

Mobile Farmers' Markets as an Effective Intervention for Improving Nutrition in Low-Income Neighborhoods: A Case Study of the Somerville, MA Mobile Farmers' Market

By

Carolyn Moore

A Master's Paper submitted to the faculty of
the University of North Carolina at Chapel Hill
In partial fulfillment of the requirements for
the degree of Master of Public Health in
the Public Health Leadership Program.

Chapel Hill

2016

Advisor:

Second Reader:

Date

Abstract

Obesity prevalence remains high with more than one-third of Americans considered obese (Ogden, Carroll, Kit, & Flegal, 2014). A growing body of research demonstrates that structural interventions can be an effective driver of an individual's behavior change and eating habits because they improve people's ability to access safe, affordable and healthy foods, also known as food access (Stulberg, 2014). Obesity and food access are also examples of health disparities that impact certain racial and socioeconomic groups more than others, making minority groups and those with lower income and education levels particularly vulnerable. This paper specifically seeks to move the food environment discussion forward by analyzing mobile markets as a practical and innovative way to incorporate physical, economic and social structural interventions to address food access issues and the promotion of healthy eating in low-income communities. The analysis is explained through a case study on the Somerville Mobile Farmers' Market, a unique, weekly mobile farmers' market targeting low-income communities within an unhealthy food environment.

As part of the case study, I conducted an evaluation including a weekly convenience sample survey throughout August, September and October 2015 at four different market locations with 43 unique customers using a form of food assistance. Eighty-eight percent of customers agreed that the mobile market helped them eat more fruits and vegetables, and the top reasons people come to the market compared to other supermarkets were price, convenience, seasonal products, quality and to support the market mission. An analysis of the overall 2015 market data showed total sales at \$10,900 with 1,671 customers. Half of the market customers used food assistance (FA); 26% use the public housing development resident discount; 16% use WIC or farmers' market coupons; and 7% use Electronic Benefit Transfer (EBT).

Finally, a discussion of national policy implications is presented including a set of recommendations for how to improve and expand the use of mobile food markets in the United States. It is concluded that given the flexibility of mobile farmers' markets, they could potentially be a broad solution for all economic and ethnic groups to help address the obesity epidemic that our nation currently faces.

Introduction

Continued Prevalence of Obesity in American Adults and Children

Obesity prevalence remains high and continues to be an important focus and priority for public health organizations more than 15 years after the World Health Organization's declaration of an obesity epidemic (Caballero, 2007). More than one-third of Americans have obesity and although a study from the Journal of American Medicine shows that rates appear to be leveling off, obesity-related conditions, including heart disease, stroke, type 2 diabetes and certain types of cancer, are some of the leading causes of preventable death in the nation (Ogden, Carroll, Kit, & Flegal, 2014), making it a serious public health concern. Nationally, obesity-related costs amount to \$147 billion every year and according to the USDA, more than \$87 billion of that money could be saved in medical costs, productivity and lost lives by eating healthier diets (The Food Trust, 2010).

Obesity is an example of health disparities that impacts certain racial and socioeconomic groups more than others, making minority groups and those with lower income and education levels particularly vulnerable. Non-Hispanic blacks have the highest rates of obesity (47.8%), followed by Hispanics (42.5%), non-Hispanic whites (32.6%) and non-Hispanic Asians (10.8%). Furthermore, studies show higher income women are less likely to be obese than low-income women and those with college degrees are less likely to be obese than less educated women (Ogden CL C. M., 2014).

These public health trends become increasingly alarming when analyzing obesity among children because children who are obese are more likely to become obese adults, and obesity risk factors in adulthood are likely to be more severe if an individual was obese as a child. Although rates are also stabilizing for children, approximately 17% of American children are obese, and

similar to obesity trends in adults, childhood obesity is more prevalent among those from lower-income families (Ogden CL C. M., 2014).

Addressing the Obesity Epidemic from a Public Health Perspective

Public health practitioners aim to assure conditions in which people can be healthy (Walker, 1989) and given the prevalence of obesity and the high risk of certain vulnerable subgroups within the U.S. population, the Centers for Disease Control and Prevention (CDC) have made it a key focus to strengthen the public health capacity to promote healthy eating and physical activity in addressing the epidemic (Centers for Disease Control and Prevention, 2009). To do this, public health practitioners can learn from the tobacco use and HIV/AIDs health epidemics to experiment, evaluate and modify a breadth of interventions to build the strongest evidence-based solutions (Byers & Sedjo, 2007).

Goals of this Paper

The paper will specifically seek to move the food environment discussion forward by analyzing mobile markets as a practical and innovative way to incorporate physical, economic and social structural interventions to address food access issues and the promotion of healthy eating in low-income communities. In order to help with this goal, I will share lessons learned, outcomes and results from the Somerville Mobile Farmers' Market in a case study of efforts to address nutrition disparities and food access issues through a unique, weekly mobile farmers' market targeting low-income communities within unhealthy food environments. The findings for this case study are derived from my Master's in Public Health (MPH) practicum experience, working with the Somerville Mobile Farmers' Market in the summer of 2015.

Educational and Structural Interventions

Some of the complexity in addressing obesity comes from the interplay of an individual's decision and responsibility to make healthy decisions with the responsibility of larger forces, such as the government, private organizations and the media, to shape a healthier society through actions, such as health education (Byers & Sedjo, 2007).

Public health practitioners refer to these two major categories of intervention as educational and structural intervention methods. Educational intervention methods are used to meet learning objectives, and therefore target knowledge, skill and belief determinants of health behaviors. Structural intervention methods instead are used to meet change objectives, and therefore target environmental changes, whether that be the social/institutional, physical or economic environment (Golden, 2015).

Historically, dietary behavior research and interventions in the past 50 years have been much more focused on educational factors related to eating behaviors, such as personal behavior, choices and responsibilities. However, a growing body of research demonstrates that structural interventions can be an effective driver of an individual's behavior change because they improve a person's ability to access safe, affordable and healthy foods, also known as food access (Stulberg, 2014).

Physical Environment

The physical food environment can be described as the multiple physical settings where people purchase and eat food, such as early childhood care, hospitals, schools, and food service venues within communities. The physical environment's impact on dietary behavior is particularly relevant for people in low-income households and neighborhoods, who tend to eat less nutritious diets than other households and on average, do not meet federal recommendations

for consumption of fruit and vegetables (Golan, Stewart, Kuchler, & Dong, 2008). For many low-income communities and communities of color, a major barrier to healthy dietary behavior is finding quality fresh food because they have to travel significant distances or pay exorbitant prices for wilting vegetables and overripe fruit from local convenience stores (The Food Trust, 2010). There are a variety of environmental conditions that relate to these issues, including food deserts, grocery gaps and food swamps, which are described below.

Food Environment Terms

Recent literature have described interrelated terms to describe varying food environments. A food desert is defined as a low-income census tract area where a substantial number or share of residents has low access to a supermarket or large grocery store. An area will qualify as low-income if the poverty rate is 20 percent or greater or the median family income is at or below 80 percent of the area median family income. An area qualifies as low-access if at least 500 people and/or at least 33% of the census tract's population live more than one mile from a supermarket or large grocery store (10 miles in non-urban areas) (United States Department of Agriculture, 2009). Similarly, grocery gaps are areas that have become food deserts over time after supermarkets and large-scale grocers have disappeared from the area, which this paper will describe in more detail later (John Hopkins, 2010). The phrase food swamp is a new phrase coined to describe a place where unhealthy foods, such as foods that are dense in calories and high in sodium and sugar, are more readily available than healthy foods (John Hopkins). An area can be both a food desert and a food swamp but in some ways, food swamps describe the evolution of food environment studies, as many researchers believe that it is the overabundance of healthy foods, rather than a lack of healthy food, that causes obesity (Rose, Bodor, & Swalm, 2009).

The USDA estimates that, as of 2010, over 23.5 million Americans currently live in a food desert. Communities within food deserts must choose between buying food at smaller local convenience stores, where produce variety is typically limited and expensive, or spend time traveling to the nearest large retailer; for more than 20 percent of rural counties, this means traveling 10 miles or more to find a supermarket or supercenter (The Food Trust, 2010).

These obstacles in the physical environment translate to health disparities and contribute to the public health challenges that such communities face. For example, a family without a grocery store within one mile of their home is almost twice as likely to have an unhealthy diet and people living in areas without access to supermarkets have the highest obesity rates. Similarly, the addition of one supermarket in a food insecure neighborhood, i.e., a neighborhood without consistent access to adequate food sources, can increase produce consumption by 32% and people living in neighborhoods with grocery store and farmers' markets have the lowest rates of obesity and diet-related disease (The Food Trust, 2010).

Economic Factors

Low-income communities' physical barriers to healthy eating are compounded by the fact that when healthy food is available, it may also be more expensive. Families try to stretch their food budget by purchasing cheap, energy-dense foods, and although less expensive and higher in calories, these foods are low in nutritional content and lead to obesity. These foods are highly accessible through convenience stores and fast food restaurants, which are more prevalent in low-income communities (Food Research and Action Center, 2010), leading to the coined term "food swamp."

Social and Institutional Factors

However, giving low-income communities access to fresh produce alone will not solve obesity issues. Recent studies examined low-income communities to see if access issues alone could explain disparities, or by more entrenched preferences for particular kinds of foods. It turns out that even with access to healthier foods, entrenched preferences for processed foods prevails.

This finding makes sense when you consider that healthy food is more expensive than less healthy processed food, takes more time and resources to cook and remains fresh and edible for fewer days. Thus an optimal intervention will require not only making food accessible and affordable, but also educating and changing perceptions and habits about diet and health (Sanger-Katz, 2015).

Innovative Solutions Incorporating Physical, Economic and Social Structural Interventions

One of the trending solutions to improve the structural environment for improved diet overall has been the notable increase of farmers' markets. In the last 15 years, the number of farmers' markets in the United States has increased from 1,755 to 5,274, and although the CDC and the USDA have specifically recommended access to farmers' markets in underserved neighborhoods as a key way to address the limited access to affordable, healthful food in low-income neighborhoods (Centers for Disease Control and Prevention, 2009), low-income communities still have not become fully participatory in this upward trend (Briggs, Fisher, Lott, Miller, & Tessman, 2010). Recent research has shown that there are disparities in farmers' market availability in the U.S.; the percentage of non-Hispanic black residents and residents living in poverty is negatively associated with per capita farmers' markets among metro and non-metro counties and household income is positively correlated with increased odds of having at least one farmers' market available among non-metro countries (Singleton, Sen, & Affuso, August 2015).

Benefits of Mobile Food Markets

An important challenge in unhealthy food environments in low-income areas is how to take advantage of the healthy and economically feasible trends that farmers markets represent. An example of an innovative solution to that challenge is mobile food markets that enable farmers' markets to more easily travel to low-income neighborhoods situated in food deserts. Food policy experts have identified several advantages that small, mobile retailers bring to the table. Produce trucks and healthy street food vendors may offer better food environment interventions because they require little upfront investment, can easily target environments with poor access to healthful foods, and requires no brick-and-mortar real estate (Algert, Lewis, & Agrawal, 2006).

Similar to regular farmers' markets, mobile markets provide access to fresh produce at low prices by selling directly to consumers. A survey that compared the prices of six southern California farmers' markets with nearby grocery stores found that on average, the farmers' markets offered prices 28% lower than grocery stores (Flournoy & Treuhaft, 2005).

The USDA Food and Nutrition Service, which offers a nutrition safety net to low-income households through programs that reach one in four people in the U.S., has also committed to improving low-income communities' access to fresh fruits and vegetables by expanding the Supplemental Nutrition Assistance Program (SNAP) at farmers' markets (Flournoy & Treuhaft, 2005). While these efforts have been slow to make progress as many farmers' markets still face challenges with accepting Electronic Benefit Transfer (EBT) cards, many private foundations, nonprofit organizations and local governments have incentivized SNAP participants to buy at farmers' markets by funding SNAP-based incentive programs that provide matching funds for purchases. These programs vary but essentially, a SNAP participant's purchase will get a dollar-

to-dollar match up to a certain amount for fruits and vegetables purchased at the market (United States Department of Agriculture, 2014).

Overall, mobile food markets offer many of the advantages of farmers' markets but with more flexibility and mobility to travel to low-income neighborhoods. Several mobile food markets have surfaced in the last decade with much success. Green Carts in New York City are mobile food carts that sell fresh fruits and vegetables in neighborhoods with limited access to healthy foods and accept EBT. Findings of a June 2014 Columbia University School of International and Public Affairs report showed that the Green Carts program increased access to healthy food in otherwise underserved high-density and low-income neighborhoods, influenced customers' consumption of fruits and vegetables and created jobs for immigrant entrepreneurs (Fuchs, Holloway, Bayer, & Feathers, 2014).

Arcadia Mobile Markets, now in its third season, serves Washington D.C. with two mobile market vehicles that have sold more than \$256,000 in fresh, local, seasonal food from regional farms in 19 low-income neighborhoods that are not served by traditional retailers. Arcadia Mobile Markets has seen a 50 percent increase in revenues in each of its first three seasons with no marketing other than customer word-of-mouth, and the average SNAP transaction value has increased from about \$8 to \$18 per customer. More than 70 percent of their SNAP transactions are with repeat customers and more than 50 percent of their sales are with low-income customers using some form of food assistance. Most impressively, while Arcadia's Mobile Markets are responsible for just two percent of total farmers' market revenues in D.C., they conducted approximately 20 percent of all SNAP sales at farmers' markets in D.C., which the markets attributes to its ability to sell where the need is greatest for healthy food, including where customers live, work, go to the doctor or attend school (Bartley, 2014).

Case Study: Somerville Mobile Farmers' Market

As part of my MPH practicum, from July to October 2015, I worked with the Somerville Mobile Farmers' Market to study the group's efforts to improve access to fresh produce in low-income neighborhoods and interview market customers on how the market has impacted their food habits.

Somerville, MA Demographics

Somerville is a city located in Middlesex County, Massachusetts, just two miles north of Boston and bordering Cambridge. It is the most densely populated city in New England with approximately 75,750 people in its 4.21 total square miles of land area (U.S. Census Bureau, 2010) and has one of the most ethnically diverse populations in the nation with more than 50 language spoken in local schools (City of Somerville, 2015). Somerville school enrollment data demonstrates the changing ethnic composition of the city with a rising Black/African American and Hispanic population. Compared to the overall city demographics collected in 2010, 2015-2016 school enrollment data shows students are 36.3% White (compared to 73.9% in the city overall); 10.3% Black/African American (compared to 6.8% in the city overall); 42% Hispanic (compared to 10.6% in the city overall); 7.8% Asian (compared to 8.7% in the city overall); and 2.8% Multi-race (compared to 3.6% in the city overall). Income levels are rising within the city but as of 2013, approximately 14.8% of the population fell below the national poverty level and the per capita income was \$34,781 (City of Somerville, 2015).

The city has become increasingly attractive in recent years due to its close proximity to Boston and Cambridge, its expansion of public transportation and numerous ongoing commercial reinvigoration projects. The city has also won numerous awards, including best run city in the Commonwealth and best place for commuting by bike in the Northeast.

Amidst the city's plans for its continued cultural and economic renaissance is a long-standing partnership with Tufts University Friedman School of Nutrition called Shape Up Somerville. Shape Up Somerville is "aimed at demonstrating the positive change that can be made in residents' lives and in healthier weight status among youth when community stakeholders come together around policy, environment and systems changes that make the health choice the choice easy" (Shape Up Somerville, 2011, p. 1). Somerville faces the same struggles as any city in transition and is at particular risk for overweight and obesity prevalence given its diverse socioeconomic composition since lower income and communities of color bear the disproportionate burden of obesity (Singh, Kogan, & Van Dyck, 2008). Exacerbating this issue is the city's risk for gentrification. Gentrification is the process of renewal and rebuilding accompanying the influx of middle-class or affluent people into deteriorating areas that often displaces poorer residents (Merriam-Webster, 2015). In the city's 20-year master plan, SomerVision, the city cites that with no intervention, monthly rents could increase more than 25 percent and as much as 67 percent with 700-800 lower-income renter households forced to dedicate over 30 percent of their income to housing costs (Somerville Mayor's Office of Strategic Planning & Community Development, 2012). Lastly, in 2008, a major local grocery store located in the heart of one of Somerville's less affluent neighborhoods closed. The closing of major grocery stores in low-income urban centers has been a problem for decades, particularly in communities of color. The grocery industry now targets suburban communities with big box supercenters and farmers' markets and community-supported agriculture supplement these retailers with alternative sources of fresh produce. The new grocery model and fresh food retailers have proliferated in affluent communities, leaving lower-income urban centers with limited options (The Food Trust, 2010).

To address these issues from a public health perspective, Shape Up Somerville began the Mobile Farmers' market in 2011 to bring healthy produce to underserved parts of the city at affordable prices. The Somerville Mobile Farmers' Market has evolved and expanded in the way it serves the community, by incorporating physical, social and economic structural interventions.

2015 Season

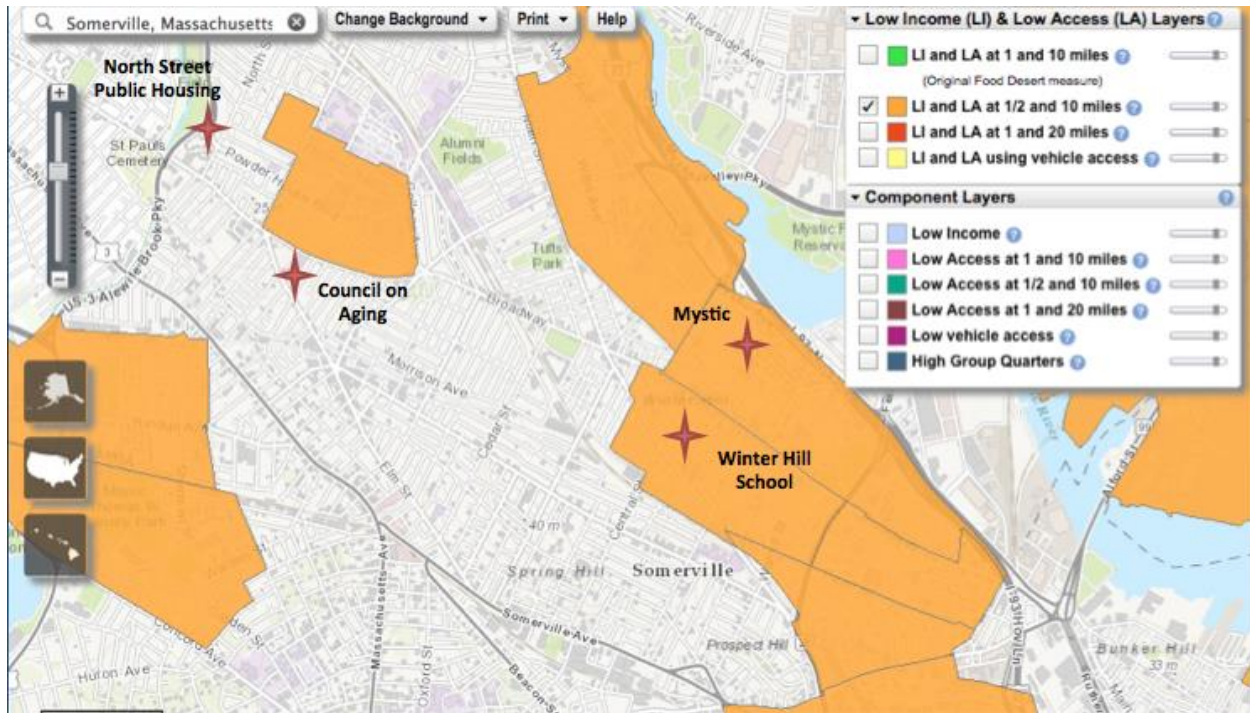
In its fifth season in 2015, Somerville Mobile Farmers' Market operated from July 10 to October 24 (National Food Day) for a total of 16 weeks with four markets per week. Sales totaled at \$10,900 with 1,671 customers. Of those customers, half used some form of food assistance to make purchases.

Like many public health interventions it was important to evaluate successes and needs for improvement (Centers for Disease Control and Prevention, 2012). Part of my role during my practicum was to conduct and summarize findings from a survey of customers in 2015. In a survey conducted with 43 unique customers using a form of food assistance, 79% reported that they shopped at the market at least monthly and 88% had been coming at least one year to the market; 55% had been coming for more than two years. Of those surveyed, 50% were Non-Hispanic White or Euro-American; 22% were Latino or Hispanic American; 19% were Black, Afro-Caribbean or African-American; and 9% were East Asian or Asian American. The top reasons people come to the market compared to the other most popular food stores (Stop & Shop and Market Basket) were price, convenience, seasonal products, quality and to support the market mission. To provide context for some of the survey responses, anecdotally, survey respondents described their rationale for choosing price as a top reason because the prices were lower than supermarkets when using their food assistance discount or the price for the quality

was very good. Convenience was frequently described as being able to easily get produce close to the places customers lived, went to school or regularly visited as part of their weekly routine. The response “seasonal products” was the ability to easily get local, seasonal products such as blueberries in July and August. This small convenience sample demonstrates that customers care about affordable prices and the value they get at the mobile farmer’s market, as well as the convenience of easily buying produce as part of their weekly routine.

Physical Intervention

The Market operated strictly on Fridays and Saturdays, making 90-minute stops at regular, weekly host sites in partnership with a local senior center, a local community school and two public housing developments. In choosing the location, the market targeted low-income neighborhoods in food insecure areas or locations where food assistance populations might frequent as part of their established routine, such as visiting the local senior center or picking up kids at school. The market was able to leverage the USDA’s Food Access Research Atlas to drive these decisions, as demonstrated in the map below. Orange signifies an area that is low-income and is more than half a mile from a grocery store in an urban area; the majority of Somerville also has low-vehicle access, a tract in which more than 100 households live at least half a mile away from a grocery store and have no car. The red stars display where the market situated their mobile market stops near low-income, low-access areas.



The Somerville Mobile Farmers’ market transported produce from location to location in a brand-new van painted with the Shape Up Somerville’s logo and social media information. The van was a significant upgrade from the 1990 box van with 250,000 miles that the market operated from in previous seasons, offering a more reliable and organized form of transportation. Market staff arrived at each location and unpacked four produce stand display cart racks, a table, a tent and any other market operation equipment, such as the cash box, the EBT machine and promotional materials. This setup has been fairly streamlined by keeping the produce on the display carts from market to market. However, other mobile market vehicles require little to no setup at all because they operate out of the vehicle itself. The Arcadia Mobile Market in Washington, D.C., for example, operates directly out of a refurbished, 28-foot school bus that has been renovated with refrigerators and shelving and allows customers to board the bus and shop for their produce (Bartley & Best, Mobile Markets: Apply the Food Truck Model to Food

Access, 2011). The Somerville Mobile Farmers' Market vehicle did not have the accessibility to comply with the Americans with Disabilities Act (ADA), and thus was not able to use the model of directly operating out of the vehicle.

The Somerville Mobile Farmers' Market changes the physical environment by offering customers the ability to conveniently purchase fresh produce at a location they frequent in their daily routine. For example, the two most popular markets, the Council on Aging and the Mystic market, had a very distinct customer base but were successful because they were engrained within the physical environment. The Council on Aging offered senior citizens the ability to purchase produce at the local community center whereas the Mystic market offered public housing residents the ability to purchase produce within their neighborhood space. As an added benefit, the Somerville Mobile Farmers' Market was also able to partner with health promotion non-profits to offer health screenings and personal finance resources, offering an additional positive transformation to the physical environment.

Economic Intervention

The market's overall goal is to increase food access to low-income communities and families within the Somerville area as a way to encourage healthy food and eating. To accommodate the community's economic needs, the market accepts a variety of payment methods, including cash, credit/debit card, SNAP (Supplemental Nutrition Assistance Program formerly known as "food stamps") and farmers' market coupons (coupons provided by the government for low-income Women, Infant and Children (WIC) or senior citizens). As an additional incentive to shop at the market, the market priced all produce with a 50% off discount for public housing development residents or customers using food assistance (SNAP or coupons) with no limit on how much customers could use the discount. Half of the market customers use

food assistance (FA): 26% use the resident discount; 16% use WIC or farmers' market coupons; and 7% use EBT.

The price chart presented below, which presents a sample of items sold in the Somerville mobile market, demonstrates the significant savings food assistance customers received at the market as compared to local grocery stores. For the majority of items, the Shape Up Somerville (SUS) market coordinator priced items above the wholesale cost for non-food assistance customers. For food-assistance customers, the price was either at or below the wholesale cost once the discount was taken.

According to the USDA's Agricultural Marketing Service, the market's produce is priced 15 percent lower as compared to non-organic products at grocery stores in the Northeast region for food assistance customers. A more accurate comparison would be to organic products since almost all of the market's products are organic and the market's prices are 44 percent lower as compared to organic products in grocery stores in the Northeast region for food assistance customers. The divide between prices is likely even more dramatic considering the high cost of living in Somerville as compared to other Northeast cities.

Shape Up Somerville Produce Prices for Select Items as Compared to Organic and Non-Organic Grocery Stores in the Northeast and Wholesale Prices

Item	Non-Organic Grocery	Organic Grocery	Wholesale	SUS Retail (Food Assistance)	SUS Retail (Non-Food Assistance)
Apples	\$2.16 / lb.	\$2.76 / lb.	N/A	\$1.25 / lb.	\$2.50 / lb.
Peppers	\$1.55 / lb.	\$2.05 / lb.	\$1.00 / lb.	\$1.50 / lb.	\$3.00 / lb.
Eggplant	\$1.18 / lb.	\$2.20 / lb.	\$1.23 / lb.	\$1.00 / lb.	\$2.00 / lb.
Beets	\$1.27 / lb.	\$2.20 / lb.	\$1.38 / bunch	\$1.00 / lb.	\$2.00 / lb.
Cabbage	\$.58 / lb.	\$1.10 / lb.	\$0.70 / lb.	\$1.00 / lb.	\$2.00 / lb.

Discussion

National Policy Initiatives

From a policy perspective, numerous initiatives have demonstrated the shift to address obesity from a structural perspective in addition to programs targeting social and individual behaviors to improve American diets. One of the goals for Healthy People 2020, a science-based set of 10-year national objectives for improving the health of all Americans, is to promote health and reduce chronic disease through consumption of a healthful diet. Healthy People 2020 plans to achieve this goal by not only addressing individual behaviors, but also the policies and environments that support these behaviors in settings such as schools, worksites, health care organizations and communities, as part of a broad public health focus. (HealthyPeople.gov, 2014). In 2010, the Obama Administration detailed a healthy food financing initiative (U.S. Department of Health and Human Services, 2010), and included access to nutritious food as one of the United States Department of Agriculture’s (USDA) top four goals in its five-year strategic plan.

Some skeptics point to the mirroring epidemic of obesity action plans and policies that have been developed as a result of the obesity crisis and conclude that these action plans are reactive and irrelevant because there is not yet direct evidence on their efficacy. However, it can be argued that best way to build strong evidence-based solutions is through the process of experimenting, evaluating and modifying a range of interventions and solutions, as demonstrated by national health policy initiatives that were successful in the past such as those related to tobacco use and HIV/AIDS health epidemics (Byers & Sedjo, 2007).

Evaluation of Success of SUS

My initial evaluation of the Somerville Mobile Farmer's Market demonstrated that the mobile market was a positively received intervention that addressed physical and economic barriers to address food access issues within Somerville. In 16 weeks throughout the 2015 summer and fall seasons, the market was able to sell \$10,900 in produce to 1,671 customers. Of those sales, 26% were to public housing residents, 16% went to individuals using federal supplemental nutrition program coupons for women, infants, children (WIC) and eligible seniors; and 7% went to those using electronic benefit transfers (EBT). As part of the case study, I conducted an evaluation including a weekly convenience sample survey throughout August, September and October 2015 at four different market locations with 43 unique customers using a form of food assistance. Based on responses to a limited convenience sample of food assistance customers, the customers come at least on a monthly basis and have been coming for more than one season. Finally, the survey data shows 88% of respondents eat more fruits and vegetables as a result of the mobile market. While the market data and surveys are limited by its convenience sampling methodology and small size (n=43), the trends it produced are useful for demonstrating the general feeling of acceptance and overall success within the Somerville community.

Based on the data and my personal attendance at the market during my practicum, my evaluation of the market was that it is a strong step in the right direction for food access. The market is effectively and consistently reaching its target customers; the setup is an attractive display of quality produce at four markets each week; the pricing is appropriate as demonstrated by repeat customers; and the market has begun to engage with community partners to address low-income community needs and health from a holistic perspective.

Recommendations for further improvement

Limited resources prevent the market from overcoming numerous barriers, including hiring enough staff to be more strategic with the market. Market leadership is often overburdened with managing the day-to-day market operations so that they are unable to dedicate time to strategic tasks such as communicating the vision, strategy and goals of the market to its most important stakeholders including customers, potential community partners, private investors and political supporters. For example, one missed opportunity is that community partners could offer additional services at the weekly market including job and health fairs, cooking demonstrations and other community programs. However, these partnerships must be established with clearly defined roles, responsibilities and goals in mind; some of the community partnerships in 2015 demonstrated the need for accountability for following through on commitments to the market and the necessity to be flexible in evolving programs when implementation does not go as planned. The Cambridge and Somerville community is also rife with companies that could offer financial resources as part of their corporate social responsibility programs. The market could then appropriate funds to hire a full-time, year-round, experienced market director who is solely dedicated to the market and manages all aspects for visibility into start to finish processes: funding, planting, marketing, selling, customer relations, community partnerships and data

collection. The market off-season from November to May could be focused on streamlining operations, marketing, building partnerships and getting funding so the market months can be dedicated to establishing customer and community relationships. The market goals for each season could also be more clear, consistent, objective and measureable to ensure market staff understands what success looks like. This could be established with an annual market kick-off meeting required for staff, community partners, volunteers and customers to generate excitement towards a common vision. Lastly, the market customers and the communities in which the markets are held should be more involved in the process year-round potentially through a market leadership council to regularly gather feedback and get the community to own their solutions to food access problems.

Mobile markets are also not a coverall solution for community food access issues, and communities should consider supplementing mobile markets with other food access programs, such as incentivizing grocery stores to move to food deserts; partnering with corner stores to stock fresh produce; and providing easier access to farther away grocery stores through more transportation options.

Shape Up Somerville is an example of a pilot program that can be used as a baseline for collecting more formal data to demonstrate the benefits of a mobile farmer's market. An extended evaluation at multiple locations throughout the United States could demonstrate the ability to replicate its results in other low-income, low-access areas. In recent decades, there has been a strong demand for public health practitioners to leverage and identify the evidence of effectiveness for various policies and programs. This concept called evidence-based public health practice can be defined as “the development, implementation, and evaluation of effective programs and policies in public health through the application of principles of scientific

reasoning, including systematic uses of data and information systems and appropriate use of behavioral science theory and program planning models” (HealthyPeople 2020, 2010, p. 4). This stringency and rigor is a necessity, especially in the world of limited public funding, because any ineffective intervention means a lost investment and opportunity to improve the conditions for people to be healthy. As a result, the CDC now commonly requires that applicants who respond to Funding Opportunity Announcements use evidence-based interventions supported by credible sources (HealthyPeople 2020, 2010). Thus, an extended study with more formal data would be a worthwhile investment to ensure future funding.

The Somerville Mobile Farmer’s Market is part of an important trend that should be expanded. Mobile farmers’ markets address the concerning obesity epidemic and the issue of health disparities within the United States and although the markets are one of numerous options for public health officials to consider for limited funding, there is growing evidence of their popularity and viability in mixed-income and mixed ethnicity areas. Furthermore, given the flexibility of mobile farmers’ markets, they could potentially be a broad solution for all economic and ethnic groups to help address the obesity epidemic that our nation currently faces.

REFERENCES

- Algert, S., Lewis, D., & Agrawal, A. (2006). Disparities in access to fresh produce among food pantry clients in Los Angeles. *The Journal of the Federation of American Societies for Experimental Biology*. doi: <http://dx.doi.org/10.1016/j.amepre.2006.01.009>
- Byers, T., & Sedjo, R. L. (2007). Public Health Response to the Obesity Epidemic: Too Soon or Too Late? *Journal of Nutrition* (137), 488-492. Retrieved from <http://jn.nutrition.org/content/137/2/488.full.pdf+html>
- Caballero, B. (2007). The Global Epidemic of Obesity: An Overview. *Epidemiologic Reviews*, 29 (1), 1-5. doi: 10.1093/epirev/mxm012
- Centers for Disease Control and Prevention. (2009). Recommended community strategies and measurements to prevent obesity in the United States. *Morbidity and Mortality Weekly Report*. Retrieved from <http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5807a1.htm>
- City of Somerville. (2015). *About Somerville*. Retrieved November 8, 2015, from City of Somerville Website: <http://www.somervillema.gov/about-somerville>
- Cummins, S., & Macintyre, S. (1999). The location of food stores in urban areas: a case study in Glasgow. *British Food Journal*, 101:7 545-553. doi:10.1108/00070709910279027
- Golan, E., Stewart, H., Kuchler, F., & Dong, D. (2008, November 1). Can Low-Income Americans Afford a Healthy Diet? *Food Choices & Health*. doi: 10.1097/NT.0b013e3181c29f79
- Golden, S. (2015, April). *Environmental and Policy Strategies for Promoting Healthy Behaviors*. Retrieved December 14, 2015, from Social and Behavioral Sciences in Public Health: https://sakai.unc.edu/access/lessonbuilder/item/14281/group/349b1ef5-dc90-4cab-b3a7-81e210e27c0e/transcripts/Environmental_and_Policy_Strategies.pdf

- HealthyPeople.gov. (2014). *Nutrition and Weigh Status Overview*. Retrieved October 27, 2015, from HealthyPeople2020: <http://www.healthypeople.gov/2020/topics-objectives/topic/nutrition-and-weight-status>
- Leggat, M., Kerker, B., Nonas, C., & Marcus, E. (2012). Pushing Produce: The New York City Green Carts Initiative. *Journal of Urban Health : Bulletin of the New York Academy of Medicine*, 89(6), 937–938. doi:10.1007/s11524-012-9688-4
- Ogden CL, C. M. (2014). Prevalence of Childhood and Adult Obesity in the United States,. *Journal of the American Medical Association* , 311 (8), 806-814. doi:10.1001/jama.2014.732.
- Shape Up Somerville. (2011). *A Decade of Shape Up Somerville: Assessing Child Obesity Measures 2002-2011*. Somerville, MA: Shape Up Somerville.
- Singh, G., Kogan, M., & Van Dyck, P. (2008). Racial/ethnic, socioeconomic, and behavioral determinants of childhood and adolescent obesity in the United States: analyzing independent and joint associations. *Annals of epidemiology*, 18 (9), 682-695. doi: <http://dx.doi.org/10.1016/j.annepidem.2008.05.001>
- Singleton, C., Sen, B., & Affuso, O. (August 2015). Disparities in the Availability of Farmers Markets in the United States. *Environmental Justice*, 135-143. doi: 10.1089/env.2015.0011.
- Somerville Mayor's Office of Strategic Planning & Community Development. (2012). *SomerVision Comprehensive Plan 2010-2030*. Somerville: City of Somerville.
- Stulberg, B. (2014). The Key to Changing Individual Health Behaviors: Change the

Environments That Give Rise to Them. *Harvard Public Health Review*. Retrieved from <http://harvardpublichealthreview.org/the-key-to-changing-individual-health-behaviors-change-the-environments-that-give-rise-to-them/>

The Food Trust. (2010). *The Grocery Gap: Who has Access to Healthy Food and Why It Matters*. Retrieved from http://thefoodtrust.org/uploads/media_items/grocerygap.original.pdf

U.S. Department of Health and Human Services. (2010, February 10). *Obama Administration Details Healthy Food Financing Initiative*. Retrieved November 2, 2015, from U.S. Department of Health and Human Services: <http://www.hhs.gov/libproxy.lib.unc.edu/news/press/2010pres/02/20100219.a.html>

United States Department of Agriculture . (n.d.). *Food Deserts*. Retrieved December 14, 2015, from Agriculture Marketing Service: <https://apps.ams.usda.gov/fooddeserts/fooddeserts.aspx>

US Department of Agriculture, Agricultural Marketing Service. (2011). *Farmers Market Growth: 1994-2011 Number of Operating Farmers Markets*. Retrieved December 14, 2015, from <https://www.ams.usda.gov/>

US Department of Agriculture, Office of the Chief Financial Officer. *Strategic Plan FYI 2010-2015*. Washington D.C. Retrieved Retrieved December 14, 2015, from <https://www.ams.usda.gov/about-ams/strategic-plan>