Preventive Medicine Reports 7 (2017) 187–192

Contents lists available at ScienceDirect

Preventive Medicine Reports

journal homepage: http://ees.elsevier.com/pmedr

Evaluation of Healthy2Go: A country store transformation project to improve the food environment and consumer choices in Appalachian Kentucky

Joshua A. Rushakoff [a,*,1], Daniel E. Zoughbie [a], Nancy Bui [a], Katerina DeVito [b], Leila Makarechi [a], Hitomi Kubo [a]

[a] Microclinic International, San Francisco, CA, United States
[b] Harvard School of Public Health, Boston, MA, United States

ARTICLE INFO

Article history:
Received 19 March 2017
Received in revised form 22 June 2017
Accepted 24 June 2017
Available online 1 July 2017

Keywords:
Appalachian region
Kentucky
Rural health
Program evaluation
Food analysis
Food preferences
Diet
Obesity
Fruits and vegetables

ABSTRACT

Rates of obesity and type 2 diabetes in Kentucky's Cumberland Valley region are among the highest in the United States and limited access to healthy food contributes to these epidemics. The aim of Healthy2Go (H2G), a country store transformation project launched by Spread the Health Appalachia (STHA), was to improve awareness and availability of healthy options in small, rural stores. Ten country stores participated in H2G and received training and technical assistance to increase availability and awareness of healthy foods. Stores made inventory changes; installed point-of-purchase educational and in-store marketing materials directing shoppers to healthier options; provided nutrition education such as healthy recipes; and altered the display and location of healthy items. To measure changes within stores and the potential impact on resident eating and purchasing habits, STHA used four instruments: a modified version of the Nutrition Environs Measures Survey – Corner Stores at baseline and follow-up, a bimonthly store inventory assessment, a final store owner survey, and a Community Nutrition Survey at baseline (n = 287) and follow-up (n = 281). The stores in the H2G program (n = 10) had a 40% increase in stocking fresh produce, a 20% increase in produce variety, and trends towards increasing healthy inventory. During the same period, surveyed residents reported a statistically significant increase in the frequency of healthy food consumption. Small store transformation programs can improve availability of and access to healthy food in rural settings and influence local purchasing patterns.

1. Introduction

In the United States, nearly 60 million people, or 19.3% of the population, live in rural areas (United States Census Bureau/American FactFinder, 2011). Similar to other rural regions across the United States, the population in the Cumberland Valley Region of Appalachian Kentucky experiences much higher rates of chronic disease and all-cause mortality than their urban counterparts (Befort et al., 2012; Bennett et al., 2011; Jackson et al., 2005). Specifically, obesity rates in rural counties, especially southern counties, exceed national averages (40% of rural vs. 33% of urban) (Adams et al., 2011; Ogden et al., 2014). Factors contributing to this rural health care disparity include high unemployment rates, low household incomes, limited educational attainment, geographic and transportation barriers, low quality food environment, and limited health literacy (United States Census Bureau/American FactFinder, 2011; Appalachia Regional Commission, 2015; Research and Statistics Branch, 2014; Adler et al., 2010; McEwen, 2012).

Consumption of healthy, nutritious foods, in combination with physical activity and appropriate access to health professionals, are critical for the maintenance of good health and for the avoidance of certain chronic conditions, including obesity and type 2 diabetes (World Health Organization, 2003; US Dep. Health Hum. Serv./US Dep. Agric., 2010). The local food environment is believed to be an important factor in shaping eating habits (Liese et al., 2007; Morland et al., 2002). Studies on the health benefits of improving food environments, mainly focusing on urban environments, have been inconclusive and there is little long term data available on this expanding area of research (Cannuscio et al., 2013; Morland et al., 2002).

Generally, rural residents face a restricted supply of healthy food options and higher prices (Sharkey, 2009). Large percentages of the population in these counties live in designated food deserts, places where it is difficult to find convenient, affordable food: 28% in Bell, 37% in Clay, 42% in Knox and 8% in Jackson (United States Census Bureau/American FactFinder, 2011). Access to fresh produce is similarly limited in the region (United States Census Bureau/American FactFinder, 2011). Rural residents rely more on non-traditional food stores including convenience stores and dollar stores than their urban counterparts

* Corresponding author at: University of California, San Francisco, 1600 Divisadero Street, Suite C430, San Francisco, CA 94115, United States.
E-mail address: Joshua.rushakoff@ucsf.edu (J.A. Rushakoff).
[1] Currently at University of California, San Francisco School of Medicine.

http://dx.doi.org/10.1016/j.pmedr.2017.06.009

(Sharkey, 2009). Corner stores (urban) and country stores (rural) are small stores offering convenient access to food and other essential items. In the Cumberland Valley, the country stores serve the most rural reaches of the counties. Corner store transformation programs, where owners receive training and technical assistance to introduce healthy foods in areas with restricted access, have emerged as a public health strategy to address poor nutrition and social determinants of health that contribute to chronic conditions around the country. To date these projects have been predominantly focused in urban environments (Martin et al., 2012; Dannefer et al., 2012; Ortega, 2014; Cavanaugh et al., 2014).

In the Healthy2Go project described below, we assessed the impact of a country store transformation program on the availability of healthy food options in a rural, low quality food environment setting, the Cumberland Valley region of Appalachian Kentucky. We also assessed the eating and purchasing habits of local residents before and after the intervention to better understand behavioral decisions and awareness of healthy eating and healthy retail.

2. Methods

2.1. Survey area

Four target counties in the Cumberland Valley area (Bell, Clay, Jackson, and Knox) were selected for the Healthy2Go intervention and evaluation activities. According to the 2010 United States census, the total population of these four Appalachian counties is 94,466, 96.5% of the population is white, and 34.4% live below the poverty line.

2.2. Intervention: Healthy2Go

The 18 month long project- Healthy2Go- was designed by Spread the Health Appalachia (STHA) to increase the availability of healthy products and improve local health literacy. Healthy2Go was one of the seven initiatives of STHA, a comprehensive public health approach to chronic conditions in rural southeastern Kentucky based on the Microclinic International contagious health model and funded by the Centers for Disease Control and Prevention (Ding et al., 2013).

2.2.1. Country store identification and recruitment

All stores located in a food desert or a food poor census tract qualified for the program. Stores were provided information on the program both during initial mNEMS-CS surveying and at local food safety and environmental department meetings. Owners self-selected to participate, committing to meet criteria in each of the three program phases and to participate in technical assistance and training programs. In the end, STHA was capable of supporting any qualifying stores with interest, and 10 stores enrolled in the program.

2.2.2. First store visit

Store owners were provided a Healthy2Go Plan outlining the incremental steps to making inventory changes and maintaining program compliance. They were also given a Healthy Product Menu with suggested inventory improvements. To address store owner education, STHA produced food literacy materials including a food-label reading guide. A thorough inventory was conducted at this and all subsequent store visits.

2.2.3. Second store visit (2 month)

STHA worked with store owners to address any concerns, rearranged store inventory and planned for future store improvements to help promote new healthy products being introduced.

2.2.4. 3rd and 4th store visits (4 and 6 months)

As the project progressed, and the store owners met certain benchmarks, STHA installed numerous point-of-purchase materials to bring attention to the new inventory and address public healthy eating literacy. These materials included shelf strips directing shoppers to healthy options and a cookbook full of easy, cheap, healthy recipes. All included recipes were under $2 per serving, used ingredients widely available at Cumberland Valley country stores, had a preparation time of 30 min or less, and averaged 197 cal, 4.7 g of fat, 8 g of sugar, and 250 mg of sodium per serving.

2.2.5. 5th and 6th store visits (8 and 10 months)

As stores continued expanding their inventories, Healthy2Go hosted promotional events at each store to bring attention to new options and promote community involvement. These events included taste tests with new foods available at the stores. Store owners also received food handling training.

2.2.6. One year follow-up

At one year, limited and varied transformations had occurred across the stores. To complete the process, stores introduced additional display improvements such as basket display and refrigeration units, furthering the promotion of healthy products.

2.3. Data collection

There were four data collection instruments used to assess the impact of the Healthy2Go program: the modified Nutrition Environment Measures Survey-Corner Stores (mNEMS-CS) (Cavanaugh et al., 2013), country store inventory logs, a final storeowner survey and the Community Nutrition Survey (CNS).

2.3.1. Country store surveys

To assess the food environment across the 4 counties, STHA staff members completed baseline mNEMS-CS surveys during July 2013 and final mNEMS-CS surveys in July 2014 (see Appendix for mNEMS-CS Survey). Twenty-seven stores were evaluated at baseline and final and were selected based on convenience sampling. All surveyed stores were located in food desert tracts or surrounding areas, mostly located at least 10 miles from a county seat. Of the 27 stores surveyed in the mNEMS-CS, 10 participated in Healthy2Go. Stores were selected to participate in Healthy2Go based on ownership engagement and stability.

STHA staff tracked inventory in 21 healthy food categories bimonthly at the ten participating stores over a one-year period (see Appendix for Healthy2Go Inventory Tracking). The inventory tracking was a benchmark for program monitoring. In addition, it allowed for a more detailed picture of the types and extent of changes in healthy food categories. The categories were established based on a review of corner store transformation programs nationally and with input from The Food Trust and local nutritionists. Lastly, the 10 participating storeowners were surveyed at the end of the intervention period to gather feedback on the benefits, impact and challenges of Healthy2Go.

2.3.2. Community Nutrition Survey population

Residents were surveyed about their purchasing and eating patterns over a one-month period, with baseline in September 2013 and final in August 2014 (see CNS in Appendix). Convenience sampling was used, surveying community members within 10 miles of participating Healthy2Go stores in the four target counties. Respondents were not surveyed at the same locations at baseline and final, but all locations were within a 10-mile radius of participating stores. STHA staff members stood in high volume parking lots and at local community centers asking all comers if they would complete a survey about eating behaviors. As needed, staff members explained confusing questions and helped respondents with limited literacy skills. The survey locations were selected to sample the population that would be likely to rely on remote country stores for some of their food purchases.

2.4. Data analysis

To assess inventory differences in the Healthy2Go and mNEMS-CS participating stores bivariate analysis was conducted. Chi-square tests were used for proportions and *t*-tests to compare means and 95% confidence intervals were calculated using simple linear regression.

3. Results

3.1. mNEMS-CS (Cavanaugh et al., 2013)

Baseline mNEMS-CS results showed an unhealthy and low quality food environment in the Cumberland Valley region, with limited availability to healthy food products (Table 1). Fewer than half of stores carried both fresh fruits and fresh vegetables, and those that did offer fresh produce had limited varieties- on average 2 types of fruit and 2.33 types of vegetables. Similarly, few stores carried low fat dairy, whole-grain products, or reduced fat meat. Importantly, there was also a shortage of healthy snack options- both baked goods and 100 cal snacks- at the country stores in the Cumberland Valley.

At one year follow-up, the mNEMS-CS across the participating and non-participating Healthy2Go stores revealed modest improvements in the availability of healthy products, with region wide trends towards improved food access and a slightly better food environment (Table 1).

3.2. Inventory tracking

Inventory tracking showed that Healthy2Go stores increased availability of, on average, 11 of 21 tracked categories of healthy products, with some stores making improvements in as many as 16 categories. Of note, there was a significant increase in the number of stores carrying fresh fruit, with a doubling in availability by the end of the program ($p = 0.02$). Similarly, there was also a significant increase in the number of varieties of fresh fruit available at the stores ($p = 0.045$). There was a similar increase in the number of varieties of vegetables offered at the stores despite no change in the number of stores carrying fresh vegetables- 3.55 compared to 3.22 on average (Fig. 1). All 10 stores owners expanded the number of healthy snacks offered at their store and 6 started selling skim milk.

Table 1
Results of baseline MNEMS-CS Survey. There was found to be limited availability of healthy options across all surveyed food groups at baseline. Notably, fewer than 50% of stores carried fresh produce, low-fat dairy, or whole wheat products. Follow-up showed an increase in all produce, dairy, and some grains availability. There were no changes in meat availability, and slight decreases in whole wheat bread and healthy cereals.

Product	Baseline		Follow-up	
	N = 27	%	*N* = 24	%
Produce				
Fresh fruit	13	48	14	58
Fresh vegetables	16	59	17	71
Canned fruit	16	59	19	79
Canned vegetables	26	96	24	100
Frozen produce	0	0	4	17
Dairy				
Low fat milk	5	19	7	29
Meat				
Reduced fat ground beef	0	0	0	0
Reduced fat hot dogs	0	0	0	0
Grains				
Whole wheat bread	12	44	6	25
Low fat baked goods	3	11	5	21
Healthy cereals	24	89	19	79
Baked chips	15	56	11	46
100 calorie snacks	0	0	2	8
Beverages				
Bottled water	27	100	24	100
100% juice	18	66	15	62

3.3. Storeowner survey

Of the 10 storeowners who completed a follow-up participation survey, 100% reported that they plan to continue promoting healthy products and to introduce additional products in the coming months (Fig. 2a). Similarly, store owners involved in the program unanimously thought that Healthy2Go should expand and 100% of owners felt the program helped their store make healthy changes (Fig. 2b).

3.4. Community Nutrition Survey

The sample population for the CNS was 287 Cumberland Valley residents at baseline and 281 residents at final, with respondents being predominantly white individuals with limited education (Table 2). Despite the restricted supply of healthy products, at baseline 75% of the 287 surveyed community members reported a desire to eat healthier at baseline. Additionally, initially 84% responded that they would buy fresh fruit and 82% would buy fresh vegetables if available at country stores.

At follow up, Cumberland Valley residents responded that prior to Healthy2Go, they did not know where to find healthy food options (8.5% strongly disagree, 18.8% disagree, 30.5% neutral, 28.1% agree, 14.0% strongly agree) and the majority of respondents stated that they would like Healthy2Go to continue (3.1% strongly disagree, 6.3% disagree, 30.0% neutral, 34.9% agree, 25.7% strongly agree) (Fig. 2c). Among community members participating in follow-up surveys, there was a significant increase in the number of people who were likely to buy healthy foods at country stores ($p = 0.05$). The majority of respondents reported that they still did not purchase produce, although there were increases in the number of people buying both fresh vegetables and fresh fruit.

The CNS gathered information about purchasing habits and eating habits. Respondents were prompted to mark what types of foods they bought at local country stores in the past month. This data (Table 3) showed mixed results, but a general trend towards purchasing additional healthy items at country stores. Next, respondents were asked to reflect on the frequency with which they ate various types of food. . Compared to the baseline CNS responses, a few noteworthy changes included an increase in frequency of consuming leafy greens two or more times a day in Bell (8.57%, 95% CI [1.91, 15.23]). Similar results were observed in Clay for those consuming greens 2–4 times a week (12.85%, 95% CI [4.89, 20.81]). There was also a significant decrease in respondents that reported "Never" consume leafy greens in Clay County (−17.15%, 95% CI [−26.12, −8.18]). In analyzing all surveyed food options, there were more statistically significant increases in the frequency of healthy food consumption than unhealthy foods, suggesting increases in self-reported frequency of consumption of healthy food options.

4. Discussion

Healthy2Go accomplished our goal of expanding access to and availability of healthy foods, specifically fresh produce, at local country stores in the resource poor Cumberland Valley region of Appalachian Kentucky. More broadly, STHA was able to modify behaviors in a short time period in these rural communities by linking built environment initiatives with community-based health education. Adapting the model used by others in urban environments to a rural context (Martin et al., 2012; Dannefer et al., 2012; Ortega, 2014; Cavanaugh et al., 2014; Gittelsohn et al., 2012), our findings suggest a benefit to the Healthy2Go intervention, with a demonstrated short-term increase in access to healthy products in the Cumberland Valley, especially fresh produce.

One important consideration, and potential limitation, when analyzing variable inventory was timing of data collection. At these small, independent stores, distribution and purchasing patterns are often irregular and sporadic. Store owners generally purchase items when

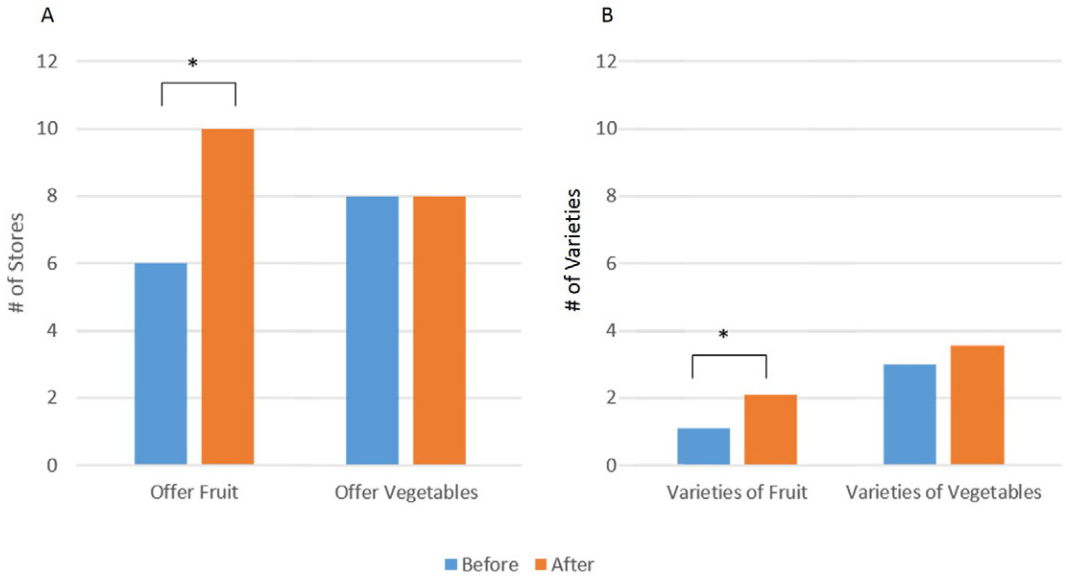

Fig. 1. Results of Healthy2Go on fresh produce offerings. (A) There were significant changes in the number of stores offering fresh fruit. The number of stores offering vegetables remained constant. (B) There was a significant increase in the number of varieties of fruit offered at each store. The varieties of vegetables offered at each store increased but was not significant ($^*p < 0.05$, n = 10).

inventory drops, compared to the regular schedule employed at larger groceries, and opportunities to restock were often impacted by weather and other uncontrollable factors.

Importantly, other stores in the region started to trend towards stocking additional healthy products, building on the Healthy2Go model and promoting continued impact in the region. The stores that participated in the program made significant changes to their inventories and display patterns and garnered substantial support from community members.

Therefore, the timing of the survey at baseline and final, whether it was right after or right before re-stocking inventory could have an impact on the results. This variability may have impacted the mNEMS-CS results, and show that snapshot management of remote stores may be unreliable. A similar 'snapshot' effect was observed in the bi-monthly

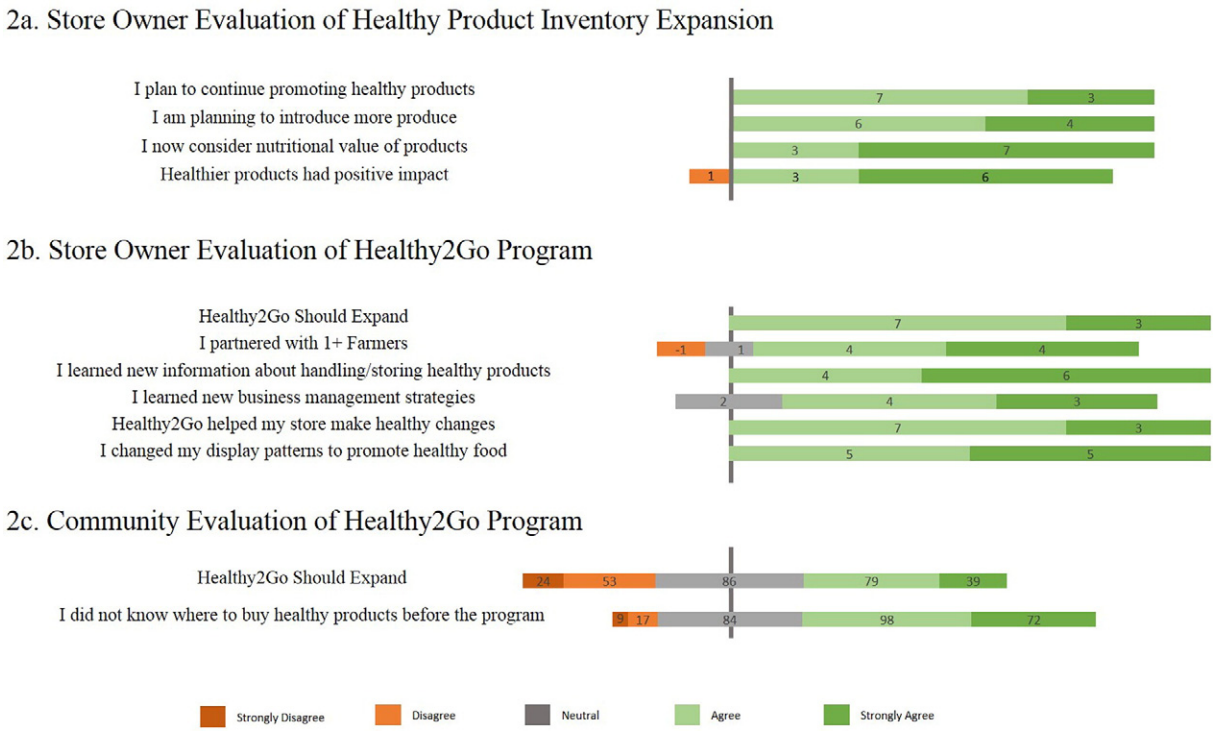

Fig. 2. Store owner and community evaluation of Healthy2Go. (A) Responses from a follow up store owner evaluation of the Healthy2Go program. When asked about promotional strategies, inventory plans, and opinions about healthy products, store owners overwhelmingly expressed new found commitment to improving the food environment in the Cumberland Valley. (B) Responses from follow up store owner evaluation of the Healthy2Go program. Store owners overwhelmingly supported the expansion of Healthy2Go to other stores, citing the training they received as a benefit of the program. Similarly, store owners reported changing their display patterns and taking the promotion of healthy products more into consideration following Healthy2Go. (C) Community members supported the expansion of the program and revealed that the program helped they find healthy products.

Table 2
Household demographics of sampled customers shopping at country stores in the Cumberland Valley, Kentucky.
Data from Community Nutrition Survey.

Characteristic	Baseline		Follow-up		Difference	
	N (287)	%	N (281)	%	%	
Household demographics						
Female	226	79	191	68	11	$p = 0.003$
Households with 3 + individuals	164	57	194	69	12	$p = 0.003$
Access to a car	264	92	268	95	3	$p = 0.15$
>35 years old	194	68	180	64	4	$p = 0.31$
Ethnicity						
White, non-Hispanic	276	96	276	98	2	$p = 0.16$
African American	6	2	5	2	0	
Hispanic/Latino	7	2	0	0	2	$p = 0.017$
Education						
Less than high-school degree	31	11	29	11	0	
High school diploma/GED	98	34	93	33	1	$p = 0.80$
Some college	61	21	57	20	1	$p = 0.76$
College degree or higher	97	34	102	36	2	$p = 0.62$

inventory at Healthy2Go stores, resulting in our general focus on program long trends. Additionally, although we modified the mNEMS-CS to better suit the Cumberland Valley (see mNEMS-CS in Appendix), this survey proved less sensitive when measuring inventory at local stores as compared to the STHA Inventory Tracking.

We utilized the important roles these stores play in their respective communities to distribute health and nutrition information to community members. The impact of these efforts was measured through follow-up community nutrition surveys which revealed trends towards purchasing healthier items. We were surprised to see these changes after only one year, highlighting an opportunity to continue engaging the community members to introduce healthy choices. The use of convenience sampling and small sample sizes, although necessitated by the region, could have impacted our data. Our project was not designed to closely monitor eating patterns, relying on individual reporting in the CNS, possibly resulting in reporting biases.

It is important to note the resource investment needed to make Healthy2Go successful, with staff members making repeated visits to develop relationships with store owners and to provide training and technical assistance on new practices and strategies. We did not calculate cost since the focus was first on whether or not this type of intervention could work in a rural setting- additional studies should further explore cost. Additionally, Healthy2Go was able to support store improvements to aid in the process of making additional healthy items available to the community. This practice was supported by a review of corner store interventions by Gittelsohn (Gittelsohn et al., 2014).

Store owners reported that finding distributors was a major obstacle to stocking healthy products, suggesting a pressing need for systemic change to ensure the access to healthy products and produce in rural communities. With limited inventories and high transportation costs, small rural stores are not the most lucrative option for distributors, leaving owners with few options for finding healthy options. Continued efforts are needed to overcome this primary, high-level issue impeding poor, rural communities' access to healthier options.

Similar to reported experiences in urban environments, store owner engagement was central to the project. The success of Healthy2Go hinged on supporting store owners to be agents of change in their community. Follow-up surveys show overwhelming satisfaction with the project and motivation to continue improving offerings at the stores suggest we were successful in reaching this goal. Despite the general success of the program, we did lose one store (robbery and closure) and another store moved in the middle of the project, resulting in an implementation restart. Certain store owners were more reluctant than others, and personal relationships were key to the project. In replicating the project, it is paramount to maintain flexible, productive relationships with the store owners.

The success of Healthy2Go in the Cumberland Valley region suggests that the urban corner store model can successfully be applied to rural communities.

Table 3
Comparison of baseline and final Community Nutrition Survey purchasing patterns. Results include data from Bell, Clay, and Jackson counties. Results from Knox County were inconsistent with the other counties for these questions, and we suspected significant issues with sampling. Notable for general increases in healthy options including fresh produce and decreases in those not purchasing produce.

	Baseline (%) (n = 233)	Follow-up (%) (n = 211)	Change
Vegetables			
None	62	65	3
Fresh vegetables	12	17	5
Frozen vegetables	6	3	−3
Canned vegetables	9	14	5
Don't buy vegetables	3	2	−1
Fruit			
None	60	63	3
Fresh fruit	14	18	4
Frozen fruit	3	2	0
Canned fruit	5	7	2
Don't buy fruit	4	4	0
Milk			
None	39	41	2
Fat-free	8	10	2
Low-fat milk	40	40	0
Whole milk	10	12	2
Grains			
None	49	51	2
Healthy grains	28	28	1
Refined grains	34	28	−6
Snacks			
None	30	33	2
Baked chips, low-fat bakery goods, nuts	33	35	1
Chips, bakery goods	54	52	−2
Beverages			
Water	47	52	5
Sparkling water	2	1	0
100% juice	16	13	3
Diet drinks	22	27	5

5. Conclusion

Similar to results reported from small store interventions in urban environments around the country, we were able to improve availability and awareness of healthy foods in rural Appalachian Kentucky, altering both supply side and demand side practices. Small store interventions have become an important public health strategy for increasing healthy food offerings in underserved, poor communities and areas lacking access to full-scale grocery stores. Further research is needed to establish linkages between these types of interventions and disease outcomes. With a focused deployment of resources, we were able to help local store owners improve the food environment in the Cumberland Valley, but to more completely overcome disparities in access to healthy food, efforts should be continued at the local level and expanded to include regional food distribution systems.

Conflict of interest

None.

Transparency document

The Transparency document associated with this article can be found, in online version.

Acknowledgments

STHA was funded by the Centers for Disease Control and Prevention (1H75DP004253-01) Community Transformation Grant- Small Communities awarded to Microclinic International and implemented in collaboration with the Bell County, Cumberland Valley District, and Knox County Health Departments.

Thank you to The Food Trust for technical assistance in the development of Healthy2Go. Special thanks to the entire STHA team, participating storeowners, and all the community members who participated in the program, supported the stores and completed the Community Nutrition Survey.

Appendix A. Supplementary data

Supplementary data to this article can be found online at http://dx.doi.org/10.1016/j.pmedr.2017.06.009.

References

Adams PE, Martinez ME, Vickerie JL, Kirzinger WK. Summary health statistics for the U.S. population: National Health Interview Survey, 2010. Vital Health Stat. 10. 2011 Dec 1–117. PubMed PMID: 22624451.

Adler, N.E., Stewart, J., 2010. Health disparities across the lifespan: meaning, methods and mechanisms. In: Adler, N.E., Stewart, J. (Eds.), The Biology of Disadvantage: Socioeconomic Stats and Health. Wiley Blackwell, New York, pp. 5–23.

Appalachia Regional Commission, 2015. Economic Status in Appalachia, FY. Web. 22 December 2014. http://arcgov.maps.arcgis.com.

Befort, C., Nazir, N., Perri, M., 2012. Prevalence of obesity among adults from rural and urban areas of the United States: findings from NHANES (2005–2008). J. Rural. Health 28, 392–397.

Bennett, K., Probst, J., Pumkam, C., 2011. Obesity among working age adults: the role of county-level persistent poverty in rural disparities. Health & Place 17, 1174–1181.

Cannuscio, C., et al., 2013. Urban food environments and residents' shopping behaviors. Am. J. Prev. Med. 45 (5), 606–614.

Cavanaugh, E., Mallya, G., Brensinger, C., Tierney, A., Glanz, K., 2013. Nutrition environments in corner stores in Philadelphia. Prev. Med.

Cavanaugh, E., et al., 2014. Changes in food and beverage environments after an urban corner store intervention. Prev. Med. 65, 712.

Dannefer, R., Williams, D., Baronberg, S., Silver, L., 2012. Healthy bodegas: increasing and promoting healthy foods at corner stores in New York City. Am. J. Public Health 102, e27e31.

Ding, E., et al., 2013. Randomized trial of social network lifestyle intervention for obesity: MICROCLINIC intervention results and 16-month follow-up. Circulation 128, 2704–2722.

Gittelsohn, J., Rowan, M., Gadhoke, P., 2012. Interventions in small food stores to change the food environment, improve diet, and reduce risk of chronic disease. Prev. Chronic Dis. 9, E59. http://www.cdc.gov/pcd/issues/2012/11_0015.htm Accessed [24 December 2014].

Gittelsohn, J., Laska, M., Karpyn, A., Klingler, K., Ayala, G., 2014. Lessons learned from small store programs to increase healthy food access. Am. J. Health Behav. 38, 307–315.

Jackson, J.E., Doescher, M.P., Jerant, A.F., Hart, L.G., 2005. A national study of obesity prevalence and trends by type of rural county. J. Rural. Health 21 (2), 140–148.

Liese, A.D., Weis, K.E., Pluto, D., 2007. Food store types, availability and cost of foods in a rural environment. J. Am. Diet. Assoc. 107, 1916–1923.

Martin, K., et al., 2012. If you stock it, will they buy it? Healthy food availability and customer purchasing behaviour within corner stores in Hartford, CT, USA. Public Health Nutr. 15, 1973–1978.

McEwen, B.S., 2012. Brain on stress: how the social environment gets under the skin. Proc. Natl. Acad. Sci. 109 (Suppl. 2), 17180–17185.

Morland, K., Wing, S., Roux, A., 2002. The contextual effect of the local food environment on residents' diets: the atherosclerosis risk in communities study. Am. J. Public Health 92, 17611768.

Ogden, C., Carroll, M., Kit, B., Flegal, K., 2014. Prevalence of childhood and adult obesity in the United States, 2011–2012. JAMA 311, 806–814.

Ortega, A., et al., 2014. Proyecto MercadoFRESCO: a multi-level, community-engaged corner store intervention in East Los Angeles and Boyle Heights. J. Community Health.

Research and Statistics Branch, Office of Employment and Training, Kentucky Education and Workforce Development Cabinet. <http://kylmi.ky.gov>. Web. (22 December 2014).

Sharkey, J., 2009. Measuring potential access to food stores and food-service places in rural areas in the U.S. Am. J. Prev. Med. 36, S151–S155.

United States Census Bureau/American FactFinder, 2011. 2007–2011 American Community Survey. U.S. Census Bureau's American Community Survey Office Web. 22 December 2014. http://factfinder2.census.gov.

US Dep. Health Hum. Serv./US Dep. Agric, 2010. Dietary Guidelines for Americans 2010. USGPO, Washington, DC.

World Health Organization, 2003. Joint WHO/FAO Expert Consultation on Diet, Nutrition and the Prevention of Chronic Disease. WHO, Geneva.