

Review



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Review of the Nutritional Implications of Farmers' Markets and Community Gardens: A Call for Evaluation and Research Efforts

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ABSTRACT

The development and promotion of farmers' markets and community gardens is growing in popularity as a strategy to increase community-wide fruit and vegetable consumption. Despite large numbers of farmers' markets and community gardens in the United States, as well as widespread enthusiasm for their use as a health promotion tool, little is known about their influence on dietary intake. This review examines the current scientific literature on the implications of farmers' market programs and community gardens on nutrition-related outcomes in adults. Studies published between January 1980 and January 2009 were identified via PubMed and Agricola database searches and by examining reference lists from relevant studies. Studies were included in this review if they took place in the United States and qualitatively or quantitatively examined nutrition-related outcomes, including dietary intake; attitudes and beliefs regarding buying, preparing, or eating fruits and vegetables; and

behaviors and perceptions related to obtaining produce from a farmers' market or community garden. Studies focusing on garden-based youth programs were excluded. In total, 16 studies were identified for inclusion in this review. Seven studies focused on the impact of farmers' market nutrition programs for Special Supplemental Nutrition Program for Women, Infants, and Children participants, five focused on the influence of farmers' market programs for seniors, and four focused on community gardens. Findings from this review reveal that few well-designed research studies (eg, those incorporating control groups) utilizing valid and reliable dietary assessment methods to evaluate the influence of farmers' markets and community gardens on nutrition-related outcomes have been completed. Recommendations for future research on the dietary influences of farmers' markets and community gardens are provided.

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Fruit and vegetable consumption is associated with decreased risk of cardiovascular disease, some cancers, and numerous other chronic diseases (1,2). However, national data indicate that <3% of men and <6% of women aged 19 to 50 years consume the daily servings of fruits and vegetables recommended by MyPyramid (3). National surveillance data (4) and numerous other research studies consistently indicate that low-income populations are less likely to meet recommended fruit and vegetable intake levels, compared to high-income populations (5).

The development and promotion of farmers' markets and community gardens is growing in popularity for numerous reasons, one being their potential to increase community-wide fruit and vegetable consumption, particularly via improving fruit and vegetable availability in low-income neighborhoods with poor access to healthful foods (6). Farmers' markets and community gardens also focus on reconnecting with the land, revitalizing neighborhoods, and promoting a green and sustainable environment through consumption of locally grown foods (7,8). Despite these similarities, there are some impor-

tant distinctions between farmers' markets and community gardens. For example, farmers' markets (defined as recurrent markets at fixed locations where farm products are sold by farmers [9]) offer direct access to a wide array of produce from local farmers, but more limited involvement in the growing process. In contrast, community gardens (which the American Community Gardening Association defines as "any piece of land gardened by a group of people" [10]) more readily provide opportunities for community involvement and experiential education about growing, as well as opportunities to strengthen community ties and build social capital. Both farmers' markets and community gardens offer important opportunities to partner with public health programming efforts aimed at improving an array of nutrition-related outcomes, including nutrition knowledge, attitudes, and/or dietary intake.

Farmers' markets and community gardens are becoming highly prevalent across the United States. In 2008, an estimated 4,685 US farmers' markets were selling local produce—an increase of nearly 3,000 markets since 1994 (11). The American Community Gardening Association estimates there are more than 18,000 community gardens in the United States and Canada (10). Despite these large numbers of farmers' markets and community gardens, as well as widespread enthusiasm for their use as health promotion tools, little is known about their effects on diet. This review provides an evaluation of the scientific literature on farmers' market and community garden programs and their nutrition-related implications. Based on published studies available, this review focuses on the potential for farmers' markets and community gardens to improve fruit and vegetable intake and highlights implications for future research.

METHODS

Scientific, peer-reviewed articles that included research conducted in the United States and published between January 1980 and January 2009 were identified via searches in PubMed and Agricola databases. Searches included the following keywords in numerous combinations: farmers' market, community garden, nutrition, obesity, intervention, and dietary intake. Article titles and abstracts were examined, and pertinent articles were retrieved. A snowball strategy was used such that references cited in these articles and reports were examined, and all additional relevant articles were identified and retrieved. In addition to peer-reviewed articles, three program evaluation reports were included because of their pertinence (12-14). Articles and reports were included in this review if they qualitatively or quantitatively examined any nutrition- or weight-related outcomes. Articles focusing on garden-based youth programs were excluded because of a recent review of this literature by Robinson-O'Brien and colleagues (15).

Sixteen articles met the review criteria (12-14,16-28). Nutrition-related outcomes evaluated in this review included fruit and vegetable intake (12-14,17,18,20-23,25); intake of other foods/beverages (20); food insecurity (28); attitudes and beliefs regarding buying, preparing, or eating fruits and vegetables (13,14,16,17,23,24,27); and behaviors (12,13,18,19,24-26) and perceptions (12,13,19,25,26) of obtaining produce from farmers' markets or community

gardens. None of the identified studies examined weight-related outcomes, such as overweight/obesity. Studies that only examined macro-level issues around program utilization and/or mechanisms for increasing program participation (29) were outside of the scope of this review.

Of the articles that met our criteria for inclusion, all identified farmers' markets studies that took place as part of two types of incentive programs: the Farmers' Market Nutrition Program (FMNP) for women enrolled in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), and farmers' market programs for seniors (some of which were funded through the US Department of Agriculture [USDA] Senior Farmers' Market Nutrition Program [SFMNP]). Overall, few studies related to community gardens were identified. Therefore, this review was organized into three sub-sections: WIC FMNP, farmers' market programs for seniors (including the USDA SFMNP), and community gardens.

DESCRIPTION AND SUMMARY OF STUDIES

WIC FMNP

The WIC FMNP was established by Congress in 1992 and provides coupons to purchase fresh, locally grown fruits and vegetables to WIC participants (30). Congress covers 70% of program administrative costs and 100% of food costs, up to \$30 annually per participant. Along with contributing required matching funds for 30% of administrative costs, some states supplement federal support for food and provide higher coupon amounts. The program currently operates in 46 states, providing benefits to more than 2.3 million WIC participants in 2007 (30).

The seven studies that examined the affects of the WIC FMNP on dietary outcomes are summarized in Figure 1. These studies evaluated the results of providing coupons to purchase fruits and vegetables at farmers' markets in Ohio, Michigan, Connecticut, and California.

Kropf and colleagues (23) evaluated cross-sectional differences in dietary intake among women enrolled in Ohio WIC programs and receiving farmers' market coupon benefits (\$18 per recipient, per season) compared to those receiving no coupons. In 2005, participants completed mailed surveys ($n=235$, 22% response rate), including a validated, seven-item Food Behavior Checklist. Participants receiving FMNP coupons ($n=65$) reported a significantly higher mean daily intake of vegetables (2.23 ± 1.18 servings) compared to women not receiving coupons ($n=170$, 1.91 ± 0.98 servings). Fruit intake did not differ between groups. In the same sample, Walker and colleagues (28) also examined household food security using the previously validated 18-item US Household Food Security Survey. Household food security status did not differ significantly between WIC and WIC FMNP participants. Although a strength of this study sample was its diversity in terms of women's living situations and food security, the generalizability of results may be limited as all participants were from one rural county and the response rate was relatively low.

The National Association of Farmers' Market Nutrition Programs (13) evaluated the influence of WIC FMNP among participants ($n=24,800$) enrolled in 30 WIC program centers across the United States and participating

farmers (n=2,561) in 2002. Survey and sampling procedures were not described, and the effect of varying coupon amounts was not examined. A survey was conducted that included questions about fruit and vegetable intake and shopping at a farmers' market. Overall, 73% of program participants who responded to the survey reported that they ate more fresh produce during summer 2002 compared to the previous summer, and 79% planned to eat more fresh produce year-round. Findings indicated that 42% of program participants had never previously been to a farmers' market, 53% learned a new way to prepare fruits and vegetables after visiting the market, 54% spent money at the market in addition to coupons, and 73% planned on shopping at farmers' markets even after their coupons were gone. Nearly all responding farmers (90%) reported that participating in the FMNP increased their farmers' market sales. A strength of this study was the representation of a large number of US program centers; however, results should be interpreted with some caution as the validity of survey measures and overall response rate to the cross-sectional surveys were not reported.

Galfond and colleagues (12) evaluated the effect of the WIC Farmers' Market Coupon Demonstration Project in a random sample of WIC participants in six states. Telephone surveys were administered to participants receiving coupons (n=1,503) and those never receiving coupons (n=1,126). Surveys were also administered to women who had previously received coupons, but did not receive them during summer 1990 (n=96). Coupons received by participants were valued at \$18.50 per household, on average. A 24-hour dietary recall and short food frequency questionnaire (FFQ) were used to assess fruit and vegetable intake. Average daily fruit and vegetable intake was 5% higher among 1990 coupon recipients compared to nonrecipients, but did not significantly differ between 1990 coupon recipients and women who had received coupons in another year. Results indicated that 80% of coupon recipients would definitely or probably shop at the farmers' market again, and 69% of recipients preferred the fruit and vegetable selection at the farmers' market to the selection at their grocery store. A particular strength of this study was the use of two established dietary assessment methods so that inconsistent responses could be resolved. However, in drawing conclusions from this cross-sectional study, the investigators cautioned that nonrecipients may not have the same access to farmers' markets as coupon recipients because they were not necessarily from similar geographic locations.

Anderson and colleagues (17) evaluated the influence of three interventions on fruit and vegetable intake and attitudes (compared to a control group) in participants of WIC or the Community Action Agency Commodity Supplemental Food Program in Michigan. Groups included in the study were no intervention, fruit and vegetable education only, farmers' market coupons only, and fruit and vegetable education plus farmers' market coupons. Coupons (\$20) were provided one time. Pre- (n=564) and postassessment (n=455) surveys assessed fruit and vegetable intake, using items modified from the Behavioral Risk Factor Surveillance System (BRFSS) survey, and attitudes about buying, preparing and eating fruits and vegetables. Education alone was associated with signifi-

cant improvement in attitudes about fruits and vegetables, which appeared to indirectly promote increased fruit and vegetable intake. Coupons alone were directly associated with significant increases in fruit and vegetable intake, but not with changes in attitudes or beliefs. The combination of education and coupons had the greatest affect on fruit and vegetable intake. Although random assignment was not feasible for every study group, the pre/post design was strengthened through the inclusion of a control group and the use of a valid, reliable fruit and vegetable intake measure.

Anliker and colleagues (18) evaluated the effects of the Connecticut WIC FMNP on fruit and vegetable intake among women from six WIC programs providing farmers' market coupons and three WIC programs that did not provide coupons. FMNP participants received \$10 in coupons annually. Preassessment interviews (n=489) and follow-up surveys (n=216) were completed about 2 months apart. A short FFQ was used to assess intake of fresh, canned, and frozen fruits and vegetables during the previous month. FFQ reliability and/or validity was not reported. Changes in fruit and vegetable intake that occurred between preassessment and follow-up surveys did not differ significantly between those who received coupons and those who did not, or between those who used coupons and those who did not. Women who received coupons and spent additional money or Food Stamps at the farmers' market showed significantly greater increases in the consumption of dark-orange vegetables, fresh tomatoes, and peppers than those who did not use additional resources. Similarly, women who went back to the farmers' market after using all their coupons reported significantly greater increases in the consumption of fresh dark-green vegetables, fresh cabbage or cauliflower, and other canned or frozen vegetables than those who did not return to the market. Major strengths of this study included the pre/post design, use of a control group, and diversity of participants enrolled. Additional follow-up assessments beyond 2 months and a higher follow-up response rate would have further strengthened this study.

Herman and colleagues (21) evaluated the effects of two interventions on fruit and vegetable intake among WIC participants in Los Angeles, CA. A 6-month intervention provided \$10 coupons to women twice per month that could be redeemed at farmers' markets or supermarkets. Diet was assessed six times in women who received coupons and four times in controls who received no coupons using single multiple-pass 24-hour dietary recalls. Compared to controls, farmers' market coupon recipients significantly increased daily fruit and vegetable intake by 1.4 servings/1,000 kcal and supermarket coupon recipients increased daily fruit and vegetable intake by 0.8 servings/1,000 kcal. Among those who received farmers' market coupons, increases in fruit and vegetable intake remained significant 6 months postintervention. Strengths of this study included use of a control group, a validated dietary assessment methodology, and multiple follow-up assessments. Although follow-up assessments showed that farmers' market coupons were associated with sustained increases in fruit and vegetable intake, these results may not readily generalize to women living in other parts of the country where there is not year-round access to farmers' markets.