

# Farmers' Market Use Patterns Among Supplemental Nutrition Assistance Program Recipients With High Access to Farmers' Markets

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## ABSTRACT

**Objective:** Evaluate farmers' market (FM) use patterns among *Supplemental Nutrition Assistance Program* (SNAP) recipients.

**Design:** Cross-sectional survey administered June to August, 2015.

**Setting:** Cleveland and East Cleveland, OH.

**Participants:** A total of 304 SNAP recipients with children. Participants lived within 1 mile of 1 of 17 FMs. Most were African American (82.6%) and female (88.1%), and had received SNAP for  $\geq 5$  years (65.8%).

**Main Outcome Measures:** Patterns of FM shopping, awareness of FM near home and of healthy food incentive program, use of SNAP to buy fruits and vegetables and to buy other foods at FMs, receipt of healthy food incentive program.

**Analysis:** Two-stage cluster analysis to identify segments with similar FM use patterns. Bivariate statistics including chi-square and ANOVA to evaluate main outcomes, with significance at  $P \leq .05$ .

**Results:** A total of 42% reported FM use in the past year. Current FM shoppers ( $n = 129$ ) were segmented into 4 clusters: single market, public market, multiple market, and high frequency. Clusters differed significantly in awareness of FM near home and the incentive program, use of SNAP to buy fruit and vegetables at FMs, and receipt of incentive.

**Conclusions and Implications:** Findings highlight distinct types of FM use and had implications for tailoring outreach to maximize first time and repeat use of FMs among SNAP recipients.

**Key Words:** *Supplemental Nutrition Assistance Program*, diet habits, health communication, farmers' market, fruit, vegetables (*J Nutr Educ Behav.* 2017;49:397-404.)

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## INTRODUCTION

Chronic disease accounts for nearly half of the US health burden.<sup>1</sup> To reduce diet-related chronic disease trends and disparities, the Centers for Disease Control and Prevention, US Department of

Agriculture, and Institute of Medicine made independent recommendations for wide-scale implementation of interventions such as farmers' markets (FM) to increase nutritious food access within communities.<sup>2-4</sup> Implementation of FM interventions may address structural

barriers such as the lack of healthy food stores in communities and high food costs that limit access to healthy foods particularly among low-income populations.<sup>5,6</sup>

Shopping at FMs is associated with improved fruit and vegetable (FV) consumption.<sup>7-9</sup> Given low levels of FV consumption and high rates of diet-related chronic disease among low-income Americans including those receiving *Supplemental Nutrition Assistance Program* (SNAP) benefits, strategies to promote use of FMs are needed as these interventions are being implemented.<sup>10-12</sup> This is especially true for SNAP populations who use FMs less frequently.<sup>13</sup> Research aimed at understanding FM shopping patterns may be used to tailor FM interventions to promote use among low-income populations.

In this research, segmentation analysis was conducted to examine different

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patterns of FM use among SNAP recipients living in communities with relatively high access to FMs accepting SNAP benefits and offering monetary healthy food incentive programs.<sup>14</sup> Healthy food incentive programs subsidize the costs of purchasing FVs at FMs to promote affordability.<sup>15</sup> Farmers' market implementation in these communities includes recommended strategies to promote accessibility and affordability of FVs.<sup>16</sup> The current study provided a unique opportunity to examine variability in FM use among parents and caregivers receiving SNAP within this context of FM implementation. The researchers' main objective was to evaluate the range of FM use patterns among the target population. In addition, the relationship between these patterns and FV consumption was explored.

## METHODS

### Study Context

Data were collected in 2015 in Cleveland and East Cleveland, OH, 2 adjacent municipalities (about 400,000 residents) with a significant number of census tracts that were low-income with low access to full-service supermarkets (ie, food deserts).<sup>17</sup> The majority of residents in Cleveland (53.3%) and East Cleveland (93.2%) were African American with more than one third of the households receiving SNAP.<sup>18,19</sup>

Cleveland and East Cleveland represented a unique setting for studying the use of FMs among SNAP recipients.<sup>20</sup> These municipalities had higher access to FMs (3.3 markets per 100,000 residents) compared with state and national trends (2.3 and 2.5 per 100,000 residents, respectively).<sup>21</sup> This included both producer FMs (eg, people growing or making foods to sell at FMs) and a public market with both producer vendors and wholesale vendors (ie, people who resell others' products). Since 2010, a healthy food incentive program had been implemented to promote SNAP use at FMs in these communities. The incentive program provided a \$1 match for every \$1 in SNAP benefits spent at an FM, matching up to \$10 daily; SNAP benefits could be used to purchase any SNAP-eligible products, but matching funds could only be used to purchase FVs.<sup>22</sup>

### Participants and Recruitment

The study was approved by the Institutional Review Board of Case Western Reserve University. Participation was limited to those living within 1 mile of an FM to control for spatial access. The researchers identified all FMs in Cleveland and East Cleveland that opened in 2014 to 2015 and that were located in or adjacent to at least 1 census tract with a SNAP participation rate of  $\geq 30\%$ . This resulted in 17 FMs that met inclusion criteria. All FMs accepted SNAP; 11 offered healthy food incentive programming. Three FMs were open year round and 14 were open seasonally. As shown in the [Figure](#), the combined area around each of the 17 FMs was 32.5 square miles; this served as the target area from which to sample participants. Within this target area, inclusion criteria for individuals were to have residence in the targeted geographic area  $\geq 1$  year, to receive SNAP currently, to have child(ren) aged  $\leq 18$  years in the household, to be responsible for household food shopping, to speak English or Spanish, and to be aged  $\geq 18$  years. One adult per household could participate.

Recruitment and data collection were conducted simultaneously (June to August, 2015) by 6 trained research assistants. Recruitment occurred at public locations with high numbers of SNAP or SNAP-eligible populations including offices where SNAP benefits and social services were provided (37.0% of the current sample recruited), emergency food assistance sites (23.3%), neighborhood centers (15.2%), and FMs (3.1%). In addition, interested individuals called the study phone line in response to fliers and word of mouth to join the study (21.4%).

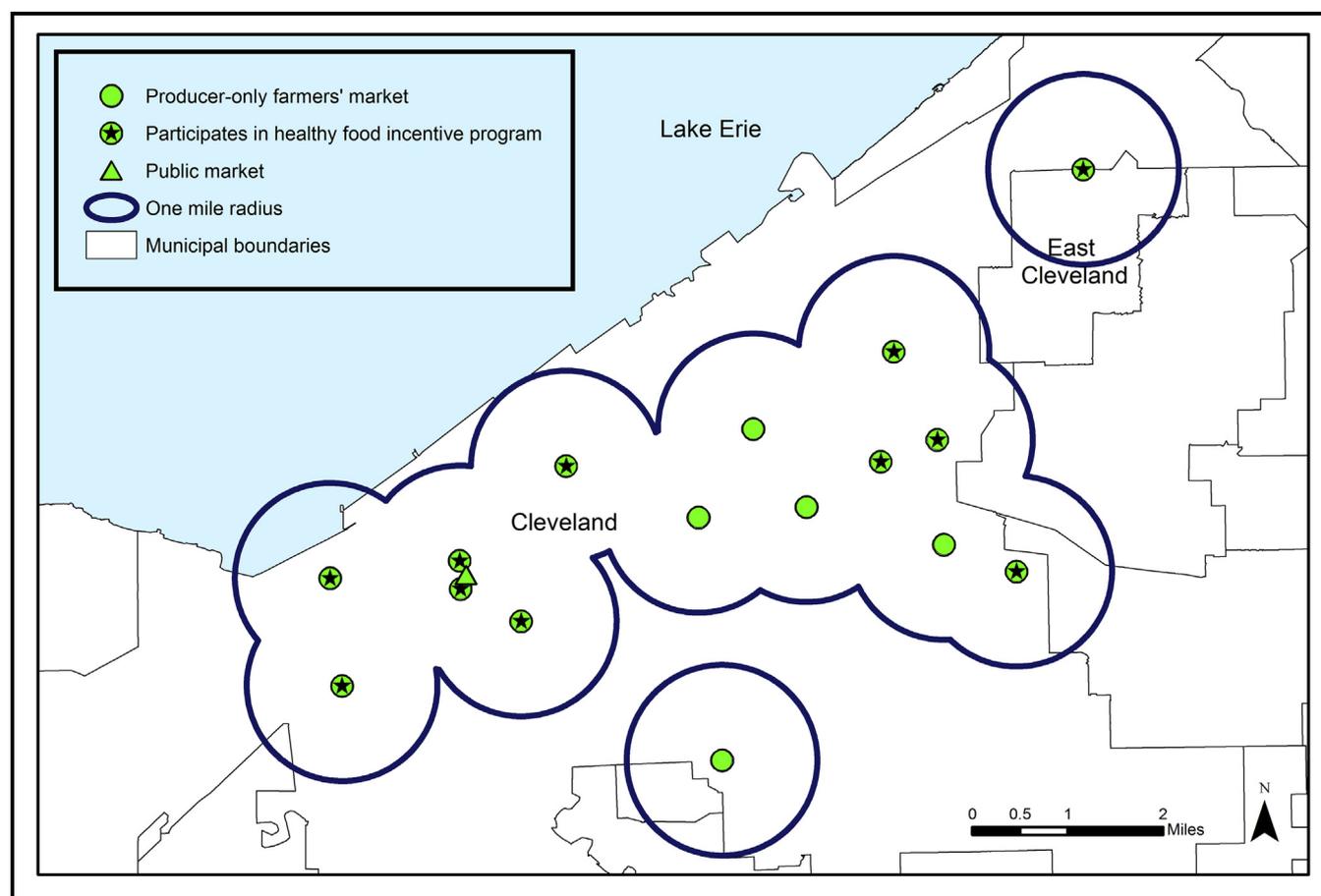
Study personnel approached 1,182 individuals about the study at 37 recruitment events at 17 community-based sites; 910 (76.8%) completed the eligibility screener and 360 (39.6%) were eligible. Most were ineligible because they lived outside the target geographic area or did not receive SNAP. A total of 355 individuals (98.7% of eligible participants) provided written consent to join the study, of whom 322 (90.7%) completed the survey. This analysis focused on 304 participants with complete data. Participants were compensated with a \$25 supermarket gift card.

### Procedures

Participants completed a 35- to 45-minute close-ended survey administered orally in person or by telephone by trained research assistants. The cross-sectional survey assessed topics related to food shopping, diet, and demographic information using both existing items and questions developed for this survey.<sup>23,24</sup> The current analysis was limited to questions regarding FM shopping behaviors over the past year (2014 to 2015) including frequency of FM shopping, use of SNAP at FMs, and receipt of the healthy food incentive ([Supplementary Material](#)). Those reporting past year FM use were asked to indicate name and location of each FM where they shopped, including specific months of shopping and preferred FM location. Participants reported awareness of both FMs in their neighborhood and the incentive program. Assessment of incentive program awareness and use was obtained by first stating the program name and then providing a brief description and a marketing flier. Those interviewed by phone were not shown the flier. Participants were asked to identify their main transportation to the store where they did most food shopping. Frequency of daily FV consumption was assessed using a 6-item screener and scoring procedures.<sup>23,25</sup> The survey was pilot-tested to refine item wording and instructions before data collection.

### Data Analysis

Descriptive analyses were tabulated and reported. Among those reporting past year use of an FM, Euclidian distance measures were calculated from participants' self-reported home address to their preferred FM location using the point distance tool in ArcGIS 10.2 (Environmental Systems Research Institute, Redlands, CA; 2011). A 2-stage cluster analysis approach was used to identify subgroups or segments of participants with similar FM use patterns. Variables considered for this analysis included the number of FM visits, shopping in the past year at a single FM vs multiple FMs, singular use of the public market, and the number of months and seasons in the past year in which participants shopped at an FM. Each variable was converted to a z-score to have a comparable



**Figure.** Cross-sectional survey target area created by 1-mile radius around farmers' markets in Cleveland and East Cleveland, OH. The target area includes 17 farmers' markets open in 2014 to 2015 located near census tracts with  $\geq 30\%$  *Supplemental Nutritional Assistance Program* participation rates. All markets accept *Supplemental Nutritional Assistance Program* benefits. Cleveland-Cuyahoga County Food Policy Coalition provided the data. The figure was created using ArcMap 10.2 (Environmental Systems Research Institute, Redlands, CA; 2011).

metric. First, the researchers used a hierarchical cluster analysis to determine the number of clusters to retain. Next, a K-means cluster analysis was conducted with the specified number of clusters. The association of the 5 variables with the resulting clusters was evaluated using ANOVA to confirm that each variable differed significantly between at least 2 of the identified patterns, and thus contributed to distinct combinations of FM use patterns. Those features that differed by  $>0.5$  SDs from the overall mean were used to generate descriptive cluster labels. Next, associations among the clusters and demographics, awareness of FMs and the healthy food incentive program, and FV consumption were assessed using bivariate statistics including chi-square and ANOVA. Finally, a Kruskal-Wallis test was conducted to evaluate differences between shopping patterns and median daily frequency of FV consumption. All associations

were evaluated at  $P \leq .05$ . With a sample size of 304 distributed across 6 groups and a 2-sided test with a  $P \leq .05$ , there was 90% power to detect a medium effect size ( $\phi = 0.3$ ) with a chi-square test of independence and a medium effect size with an ANOVA ( $d = 0.5$ ). IBM SPSS Statistics for Windows (version 23, IBM Corp, Armonk, NY) was used for statistical analyses.

## RESULTS

**Table 1** summarizes sample characteristics of parents and caregivers receiving SNAP benefits who completed the survey ( $n = 304$ ). Most were female (88.1%) and African American (82.6%), were not currently employed (69.4%), had an annual household income  $< \$10,000$  (67.8%), and had received SNAP for  $\geq 5$  years (65.8%). Most (61.8%) had 1 adult with  $\geq 2$  children living in the household. Most (57.9%)

reported reliance on alternative modes of transportation other than their own car (eg, bus, ride) to get to the store where most of their food shopping occurred. About one third of participants (34.2%) reported that their health status was fair or poor.

Overall, awareness of FMs and the healthy food incentive program was low. Most participants (59.2%) were not aware of an FM located near where they lived although all lived within 1 mile of an FM. Similarly, the majority (74.6%) were not aware of the healthy food incentive program. Nonetheless, 68.1% reported that they had shopped at an FM at least once in their lifetime and 42.4% had shopped at an FM in the past year. Frequency of shopping at an FM within the past year ranged from 17.8% shopping 1–2 times to 14.8% shopping 3–6 times and 9.9% shopping  $\geq 7$  times. Among those who had ever shopped at an FM, 72.1% reported using SNAP benefits

**Table 1.** Characteristics of Supplemental Nutrition Assistance Program Recipients (n = 304) From Cleveland and East Cleveland, OH, Who Participated in a Cross-sectional Survey in 2015

Characteristics	n (%)
Gender	
Male	36 (11.9)
Female	267 (88.1)
Race	
White	27 (8.9)
Black	251 (82.6)
Hispanic/Latino	9 (2.9)
Multiple races	17 (5.6)
Age, y	
18–27	67 (22.0)
28–37	106 (34.9)
38–47	61 (20.1)
≥48	69 (22.7)
Missing	1 (0.3)
Level of education	
Some high school or less	73 (24.0)
High school graduate	131 (43.1)
College or more	100 (32.9)
Annual household income	
<\$10,000	206 (67.8)
≥\$10,000	93 (31.0)
Missing	5 (1.6)
Length of time receiving Supplemental Nutrition Assistance Program benefits, y	
<1	14 (4.6)
1–2	33 (10.9)
3–4	52 (17.1)
≥5	200 (65.8)
Missing	5 (1.6)
Employment status	
Employed for wages	93 (30.6)
Not employed for wages	211 (69.4)
Transportation to primary food shopping	
Have own car	128 (42.1)
Does not have own car	176 (57.9)
Partnered or married status	
Partnered or married	42 (13.8)
No partner	259 (85.2)
Missing	3 (1.0)
Adults in household, n	
1	182 (59.9)
≥2	121 (39.8)
Missing	1 (0.3)
Children in household, n	
1	115 (37.8)
≥2	188 (61.8)
Missing	1 (0.3)
General health status	
Excellent	31 (10.2)
Very good	47 (15.5)
Good	121 (39.9)

(continued)

to purchase FVs. Among those shopping at 1 of the FMs offering the healthy food incentive program, 26.3% reported receipt of the incentive.

Overall, 31.9% of participants had never shopped at an FM and 25.7% had not shopped at an FM in the past year. Among the 129 participants who had shopped at an FM in the past year, the median distance to their primary FM was 2.3 miles, which indicated that participants did not necessarily shop at their nearest FM. The cluster analysis of participants who shopped at an FM in the past year yielded 4 distinct groups; all variables included in the analysis significantly contributed to distinguishing the groups (Table 2). The first cluster, single market shoppers, included 41.2% of current FM shoppers who exclusively used a single producer FM, and made an average of 3.2 visits to an FM during an average of 2.4 months over 1.5 seasons. The second cluster, public market shoppers, included 30.2% of current FM shoppers. This group was distinct in its exclusive use of the public market that was open year round. The third cluster, multiple market shoppers, included 23.3% of current FM shoppers using ≥2 FMs in the past year. Including both producer and public markets, their mean number of FM visits was nearly twice as high as the single market cluster (5.9 vs 3.2, respectively). The fourth cluster of high-frequency shoppers included 5.4% of current FM shoppers. This cluster was small, yet distinct in its high number of FM visits in the past year.

Next, the researchers explored the relationship among the 6 clusters (including never and not in the past year FM shoppers) and the following outcomes: awareness of (1) FMs near the home and (2) of the healthy food incentive program; use of SNAP to buy (3) FVs at FMs and (4) other foods at FMs; and (5) receipt of the healthy food incentive program (Table 3). The clusters differed significantly based on level of education and mode of transportation for primary food shopping but did not differ based on the other socio-demographic factors listed in Table 1. In addition, the clusters differed significantly regarding participants' awareness of FMs in their neighborhood ( $P < .001$ ) and the incentive program ( $P = .001$ ), use of SNAP to buy FVs at FMs

Table 1. Continued

Characteristics	n (%)
Fair	84 (27.7)
Poor	20 (6.6)
Farmers' market use	
Never	97 (31.9)
Not in past year	78 (25.7)
1–2 times in past year	54 (17.8)
3–6 times in past year	45 (14.8)
≥7 times in past year	30 (9.9)

( $P = .03$ ), and receipt of the incentive program ( $P = .05$ ). Participants who did not shop at an FM in the past year reported less awareness of an FM in their neighborhood. Only 13.4% of those who never shopped at an FM in their lifetime were aware of the incentive program. Among current FM shoppers, 38.5% of the public market cluster was aware they had an FM in their neighborhood; awareness rates were much higher for multiple market (66.7%), single market (69.8%), and high-frequency (71.4%) clusters. The public market cluster also reported low awareness of the incentive program. The public market did not offer the incentive program during the study time frame. Most individuals in the high-frequency cluster (71.4%) reported awareness of FMs in their neighborhood. The multiple market cluster reported the highest awareness of the incentive program; 43.3% of the people in this cluster self-reported that they were aware, yet only 13.3% in reported receipt of the incentive. Use of SNAP at FMs to

buy FVs was high across all clusters, with 100% of the high-frequency shoppers reporting use. Participants in the high-frequency (28.6%) and single market (26.9%) clusters self-reported the highest receipt of the incentive.

Finally, the researchers examined the relationship between daily FV consumption and both FM shopping frequency and the FM shopping clusters. Overall, participants self-reported that they ate fruit a median of 1.1 times/d (interquartile range, 1.6 times/d) and vegetables a median of 1.3 times/d (interquartile range, 1.6 times/d). There was a statistically significant difference in median daily fruit consumption based on the frequency of FM use. Those shopping at an FM at least once in the past year reported that they ate fruit 1.3 times/d, compared with 0.8 times/d among those who never shopped at an FM ( $P = .002$ ). Daily fruit consumption also differed significantly by shopping clusters ( $P = .004$ ). High-frequency shoppers reported the highest daily fruit consumption (2.0 times/d).

## DISCUSSION

Results provide novel data examining FM use patterns among a sample of parents and caregivers receiving SNAP benefits who lived in low-income, urban neighborhoods with high access to FMs that accepted SNAP benefits and offered a healthy food incentive. Within the context of real-world implementation of this multicomponent FM approach, 68.1% of participants reported use of an FM at least once in their lifetime and 42.4% had shopped at an FM in the past year. Both the number of FMs in the study context and FM shopping trends among study participants were substantially higher than national trends. National trends revealed that about 2% of SNAP households shopped at an FM at least once in the past year and that about 25% went repeatedly (ie,  $\geq 3$  times in a year).<sup>13</sup> The availability of multiple FMs within a community offers flexibility with respect to day and time for shopping. Moreover, these FMs may include different vendors offering different products. Taken together, these combine to heighten opportunities for habituating FMs into food shopping routines to achieve dietary goals.<sup>26</sup>

The current findings provided evidence that implementing a multicomponent FM approach that includes establishment of markets in low-income neighborhoods, acceptance of SNAP benefits for payment, and availability of healthy food incentive programming may increase FM use among SNAP populations. In 2013, 21.0% of FMs in the US accepted SNAP benefits for payment.<sup>21</sup> However, recent initiatives

**Table 2.** Defining Characteristics of Farmers' Market Shopping Clusters Among Supplemental Nutrition Assistance Program Recipients (n = 129) Reporting Use of Farmers' Markets During Past Year

Defining Characteristics	Single Market	Public Market	Multiple Market	High-Frequency Shoppers (n = 7)	F/ $\chi^2$	P
	Shoppers (n = 53)	Shoppers (n = 39)	Shoppers (n = 30)			
Farmers' market shopping in past year (mean [range])						
Total mo	2.4 (1–7)	3.6 (1–7)	3.5 (2–8)	6.0 (5–7)	9.3	< .001
Seasons, n	1.5 (1–3)	1.8 (1–3)	2.1 (1–4)	2.9 (2–4)	10.5	< .001
Farmers' market visits, n	3.2 (1–12)	3.9 (1–12)	5.9 (2–15)	27.9 (20–40)	109.9	< .001
Use of multiple farmers' markets (%) <sup>a</sup>	0	0	100.0	28.6	121.3	< .001
Use of public market only (%)	0	100.0	0	28.6	122.4	< .001

<sup>a</sup>Multiple farmers' markets included use of both producer markets where people growing and making food sold directly at market and a public market that included both producer and wholesale vendors.

Note: F value was determined using ANOVA.

**Table 3.** Differences Between Farmers' Market Shopping Clusters and Awareness and Use of Farmers' Markets and Patterns of Fruit and Vegetable Consumption Among Supplemental Nutrition Assistance Program (SNAP) Recipients (n = 304)

Outcome Variables	Did Not Shop at FM in Past Year		Shopped at FM in Past Year				All Category Comparisons <sup>d</sup>	
	Never <sup>a</sup> (n = 97)	Ever <sup>b</sup> (n = 78)	Public Market (n = 39)	Single Market (n = 53)	Multiple Market (n = 30)	High Frequency (n = 7)	$\chi^2$	P
Awareness of (n [%])								
Farmers' market near home	23 (23.7)	24 (30.8)	15 (38.5)	37 (69.8)	20 (66.7)	5 (71.4)	44.6	< .001
Healthy food incentive program	13 (13.4)	20 (25.6)	7 (17.9)	21 (39.6)	13 (43.3)	3 (42.9)	20.4	.001
Use of (n [%])								
SNAP to buy fruits and vegetables at farmers' market	— <sup>c</sup>	44 (56.4)	29 (74.4)	33 (62.3)	24 (80.0)	7 (100.0)	11.0	.03
SNAP to buy food such as honey, cheese, or eggs at farmers' market	— <sup>c</sup>	27 (34.6)	23 (59.0)	22 (41.5)	15 (50.0)	5 (71.4)	9.0	.06
Healthy food incentive	— <sup>c</sup>	8 (10.4)	3 (7.7)	14 (26.9)	4 (13.3)	2 (28.6)	9.7	.05
Times per day consumed (median [interquartile range])								
Fruit	0.7 (1.7)	1.0 (1.7)	1.3 (2.3)	1.2 (1.8)	1.4 (2.2)	2.0 (1.8)	17.1	.004
Vegetables	1.2 (1.6)	1.3 (1.9)	1.4 (1.3)	1.3 (1.2)	1.8 (1.8)	1.1 (2.2)	4.7	.46
Fruits and vegetable	2.1 (2.6)	2.5 (2.7)	3.0 (2.9)	3.1 (2.6)	3.4 (4.2)	3.1 (4.4)	9.9	.08

FM indicates farmers' market.

<sup>a</sup>Never shopped at farmers' market in lifetime; <sup>b</sup>Shopped at farmers' market at least once but not in the past 12 months;

<sup>c</sup>Participants who never shopped a farmers' market were not applicable to behavior; <sup>d</sup>Chi-square scores were from Kruskal-Wallis test.

by the US Department of Agriculture aimed to increase SNAP payment systems at FMs substantially, which will be a critical step to promote FM use among populations receiving SNAP.<sup>27,28</sup> Comprehensive implementation of healthy food incentive programs were found to further the reach of FMs among SNAP recipients.<sup>29</sup> However, even when SNAP is accepted and incentives are offered, efforts are needed to address obstacles to first-time and repeat use of FMs among low-income populations, such as lack of awareness about the acceptance of SNAP at FMs and transportation barriers.<sup>30</sup>

Understanding FM use patterns may inform future intervention efforts that are tailored for different populations receiving SNAP.<sup>14</sup> Further investigations among SNAP recipients who are high-frequency FM shoppers may illuminate factors that facilitated successful integration of FM use into regular food shopping routines. Intervention strategies to motivate this group of high-frequency shoppers to continue to use FMs may be substantially different from the strategies needed to attract a first-time customer or to reengage a customer who used an FM in the past but who does not currently shop at this food retail outlet.

Findings from this study illuminated the importance of integrating communication and outreach strategies into FM implementation. With the exception of the public market cluster found in this research, current FM shoppers were more than twice as likely to be aware that they had an FM located near their residence, compared with those who had not shopped at an FM in the past year. Research is needed to better understand the most effective dissemination channels and messages to raise awareness about FMs and healthy food incentive programs among low-income populations.

Finally, the current findings suggested that there may be bottlenecks to receiving healthy food incentives at FMs offering these programs. Research is needed to identify strategies to integrate healthy food incentive programming seamlessly into FM operations to ensure that low-income consumers do not feel stigmatized when using SNAP benefits at FMs.<sup>31</sup> Healthy food incentive programs are based on behavioral economic principles that suggest a small incentive may nudge a new behavior.<sup>32</sup> Findings from this study indicated that people receiving SNAP benefits reported limited awareness of the additional benefit offered by incen-

tive programs to support FV purchasing. This lack of awareness limits the nudging function of incentive interventions.<sup>33</sup> Findings from this research revealed that there may be an opportunity to be more explicit when healthy food incentives are distributed to raise awareness about the dietary benefits of this monetary intervention.

The sampling strategy allowed the researchers to control for spatial access to FMs, and thus offered a unique perspective about FM awareness and use within a setting of high access. An additional strength was the use of community and bilingual researchers who administered the surveys orally, which may have promoted trust and comprehension during data collection. Participants were recruited purposefully and may not have been representative of all families with children receiving SNAP benefits in the targeted geographic area. To promote representation, recruitment occurred in public places where SNAP populations may have been frequenting. Only 3.1% of the sample was recruited at an FM. Another limitation was the risk of recall bias related to the outcome behaviors, because participants were asked to provide responses for events during the past year.

## IMPLICATIONS FOR RESEARCH AND PRACTICE

A large body of research focused on the challenges of nutritious food access in low-income communities highlight the health implications of living in so-called food deserts.<sup>5,34,35</sup> In contrast, this study revealed a way in which urban municipalities have worked to address food access challenges through wide-scale implementation of FMs and healthy food incentive programs. Within this context, a range of FM shopping patterns were evident. Findings shed light on behavioral diversity within the population receiving SNAP and the need for tailored intervention efforts to maximize the reach of FMs to achieve health promotion goals among low-income populations.

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## SUPPLEMENTARY DATA

Supplementary data related to this article can be found at <http://dx.doi.org/10.1016/j.jneb.2017.01.007>.

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### **CONFLICT OF INTEREST**

The authors have not stated any conflicts of interest.