

Do Farmers' Markets Improve Diet of Participants Using Federal Nutrition Assistance Programs? A Literature Review

Abstract

Farmers' markets have emerged as one health strategy to improve the access and availability of fresh foods for limited-resource audiences using federal nutrition assistance programs, although their effectiveness on dietary intake is not well understood. The review reported here evaluates the strengths and weaknesses of existing research about the dietary outcomes of accessing farmers' markets, focusing on federal nutrition assistance programs tied to farmers' market initiatives. The comprehensive literature review includes a total of six total articles published between January 2005 and January 2012. The review highlights the need for more comprehensive and systematic research.

Carmen J. Byker
Assistant Professor
Montana State
University
Bozeman, Montana
carmen.byker@montana.edu

Sarah Misyak
Ph.D. student
Virginia Tech
Blacksburg, Virginia
smiskyak@gmail.com

Justin Shanks
Ph.D. student
Virginia Tech
Blacksburg, Virginia
jshanks@vt.edu

Elena L. Serrano
Associate Professor,
Extension Specialist
Virginia Tech
Blacksburg, Virginia
serrano@vt.edu

Introduction

Obesity is inversely related to income (Chang & Lauderdale, 2005), potentially due to limited access to healthy foods (Beulac, Kristjansson, & Cummins, 2009; Larson, Story, & Nelson, 2009). The use of federal nutrition assistance programs at farmers' markets is being promoted as a potential strategy to increase access and availability of healthy foods for low-income populations in communities, as demonstrated by federal funding mechanisms like the Farmers Market Promotion Program (Kim, 2011). Federal nutrition assistance programs, including the WIC Farmers Market Nutrition Program (WIC FMNP) (USDA, 2011a) and the Senior Farmers Market Program (SFMNP) (USDA, 2011b), provide vouchers to low-income individuals to purchase fruits and vegetables at farmers' markets. The establishment of electronic benefit transfer (EBT) (USDA, 2010) at farmers' markets offers opportunities for individuals to purchase fresh produce, edible plants, meats, eggs, seeds, and dairy (including cheese) from farmers' markets using Supplemental Nutrition Assistance Program (SNAP) benefits.

These federal nutrition assistance programs are meant to be an environmental intervention in a community that increases access to healthy foods like fruits and vegetables (Freedman et al., 2012). Despite considerable support for these environmental level interventions, the efficacy of federal nutrition assistance programs at farmers' markets on dietary intake has not been systematically

reviewed.

The purpose of the review reported here is to evaluate the strengths and weaknesses of existing research about the relationship between farmers' markets that accept federal nutrition assistance programs and dietary outcomes. The review identified gaps in the literature and provides guidance about the future directions of farmers' market research and practices to better understand the intersection between farmers' markets and community health strategies that address low-income audiences.

Materials and Methods

The literature review included all peer-reviewed research articles published from 2005 and 2012 that aimed to improve diet through use of a federal nutrition program at a farmers' market. The date range was selected given the considerable growth in farmers' markets since the end of 2004 (USDA, 2011c). Social and behavioral science peer-reviewed articles were identified using ISI Web of Knowledge, PubMed, Informaworld, ScienceDirect, and Google Scholar databases. Searches included combining the term "farmers' market" in several ways, with the keywords access, availability, location, price, food security, poverty, socioeconomic status, low-income, hunger, food insecurity, nutrition program, Supplemental Nutrition Assistance Program (SNAP), EBT (electronic benefit transfer), Women, Infants, and Children (WIC), (Senior Farmers Market Nutrition Program (SFMNP), food stamp, food bank, or Farmers Market Nutrition Program (FMNP). We searched for additional articles by reviewing the reference lists from original research articles identified in the review.

For each pairing of search terms, titles and abstracts were read to identify articles related to interventions that aimed to improve dietary intake through use of a federal nutrition assistance program at markets. Relevant articles were retrieved and annotated by two trained researchers. Six articles met the review criteria (Herman, Harrison, Afifi, & Jenks, 2008; Herman, Harrison, & Jenks, 2006; Racine, Smith Vaughn, & Johnson, 2010; Kropf, Holben, Holcomb, & Anderson, 2007; Lee, Fischer, & Johnson, 2010; Grace, Grace, Becker, & Lyden, 2008). Diet-related outcomes examined in the review included: sociodemographic information, dietary recalls and self-report, federal nutrition assistance program participation, barriers and benefits, height, weight, basal metabolic rate, and household food security (Table 1).

Table 1.

Research Studies Promoting Farmers' Markets as a Health Promotion Tool Related to Dietary Outcomes of Federal Nutrition Assistance Programs

Authors	Study Design	Study Population	Study Location	Study Details	Study Measures	Main Findings
(Grace, Grace, Becker, & Lyden, 2008)	Case-Study	Low-income Women	Portland, OR	Challenges for farmers' market patronage by food stamp participants	Survey and Interviews	Low market attendance and fruit and vegetable intake were reported. Barriers included price,

						convenience, quality and variety.
(Herman, Harrison, & Jenks, 2006)	Non-equivalent control group design	Low-income Women Minority	Los Angeles, CA	Effectiveness of WIC vouchers	Survey and Dietary Recall	Vouchers increased fruit and vegetable access as they were redeemed at farmers' markets, but dietary intake was not measured.
(Herman, Harrison, Afifi, & Jenks, 2008)	Non-equivalent control group design	Low-income Women Minority	Los Angeles, CA	Effectiveness of WIC vouchers	Survey and Dietary Recall	Vouchers decreased total energy intake and increased fruit and vegetable consumption by an average of 1.4 servings.
(Kropf, Holben, Holcomb, & Anderson, 2007)	Cross-sectional	Low-income Women	Athens, Ohio	A comparison of the effect WIC vs. WIC FMNP on perceived benefits	Survey	Education level, vegetable intake, perceived benefit of produce consumption, and perceived diet quality was higher in the WIC FMNP participants.
(Lee, Fischer, & Johnson, 2010)	Review	Low-income	Georgia	SFMNP participants	Survey	Streamlining SFMNP pre-registration and voucher programs increased voucher redemption and fruit and vegetable intake.
(Racine, Smith Vaughn, & Laditka, 2010)	Quasi-experimental	Low-income Women Minority	Charlotte, NC and Washington DC	The effect of previous enrollment in WIC FMNP on farmers' market attendance and diet quality	Survey	Former participants in WIC FMNP were more likely to shop at farmers' markets, had higher produce consumption, and higher fat intake (explained by the

						use of salad dressing).
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Results

The analysis of the effectiveness of farmers' markets on diet outcomes lies within the hallmark federal nutrition assistance programs, including WIC FMNP, SFMNP, and EBT (SNAP). The following results first address a brief history of each federal nutrition assistance program and then focus specifically on studies that address dietary impacts.

WIC FMNP

Congress founded the WIC FMNP in 1992 to increase fruit and vegetable access and intake for WIC participants and increase market sales for vendors (USDA, 2011c). Those eligible for the WIC Program are concurrently qualified for WIC FMNP, which now operates in 46 states and Indian Tribal Organizations (USDA, 2012). For participating states, the FMNP program is added onto the existing WIC. Federal funds (between \$10 and \$30 per recipient per year) are distributed to the state, which then adds FMNP coupons to regular WIC benefits. Many of the involved state agencies choose to match these funds and provide nutrition education to increase the total FMNP benefit. In 2009, 2.2 million WIC recipients acquired benefits from FMNP, which ultimately generated \$20 million in revenue for farmers (USDA, 2011c).

Based in Los Angeles, California, Herman and colleagues (2008) analyzed the long-term effectiveness of providing vouchers (emulating WIC FMNP) for fresh produce purchase to low-income women enrolled in the WIC program. At the time of the study (2001), carrots were the only form of fresh produce provided in the food package for WIC mothers (USDA, 2011d). The study was a nonequivalent control group design with three similar sites involved (Herman et al., 2008). A total of 602 participants enrolled at one of two intervention sites or a control site. Participants at intervention sites received \$10 worth of vouchers weekly for either supermarket or farmers' market produce purchases. Participants at the control site received \$13 per month to purchase disposable diapers. Baseline 24-hour recalls were administered 2 months previous to the intervention. Interviews (where multiple pass food recalls were administered) were conducted six times for the intervention sites and four times for the control site during the study period. In addition, sociodemographic information, federal nutrition assistance program participation, height, weight, basal metabolic rate, and household food security status information was collected. Results showed that demographic characteristics were similar across sites, with a majority of participants classified as Hispanic (86.3%), an average age of 27 years old, with high school education level, and an average annual household income of approximately \$15,000 per year. Over the study period, average energy intake decreased and fruit and vegetable increased for the two intervention sites. Six months post study, an increase in fruit and vegetable intake was sustained by 1.4 servings per day for the farmers' market group and 0.8 servings per day for supermarket group. Qualitative insight provided by participants disclosed that farmers' market produce was perceived as fresher and higher in quality, possibly explaining the difference in increased intake.

In another publication based upon the same data, Herman et al. (2006) reported the types of fruits

and vegetables purchased at farmers' markets and supermarkets when given vouchers through the WIC program. The group of participants purchased a total of 34 types of vegetables and 33 types of fruits at a farmers' market and supermarket, respectively. Ten percent of the total vouchers were not redeemed. Reasons participants provided for not redeeming vouchers included: still planning to use them, being busy, having them lost or stolen, and not having a refrigerator. Upon analysis, there was no significant difference between the numbers of items purchased at each outlet, indicating that vouchers targeted towards purchase of fruits and vegetables would be redeemed equally at both farmers' markets and supermarkets in a general WIC population. However, dietary intake was only inferred through voucher redemption and not actually measured.

Racine and colleagues (2010) examined the use of farmers' markets by U.S.-born African Americans previously enrolled in the WIC FMNP. Additionally, barriers to farmers' market participation and overall dietary intake were evaluated. The quasi-experimental study was carried out through survey in WIC appointment waiting rooms in Charlotte, North Carolina (n=108) and Washington DC (n=71). Demographic information was collected through the WIC program. At the time of the study Charlotte did have a WIC FMNP, and Washington DC did not have a WIC FMNP. The survey asked about farmers' market utilization and reasons for non-utilization, participation and redemption of vouchers in the FMNP, and dietary intake (using National Cancer Institute 17-item Multifactor Screener). Results showed that demographics were not different among locations, with an average age of 24 years old, high school education level, and 7.5 servings of fruits and vegetables per day. Participants with no previous experience using the FMNP in Charlotte (32.4%) and DC (40%) had infrequently shopped at farmers' markets. Respondents who previously participated in the FMNP were more likely to shop at farmers' markets and reported increased produce consumption levels and higher intake of fat (attributed to use of salad dressing). Age or education level had no significant impact on participation in the FMNP or farmers' markets in general. Location and transportation were the most frequently cited barriers to shopping at the farmers' market. This article provides evidence that women who previously use WIC FMNP are likely to return to a farmers' market and that farmers' market use had positive impacts on fruit and vegetable intake. As such, the publication stresses the importance of reducing initial barriers and promoting farmers' market use among WIC populations.

Kropf et al. (2007) aimed to distinguish differences in food security status, fruit and vegetable intake and behavior, and education level between women participating in the WIC program alone and WIC FMNP. A cross-sectional survey was sent via mail to 1,076 female heads of households participating in Athens County, Ohio WIC in November 2005. Different surveys were sent to participants in WIC FMNP (n=246, response n=65) and WIC alone (n=830, response n=170). Surveyed differences include: food security status, fruit and vegetable intake and behaviors, perceived diet quality, and education level. Measurements (all validated) included demographics, the US Household 18-item Food Security Survey Model, a 13-item Tool to Assess Psychosocial Indicators of Fruit and Vegetable Intake in Low Income Communities, a seven-item Food Behavior Checklist for Limited Resource Audience, a one-item perceived health question, and a seven-item measure of social capital. Respondents from the WIC FMNP group reported higher levels of education. Food security status did not differ between groups, probably because vouchers for WIC FMNP were only worth \$18 once a month. Food security status was inversely associated to diet quality. Vegetable intake was significantly higher for the WIC FMNP group, whereas there were no significant differences in fruit

intake. The perceived benefits of fruits and vegetables and perceived diet quality were significantly higher in the WIC FMNP. The study provides evidence that WIC FMNP participation appears to increase diet quality, but does not show similar benefits for food security status.

SFMNP

Congress established the SFMNP in 2001 to increase local and fresh food access for seniors and to support and develop direct-to-consumer markets (USDA, 2011b). To qualify, seniors must be 60 years old and above and must have a gross income below 185% of the Federal poverty income guidelines. In 2010, 51 state and Indian agencies were enrolled in SFMNP. Under the program, seniors receive between \$20 and \$50 per season to purchase fresh produce, herbs, or honey at farmers' markets, roadside stands, or through community-supported agriculture shares.

Lee et al. (2010) described the influence of one Georgia SFMNP supported through a partnership with the University of Georgia. Novel infrastructure was created for the program to increase senior participation through the provision of transportation to and from the establishment of special farmers' markets at select senior centers to increase access. To maximize redemption and participation, the SFMNP pre-registration and voucher distribution methods were streamlined, and a home-delivered meal service was implemented. After the establishment of this program, voucher redemption increased from 82% (similar to other SFMNP) to 96%. Through self-report survey data, fruit and vegetable intake increased as a result of this program. While Lee et al. (2010) show the positive effects of minimizing barriers for seniors, similar studies should strive to include demographic characteristics and more comprehensive, systematic measures of dietary intake.

SNAP

In addition to WIC FMNP, and SFMNP, some farmers' markets also have EBT machines in place, enabling the acceptance of SNAP benefits (known as the food stamp program before 2008) (USDA, 2010). An EBT-alone machine or a Point of Sale (POS) machine (processes credit, debit, and/or SNAP benefits) and a phone line are needed to accept SNAP benefits. Although implementing this technology at a farmers' market presents some challenges, the primary benefit is the diversification of the customer base. In 2009, SNAP recipients purchased \$4 million worth of food from farmers' markets across the country (Briggs, Fisher, Lott, Miller, & Tessman, 2010). Although this number is larger than in previous years, it still only represents .008% of all SNAP food purchases. As incentive for markets to install EBT technology, the USDA Agricultural Marketing Service currently offers the Farmers Market Promotion Program grant (Kim, 2011). While the acceptance of SNAP benefits is growing, few studies accounted for the nutritional outcomes that this service at farmers' market provides.

Grace and colleagues (2008) investigated the barriers described by 108 low-income clients enlisted in the food stamp program (study conducted before 2008) of shopping at farmers' markets in Portland, Oregon. A survey was created that asked about demographics, farmers' market awareness and experience, mealtime routines, and grocery shopping habits. There were also additional interview discussion questions. Most respondents reported being female (74%). Only 10% of participants reported being regular shoppers, and 33% had never shopped at a farmers' market. The latter of

which is perhaps partially attributed to the fact that only 27% of participants knew about the acceptance of EBT cards at the market. Price was the most frequently described barrier to shopping at a farmers' market, followed by convenience, quality, and variety. Factors of convenience included location and hours of operation. Participants reported low fruit and vegetable intake, with 81% consuming three servings or fewer per day. Low produce consumption was related to perceptions of high prices and inconvenience of preparation. Suggestions for increasing attendance among low-income consumers included promotional deals and relaying more information about the value of the food. Of those who did shop at the farmers market regularly, a convenient location and availability of WIC FMNP were cited as reasons. Grace and colleagues findings clearly suggest that agencies should promote the use of EBT cards at farmers' markets accepting SNAP benefits.

Discussion

Farmers' markets are growing in number, which suggests the number of people using farmers markets' and other direct-to-consumer markets is also increasing (USDA, 2011a). Given the amount and variety of produce present, farmers' markets are food outlets that may positively affect dietary intake and promote community health, but there is little evidence to support that prediction (McCormack, Laska, Larson, & Story, 2010; Byker, Shanks, Misyak, & Serrano, 2012). It is important to understand the dietary outcomes of these programs in order to strategize avenues to increase healthy food access in communities and uphold federal support for these programs.

Researchers and practitioners, including Extension professionals, have a role in supporting and working with communities, consumers, and farmers at farmers' markets (Abel, Thomson, & Maretzki, 1999) to understand the impact that federal nutrition assistance programs at farmers' markets have on dietary intake. Table 2 suggests a few practical ideas for how Extension agents can have a role in understanding the impact that federal nutrition assistance programs at farmer's markets have on dietary intake.

Table 2.

Community Interventions for Extensions Professionals to Play a Role in Understanding the Impact That Federal Nutrition Assistance Programs at Farmers' Markets Have on Dietary Intake

Intervention Ideas	Outcomes to Test	Methodology
<ul style="list-style-type: none"> • Challenge farmers' market federal nutrition assistance program participants to redeem full benefits from local farmers' markets. 	<ul style="list-style-type: none"> • Change in dietary quality • Redemption rates • Fruit and vegetable variety 	<ul style="list-style-type: none"> • 24-hour recalls or food records • Farmers' market records • Participant questionnaire
<ul style="list-style-type: none"> • Conduct educational 	<ul style="list-style-type: none"> • Change in dietary 	<ul style="list-style-type: none"> • 24-hour recalls or food

<p>cooking classes for farmers' market federal nutrition assistance program participants about proper food handling, fresh food storage, and food preparation</p>	<p>quality</p> <ul style="list-style-type: none"> • Knowledge about proper food handling, fresh food storage, food preparation • Cooking behavior change 	<p>records</p> <ul style="list-style-type: none"> • Participant questionnaire
<ul style="list-style-type: none"> • Hold taste-testing activities for federal nutrition assistance program participants that compares farmers' market produce to grocery store produce. 	<ul style="list-style-type: none"> • Attitudes towards farmers' market fruits and vegetables • Redemption rates • Change in dietary quality (after redemption increase) 	<ul style="list-style-type: none"> • Participant questionnaire • Farmers' market records • 24-hour recalls or food records
<ul style="list-style-type: none"> • Facilitate focus groups or interviews with federal nutrition assistance program participants that questions barriers and opportunities to redemption and create intervention that aims to increase redemption change dietary quality based upon results. 	<ul style="list-style-type: none"> • Barriers to redemption • Opportunities for redemption 	<ul style="list-style-type: none"> • Focus group • Interview

The six studies reviewed describe a broad range of information regarding the relationship between federal nutrition assistance programs, dietary intake, and farmers' market use. The studies provide some evidence about the positive influence that farmers' markets have on dietary habits of federal nutrition assistance program participants, although more research is needed to establish any causality between farmers' market and improved dietary intake with WIC FMNP, SFMNP, and EBT (SNAP) use. In summary, though there is evidence that the use of vouchers by WIC participants has positive effects on fruit and vegetable intake, the research published about the SFMNP or the redemption of SNAP benefits at farmers' markets is still lacking.

In the literature review, it was not possible to compare research findings because of the design differences that existed in each intervention. For example, of all three federal nutrition assistance programs, few tools for outcome measures were consistent, complicating cross-study comparisons. Efforts should be made to develop and collect systematic, consistent consumer sociodemographic and dietary data that would build the evidence base for farmers' markets, while also reviewing the effectiveness of WIC FMNP, SFMNP, and use of EBT machines. Additionally, given the difficulty in randomization and control of community-based studies (such as with farmers' markets), researchers and practitioners should explore quasi-experimental designs that use reliable and valid interviews, surveys, and dietary assessments. The Extension network could undertake notable research in this area by creating common data-gathering mechanisms that are routinely collected in several locations around the country. Understanding whether sociodemographics are mediators for farmers' market participation is an important issue to consider and has not yet been reconciled in study findings (Byker, et al., 2012). Another question includes how policies related to allowable food purchases at farmers' markets for federal nutrition assistance program impact farmers' market access, food purchasing, and dietary intake.

In order to support the expansion, growth, and diversification of farmers' markets from federal nutrition assistance programs, it is important for future research to add evidence about dietary outcomes. While the few studies cited here are a good first step toward validating the perceived dietary benefits attributed to farmers' markets, more valid and reliable evidence must be gathered before farmers' markets can be fully promoted as effective strategies for increasing healthy food access for a diverse population within federal nutrition assistance programs.

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