

Feasibility of Increasing Access to Healthy Foods in Neighborhood Corner Stores

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Abstract The feasibility of working with neighborhood corner stores to increase the availability of fresh fruit and vegetables in low-income neighborhoods in New Orleans was assessed. Household interviews and 24-hour dietary recalls ($n = 97$), corner store customer intercept interviews ($n = 60$) and interviews with corner store operators (owners/managers) ($n = 12$) were conducted in three neighborhoods without supermarkets. Regional produce wholesalers were contacted by phone. Results indicated that the majority of neighborhood residents use supermarkets or super stores as their primary food source. Those who did shop at corner stores typically purchased prepared foods and/or beverages making up nearly one third of their daily energy intake. Most individuals would be likely to purchase fresh fruit and vegetables from the corner stores if these foods were offered. Store operators identified cost, infrastructure and lack of customer demand as major barriers to stocking more fresh produce. Produce wholesalers did not see much business opportunity in supplying fresh produce to neighborhood corner stores on a small scale. Increasing availability of fresh

fruit and vegetables in corner stores may be more feasible with the addition of systems changes that provide incentives and make it easier for neighborhood corner stores to stock and sell fresh produce.

Keywords New Orleans · Urban population · Feasibility studies · Food supply · Diet

Introduction

Overweight, obesity and related chronic diseases disproportionately affect individuals of low-income and minority populations in the United States [1–5] and it is those populations that are most likely to live in neighborhoods that lack the resources (e.g. safe places to walk and play and proximal locations to purchase healthy foods) most protective against the development of chronic diseases [6–9]. Disparities in access to supermarkets have been documented throughout the US. Low socio-economic status, predominantly minority neighborhoods tend to have fewer numbers of supermarkets and live farther away from them compared to their higher-income white counterparts [6, 7, 10–12]. To further compound this disparity, low income populations have low rates of car ownership and tend to rely on walking, public transportation or cars owned by others to access grocery stores and other services [13]. Evidence has suggested that those who reside in a neighborhood with nearby access to a supermarket are more likely to have a healthy diet and be of a healthy weight compared to those who live farther away from a supermarket [13–18]. Additionally, increased neighborhood availability of fresh vegetables has been associated with increased vegetable consumption by residents [19].

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Research in New Orleans has echoed these national findings. Predominantly African American neighborhoods are less likely to have access to a supermarket than predominantly white neighborhoods [20]. The same low-income minority neighborhoods that lack supermarkets are usually inundated with fast food outlets and small corner stores (CSs) that tend to carry a large amount of energy-dense snack foods and only small amounts of fresh fruit and vegetables (FFV) [21, 22]. The case has been made that, to increase access to healthy foods, specifically FFV, attempts should be made to work through the CSs that are so prevalent in communities underserved by larger grocery stores [23]. A Hartford, CT, study showed that increased varieties of FFV increased the odds of customer purchase of these items [24]. Ongoing work in Baltimore, MD, as a component of the Baltimore Healthy Store intervention, has demonstrated that in-store promotion of healthier food items increased the stocking and sales of these food items in small stores [25]. Limited research, though, has been conducted to examine the potential to work within corner stores in urban, low-income environments to improve access to FFV. One recent assessment of the Healthy Bodega Initiative in New York City showed that although the availability of healthy food items increased as a result of the initiative, there were non-significant increases in fresh FFV availability and there was no increase in the purchase of FFV from pre-to post-intervention by customers [26].

The underlying theoretical basis for this study was Social Cognitive Theory, which postulates that not only personal factors, but both physical and social environments are important in motivating and shaping behavior [27]. Specifically, the concept of reciprocal determinism indicates that a change in one category of variables (for example, the physical environment) can lead to changes in the other two categories of variables (for example, personal opportunity and self-efficacy as well as relevant behaviors such as food buying and consumption). Increasing availability of healthy foods in neighborhood corner stores is both intuitive and logical when encouraging people to eat healthier for the prevention of overweight and obesity. However, increasing healthy food access has received mixed reviews [28–32]. A study is needed to determine the feasibility of such an intervention at the neighborhood level.

Purpose

The purpose of this study was to use mixed methods and multiple sources of data to examine the feasibility and acceptability, from various perspectives, of increased offerings and access to FFV in CSs located in New Orleans. Data were obtained through household interviews that included 24-hour dietary recalls (24HDRs), CS customer intercept interviews, store operator interviews, and phone interviews with regional produce wholesalers.

Method

The Prevention Research Center (PRC) at Tulane University has used community-based research methods to address the physical and social environmental factors influencing the obesity epidemic and its behavioral determinants (physical activity and diet) for over a decade. This has included a thorough documentation and understanding of the changing food landscape in New Orleans and persistent disparities in access to healthy foods [20, 21, 33–36].

Study Design

Table 1 highlights the numbers of stores and interviews completed for both the qualitative and quantitative data collection methods used in this cross-sectional study. Household interviews and 24HDRs were conducted to determine purchasing and consumption patterns of neighborhood residents. Intercept interviews with CS customers helped identify customer shopping patterns and preferences. Face-to-face interviews with CS operators (owners/managers) examined perceptions and identified existing barriers and opportunities for selling FFV. Small and medium regional produce wholesalers were contacted by phone to determine products and services offered to CSs and whether the network of regional produce wholesalers can and are willing to meet the needs of CSs. All protocols were approved by the Tulane University Institutional Review Board.

Household Interviews

A random sample of inhabited households in three neighborhoods in New Orleans was identified for household interviews. The three neighborhoods were selected because they each contained multiple CSs and did not have super stores or supermarkets nearby. Interviewers, trained according to a standardized protocol, made a maximum of five attempts to contact households between 10:00 a.m. and 7:00 p.m. Monday through Saturday, ceasing their efforts either when contact was made and a survey was completed or refused, or after the fifth attempt had been made without contact. The survey was limited to individuals between the ages of 18–70 years, English speaking, and who had lived full-time in the neighborhood for at least 3 months. Both qualitative and quantitative data were collected using a modified version of the Nutrition Data System for Research (NDSR), developed at the University of Minnesota Nutrition Coordinating Center (NCC) [37]. The NDSR includes a database of more than 18,000 foods and generates values for nutrients and other food components [38, 39]. A computer-based multi-pass method was utilized to collect dietary intake and allow for group level caloric and macronutrient analysis [40]. The 24HDRs were administered by trained

Table 1 Geographic distribution of interviews in New Orleans, Louisiana

Neighborhood	Household surveys completed	Corner stores sampled	Store owner interviews completed	Corner store intercept interview sites	Intercept interviews completed
Neighborhood A (upper 9th ward)	41	12	6	3	40
Neighborhood B (7th ward)	50	9	3	1	10
Neighborhood C (17th ward)	6	3	3	1	10
Total	97	24	12	5	60

research assistants (graduate level nutrition students and nutritionists). The 24HDR was modified to ask respondents to identify the specific store or restaurant where each reported food item was purchased. Other survey questions included where the respondent usually shopped for groceries, frequency of shopping, access to food stores, and general demographic information.

Corner Store Customer Intercept Interviews

Customer intercept interviews were completed outside of those CSs in which operators had completed interviews and granted permission to survey their customers. CS customers were approached individually upon their exit from the store and the survey was orally administered by research assistants. The survey contained questions about frequency of shopping at the CS and supermarkets, reasons for shopping at the CS, distance and mode of transportation used to reach the CS, purchases usually made at the CS, likelihood of purchasing fresh produce if the CS offered more of these items, satisfaction with current item availability in the CS, preferences for availability of other items in the CS, and demographic information.

Corner Store Operator (Owner/Manager) Interviews

An annually updated PRC database containing information on all existing food stores in Orleans Parish was used to identify CSs in the three selected neighborhoods. PRC staff, trained on the relevant protocol, conducted semi-structured interviews with CS operators (owners/managers) located in the three neighborhoods. Included in the interview were questions pertaining to typical store customers, produce offerings, stocking and selling of different food items, the role of the store in the community, and interest in partnerships to increase the availability of healthy food items in the store.

Wholesaler Telephone Interviews

Seven produce wholesale businesses based in southern Louisiana and serving the neighborhoods under study were identified, and senior level personnel were contacted for

semi-structured telephone interviews. Wholesalers were questioned regarding background information on their business including geographic area served, length of business in the area, annual sales and number of employees. They were also asked about changes experienced over the last 5 years to their business, products sold (specifically fresh produce sales), produce delivery, merchandising, changes in products requested, competitors, customers and clients served, and business with small neighborhood stores.

Results

Household Interviews

Of the 117 individuals contacted for the household survey, 83 % (n = 97) completed the full survey. The majority of respondents were female (71.1 %), African American (87.6 %) and over half were 45 years of age or older (56.7 %) (Table 2). The overall mean daily caloric intake reported by respondents in the 24HDR was 2,023.0 ± 1,089.5 kcal (Table 3). Total fat intake was 72.4 ± 45.74 g; total carbohydrate intake was 256.9 ± 148.05 g; protein intake was 70.9 ± 38.5 g (data not shown). Dietary fiber and sodium intake were 11.7 ± 8.88 g, and 3,342.0 ± 1,826.0 mg, respectively (data not shown). Specific 24HDR nutrient intake results are reported by age and gender in Table 3. All macronutrient proportions were within the Acceptable Macronutrient Distribution Ranges with the exception of 19–34 year old males whose mean percent total fat intake was above the established Acceptable Macronutrient Distribution Range of 20–35 % [41]. The mean caloric intake of the 24 respondents who ate food purchased from a CS within the previous 24 h was 2,534.0 ± 1,345.7 kcal (data not shown). Within this group, a mean caloric intake of 769.7 ± 602.2 kcal, or 31.8 ± 21.0 % of total calories came from foods bought from the CSs.

Respondents reported they most frequently bought food at super stores (40.2 %) and supermarkets (40.2 %). Neighborhood CSs were the third most frequently listed primary food source (11.3 % of respondents). This self-report information was confirmed by NDSR 24HDR data

Table 2 Household survey respondent demographics

Variable	Household survey		Intercept survey	
	N = 97	% (SD)	N = 60	%
Female	69	71.1	29	48.3
Married	36	37.1	N/A ^a	N/A ^a
Race				
African American	85	87.6	53	88.3
White	6	6.2	2	3.3
Other	6	6.2	5	8.3
Age				
18–24	13	13.4	10	16.7
25–34	14	14.4	14	23.3
35–44	15	15.5	9	15.0
45–54	26	26.8	15	25.0
55–64	23	23.7	7	11.7
65+	6	6.2	5	8.3
Annual household income ^b				
Under \$25,000	38	39.2	38	63.3
\$25–49,000	25	25.8	21	35.0
\$50,000+	25	25.8	1	1.7
Don't know/refuse	9	9.3	N/A ^a	N/A ^a
Car access				
No car/no access	20	20.6	N/A ^a	N/A ^a
No car/access	15	15.5	N/A ^a	N/A ^a
Own car	62	63.9	39	65.0
Level of education				
<High school	24	24.7	N/A ^a	N/A ^a
High school/GED	43	44.3	N/A ^a	N/A ^a
>High school	30	30.9	N/A ^a	N/A ^a
Employment status				
Employed full/part-time	35	36.1	N/A ^a	N/A ^a
Unemployed	18	18.6	N/A ^a	N/A ^a
Disabled/unable to work	16	16.5	N/A ^a	N/A ^a
Other (student, retired, homemaker)	28	28.9	N/A ^a	N/A ^a
Renters	59	60.8	N/A ^a	N/A ^a
Receive food stamps	50	51.5	N/A ^a	N/A ^a
Mean BMI	30.4	(±8.4)	N/A ^a	N/A ^a
Respondent primary food shopper	81	83.5	N/A ^a	N/A ^a

^a N/A—was not asked in intercept survey

^b Income response categories were not asked identically in both surveys

that linked food intake responses with location of purchase for specific food items (Table 4).

Intercept Interviews with Customers of Corner Stores

Permission was granted to conduct intercept interviews from five of the 12 CSs where operator interviews were completed. A total of 60 individuals completed surveys

upon exiting the stores that were located in three different neighborhoods in New Orleans (Table 1). When asked to indicate which of the reasons they chose to shop at that specific store on the day of the interview, customers stated that it was close to where they live (71.7 %), close to where they work (20.0 %), and on or close to the route that they travel (3.3 %). Price was the reason 6.7 % of respondents chose to go to the store and the service was important for

Table 3 Mean nutrient intakes from 24-hour dietary recall data

	Energy	% Cal total fat	% Cal carb	% Cal prot	% Cal alcohol
AMDR ⁺		20–35	45–65	10–35	
Overall	2,023.0 ± 1,089.5				
Males					
19–30 yr	2,996.9 ± 2,491.1	41.0 ± 3.8	47.7 ± 7.0	11.4 ± 6.8	0.02 ± 0.04
31–50 yr	3,223.7 ± 768.8	28.7 ± 6.7	46.7 ± 12.9	13.3 ± 4.2	11.7 ± 12.9
51–70 yr	2,404.8 ± 971.5	30.1 ± 9.7	48.5 ± 15.5	15.0 ± 5.7	6.6 ± 11.1
Females					
19–30 yr	2,065.2 ± 1,139.6	32.2 ± 6.1	52.0 ± 9.8	13.4 ± 6.0	2.4 ± 6.4
31–50 yr	1,849.6 ± 744.6	33.2 ± 10.8	51.2 ± 11.9	15.4 ± 5.7	0.2 ± 0.8
51–70 yr	1,318.3 ± 695.6	29.8 ± 12.2	54.8 ± 15.2	15.4 ± 6.7	0.02 ± 0.07

cal calories, *carb* carbohydrates, *prot* protein

⁺ Acceptable macronutrient distribution ranges (AMDR)

Table 4 Store types most frequented (survey) and source of highest caloric intake (24-hour dietary recall)

Food source	Primary food source* N (%)	Source of highest caloric intake** N (%)
Super store	39 (40.2)	24 (24.7)
Supermarket	39 (40.2)	28 (28.9)
Neighborhood corner store	11 (11.3)	6 (6.2)
Chain discount store	2 (2.1)	8 (8.2)
Fast food	2 (2.1)	11 (11.3)
Church	2 (2.1)	2 (2.1)
Food pantry	1 (1.0)	1 (1.0)
Drug store	1 (1.0)	1 (1.0)
Full service restaurant	0 (0.0)	2 (2.1)
Carry out/prepared food	0 (0.0)	4 (4.1)
Other	0 (0.0)	5 (5.2)
Don't know	0 (0.0)	5 (5.2)
Total	97 (100.0)	97 (100.0)

* Results from household survey question asking respondent to identify primary food source (most frequented store)

** Results from 24-h recall data

15 %. Only one individual referred to the quality of items available in the store and no one referenced the selection of items available. Nearly all respondents (90 %) were “satisfied” or “very satisfied” with the items currently available in the corner stores.

Food items purchased by the respondents at corner stores are listed in Table 5A. In addition to food items purchased, 12 customers (20.0 %) purchased cigarettes, seven (11.7 %) purchased non-food items, three (5.0 %) purchased lottery tickets, and one (1.7 %) purchased other food items. Data from 24HDRs validate food items commonly purchased and consumed from corner stores as reported in the intercept surveys (Table 5B).

When asked to select items from a checklist that the customers would like the CS to have available that were not currently offered, nearly half of respondents (48.3 %) indicated interest in additional varieties of meat products, such as cold cuts and fresh meat. Only 16 individuals (26.7 %) indicated an interest in seeing FFV available for

purchase in the CS. Other items that customers added to the checklist were an assortment of non-food items (car accessories, diapers, and clothes), prepared food (pizza and sandwiches), beans, seafood, health snacks, and grains. Of the 60 individuals who completed the surveys, 91.7 % stated that they would be “very likely” or “somewhat likely” to buy fresh fruit from the CS if they sold more of it. Similarly, 93.3 % were “very likely” or “somewhat likely” to buy fresh vegetables from the CS if they sold more of them.

Interviews with Corner Store Operators (Owners/Managers)

A total of 24 corner store operators (owners/managers) were contacted and 12 completed interviews for a participation rate of 50 %. Six of the respondents were located in Neighborhood A, three in Neighborhood B, and three in Neighborhood C (Table 1). All but one of the 12 stores

Table 5 Corner store food items

Category	N = 60 (%)	Category	N = 24 (%)
(A) Food items purchased from corner store as reported in intercept interview		(B) Foods consumed from corner store as reported in 24 h recall data	
Prepared foods ^a	24 (40.0)	Prepared foods ^a	13 (54.2)
Beverages	33 (55.0)	Soda	5 (20.8)
Milk	4 (6.7)	Juice or flavored drink	5 (20.8)
Alcohol	11 (18.3)	Alcohol	4 (16.7)
Snack foods	13 (21.7)	Chips	3 (12.5)
Ice cream	1 (1.7)	Ice cream	2 (8.3)
Bread	5 (8.3)	Cookies and pastries	2 (8.3)
Meat	3 (5.0)	Meat cooked at home	2 (8.3)
Fruit	2 (3.3)	Water	2 (8.3)
Candy	8 (13.3)	Candy	1 (4.2)
Vegetables	0 (0)	Tea	1 (4.2)

^a Prepared foods include fried chicken, sandwich, red beans, meats, grits, mac n cheese, French fries etc

carried some sort of FFV on a regular basis with bananas being the most commonly carried fruit (83.3 %) and onions the most commonly carried vegetable (50 %). Bananas were cited as the best-selling produce item by 66.7 % of the CS operators, followed by onions (33 %), potatoes (25 %), bell peppers (16.7 %), cabbage (8.3 %) and tomatoes (8.3 %). Of the 11 CSs that carried produce, six had wholesalers deliver (every other day to twice a month) and five purchased their own produce from other food retail locations multiple times per week. Only three of the CSs reported making a profit from FFV, while six indicated that they made little to no profit. The remainder were unsure.

CS operators (owners/managers) stated that beverages (83.3 %), both alcoholic (50.0 %) and non-alcoholic (75.0 %), were the top selling product with snack items reportedly being the second-highest top-selling item (41.7 %). Highest profits for the store came from drinks (75.0 %), both alcoholic (41.7 %) and non-alcoholic (41.7 %), and cigarettes (25.0 %). Participants reported that the effect of reducing or ceasing to sell snack foods or sodas in their CS would represent a loss of profits and customers, would increase the cost of other items, and might even result in store closures.

CS operators (owners/managers) reported that the largest obstacles to selling FFV were lack of customer demand (66.7 %), the high cost of produce (33.3 %) and no store infrastructure or space for FFV (25 %). The remaining operators (owners/managers) indicated they only carry what the customers want and what they know will sell. In order for the CSs to carry more FFV, 83.3 % of operators (owners/managers) reported there would have to be an increased consumer demand for the fresh produce, 66.7 % of operators (owners/managers) said they must be convinced that the FFV will sell before carrying it, 25 % reported they would need infrastructure remodeling and 25 % said they would

need cost-effective methods or financial assistance to carry more FFV. Most (83.3 %) of the CS operators (owners/managers) expressed interest in carrying healthier foods, but half of them stated that this was still conditional on whether or not the customers would buy the additional produce and healthier food items offered.

Interviews with Produce Wholesalers

Of the seven wholesalers contacted, three did not respond, one declined an interview and three completed interviews. Information obtained from participants indicated that although produce sales have increased, the customer base of produce wholesalers has shifted toward restaurant and other food service outlets. The regional produce wholesalers consistently stated that they did not view “small neighborhood food stores” or “corner stores” as business opportunities. One small wholesaler said “I’m not really interested [because] it’s difficult to make any money on these stores,” citing problems such as ordering “a little bit of everything” but in small volume, calling late and changing orders often necessitating extra delivery trips that are not included in product fees. Mid-sized wholesalers had little experience working with CSs and were open to “selling more produce to neighborhood corner stores” provided that doing so made business sense. One wholesaler said they would do business with small neighborhood stores “as long as the volume is there and we can make it profitable.”

Discussion

The feasibility of increasing access to and consumption of fresh fruits and vegetables (FFV) through increased offerings at neighborhood corner stores (CSs) was examined in

the current study. Both quantitative and qualitative data were collected using multiple methods in three selected neighborhoods in New Orleans. The major finding of this study is that increasing offerings of FFV in CSs may not be feasible or successful without additional processes and systems changes.

Consumer Perspective

Household interviews indicated that neighborhood residents primarily shopped for food at supermarkets and super stores (Table 4). Of those individuals who shopped at CSs, many were supportive of increased availability of FFV in these stores, although meat products were the most frequently cited item that customers would like to see available in the stores. CS customers indicated that they would be very likely to purchase fresh produce from the stores if it were stocked. This was tempered, however, by the small portion of neighborhood residents who actually consumed food purchased at their CSs. Of note, the items most commonly purchased and consumed from CSs were prepared food items and beverages (Table 5A, B). These respondents had a higher mean caloric intake ($2,534.0 \pm 1,345.7$ kcal) compared to the group ($2,023.0 \pm 1,089.5$ kcal) with nearly one third of their calories attributable to food purchased from the CSs. Intercept interviews with customers exiting CSs indicated that purchases were mainly made there as a matter of convenience relative to the location of the store (as would be expected), and a few cited good service and item prices. Quality or variety of selection of available items did not seem to be an issue.

Business Perspective

Simply stated, the produce wholesalers for the areas under study did not see the small food stores (CSs) as a business opportunity and one that often resulted in increased delivery costs without adequate return. The CS operators (owners/managers) indicated that lack of store infrastructure for produce offerings, lack of consumer demand, and low profit margin made increased availability of FFV through CSs unlikely.

Certainly, there is the potential that if CSs were to initiate increased availability of a variety of fresh produce items they may attract additional neighborhood customers that support this increased stock. Based on these study data, however, that would be a risky investment for the CS operators (owners/managers) who typically cater to consumer demand. With the perception of CS operators (owners/managers) that FFV items provide little or no profit margin, coupled with limited demand from customers to stock, high infrastructure and procurement costs to carry, and a lack of interest from regional wholesalers to sell fresh

produce to CSs, there are many barriers to increasing the availability of fresh produce in neighborhoods through CSs. These barriers are similar to those identified by Gittelsohn et al. [42] in formative research conducted in preparation for their Baltimore Healthy Stores work.

It is clear that additional changes need to occur before increased availability of FFV in CSs is viable, and a systematic change in the food supply chain may be needed to make CS interventions effective. Coordinated efforts and support for this change would need to come from suppliers, owners and customers for meaningful change to occur. Due to the large amount of time and investment required to achieve small increases in availability of FFV in CSs and the limited number of neighborhood residents who use corner stores as their primary source for food purchases, it may be more effective to utilize policy methods as a way to increase the availability of FFV for neighborhood residents.

One example of this kind of policy intervention was the historic change in the Special Supplemental Nutrition Program for Women, Infants and Children (WIC) food package in 2009 to include low-fat milks, whole grain breads and brown rice in addition to vouchers to purchase fresh fruit and vegetables [43]. WIC authorized vendors include large super stores and supermarkets but also include small neighborhood CS. These stores must meet minimum stocking requirements to maintain their WIC vendor status and in doing so are providing increased access to these food items for WIC participants in addition to other neighborhood residents. Some evidence is beginning to accumulate that demonstrates increased availability, purchasing and consumption of foods included in the revised food package [44–47].

A city-wide change in New Orleans was the recent passage of the Fresh Food Retailer Incentive (FFRI) to provide low-interest and forgivable loans for operators, owners or developers of new stores to locate in areas currently underserved or for existing small stores to increase their capacity to sell FFVs [48]. The New Orleans FFRI was modeled after the Pennsylvania Fresh Food Financing Initiative which has been utilized as a model in the creation of a similar federal program in the Healthy Food Financing Initiative [49]. These are a few examples of the beginnings of systematic changes being implemented in New Orleans and around the U.S. The impact of these changes is being examined as an effective policy method to increase the availability and consumption of FFV. Additional work within corner stores may be more feasible in the future as a result of these programs.

Strengths and Limitations

The strengths of this study include the mixed methods, quantitative and qualitative, used to assess the feasibility of

increasing the availability of FFV by working within CSs. Interviews with produce wholesale suppliers and CS operators (owners/managers) provided a business or supply-side perspective and emphasized additional barriers to increasing availability of FFV in small food stores. The consumer perspective, however, was represented by residents and CS customers in only three New Orleans neighborhoods and may not be representative of other neighborhoods in the city, necessitating ongoing research into this important issue of availability and consumption of FFV.

Conclusions/Recommendations

Corner stores have the potential to be important access points in low-income neighborhoods for needed supplies and food items. It would be ideal if these stores could sell a wide selection of healthy foods. Future work should focus on supporting coordinated efforts to make it easier for small food stores to provide healthy food options in the neighborhood. Because many environments exist within which to work and a variety of methods can be utilized in the attempt to create healthier food environments, it is imperative to identify the most feasible and effective methods within which to invest time and money in an effort to improve health behaviors and outcomes.

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