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# Food Consumption, Attitude, and Behavioral Change Among CSA Members: A Northern Utah Case Study[1]

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## Abstract

This study examines the impacts of Community Supported Agriculture (CSA) program participation on consumer attitudes and behaviors related to food consumption and preparation, among CSA members in Utah. Data were collected through a series of pre, post, and monthly program surveys, along with food purchase receipts and CSA basket contents. Results show a shift in participant dietary intake and food preparation attitudes and behaviors, namely increased consumption of fresh produce, decreased grain intake, and fewer meals consumed away from home. Participants also became more interested in cooking and canning/preserving. Increases in Vitamin C, Vitamin B, and folic acid availability among participants also resulted.

**Keywords:** Community Supported Agriculture (CSA), consumption patterns, dietary intake, food away from home (FAFH), fresh produce, obesity

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## Introduction

Community Supported Agriculture (CSA) programs are rapidly expanding across the US and are now a primary direct-to-consumer marketing method for local foods, benefiting both farmers and consumers alike (Curtis 2011; Thilmany, Bond, and Bond 2008). CSA programs provide members weekly pre-paid baskets of fresh produce, meats, cheeses and value-added products, normally during the growing season. Farmers benefit from the guaranteed market for their products, as well as above wholesale level pricing. CSAs provide consumers with high quality, fresh local foods, commonly at lower prices than those at traditional grocery outlets (Cooley and Lass 1998; DeMuth 1993). In particular, they provide consumers the opportunity to experience new foods, develop new social networks and reconnect with the land and the traditional practices of agriculture (O'Hara and Stagl 2001). Consumer motivations for CSA program participation include concern for the environment, a desire for fresh safe food, the importance of supporting local growers, and a sense of community connectedness (Cooley and Lass 1998; Cone and Myhre 2000; O'Hara and Stagl 2001).

US residents do not consume the recommended amounts of fruits and vegetables, and intake has decreased in recent years (Lorson, Melgar-Quinonez, and Taylor 2009; Slining, Mathias, and Popkin 2013). This is concerning, as diets high in fruits and vegetables are naturally high in nutrients and low in energy, resulting in a reduced risk for obesity and related chronic diseases. In children, a diet high in fruits and vegetables is associated with lower risk for central obesity (Bradlee et al. 2010). Evidence from a randomized parent-child trial of dietary interventions for obesity found that increasing fruit and vegetable intake was more effective than decreasing fat and sugar (Epsteon et al. 2001). However, efforts to increase fruit and vegetable consumption in the US population have generally been unsuccessful. Consumer access to direct-to-consumer market channels such as farmers' markets, mobile produce trucks, community gardens, and Community Supported Agriculture (CSA) may provide solutions to overcome barriers, such as access and affordability. However, strong evidence to support the efficacy of such programs in increasing fresh produce consumption is lacking.

The majority of the research on the dietary and nutritional impacts of direct-to-consumer market purchases focus on the impacts of public programs on fresh produce consumption among low income individuals, such as the WIC (Women, Infant, and Children) and the Senior Farmers' Market Nutrition Programs (McCormack et al. 2010). Studies related to farmers' markets include one by Conrey et al. (2003), which investigated the changes in nutritional health resulting from the WIC program. They found that increased fruit and vegetable consumption was directly related to the nutritional information provided by the program, rather than the access to farmers' market produce. Another study examined the nutritional benefits of adding EBT machines to farmers' markets (Krokowski 2014), noting that the availability of EBT machines led to increased fruit and vegetable purchases among SNAP (Supplemental Nutrition Assistance Program) participants.

The study conducted by Zepeda, Reznickova, and Lohr (2014) examined the impact of mobile farmers' markets on food choice in areas considered food deserts or communities with little access to fresh food. Study results found that consumers who shopped at the mobile market ate significantly more fruits and vegetables. But, the authors noted the lack of cooking skills among residents, as well as affordability and mobile market hours as hindrances to expanded behavior changes.

Few studies assess changes in dietary choice and food preparation habits resulting from CSA program membership. One study by Johnson et al. (2004), where CSA baskets were delivered directly to home-bound seniors, found that participants increased their produce intake by a full serving per day, but they attributed this success to additional educational and policy efforts. In a study by Quandt et al. (2013), fifty low income women with children were provided a weekly CSA box for 16 weeks. Study results show that the participant household inventory of fruits and vegetables increased along with reported consumption of fresh produce, but consumption changes were not statistically significant. More importantly, participants picked up their box only 9.2 of 16 weeks due to transportation and scheduling challenges, indicating the need for home CSA box delivery.

A study by Perez, Allen, and Brown (2003) discovered that CSA members were likely to eat more fruits and vegetables and to cook more creatively and Ostrum (1997) found that eating habits were affected among CSA members. Russell and Zepeda (2007) state that member dietary changes along with increased consideration of food seasonality were the direct result of the CSA's educational components. Examples of specific changes included planning meals around available produce, exploring new foods, and freezing or storing excess vegetables.

The objective of this study is to examine the impacts of CSA program participation on consumer attitudes and behaviors related to food consumption, preparation, storage, and dining out practices, specifically behavior and attitudes toward fresh produce consumption, preparation of nutritionally enhanced meals, and food consumption away from home. Food away from home (FAFH) consumption is important as research shows that the prevalence of obesity is influenced by the number of meals consumed away from home (French, Story, and Jeffery 2001), likely due to the larger portion sizes offered (Rolls, Morris, and Roe 2002).

If CSA membership does indeed improve consumer dietary intake and food preparation and consumption attitudes, public policy encouraging and/or providing CSA program memberships would provide another vehicle for fostering dietary improvements among SNAP, WIC, and other federal program participants. This may be especially important in areas where farmers' markets may not be available or accessible for targeted populations, as was the case in Dollahite et al. (2005), which found that farmers' market access for low-income families was a barrier to the WIC program. Agricultural producers may also be affected by study results in terms of the opportunity to expand markets for their CSA programs to currently untapped consumers through government programs, and/or through increased participation of consumers looking to improve their health. The use of longitudinal data, including both participant survey responses and actual consumption information in the current study distinguishes it from previous studies.

## Survey Data and Results

A total of 14 families (28 adults and 5 children) from four separate CSA programs operating in Cache Valley, Utah took part in this pilot longitudinal study conducted in 2012. Participants were recruited through email invitations distributed by CSA program managers to CSA program subscribers. Pre-program, monthly, and post-program web-based surveys were administered to the participants from June through December of 2012. The CSA programs began in June and ended in late September, but the high season for fresh produce in northern Utah is mid-July to

mid-September. The surveys provided stated data on participant food consumption habits and attitudes, as well as lifestyle preferences. Surveys' focused on changes in consumption and food preparation behavior, such as the use of new, unfamiliar food or varieties, changes in the quantity of meals consumed outside the home, the percentage of CSA basket contents consumed, the storage (canning, freezing or drying) of excess produce, and the use of CSA provided recipes. Study participants were provided a $100 fee for completing all aspects of the study.

Pre-program survey results show that 81% of study participants were female and 75% married, 28.6% had children under the age of 18, and study participants were primarily Caucasian (78.6%). Seventy-seven percent had at least a four-year degree, 65% were employed, and 42.7% reported an annual income above $50,000. Many learned about their CSA program from friends and family (53%), followed by CSA program websites (11%). Participants joined the CSA program primarily for access to fresh local produce and to support local farmers (see Figure 1) and they paid on average $16.50 weekly for their CSA share. Less than one-third (27%) had participated in the CSA program the previous year. Those that hadn't participated noted the following reasons; unfamiliar with CSA program (40%), did not live in the area (27%), financial reasons (13%), needed to find others to split share (6.6%), couldn't find good quality (6.7%), and the CSA was full (6.7%).

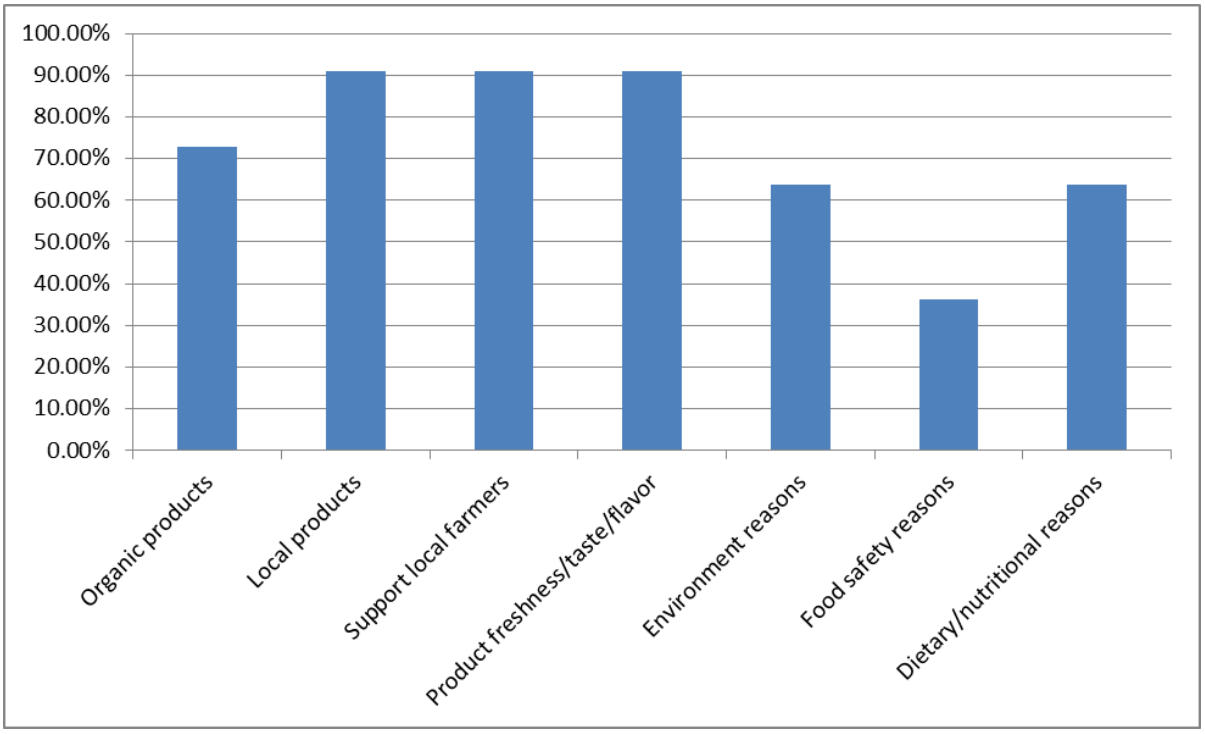


**Figure 1.** Respondent Rational for CSA Program Participation (Percentage)

At program start (see Table 1), respondents indicated that they preferred a CSA basket for 2-3 people (57.1%), followed by 1-2 people (35.7%). Also, they noted that information on food preparation and recipes (92.9%) would be most valuable, followed by canning and preserving (57%), and farms visits/tours (57%). When asked to rate geographic origin and production practice labeling, produced in the USA (38.5%) and certified organic (23.1%) were the two most

important labels. Participants ranked product quality as more important than origin or price. Study participants were asked to rate on a scale of 1 (not important) to 5 (very important) eleven separate fresh produce features. Product taste and quality were rated the highest (4.5 and 4.3, respectively), followed by product freshness and value. Local origin and organic produce were also important (rated at 3.5 out of 5). Knowledge of the produce grower and specialty item were rated lowest.

**Table 1.** Respondent Preferences Pre and Post-CSA Program

| | Description | Pre Program Percentage/ Mean | Post Program Percentage/ Mean |
|---|---|---|---|
| What is your preferred basket size? | Serving 1-2 people | 35.7% | 57.1% |
| | Serving 2-3 people | 57.1% | 42.9% |
| | Serving 3-4 people | 7.1% | 0.0% |
| Which educational programs would be of interest to you? | Cooking classes | 50.0% | 57.1% |
| | Preparation ideas/recipes | 92.9% | 78.6% |
| | Canning/preserving | 57.1% | 71.4% |
| | Wine pairing | 42.9% | 50.0% |
| | Food pairing | 35.7% | 35.7% |
| | Food safety | 21.4% | 14.3% |
| | Farm visits/tours | 57.1% | 35.7% |
| When purchasing food products, which label is most important? | A product of your state (Utah) | 15.4% | 8.3% |
| | A product of the USA | 38.5% | 41.7% |
| | A product from outside of the USA | 0.0% | 0.0% |
| | A product identified as “organic” | 23.1% | 25.0% |
| | A product identified as “natural” | 15.4% | 16.7% |
| When purchasing food products, which of the following is most important? | The quality of the product | 64.3% | 78.6% |
| | The product origin (place of production) | 7.1% | 14.3% |
| | The product with the lowest price | 21.4% | 7.1% |
| When making produce purchases, how important are the following features? (Scale of 1 to 5) | Product variety | 3.36 | 3.21 |
| | Product quality | 4.36 | 4.21 |
| | Product value | 3.86 | 3.64 |
| | Product appearance | 3.36 | 3.00 |
| | Produced locally (in State) | 3.43 | 3.21 |
| | Specialty item | 2.36 | 1.77 |
| | Product pricing | 3.36 | 3.43 |
| | Organic production | 3.07 | 2.79 |
| | Product freshness | 4.07 | 4.14 |
| | Product taste | 4.57 | 4.29 |
| | Know grower/farmer | 2.79 | 2.43 |

In order to achieve a better understanding of study participant attitudes and lifestyle preferences, they were asked to indicate their level of agreement on a scale of 1 (strongly disagree) to 5 (strongly agree) for ten statements. Concerns over health/diet were rated highest (4.5), followed by food safety concerns (4.35), and the desire to support local farmers (4.28). Concerns about food origin, as well as the importance of agricultural open space and physical activity were also rated highly. Eating outside the home and agreement with being a vegetarian or vegan rated the lowest. Over 80% of the participants supplemented their CSA membership with trips to the local

farmers' market, and averaged three trips monthly to their local grocery store, spending $92 per trip on average.

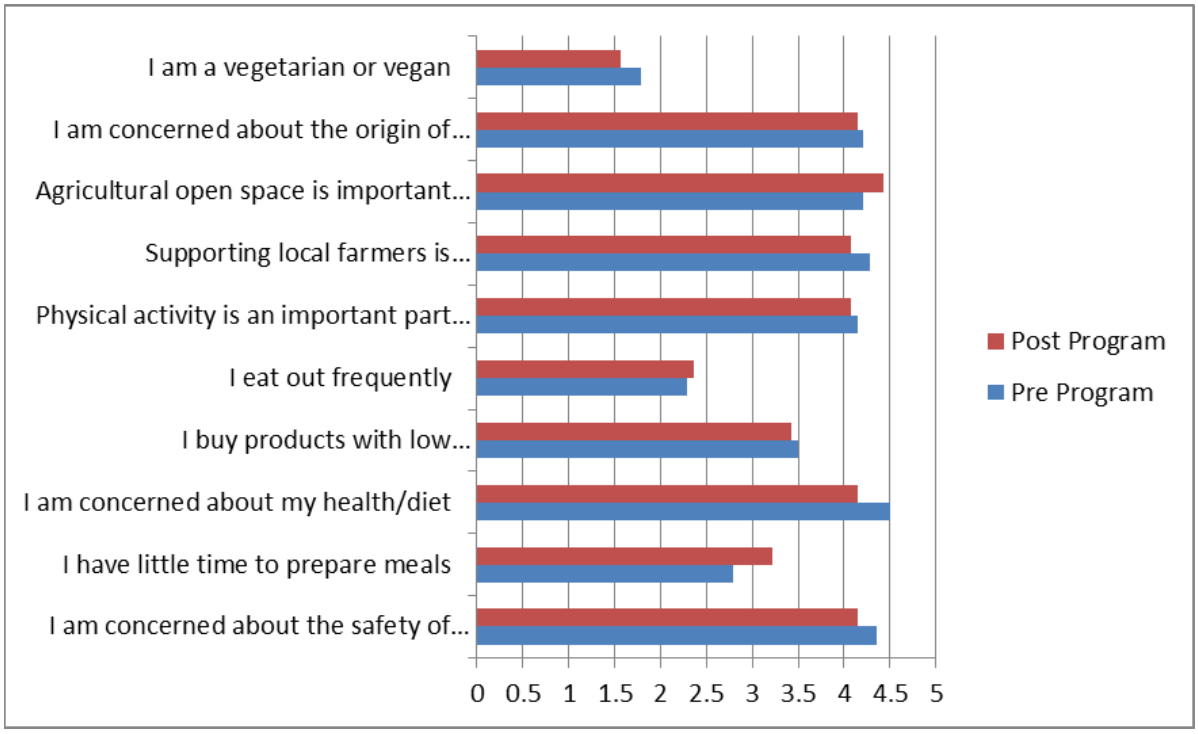


**Figure 2.** Respondent Attitude and Lifestyle Preferences Pre and Post-Program
(Scale of 1- 5, 1 is Strongly Disagree and 5 is Strongly Agree)

The monthly participant survey responses indicated that participant CSA basket usage hovered around 90% throughout most of the season (see Figure 3). The primary reason given for not using all of the baskets' items was the inability to prepare unfamiliar items (27%). Basket usage also indicates that on average only about 10% of the food items were wasted. During the first three months, participants were preparing around 72% of the unfamiliar items. In September, there was a steep decline (45%), implying that participants became more familiar with the basket selections. This was also evidenced by the decrease in recipe usage across the season from 50% in July to 27% in the fall. The storage or canning of produce peaked in August at 82% then declined throughout the fall reaching 27% in November. The number of meals participants consumed at home increased from 75% to 80% in August and September at the height of the season, then fell back to 76% in October and November after the CSA program ended (see Figure 4).

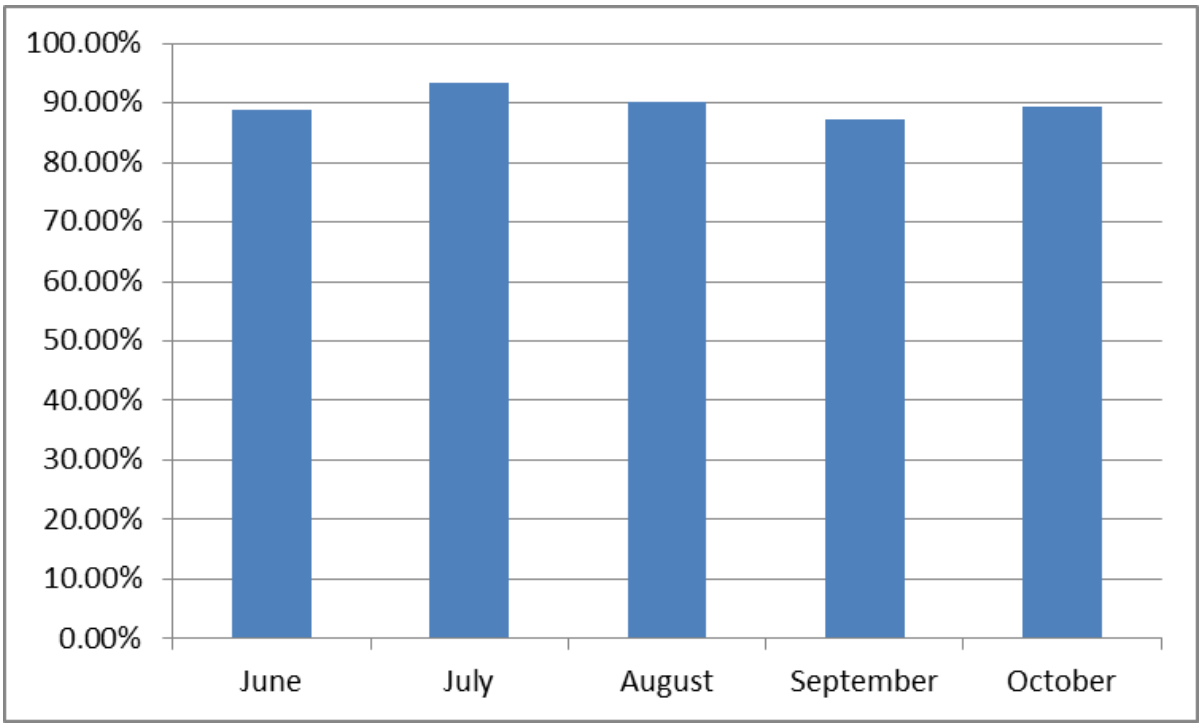


**Figure 3.** Respondent Reported CSA Basket Consumption by Month (Percentage)
**Note.** Differences not statistically significant at the 90% level.

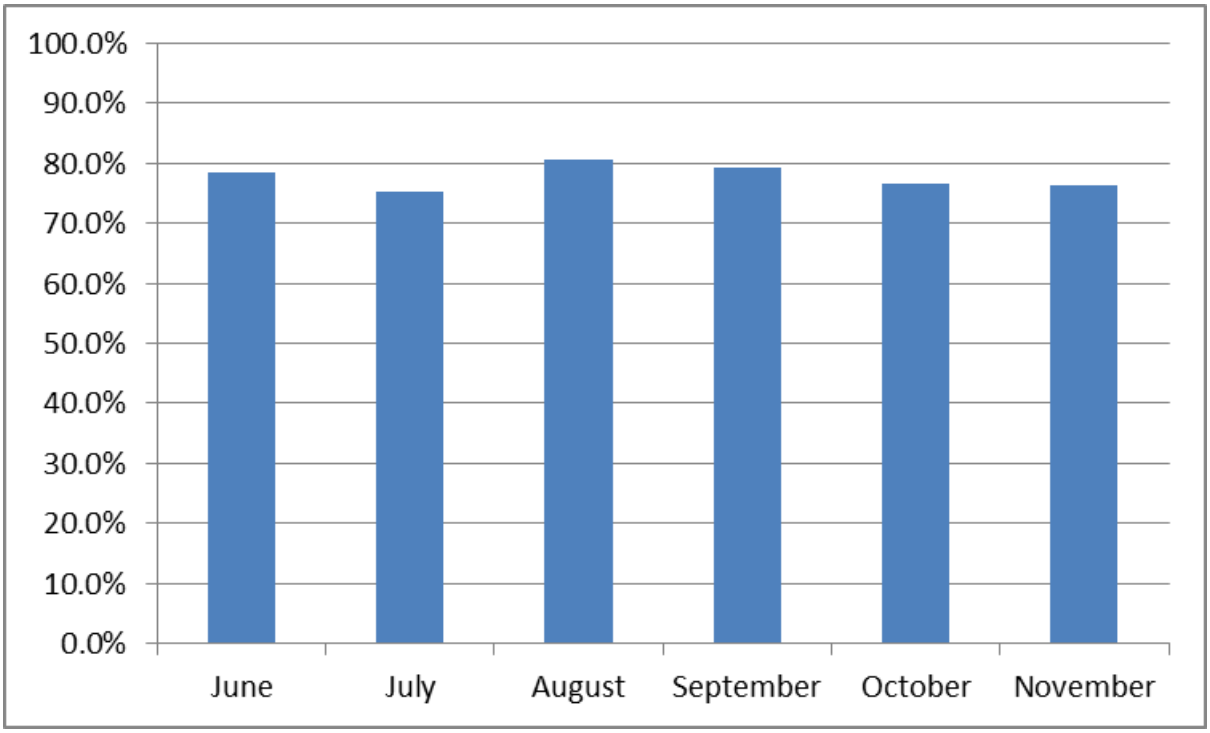


**Figure 4.** Respondent Reported Average Weekly Meals Consumed at Home by Month (Percentage)
**Note.** Differences statistically significant at the 90% level or better for July/August, August/October, and August/November.

Post-program survey results indicated that 100% would subscribe to a CSA program in the future and 81% expressed an interest in a winter CSA program. Participants were asked about their perceived changes in food patterns and results are provided in Table 2. Seventy-one percent felt the CSA membership encouraged them to preserve/store more food than normal. They also felt that their fruit and vegetable consumption was much higher (71%), and that there was some or much improvement in their nutritional intake (overall diet) (57% and 35%, respectively). Almost all participants felt that the recipes and the availability of previously unknown products in their CSA baskets changed their food preparation or cooking knowledge (93%). Additionally, average meals consumed at home weekly increased to 17.6 (up from 17.1 pre-program). Two-thirds (64.2%) of the study participants claimed they now ate at home more often.

**Table 2.** Respondent Post-CSA Program Perceptions

| | Description | Mean | Percentage/ |
|---|---|---|---|
| As a result of participating in the CSA program, did you store (can, dry, freeze) more produce items than usual for consumption this winter? | Unsure | 1.64 | 7.0% |
| | No | | 21.0% |
| | Yes | | 71.0% |
| As a result of participating in the CSA program, how has your fruit and vegetable consumption changed? | Lower | 4.71 | 0.0% |
| | No change | | 0.0% |
| | Unsure | | 0.0% |
| | Slightly higher | | 28.0% |
| | Much higher | | 71.0% |
| As a result of participating in the CSA program, how do you feel your overall nutritional intake has changed? | Unimproved | 4.28 | 0.0% |
| | No change | | 0.0% |
| | Unsure | | 7.1% |
| | Some improvement | | 57.1% |
| | Much improvement | | 35.7% |
| As a result of participating in the CSA program, How was the number of tims per week you ate at Home impacted? | At at home less | 3.50 | 0.0% |
| | No change | | 28.5% |
| | Unsure | | 7.1% |
| | Ate at home slightly more | | 50.0% |
| | Ate at home much more | | 14.2% |
| Did the recipes provided or availability of previously unknown products in your basket change your food preparation or cooking knowledge? | Unsure | 1.90 | 0.0% |
| | No | | 7.1% |
| | Yes | | 92.9% |

Post-program, study participants desired a smaller CSA basket size (1-2 people at 57.1%). It's not uncommon for CSA basket contents to be higher than expected, leading to increased efforts in using the contents and/or waste. While interest in food preparation ideas and recipes declined from 93% to 79%, it remained the educational program in which participants were most interested. Additionally, participants had an increased interest in food related education, including canning and preserving, wine pairing, and cooking. Participant interest in food safety information and farm tours declined. This is echoed in the comparison of attitude and lifestyle preference pre and post-program which show that participant food safety concerns, diet/health concerns, and food origin concerns decreased (see Figure 2). With regards to labeling, US origin,

certified organic, and natural became more important post-program, while local (in-state) labeling became less important. Product quality and origin became more important and low price became less important. Participant preferences for produce attributes declined overall from pre to post-program, with the exception of product freshness and price, which increased.

## Food Consumption Data and Results

As a supplement to the self-reporting surveys, participants submitted their monthly grocery store and farmers' market purchase receipts by mail to the designated study researcher at the end of each month (June to November 2012). Additionally, all contents of participant weekly CSA baskets were tracked by item and weight. The contents of meals consumed outside the home were not tracked. These data sources allowed for comparisons of available nutrients, calories and types of foods purchased during and after CSA program completion. It is not possible to draw conclusions regarding changes in dietary intake (e.g. food consumption) based on the survey results, because information was unavailable on factors such as cooking methods, age, gender, and weight (which can change specific nutritional requirements), and actual food intake. It was beyond the scope of the current study to track actual food intake, for example using a 24-hour food recall survey. Nutrient availability was determined per individual (within a given family) per month, regardless of the age of each individual. Adult vs. child availability was considered. Due to the small sample size and the large variation in dietary choices between families, no between-family comparisons could be made.

All retail-type food purchases were entered into Genesis R&D SQL, based on store receipts, CSA basket contents, and self-reported home delivery and farmers' market purchases. Where possible, UPC codes from receipts were used to pinpoint specific foods. All other products were identified as closely as possible based on store coding or receipt abbreviations, using brand-specific nutrient content information where available. Foods were entered based on net package or unit weight to control for potential error based on differences in serving size between manufacturers. Additionally, nutritional analyses are characteristically conducted on a weight basis, regardless of food type, processing method, or serving size. For foods typically sold by weight (e.g. ground meats) where no weight information was available on the receipt, market reports of average cost per pound during the study period were used to calculate purchase weight. For foods typically sold by piece (e.g. fish filets) where no weight information was available on the receipt, USDA nutrient content databases were used to obtain nutrient values. Nutrient availability per individual per meal within a given month was normalized based on self-reported percentages of meals consumed at home according to the following formula:

$$A_{AX} = (T_{AX} / \text{\# family members}) / (D_X \text{ x 3 meals daily x } H_X)$$

Where:

$A_{AX}$ = Amount of nutrient "A" available per meal in month "X" from meals consumed at home
$T_{AX}$ = Amount of nutrient "A" available in month "X" from meals consumed at home based on grocery receipts and CSA basket data
$D_X$ = Number of days in month "X"

$H_X$ = Percentage of meals consumed at home based on self-reported data

Nutrients examined included all categories required by the U.S. Food and Drug Administration to be shown on standard Nutrition Facts Panels, and all additional vitamins and minerals for which a Recommended Daily Allowance is established.

To examine the effect of CSA participation on food purchase choices, foods were assigned to one of the following seven categories:

1. Fresh produce (fruits and vegetables)
2. Processed produce (fruits and vegetables, including frozen, canned, or otherwise prepared)
3. Meats, eggs, nuts and protein substitutes (including nut butters)
4. Dairy and dairy substitutes (excluding frozen desserts such as ice cream)
5. Grains (including pasta, tortillas, dry grains, cereal, prepared breads, rolls and dough; excluding chips, crackers, cakes, dessert and popcorn)
6. Convenience and multi-component meals (including frozen, canned, or otherwise prepared entrees, soups and sandwiches)
7. Snack foods (including chips, crackers, soda, desserts and candy)

Using Genesis software, a listing of each individual food as a percentage of the total monthly food weight was obtained. Individual foods were then assigned to the appropriate category, and a monthly percentage for each category was calculated. Due to the variety of foods included within each subcategory, it was impractical to calculate percentages based on the number of servings available. For example, within the “Proteins” category, serving sizes range from 1 ounce for nuts to about 2 ounces for eggs to 3 ounces for meats and poultry. Nutrient availability and food purchase category values were analyzed as a paired-t. Within a given family (holding number of members and age constant), months during which CSA baskets (June – September) were received were compared to months during which there was no CSA participation (October – December). The percentage of food wasted on average was assumed the same across months, or 10% for CSA basket items and 30% for all other (Buzby, Wells, and Hyman 2014).

As shown in Figure 5, purchases of fresh produce were significantly (at the 95% level or better) higher during CSA participation, and total produce purchases were 13% higher (39% fresh, 6% packaged, or 45% total during CSA; 21% fresh, 11% packaged, or 32% total post-CSA). While the increased purchases of fresh produce during the CSA months may be due to seasonality, it is worth noting that fresh produce is readily available at local grocery stores during post-CSA months as well, giving participants the opportunity to continue consumption after the CSA program. It is also likely that participants did not want to waste the CSA basket contents, and thus used as much of the fresh produce as possible, which is also reflected in the lower proportion of meals consumed outside the home.

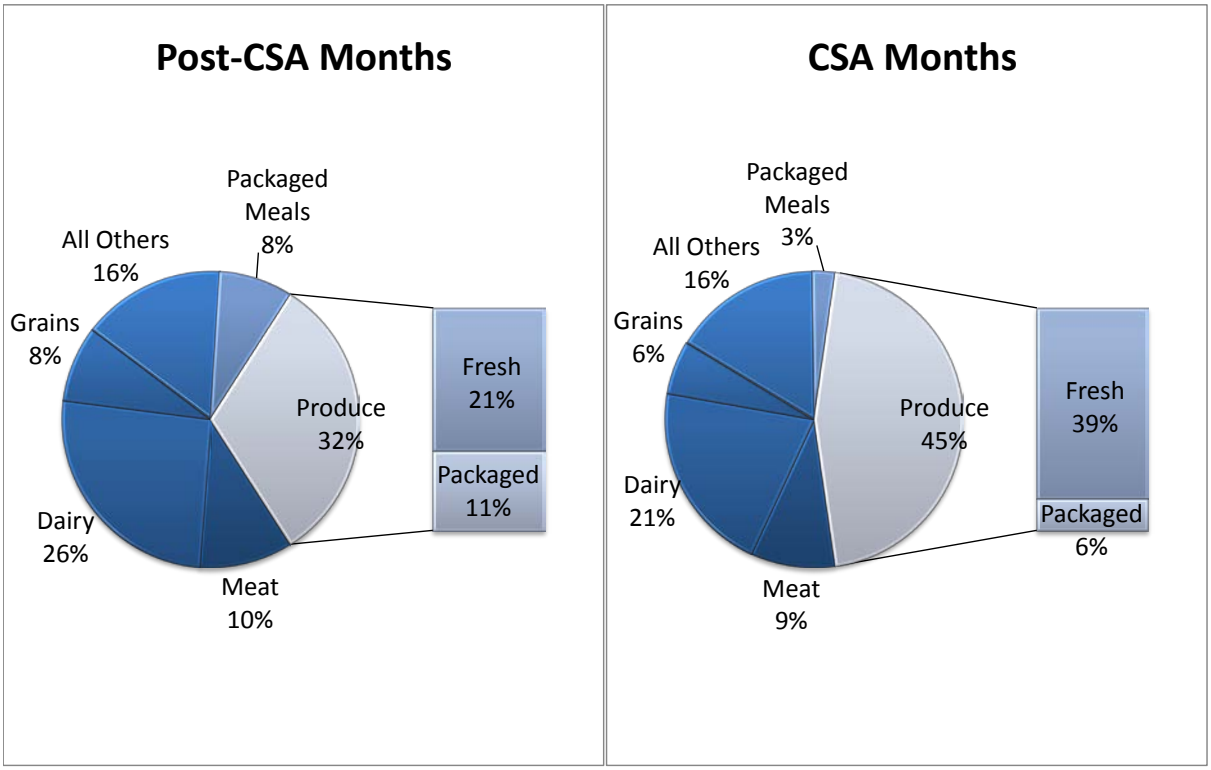


**Figure 5.** Participant Food Purchases by Weight (Percentage) in CSA and Post-CSA Months

Purchases of grain products fell significantly during CSA participation (5.9% CSA, 8.3% post-CSA), suggesting that fresh produce may have replaced grains in normal consumption. This was reflected as well in the significantly increased availability of Vitamin C and folic acid during CSA months, as fresh produce is a major source of these nutrients. While folate availability was above the RDA for both males and females (400 mcg/day) at all points during the study, some values were below the RDA for pregnant/lactating women (600 mcg/day) during post-CSA months. Several of the average Vitamin C availabilities were below the RDA (90 mg/day males, 75 mg/day females) in post-CSA months. Dairy product purchases were 5% lower during the CSA months, as well as packaged meals, which declined from 8% to 3%, but there was no difference in snack food purchases.

An increased availability of Vitamin B12 was also seen during CSA months, but could be due to seasonal effects. Red meats are the primary source of this vitamin and none of the foods provided in the CSA baskets contained this nutrient. Based on information taken from store receipts, more red meats were purchased (hamburger and hot dogs) during the summer months when the CSA was active, while poultry-based purchases were more common in post-CSA months. No other significant (at the 95% level or better) nutrient differences were found (ie. total calories, total saturated/trans fats, sugar, fiber, protein, sodium, etc.). Because purchases of grain products declined during CSA participation, it is likely the source of fiber changed from fresh produce in CSA months to whole grains in post-CSA months. Additionally, based on review of grocery receipts, a portion of the fresh produce purchases in CSA months consisted of lower fiber seasonal choices such as berries (as opposed to higher fiber vegetables). Fat calories mostly came from foods included in the “All Others” category that includes all snack foods (desserts,

chips, candy, etc.), which did not change based on CSA participation. The next largest source of fat calories was packaged meals, which were higher in post-CSA months. However, this was likely balanced by higher red meat purchases in CSA months verses higher poultry purchases in post-CSA months.

## Discussion and Conclusions

This study examined the impacts of CSA membership on participant food choices and dietary intake, as well as food preparation attitudes and behaviors. Results show a definite shift in food preparation attitudes and behaviors as participants increased their consumption of meals at home, increased their cooking knowledge and storage/preservation of foods. They also became more interested in cooking and wine pairing classes, and remained interested in food preparation ideas and recipes. These are important outcomes as research shows that the prevalence of obesity is influenced by the number of meals consumed away from home, and that lack of familiarity with food preparation is one of the major driving factors in the proportion of restaurant meals consumed (French, Story, and Jeffery 2001; Rolls, Morris, and Roe 2002; Glanz et al. 1998; Condrasky and Hegler 2010).

Additionally, participant stated and revealed consumption of fresh produce increased during the CSA program, along with decreased consumption of grains, dairy, and packaged meals. Another important outcome as fresh produced consumption is associated with reduced risk for obesity and chronic diseases in people of all ages (Bradlee et al. 2010). Additionally, the increased fresh product consumption was coupled with increased availability of Vitamin C and folic acid in participant diets. Folic acid has been linked to the prevention of certain cancers, and decreased incidence of stroke, osteoporosis, cervical cancer, macular degeneration, and depression (CDC 2015). Participant consumption of snack foods, however, did not decline during the CSA program.

As this pilot study included only a small sample of participants, further studies which include a larger sample size and a more representative population, especially in terms of lower-income individuals of diverse ethnic backgrounds, are needed. However, this study shows the potential for CSA program membership to improve member diets, as well as food purchase and preparation choices, especially for fresh produce. Hence, public programs encouraging or providing CSA membership for participants may be beneficial, especially when paired with food preparation and nutrition instruction.

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