foods (California Department of Public Health, 2010; Colorado WIC Program, 2009; Montana Department of Public Health and Human Services, 2009). Additionally, the social marketing and nutrition education component of corner store conversions could also be replicated using community-wide nutrition educational campaigns intended to draw customers to healthy local stores.

In conclusion, corner store conversions are a viable method for public health practitioners and policymakers to improve healthy food consumption in food deserts. In the future, researchers should assess both the short- and long-term behavioral and health outcomes of corner store conversions with populations living in food deserts. Policymakers and public health practitioners can use several available strategies to encourage corner stores in food deserts to stock more healthy food options.

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References

Andreasen, A. R. (2006). *Social marketing in the 21st century*. Thousand Oaks, Calif.: Sage Publications.

Appel, L. J. (2003). Lifestyle modification as a means to prevent and treat high blood pressure. *Journal of the American Society of Nephrology, 14*(7: Suppl 2), S99-S102.

Bodor, J. N., Ulmer, V. M., Dunaway, L. F., Farley, T. A., & Rose, D. (2010). The rationale behind small food store interventions in low-income urban neighborhoods: insights from New Orleans. *Journal of Nutrition, 140*(6), 1185-1188.

Bolen, E., & Hecht, K. (2003). *Neighborhood Groceries: New Access to Healthy Food in Low-Income Communities*: California Food Policy Advocates.

Borradaile, K. E., Sherman, S., Vander Veur, S. S., McCoy, T., Sandoval, B., Nachmani, J., et al. (2009). Snacking in children: the role of urban corner stores. *Pediatrics, 124*(5), 1293-1298.

California Department of Public Health. (2010). Vendor Minimum Stocking Requirement. Retrieved from http://www.cdph.ca.gov/programs/wicworks/Documents/StockingRequirementCertification.pdf

California FreshWorks. (2011). The California FreshWorks Fund Available from http://www.cafreshworks.com/about

Centers for Disease Control and Prevention (CDC). (2010). Healthy Places: Healthy Food Environment. Retrieved September 30, 2010, from http://www.cdc.gov/healthyplaces/healthtopics/healthyfood_environment.htm

Colorado WIC Program. (2009). Stocking Requirements-- As of June 1, 2009. Retrieved from http://www.cdphe.state.co.us/ps/wic/Minimum%20Stocking%2009%20Final.pdf

Curran, S., Gittelsohn, J., Anliker, J., Ethelbah, B., Blake, K., Sharma, S., et al. (2005). Process evaluation of a store-based environmental obesity intervention on two American Indian Reservations. *Health Education Research, 20*(6), 719-729.

Dauchet, L., Amouyel, P., & Dallongeville, J. (2005). Fruit and vegetable consumption and risk of stroke: a meta-analysis of cohort studies. *Neurology, 65*(8), 1193-1197.

Dixon-Woods M, Agarwal S, Jones D, Young B, Sutton A. Synthesising qualitative and quantitative evidence: a review of possible methods. *Journal of Health Services Research & Policy*. January 1, 2005 2005;10(1):45-53B.

Ethelbah, B., & Gittelsohn, J (2005). Apache Healthy Stores: Results of the Main Trial and Future Directions. Retrieved from http://healthystores.org/images/ahsdownload/AHSreport.pdf

Everette, M., & Brisson, E. R. (2009). *Exploring Food Options in South (South Central) Los Angeles*: Community Nutrition Education Services, Inc.

Farley, T. A., Rice, J., Bodor, J. N., Cohen, D. A., Bluthenthal, R. N., & Rose, D. (2009). Measuring the Food Environment: Shelf Space of Fruits, Vegetables, and Snack Foods in Stores. *Journal of Urban Health-Bulletin of the New York Academy of Medicine, 86*(5), 672-682.

Flegal, K. M., Carroll, M. D., Ogden, C. L., & Curtin, L. R. (2010). Prevalence and Trends in Obesity Among US Adults, 1999-2008. *Journal of the American Medical Association, 303*(3), 235-241.

Gittelsohn, J., Anliker, J., Sharma, S., Curran, S., Suratkar, S., Caballero, B., et al. (2008). Impact of Food Store-Based Intervention Program on Psychosocial Factors, Food Purchasing, Preparation, and

Consumption in Two American Indian Communities: Results of the Apache Healthy Stores Study. *Obesity, 16*, S58-S58.

Gittelsohn, J., Dyckman, W., Frick, K. D., Boggs, M. K., Haberle, H., Alfred, J., et al. (2007). A pilot food store intervention in the Republic of the Marshall Islands. *Pacific Health Dialog, 14*(2), 43-53.

Gittelsohn, J., Dyckman, W., Tan, M. L., Boggs, M. K., Frick, K. D., Alfred, J., et al. (2006). Development and implementation of a food store-based intervention to improve diet in the Republic of the Marshall Islands. *Health Promotion Practice, 7*(4), 396-405.

Gittelsohn, J., Song, H. J., Suratkar, S., Kumar, M. B., Henry, E. G., Sharma, S., et al. (2010). An urban food store intervention positively affects food-related psychosocial variables and food behaviors. *Health Education & Behavior, 37*(3), 390-402.

Gittelsohn, J., Suratkar, S., Song, H. J., Sacher, S., Rajan, R., Rasooly, I. R., et al. (2010). Process Evaluation of Baltimore Healthy Stores: A Pilot Health Intervention Program With Supermarkets and Corner Stores in Baltimore City. *Health Promotion Practice,* 11(5):723-32.

Gittelsohn, J., Vijayadeva, V., Davison, N., Ramirez, V., Cheung, L. W., Murphy, S., et al. (2010). A food store intervention trial improves caregiver psychosocial factors and children's dietary intake in Hawaii. *Obesity, 18 Suppl 1*, S84-90.

Goldman KD, Schmalz KJ. (2004). The Matrix Method of Literature Reviews. *Health Promotion Practice.* 5(1):5-7.

Ho, L. S., Gittelsohn, J., Rimal, R., Treuth, M. S., Sharma, S., Rosecrans, A., et al. (2008). An integrated multi-institutional diabetes prevention program improves knowledge and healthy food acquisition in northwestern Ontario First Nations. *Health Education & Behavior, 35*(4), 561-573.

Lane, S. D., Keefe, R. H., Rubinstein, R., Levandowski, B. A., Webster, N., Cibula, D. A., et al. (2008). Structural violence, urban retail food markets, and low birth weight. *Health & Place, 14*(3), 415-423.

Laska, M. N., Borradaile, K. E., Tester, J., Foster, G. D., & Gittelsohn, J. (2010). Healthy food availability in small urban food stores: a comparison of four US cities. *Public Health Nutrition, 13*(07), 1031-1035.

Montana Department of Public Health and Human Services. (2009). Montana WIC Minimum Stocking Requirements For All Montana Authorized Retailers. Retrieved from http://www.dphhs.mt.gov/PHSD/family-health/nutrition-wic/documents/N-9-8-09MTWICStockingRequirements.pdf

Moore, L. V., Roux, A. V. D., Nettleton, J. A., & Jacobs, D. R. (2008). Associations of the local food environment with diet quality - A comparison of assessments based on surveys and geographic information systems. *American Journal of Epidemiology, 167*(8), 917-924.

Morland, K., Wing, S., & Roux, A. D. (2002). The contextual effect of the local food environment on residents' diets: The atherosclerosis risk in communities study. *American Journal of Public Health, 92*(11), 1761-1767.

Niner, D. A., & Rios, M. (2009). *Hispanics in the United States, Puerto Rico, and the U.S. Virgin Islands: 2000*. Washington, DC: U.S. Census Bureau.

Public Health Law & Policy. (2009). *Healthy Corner Stores: The State of the Movement*: Public Health Law & Policy.

Public Matters. (2012). Is There A Supermamá In You? East Los Angeles, CA: UCLA/USC Center for Population Health and Health Disparities. Retrieved from http://vimeo.com/37260234.

Public Matters & South LA HEAC. (2010). Market Makeovers. Retrieved from http://marketmakeovers.org/

Quatromoni, P. A., Copenhafer, D. L., D'Agostino, R. B., & Millen, B. E. (2002). Dietary patterns predict the development of overweight in women: The Framingham Nutrition Studies. *Journal of the American Dietetic Association, 102*(9), 1239-1246.

Rosenkranz, R. R., & Dzewaltowski, D. A. (2008). Model of the home food environment pertaining to childhood obesity. *Nutrition Reviews, 66*(3), 123-140.

Song, H.-J., Gittelsohn, J., Suratkar, S., Sharma, S., Frick, K., & Kim, M. (2007). Development and implementation of an intervention for Korean American corner stores in Baltimore City. *The FASEB Journal, 21*(5), A305-c.

Song, H. J., Gittelsohn, J., Kim, M., Suratkar, S., Sharma, S., & Anliker, J. (2009). A corner store intervention in a low-income urban community is associated with increased availability and sales of some healthy foods. *Public Health Nutrition, 12*(11), 2060-2067.

Song, H. J., Gittelsohn, J., Kim, M., Suratkar, S., Sharma, S., & Anliker, J. (2011). Korean American Storeowners' Perceived Barriers and Motivators for Implementing a Corner Store-Based Program. *Health Promotion Practice*, 12(3):472-82.

Walker, R. E., Keane, C. R., & Burke, J. G. (2010). Disparities and access to healthy food in the United States: A review of food deserts literature. *Health & Place*, 16(5):876-84.

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