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Can CSA Cost-Offset Programs Improve Diet Quality for Limited Resource Families?

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The current U.S. Department of Agriculture (USDA) strategic plan, which guides many of its grant programs, highlights the connection between financial sustainability of food producers, supply of fresh local food to consumers, and improved nutritional and health outcomes (U.S. Department of Agriculture, 2014). Achieving these goals requires an integrated and transdisciplinary approach to tackle the interactions between components of the complex food system and human health (Nesheim, Oria, and Yih, 2015). There is limited empirical evidence to date about the relationship between producers' financial sustainability and public health outcomes. In particular, there is little understanding of whether financial security and diet-related health outcomes can interact positively (Sitaker et al., 2014).

To fill these knowledge gaps, our team of researchers—spanning the fields of nutrition, public health, and economics—developed an innovative project that integrates increased access to fresh produce for low-income households with entrepreneurial food systems innovation. This project, called Community Supported Agriculture Cost-offset Intervention to Prevent Childhood Obesity and Strengthen Local Agricultural Economies, is funded by the USDA Agriculture and Food Research Initiative (AFRI) project. Its intent is to integrate research, extension, and education to examine subsidized or “cost-offset” community supported agriculture (CO-CSA) participation as a strategy for improving dietary quality among low-income families, help at-risk children achieve and maintain healthy body weights, and support vibrant agricultural economies.

This is the first transdisciplinary initiative to rigorously evaluate dietary outcomes resulting from the direct-to-consumer (CSA) sales of fresh produce to low-income families, combined with nutrition education, over multiple years as well as assessing impacts on the local economy. It draws on research related to obesity, fruit and vegetable consumption, food access in rural areas (particularly access to fresh produce), and farm viability in direct-to-consumer market channels. This article focuses on the formative research component of the larger study. Data were collected from CSA participants, extension educators, and farmers. Findings of the formative evaluation align with both anecdotal and academic findings: involvement, freshness, value, and variety are important to increasing familiarity and use of fruits and vegetables.

A Call to Action

More than a third of American children and adolescents are obese or overweight, creating alarming social, medical, and economic costs to society as a growing number of children experience costly and debilitating obesity-related health issues like type 2 diabetes and cardiovascular disease (Ogden et al., 2014). These problems may be compounded by other costly health conditions throughout life, including high blood pressure, osteoarthritis, certain cancers, stroke, and heart disease (National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases, 2012). Rates of obesity and chronic disease are higher among low-income and rural populations, the latter of which are more likely to live in poverty compared to urban populations (Lobmayer and

Wilkinson, 2002; Gamm et al., 2003; U.S. Department of Agriculture, Economic Research Service, 2014). Yet Americans currently eat less than two-thirds of the recommended amounts of fruit and vegetables, as well as lower than recommended levels of nutrient-dense dark green and orange vegetables (U.S. Department of Agriculture and U.S. Department of Health and Human Services, 2010).

Individuals with low socioeconomic status, food insecurity, and rural residence have even lower levels of fruit and vegetable consumption, partly due to less access to fresh, affordable foods (U.S. Department of Agriculture and U.S. Department of Health and Human Services, 2010; Guenther et al., 2006; Bowman, 2007; Lallukka et al., 2010; Hanson and Conner, 2014; Lutfiyya, Chang, and Lipsky, 2012; Liu et al., 2012; Larson, Story, and Nelson, 2009).

Fruit and Vegetables Contribute to Good Health

Moderate evidence suggests that increasing fruit and vegetable consumption in adults can lead to weight loss when combined with reduced consumption of energy-dense foods, which may be effective in maintaining a healthy weight (Boeing et al., 2012; Mytton et al., 2014). Evidence of an association between fruit and vegetable consumption and weight development in children and adolescents is much weaker, but some observational and epidemiological studies have shown that consuming more fruits and vegetables is associated with lower body weight in children (Boeing et al., 2012; Tohill et al., 2004; Lin and Morrison, 2002). When substituted for energy-dense foods or combined with other strategies—such as increasing physical activity—increased fruit and vegetable consumption may prevent weight gain or promote weight maintenance (Ledoux, Hingle, and Baranowski, 2011; Rolls, Ello-Martin, and Tohill, 2004).

These relationships are important considerations for long-term child obesity prevention because we know that behaviors established in childhood and adolescence often persist into adulthood and that parental eating behavior is a potent influence on children's diets (Kelder et al., 1994; Mikkilä et al., 2004; Poti, Duffey, and Popkin, 2014). Collectively, this evidence supports integrated, family-based strategies for childhood obesity prevention that include increasing access to and consumption of fruits and vegetables, which can displace energy-dense foods and beverages.

CSAs Contribute to Good Health and Healthy Economies

Like other direct-to-consumer outlets, CSAs have the potential to improve physical and financial access to fresh produce (Cooley and Lass, 1998). CSAs allow consumers pay upfront for a "share" of a farmer's crop, receiving fresh produce regularly as it is harvested during the growing season. CSA produce can cost significantly less than similar types and amounts of produce bought at the grocery store (Perez, Allen, and Brown, 2003; Russell and Zepeda, 2008; Brehm and Eisenhauer, 2008). However, findings on the profitability of CSAs to the farmer are contradictory: In some cases CSAs are more profitable than wholesale accounts but, in others, farmers reported dissatisfaction with economic returns (Stagl, 2002; Jablonski, Perez-Burgos, and Gomez, 2011).

CSA membership has been associated with increased willingness to try new produce and greater consumption of meals at home (Russell and Zepeda, 2008; Andreatta, Rhyne, and Dery, 2008). It may also result in increases in the quantity and variety of fruits and vegetables consumed by CSA members (Russell and Zepeda, 2008; Uribe, Winham, and Wharton, 2012; Allen et al., 2016). Though logistical barriers to CSA share pick up and unfamiliarity with some CSA vegetables are reported by low-income families as rationale for lower participation, CSAs may be feasible and acceptable to low-income participants under the right conditions.

Subsidized CSA shares, convenient pick-up locations, and complementary nutrition education are strategies that researchers and educators have employed to increase participation among low-income families with children (Hayden and Buck, 2012; Healthy Food for All, 2014; Northeast Organic Farming Association of Vermont, 2014; Harnack et al., 2016; Quandt et al., 2013; Hoffman et al., 2012). Farmers can use a variety of strategies to help potential limited-resource members overcome income barriers, including accepting Supplemental Nutrition Assistance Program benefits (SNAP), payment plans, working shares, subsidies from grants or full-pay members, low-cost shares, transportation assistance, and bartering (Forbes and Harmon, 2008). Farmers have been shown to benefit from CSAs via improved financial security, decreased time and money spent on marketing (particularly during their growing season), and reduced production costs (Saulny, 2008; Stagl, 2002; LeRoux et al., 2010; Sabih

and Baker, 2000; Cohen and Derryck, 2011; Jablonski, Perez-Burgos, and Gomez, 2011; Hardesty, 2010). By accommodating low-income participants through share subsidies, farmers can potentially expand their market reach.

Recent studies have shown positive changes in attitudes and consumer behavior toward fruit and vegetables among low-income CSA members (Harnack et al., 2016; Quandt et al., 2013; Hoffman et al., 2012) and among CSA members in general (Curtis, Allen and Ward, 2015). Nonetheless, aside from the rigorous dietary outcome measures reported in Harnack et al. (2016), who studied subsidized incentives for fruit and vegetable purchases, there is limited empirical evidence for the benefits of longer-term CSA membership on dietary quality, particularly among low-income families (McCormack et al., 2010; Hedden, 2011). Similarly, the economic impact of CO-CSAs on farm profitability has not been adequately studied.

Can CSA Cost-Offset Programs Prevent Childhood Obesity and Strengthen Local Agricultural Economies?

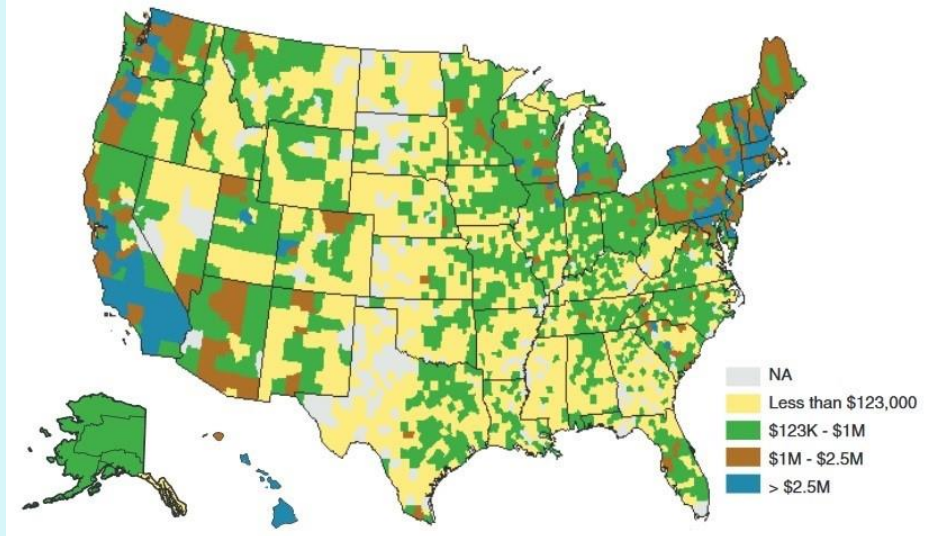
The formative research presented here includes participation in CSAs with different business models in New York, North Carolina, Vermont, and Washington. The quantity and value of direct-to-consumer sales varies considerably across the states and communities participating in this research and captures most of the range of variation in sales seen across the United States. Direct-to-consumer sales are consistently high across all Vermont counties; New York and Washington both have some counties with lower and some with higher direct-to-consumer sales; overall, North Carolina counties have lower direct-to-consumer sales (Low et al., 2015).

Between 2007 and 2012, all four states have seen areas of growth, stability, and decline in direct-to-consumer sales. By including multiple states and three U.S. regions, we aim to increase the likelihood that our research results will be relevant and transferable nationally to other communities trying to increase farmer viability and decrease childhood obesity by increasing fruit and vegetable consumption through direct-to-consumer markets.

We used formative research methods to develop an increased understanding of CSA beliefs, perceptions, and practices among key intervention stakeholder groups. This method leads to proper targeting and appropriate strategies for the intervention, which began during the 2016 growing season. We performed qualitative interviews in each of the four intervention states with twenty-four CSA farmers, forty-one parents in low-income households, and twenty community health educators. We chose respondents using sampling matrices to ensure that they represented a diversity of characteristics (such as farm experience with cost offset mechanisms and children of appropriate age in low-income households) that were of relevance to the intervention.

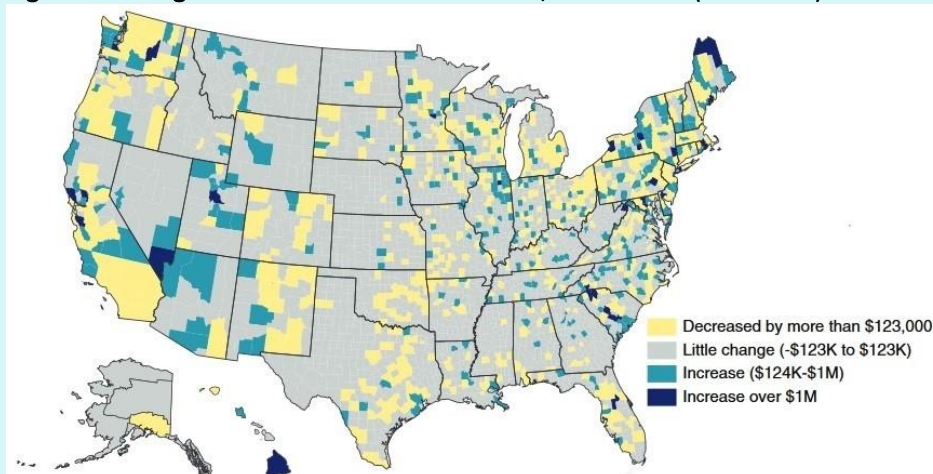
These interviews described the perceived benefits, opportunities, consequences, and barriers to the CO-CSA model and the proposed intervention. We used these findings to design the intervention, guided by emergent themes related to (i) general beliefs and attitudes about produce and farming, (ii) perceptions of CSAs, and (iii) perceptions of successful nutrition education curricula.

Figure 1: Total Dollar Direct-to-Consumer Sales, by County, 2012



Source: Low et al., 2015

Figure 2: Changes in Direct-to-Consumer Sales, 2007–2012 (USD 2012)



Source: USDA Economic Research Service, data from Census of Agriculture, 2012 and 2007.

Source: Low et al., 2015

Multiple States and Multiple Disciplines Add Complexity

A transdisciplinary team with a breadth of perspectives requires deep discussion and consideration of the benefits and drawbacks of quasi-experimental comparison as opposed to randomized control designs, the appropriate level of randomization (individual versus community), and a host of measurement issues. Some of these challenges are outlined in the literature (Hamermesh, 2001; Kolodinsky et al., 2009; Kolodinsky and Goldstein 2011; Sturm, 2005; McKinnon et al., 2009). This consideration has allowed us to create a rigorous research design that integrates these perspectives and meets the demands of many fields.

A randomized experimental design with a delayed-intervention control group will maximize our ability to rigorously measure program impacts on low-income households while meeting high ethical standards for

responsible community nutrition research (allowing all participants to ultimately benefit from the program). Individual 1:1 randomization is implemented within community clusters to produce equivalent intervention and control groups while also acknowledging that agriculture requires planning well in advance of the CSA season and that our CSA partner farms need to know how many shares are required in each year of the longitudinal intervention study.

Our data collection approach attempts to capture a broad range of information; therefore, we have employed a diverse array of data collection methods, including qualitative interviews and focus groups; longitudinal quantitative on-line surveys; in-person physical measurements of children and adults; on-line completion of 24-hour dietary recalls for children; on-line and paper process evaluation surveys from educators and participants; skin carotenoid measures using new, non-invasive technology; and end-of season interviews with farmers, educators, and participant parents. These multiple data sources provide a range of perspectives.

The rationale for integrating different disciplines in food system research has been clearly articulated, but there is limited evidence on food systems programs and policies that align with nutrition goals. Looking to the future, this project seeks to generate new evidence on what programs best serve the needs of both low-income families and local agricultural economies. In addition to studying impacts, the practical, real-world nature of this project will facilitate the development of a nuanced understanding of the incentives and disincentives for farmers and consumers in a CO-CSA model. Our team designed evaluation instruments collaboratively and iteratively to shed light on a range of implementation factors, including the perspectives of key stakeholders on how the intervention is working. Information gathered will help identify areas where targeted action could enhance nutrition and health as well as economic outcomes. We plan to share our program experiences so that others may benefit from what we learn.

Many opportunities exist for researchers in agriculture, nutrition, health, and community development to interact in projects such as this, which require deep inquiry, reflection, and problem-solving. All study materials—from data collection instruments to participant reminder messages and our logo—have been developed and refined collectively, and issues that have arisen have been resolved through discussion and critical reflection among research team members and institutions. The extended project time frame (five years) allows us to grow together while working on a tangible project that demands diverse expertise and perspectives.

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