

MIXED METHOD EVALUATIONS OF COMMUNITY-BASED FRUIT AND
VEGETABLE PROMOTION PROGRAMS FOR LOW-INCOME HOUSEHOLDS

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MIXED METHOD EVALUATIONS OF COMMUNITY-BASED FRUIT AND VEGETABLE PROMOTION PROGRAMS FOR LOW-INCOME HOUSEHOLDS

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The objective of this dissertation was to examine the implementation and effectiveness of a farmers market incentive program (FMIP), *Double Up Food Bucks* (DUFB), and a cost-offset community supported agriculture (CO-CSA) program, *Farm Fresh Foods for Healthy Kids* (F3HK) – both of which are designed to improve food security and fruit and vegetable (FV) intake among low-income consumers. This is a timely effort given disparities in obesity and chronic disease risk between individuals of lower- and higher-socioeconomic status and ongoing conversations regarding the 2018 Farm Bill and Supplemental Nutrition Assistance Program (SNAP) reform. **Chapter 1** reviews the persistence of food insecurity in the U.S. and explains the relationship of this issue with our food system before introducing FMIPs and CO-CSAs as possible solutions needing robust evaluation. **Chapter 2** introduces this work's specific aims and theoretical framework. The aims were three-fold: to conduct a mixed methods process evaluation of F3HK from the perspective of multiple stakeholders (**Chapter 3**); to calculate the effectiveness and cost-effectiveness of using F3HK to shift users' FV-related knowledge, attitudes, beliefs, behaviors, self-efficacy, food security status, and home food environment (**Chapter 4**); and to calculate the effectiveness and cost-effectiveness of using DUFB to improve food security status and FV intake among SNAP users (**Chapter 5**). Results have implications for the implementation of community-based food system-focused nutrition interventions and for the design of federal food assistance and agricultural policy.

BIOGRAPHICAL SKETCH

Jennifer's exposure to the interrelated topics of our food system, food access, and nutrition programming and policy began in her hometown – a small, predominantly low-income farming community in rural Michigan. She competed successfully for a full scholarship to Central Michigan University (CMU) where she studied Dietetics, planning to work clinically at the local hospital and ease a shortage of dietitians. In her sophomore year, she was accepted into the McNair Scholars program, which provided opportunities to gain independent research experience at both CMU and Michigan State University. She was awarded the Provost's Award for Undergraduate Research and the Honors Program Academic Excellence Award before graduating *summa cum laude* and matriculating into Cornell University's combined PhD/RD program in the Division of Nutritional Sciences.

At Cornell, Jennifer gained experience as an intern with the Special Supplemental Program for Women, Infants and Children and University of Rochester's Strong Memorial Hospital. She is now a Registered Dietitian and was a doctoral candidate on the Division's NIH-sponsored grant for Nutrition Training in Translational Science. Her dissertation was completed under the guidance of Dr. Rebecca Seguin-Fowler. She has contributed to the development, oversight and evaluation of the multi-state Farm Fresh Foods for Healthy Kids program RCT and led a multi-year mixed methods evaluation of the Double Up Food Bucks program in Western New York. Her long-term objective is to inform domestic food assistance and agricultural policy. In addition to her research, Jennifer has served through the Nutrition Graduate Student Organization, the College of Human Ecology's Educational Policy Committee, the Southern Tier Academy of Nutrition and Dietetics, the Academy of Nutrition and Dietetics' Council on Research and, currently, as Chair of the Academy's Research Priorities and Strategies Development Task Force. In 2017, she was awarded Recognized Young Dietitian of the Year by the New York State Academy of Nutrition and Dietetics.

To all who have inspired this work.

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LIST OF ABBREVIATIONS

CO-CSA	Cost-offset community supported agriculture
CSA	Community supported agriculture
DUFB	Double Up Food Bucks
EBT	Electronic Benefits Transfer
EFNEP	Expanded Food and Nutrition Education Program
F3HK	Farm Fresh Foods for Healthy Kids
FINI	Food Insecurity Nutrition Incentive
FM	Farmers market
FMIP	Farmers market incentive program
FSSM	Food Security Survey Module
FV	Fruit and vegetable
GDP	Gross Domestic Product
ICER	Incremental cost-effectiveness ratio
NCI FVS	National Cancer Institute's All-Day Fruit and Vegetable Screener
NC	North Carolina
NHANES	National Health and Nutrition Examination Survey
NY	New York
QA	Quality Assurance
SNAP	Supplemental Nutrition Assistance Program
US	United States
USDA	United States Department of Agriculture
VT	Vermont
WA	Washington
WIC	Special Supplemental Nutrition Program for Women, Infants & Children

CHAPTER 1

FOOD SYSTEM APPROACHES TO IMPROVING FOOD SECURITY AND TRANSFORMING THE FOOD SYSTEM

The Persistent Issue of Food Insecurity

Despite decades of research, programming, and policy aimed at ensuring sufficient food access and promoting the health of U.S. citizens, food insecurity remains a pervasive issue. In a period characterized by increased agricultural mechanization, specialization, efficiency, and production, approximately one in six households with children are still food insecure and “uncertain of having, or unable to acquire, enough food to meet the needs of all members” due to “insufficient money or other resources for food”.¹ The prevalence of food insecurity rises even higher for households with children headed by single parents (21.7% and 31.6% for single men and women, respectively).¹

Food insecurity has notable and lasting impacts on children’s health and wellbeing; food insecure children tend to have more stomach aches, headaches, colds, hospital visits, and higher rates of iron deficiency anemia and chronic health conditions than their food secure counterparts.^{2,3} They also experience worse cognitive and behavioral outcomes, including a greater likelihood of having to repeat a grade, inferior interpersonal skills, and poorer competency in attentiveness, persistence, and flexibility – all of which are key to the learning process.^{2,4} In addition, women in food insecure households gain more weight during pregnancy than women in food-secure

households and are more likely to have pregnancy complications such as gestational diabetes.⁵ Children born to mothers who are obese or had gestational diabetes are at greater risk for becoming obese or diabetic themselves later in life. This may explain, in part, why children in food-insecure households are more likely to be overweight and at greater risk for becoming overweight, if they are not so already.^{6,7}

Children are not the only age group affected by food insecurity and its health ramifications. Historically, low-income and food-insecure adults have experienced disproportionately high rates of obesity and chronic disease.^{8,9} Though the incidence of obesity has increased for higher-income and more-educated groups, the prevalence of obesity remains highest for those who are lesser-educated and make lower incomes¹⁰ and obesity continues to be associated with greater risk for heart disease, stroke, Type 2 diabetes, and many types of cancer, among other issues.¹¹

The disparities in disease and obesity rates experienced by low-income and food-insecure families have been attributed, in part, to poor dietary quality. The diets of low-income and food-insecure populations are notably low in fruits and vegetables (FVs) and are of significantly less nutritional quality than the diets of those with higher socioeconomic status.^{12,13} Insufficient nutritional quality may translate over time into elevated risk for obesity and chronic disease given that diets higher in FVs (and thus higher in fiber, vitamins, minerals, and other health-promoting nutrients) are associated with the prevention of chronic disease and other deleterious health outcomes.¹⁴⁻¹⁷ Poor diet quality may be related to insufficient access to fresh,

affordable, healthy foods^{18,19} and cycles of food deprivation and overeating driven by the monthly distribution and spending cycles of food assistance benefits.

A Renewed Call to Action

The issue of food insecurity in the U.S. moved to the forefront of America's attention during the Great Depression of the 1930s.^{20,21} Farmers struggled with debt and retention of their land while between 20% and 50% of the public faced unemployment; farming and non-farming families alike were confronted with economic uncertainty.^{22,23} Paradoxically, agricultural overproduction had resulted a surplus of commodities, but many families faced hunger.²⁰ The government's response included what was designed to be a provisional service during this (presumably temporary) time of need: food stamps.²⁴ Now referred to as the Supplemental Nutrition Assistance Program (SNAP), this program has remained a fixture in the U.S. social safety net.

Over time, understanding of food security and all that it encompasses has evolved. One of the first definitions of food security was "availability at all times of adequate world food supplies of basic foodstuffs to sustain a steady expansion of food consumption and to offset fluctuations in production and prices".²⁵ This definition frames the problem as a systems-level food supply issue (i.e. something that could be addressed at the governmental and societal levels) very much in line with (and thus promoting of) the dominant paradigm of development at that time: market-oriented agricultural intensification. The reality is that achieving household-level food security

is more complex. Indeed, while national food assistance programs such as SNAP were intended to ameliorate food insecurity, not only do participants continue to experience periods of insecurity related to the monthly distribution system and associated cycles of food restriction²⁶ but, according to some analyses, participants are less likely than eligible non-participants to meet dietary guidelines.²⁷ This has prompted discussion regarding program design and the role of diet quality in overall food security.

The definition of food security has been revised to acknowledge the multi-faceted nature of the issue and, implicitly, as something that can manifest at the individual level regardless of whether a sufficient national food supply exists: “A situation that exists when all people at all times have physical, social, and economic access to sufficient, safe, and nutritious food that meets their dietary need and food preferences for an active and healthy life“.²⁸ There are now also four recognized “pillars” of food security: food availability, food access, food utilization, and food stability.²⁹ These pillars recognize that it is not sufficient to have adequate availability of food supplies through production, distribution, and trade alone. Individuals must also have the resources (financial and otherwise) to access food that is safe and nutritious; the knowledge, skills, and tools necessary to prepare food appropriately; the biological capability to utilize nutrients metabolically; and, finally, stability of these factors to ensure food security over time.²⁸ With this understanding, a multisector approach is required to translate this more nuanced understanding of food insecurity into feasible and effective policies and programs.

Reform of the SNAP program has been debated in recent years due to concerns that it was not designed with participant health promotion in mind.³⁰ SNAP benefits are administered monthly and can be used toward the purchase of any unprepared food items.³¹ Some stakeholders propose restricting SNAP participant purchases to healthy foods, suggesting this may help to ease the burden of obesity and chronic disease in this population.³² Others express concern that benefit restriction would “lead to political controversy and unintended side effects” while also being ineffective in improving participants’ diets and unrealistic to manage.³⁰

Strengthening Local Agricultural-Based Economies

Concern has also been growing about the state of small farming in the U.S. Agriculture composes a sizable and growing sector of the US economy; in 2015, agriculture and agriculture-related industries represented a 5.5% share (\$992 billion) of the U.S. Gross Domestic Product (GDP), an increase from 2014 and the eighth straight year that agriculture has had increased contributions to the GDP.³³ Interestingly, the number of farms in the U.S. has decreased for many years in the context of increased industrial-scale agriculture.³⁴ Many regions still boast a large network of small farmers, though, despite policies favoring larger-scale farming operations; in NY for example, of approximately 35,000 farms, over half are less than 100 acres in size.³⁵

Notable among large-farm-favoring policies are those related to agricultural subsidies, which have been implicated by some as a factor in the U.S. obesity epidemic.³⁶ The

current system provides greater financial support to farmers growing less perishable crops that lend themselves to trade on the international market (e.g. wheat, corn, barley, oats, rice, and soybeans). Small farmers growing highly perishable “specialty” crops, i.e. FVs, are thus less able to compete in standard agricultural markets.

Given their size and relative disadvantage in the market, small farmers could benefit from pursuing alternative food distribution networks.³⁷ In theory, such pursuits could help small farmers to expand their customer base and improve their revenues while contributing to the improved distribution of and access to fresh produce. The case for alternative food distribution networks for small farmers is strengthened by growing consumer interest in “locally”-sourced foods despite the geographic ambiguity of this term.^{38,39} Increased value of local foods in the market provides farmers an opportunity to rethink the distribution of their crops and the government an opportunity to consider how it can support small farms so that their unique contribution to the food system is not lost over time.

Taking an Environmental and Policy Approach

In 2014, the USDA started the Food Insecurity Nutrition Incentive (FINI) grant program, which provides \$100 million in grants over 5 years to programs that aim to “increase the purchase of fruits and vegetables among low-income consumers participating in the Supplemental Nutrition Assistance Program (SNAP) by providing incentives at the point of purchase” rather than restricting benefit usage.⁴⁰ This represents a historical shift in how the U.S. views the promotion of nutrition and

health. Previously, more emphasis has been placed on the importance of education and developing personal responsibility around health; there is a growing body of evidence, however, that such education is more effective in the context of multi-component environmental and policy interventions that support individuals' ability to make recommended lifestyle changes.⁴¹⁻⁴³ Point-of-purchase incentives fit within the realm of environmental and policy approaches and have the potential not only to support improvements to food access and the U.S. food system more broadly, but also to shift behavior and improve dietary and health outcomes among lower-income and food-insecure Americans.

In 2016, the USDA announced that \$90 million was being made available for another set of local-food-systems-supporting initiatives, this time targeting producers rather than consumers. These initiatives include the Specialty Crop Block Grant Program, the Farmers Market and Local Food Promotion Program, and the Federal-State Marketing Improvement Program.⁴⁴ Such initiatives aim to help support direct producer-to-consumer marketing projects with the goal of improving market demand for locally- and regionally-produced specialty crops.

Given the interrelated nature of strengthening local food systems, bolstering specialty crop production and improving the nutritional focus of food insecurity initiatives, it is worth considering whether joint approaches to these endeavors may exist. Two such approaches that have emerged are farmers market incentive programs (FMIPs) and cost-offset (or subsidized) community supported agriculture (CO-CSA) programs.

Both models aim to improve low-income households' purchasing power by subsidizing the price of fresh FVs purchased directly from local farmers.

Farmers Market Incentive Programs (FMIPs)

Examples of farmers market incentive programs include Double Up Food Bucks (DUFB), Fresh Connect, and the Farmers Market Nutrition Program (FMNP).

Through DUFB, SNAP participants receive a dollar toward the purchase of locally-grown produce for every dollar of benefits used at participating markets up to \$20 per market per day. In this case, "local" is defined as the state in which the participating market is located. DUFB was started by a Michigan non-profit, Fair Food Network, in 2009 and has since been implemented in 21 other states. Fresh Connect is a New York State program in which SNAP participants earn two dollars toward the purchase of FVs for every five dollars of SNAP benefits spent at participating markets. FMNP takes a different approach than DUFB and Fresh Connect and simply distributes coupons for a given value of free produce to low-income seniors and participants of the Special Supplemental Nutrition Program for Women, Infants and Children (WIC). A wide variety of other FMIPs exist across the U.S.⁴⁵⁻⁴⁸

FMIPs appear to be a promising approach due to both their geographic reach and emerging evidence of their effectiveness. The number of farmers markets in the U.S. has increased to 8,669 within the last decade⁴⁹ and markets are increasingly available to consumers in both rural and urban settings. In addition to their rising availability and programmatic efforts to improve financial accessibility, recent studies indicate

FMIPs may be effective in helping participants to access and consume fresh produce. A study of low-income women found that farmers market voucher use was associated with higher FV consumption^{50,51} and a study of 22 farmers markets in low-income communities found that incentive program participants were significantly more likely than non-participants to self-report improvements in FV intake.⁴⁷ Few studies have used a repeated measures design to assess the diets of low-income participants over time and have documented the success of FMIPs in improving FV intake.^{52,53}

Though the evidence base for such incentives is still limited, these findings lend support to claims that FMIPs can attract new customers to the market and thus contribute to improved financial security of participating farmers. These findings also suggest that FMIPs can facilitate positive dietary shifts and may therefore contribute to reduced body weight and chronic disease disparities over time. The increase in farmers market availability and documented success of FMIPs to date suggests they may be a feasible and effective model for national dissemination.

Cost-Offset Community Supported Agriculture

Another potential strategy for improving diet quality and health outcomes in low-income and food-insecure households is participation in cost-offset community supported agriculture (CO-CSA). This is a financial model in which lower-income families receive a cost-subsidized share of produce from a local farmer. The shares are typically subsidized using full-paying CSA member donations, fundraisers, farmer contributions, private funding, or grants. Cost-offset structures are integrated into CSA

programs throughout the U.S., but, similarly to FMIPs, they remain highly differential across and within states. If farmers who offer CO-CSA programs are set up to accept Electronic Benefits Transfer (EBT) payments, participants can use their SNAP benefits to pay weekly or biweekly for the portion of the share for which they are responsible. This is a notable divergence from the typical CSA model in which shareholders would typically pay in full for the share ahead of the growing season so that farmers have sufficient financial resources for necessary agricultural inputs and monthly expenses.⁵⁴ In general, CSA members have improved access to and consumption of FVs.^{55,56} The primary benefit of CSA participation for food-insecure families may be the weekly access to fresh produce, though, which has potential to limit the cycle of food deprivation experienced in these households. Despite the implementation of CO-CSA programs throughout the U.S. for many years, few have endeavored to assess their effectiveness and relatively little is known about their potential to shift dietary behaviors.

Problematic Assumptions

To improve food security by its current definition, the above-discussed programs would have to improve not only the availability of safe and nutritious foods, but also its physical, social, and economic access and utilization and must include foods that meet dietary requirements and food preferences and that are available and accessible consistently. Understanding of these programs is insufficient to answer whether that's actually possible⁵⁷; however, both have the potential to be seen as problematic given that they 1.) require time-constrained participants to add an additional stop to their

food shopping routine, potentially minimizing the assumed increase in physical access to food; 2.) are seasonal in nature and may thus have only limited or temporary impacts on stability of food access; and 3.) neither necessarily includes education about how to prepare and preserve the fresh produce, potentially limiting produce utilization.

To improve farm security, FMIPs and CO-CSA programs would presumably have to attract an expanded and reliable revenue base to participating farmers. It remains to be seen whether the low-income patrons of these programs maintain their participation over time, especially given the potential time burden and limited accessibility due to the restricted hours of most farmers market (FM) and CSA venues. In a study of standard CSAs in the central coast of California, CSA farmers reported that 65% of members typically rejoin with non-renewing members citing dissatisfaction with the product mix and produce quantities.⁵⁶ Such inconveniences and issues may risk long-term retention of new customers of these programs, especially those for whom resources are limited.

Potential improvements in farm security are also compromised by existing program implementation and funding structures. FMIPs are implemented through a variety of mechanisms. In DUFB, SNAP participants are provided with plastic tokens to use at the market as a means of payment; Fresh Connect participants get paper checks; and FMNP participants get coupons. Each of these variations is due to the lack of coordination between programs given their association with different funding

mechanisms and agencies at the local, state, and federal levels. Participating farmers must not only understand the differing protocols associated with their acceptance of benefits from each program (which may be burdensome and frustrating), they must also ensure that the “payment” received from participants is submitted to the correct party so that they can be reimbursed appropriately. Thus, these programs can be difficult to manage and farmer confusion may result in delayed reimbursement for goods at best or loss of income and decreased participation by farmers at worst.

The CO-CSA model can be problematized further. A fundamental benefit of the traditional CSA model for farmers is shareholders’ monetary investment in advance of the growing season.⁵⁸ This advance investment helps not only to provide the farmers with the financial resources necessary to purchase required agricultural inputs, but also to ensure that the farmers and shareholders share the risk (and reward) of this form of agricultural production.⁵⁹ CO-CSA models try to accommodate the limited financial resources of low-income families and thus often allow for weekly payments and use of SNAP benefits. If farms accept SNAP benefits and allow CO-CSA participants to pay weekly, farms may experience financial loss due to missed pick-ups and payments. CO-CSA programs may thus have limited impact on farmers’ financial security and participants’ food security and health if members are unable to participate reliably.

Contested Transformative Potential

Some scholars find FMIPs, CO-CSA, and other alternative agricultural programs to be problematic for reasons beyond issues of practicality and feasibility. Such approaches

are seen as 1) aligning with (and thus not challenging) existing market structures and 2) ignoring social injustices (e.g. labor exploitation) caused by the neoliberal economic ideology that guides agricultural practice and policy.^{60,61} Proponents of a transformed food system use “food sovereignty” as a guiding principle. Food sovereignty is an “intensely political” concept that has been used to guide the development of counter-hegemonic food movements and to “transform the oppressive trade relations and corporate control through which the system is currently structured, replacing them with socially-embedded markets and democratic governance”.⁶¹ The concept is similar to the “re-embedding” of markets in society proposed by Polanyi (2001).⁶² Advocates envision a system free from oppression that is controlled by the people rather than profit-driven corporations and is supported by appropriate changes in national and international policy.

FMIPs and CO-CSA programs could be perceived as both promoting and problematic according to the tenants of food sovereignty. Their activities fall within the broad arms of the current market system, but they operate outside of traditional food market venues (i.e. grocery stores) and instead take place at local farmers markets and CSA pick-up sites. In this way, these direct-to-consumer programs inherently shorten food supply chains by de-centralizing and re-localizing agricultural production and food system transactions. Moreover, farmers participating in such programs cite food-sovereignty-supported values, including motivations to be connected to their community, and to promote good land stewardship practices.⁶³ Such programs may not be the purest manifestations of social justice-promoting programming envisioned

by food movement advocates, but this does not preclude their potential to have real and positive impacts. FMIPs and CO-CSA programs must be evaluated more thoroughly to discern the degree to which such promise translates into real benefits for participating families, farmers, and communities.

Conclusion

The producer-to-consumer programs and point-of-purchase incentive models discussed in this chapter have the potential to improve food security, dietary quality, and health of adults and children in low-income households while also strengthening local agricultural economies and promoting a more equitable food system. The actual impacts of these programs, still in their infancy, are not fully understood and there is much to be learned about how they can be designed for maximum positive impact for participants, farmers, and society alike. This will require rigorous evaluation of the assumptions underlying support for these programs by asking: Can consistent access to and consumption of produce impact food security status? Are any observed improvements in fruit and vegetable consumption sufficient to produce clinically-meaningful reductions in weight and chronic disease? How can these programs contribute to reductions in pervasive health disparities? What role may such programs play in the economic viability of small farms? What is the impact of these programs on the local ecology, including social relationships with each other and with food? Does the structure of these programs (e.g. funding mechanisms) influence their impact? Together, stakeholders across public and private sectors will have to work together to evaluate these programs and answer these questions.

CHAPTER 2

DISSERTATION OVERVIEW

Research Objective

The objective of this dissertation was to examine the implementation and effectiveness of a farmers market incentive program (FMIP) and cost-offset community supported agriculture (CO-CSA) program designed to improve food security and dietary quality among low-income consumers. This is a timely and important issue given disparities in obesity and chronic disease risk between lower- and higher-income individuals and ongoing conversations regarding the 2018 Farm Bill and reform of Supplemental Nutrition Assistance Program (SNAP). The farm bill is comprehensive legislation that supports a variety of food- and farm-related initiatives, including SNAP, and is passed by Congress every five years. Even though SNAP is just one component, it is the subject of intense political debate because it comprises 80% of the bill's budget. There is concern that the program does not do enough to promote participant health and that the farm-related aspects of the bill provide relatively little support to farmers growing fruits, vegetables, and other specialty crops. Results of this dissertation will expand the currently limited evidence on produce incentive programs and have clear and immediate implications for federal food assistance and agricultural policy.

Public Health Significance

The interrelated issues of obesity, chronic disease, and food insecurity are of primary national importance due to their widespread prevalence in the United States. Recent

data from the Centers for Disease Control and Prevention estimate that approximately 17% of children and adolescents and 40% of adults are obese.^{64,65} No U.S. state or territory has a prevalence of obesity less than 20% and five now have a prevalence of obesity greater than 35%.⁶⁶ These statistics do not include the prevalence of overweight in the U.S. (15% of children and adolescents and 33% of adults) which, when combined with obesity rates, reveal that almost three quarters of adults and just under one in three children are of a potentially unhealthy weight.^{64,67} Both overweight and obesity have systemic effects on health; obesity puts individuals at greater risk for heart disease, stroke, type 2 diabetes, and many types of cancer, among other issues.¹¹ It is thus not surprising that roughly half of U.S. adults have at least one of ten major chronic diseases⁶⁸ and that almost 27% of children also have at least one chronic disease.⁶⁹ Food insecurity is no less of an issue; approximately one in six households with children are food insecure and “uncertain of having, or unable to acquire, enough food to meet the needs of all members because they had insufficient money or other resources for food”.¹

Almost two dozen objectives within Healthy People 2020 were set to address these issues.⁷⁰ They include: “Reduce the portion of adults that are obese”; “Reduce the portion of children and adolescents aged 2 to 19 years who are considered obese”; “Reduce household food insecurity and in doing so reduce hunger”; and, “Increase the contribution of total vegetables to the diets of the population aged 2 years and older”. All but one of these objectives are deemed Leading Health Indicators, a designation used to identify “high-priority health issues”.

Program Background

Double Up Food Bucks (DUFB)

DUFB is a FMIP implemented by the non-profit Fair Food Network and regional partners across 23 states.⁷¹ In DUFB, SNAP participants receive a dollar toward the purchase of locally-grown (i.e. in-state) FVs for every dollar of SNAP benefits used at participating farmers markets. Program implementation varies across regions. In Western New York, where this study was completed, participants can receive up to twenty dollars in extra benefits per market visit per \$20 spent, essentially doubling their purchasing power for fresh FVs.

In the fall of 2014, a cross-sectional pilot evaluation of DUFB was conducted in partnership with Field & Fork Network at seven western NY farmers markets. Between September and November, interested participants (n=147) completed an anonymous, five-minute, paper-based survey regarding program exposure, program satisfaction, and self-reported changes in frequency of FM visits, food purchasing and consumption, confidence to prepare FVs, and healthfulness of their overall diet since starting to use DUFB. At the end of the survey, participants could provide their contact information separately for inclusion in follow-up focus groups (n=4) held in mid-November to explore perceived barriers to, facilitators of, and benefits of DUFB participation.

Results of the survey provided insights into program reach and perceived benefits of participation. Survey respondents represented 43 different zip codes, indicating the far

geographic reach of the program and its benefits. Despite much marketing by Field & Fork Network, respondents primarily heard about DUFB while already at the farmers market (44%) and via word-of-mouth (25%). Of those who had used DUFB at least once prior to completing the survey, participants reported being “very satisfied” with DUFB (94%) and affirmed that, since starting to use DUFB, they visited FMs more frequently (76%); were purchasing more FVs (85%); were more confident to prepare FVs (68%); were eating more FVs (86%); were buying fewer chips, candies, and cookies (62%); and had an overall healthier diet (77%) (Garner, Thayer, French and Seguin 2014, unpublished data).

Focus groups results provided more insight into program benefits. Four primary benefits to participation were discussed: improved financial access to high quality, fresh produce; more frequent consumption of FVs; improved opportunity to experiment with new types of produce; and, improved ability to support local farmers and the community, as highlighted by a participant who stated, *“I’d rather spend more money on things I know that are coming from my community... the money gets back into the community so it kinda helps either way you look at it - for the community and for [our]selves...”* (Garner, Thayer, French and Seguin 2014, unpublished data).

Focus groups were also helpful in understanding barriers to and facilitators of using DUFB (Garner, Thayer, French and Seguin 2014, unpublished data). The primary barrier to DUFB utilization was unawareness of the program and how it works, which aligns with the survey findings regarding participants’ accidental first exposure to the

program. Two key factors that promoted program use were the large variety of farmers and produce to choose from and the ease of using DUFB. Together, results from the survey and focus groups informed a revised marketing strategy for Field & Fork Network and plans for a more robust participant evaluation (presented in Chapter 5).

In 2014, Field & Fork Network also conducted a separate, market- and farmer-level evaluation of DUFB and found that the program contributed to an average increase in market SNAP sales of 219% and the attraction of over 1000 new customers to regional, participating markets. Seventy percent of farmers reported making more money because of their acceptance of DUFB benefits and 62% reported having an expanded customer base (Field & Fork Network 2014, unpublished data). Field & Fork Network's 2016 Annual Report contains similar findings as well as a new, related finding: 67% of farmers report selling more FVs since joining DUFB.⁷²

Farm Fresh Food for Healthy Kids (F3HK)

F3HK is a CO-CSA program developed by researchers at Cornell University (NY), University of Vermont (VT), Eastern Carolina University (NC), University of North Carolina (NC), and The Evergreen State University (WA). The program provides low-income families the opportunity to purchase a 50%-subsidized CSA share; to pay for their portion of the share weekly and with their Supplemental Nutrition Assistance Program (SNAP) benefits, if applicable and desired; to receive 2-4 pieces of free cooking equipment of their choice (from a range of options); and to attend nine, CSA-

tailored healthy eating classes taught by a community health educator (or receive the corresponding educational materials for at-home use).

F3HK was designed based on existing literature regarding CSA-based interventions^{55,73,74} and formative in-depth interviews with 1) farmers with CO-CSA models, 2) farmers without CO-CSA models, 3) adults in low-income households, 4) children in low-income households, 5) full-paying CSA shareholders, and 6) Extension-affiliated educators who have extensive experience working with low-income families. A community-based, multi-state randomized intervention trial of F3HK began in April 2016 and will end in fall 2018.

Specific Aims

The research described in this dissertation sought to achieve the following aims.

Aim 1. Conduct a mixed methods process evaluation of a CO-CSA plus education intervention – *Farm Fresh Foods for Healthy Kids (F3HK)* – targeting low-income families with children, from the perspective of multiple stakeholders. This work is described and discussed in Chapter 3.

Aim 1a. Evaluate the dose delivered, dose received and fidelity of both the CO-CSA and educational portions of F3HK implementation across all sites. A mixed methods process evaluation of a community-based randomized trial of the F3HK program in four states (VT, NY, NC, and WA) was leveraged for this purpose. Data

regarding participants' attendance at classes and purchase of each week's CSA share were collected and analyzed to determine intervention "dose delivered". "Dose received" was evaluated using post-lesson surveys that assessed participants' perceptions of lesson content utility and use of CSA share contents. Post-lesson surveys were also completed by educators and used to assess their fidelity to the written curriculum. Site coordinators in each state conducted lesson audits to validate educators' reporting of lesson fidelity and provide additional contextual data.

Aim 1b. Explore site- and educator-related factors that could moderate effectiveness of the F3HK intervention in improving participant fruit- and vegetable-related knowledge, attitudinal and behavioral outcomes. Site

coordinators conducted lesson audits to assess factors that could influence intervention effectiveness (e.g. class dynamic, educator preparedness). Post-season interviews with each educator explored site-specific factors that may have impacted implementation and effectiveness of F3HK.

Aim 2. Conduct an intermediate outcome and cost-effectiveness analysis of a CO-CSA plus education intervention – *Farm Fresh Foods for Healthy Kids (F3HK)*.

This work is described and discussed in Chapter 4.

Aim 2a. Evaluate whether psychosocial and household-level outcomes improve among low-income families with children after participation in F3HK.

Psychosocial outcomes include caregivers' FV portion knowledge, cooking attitudes,

nutrition-related beliefs, general cooking self-efficacy, self-efficacy to prepare FVs, and FV snack preparation. Household-level outcomes include FV availability, FV accessibility, and food security status.

Aim 2b. Determine the cost-effectiveness of using F3HK to improve psychosocial and household outcomes among low-income families with children. Programmatic cost data were estimated from program administration and budget records. Participant costs were estimated based on self-reported travel and time costs. Incremental cost-effectiveness ratios (ICERs) were calculated by dividing the cost of the program, per household, by the change in studied outcomes between baseline and endpoint for those outcomes that improved significantly between timepoints. ICERs were completed from both the narrow program – i.e. considering only programmatic costs – and the broad societal perspectives, including costs incurred by participants.

Aim 3. Conduct an outcome and cost-effectiveness analysis of a FMIP – *Double Up Food Bucks (DUFB)* – operating in Western New York and targeting SNAP-using households. This work is described and discussed in Chapter 5.

Aim 3a. Evaluate whether diet-related outcomes improve among low-income adults using SNAP after participation in DUFB. Outcomes include FV intake among adults and household food security status.

Aim 3a. Determine the cost-effectiveness of using DUFB to improve diet-related outcomes among low-income adults using SNAP. Programmatic cost data were estimated from program administration and budget records. Participant costs were estimated based on self-reported travel and time costs. Incremental cost-effectiveness ratios (ICERs) were calculated by dividing the cost of the program, per household, by the change in studied outcomes between baseline and endpoint for those outcomes that improved significantly between timepoints. ICERs were completed from both the narrow program – i.e. considering only programmatic costs – and the broad societal perspectives, including costs incurred by participants.

Defining “Low-Income”

All participants of the DUFB program had to be a SNAP participant and thus met the U.S. government’s income guidelines defined by the Food and Nutrition Service of the USDA.⁷⁵ Participants of the F3HK trial were not required to be a SNAP participant but had to be eligible for the Expanded Food and Nutrition Education Program (EFNEP). EFNEP eligibility is met if someone in the household participates in SNAP, WIC, Head Start, or free or reduced-price school lunch, or if self-reported income is less than or equal to 185% of the federal poverty level.

Theoretical Framework

The framework that was used to conceptualize this work is based on Anthony Giddens’ Structuration Theory.^{76,77} According to Giddens, our practices (i.e. our behaviors) are the result of varying degrees of influence from both “structural” factors,

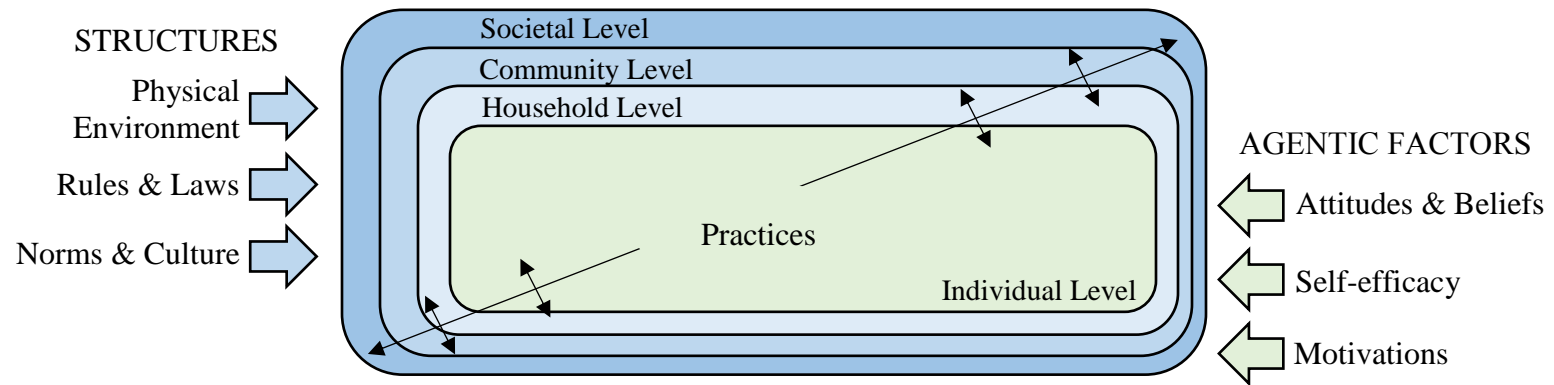
such as existing community conditions, laws, norms, and culture, and “agentic” factors, such as one’s attitudes, beliefs, self-efficacy, and motivations. Giddens believed that structure and agency work simultaneously to influence behavior: “the two are indiscernible and coexisting in all forms of human activity”.

Giddens’ theory can be applied at both the individual and community level much like Bronfenbrenner’s Ecological Model (Figure 2-1).⁷⁸ Giddens used the word “practice” instead of behavior because he recognized that we often repeat or “practice” the same behaviors consistently over time and that those behaviors can be restructured into new practices through “reflexivity”. Reflexivity is the process by which existing community structures (e.g., a local FMIP) guide “scripts” for our behaviors (e.g., the purchase of produce directly from local farmers during the growing season) that ultimately influence an individual’s agency (e.g., improved self-efficacy for purchasing, preparing and consuming FVs).

Because agentic factors and structure interact at all levels of an individual’s influence (i.e. personal, household, community, and societal factors), scripts may differ between settings across these levels. Over time, scripts at each level may be revised due to self-reflection (e.g., participation in a nutrition class), which can result in the changing of actual structures (e.g. heightened community value of and demand for high quality, affordable produce). It is an iterative process of structures and agents interacting over time to modify their environments’ structures and their own behaviors.

The DUFEB and F3HK programs exist in individuals' communities and are "structures" designed to improve behavior and, over time, to promote long-term health for individuals and their community through the process of reflexivity. Through its education sessions, F3HK also functions to modify individual agency (i.e. promote positive attitudes and beliefs toward FVs; improve self-efficacy around preparing FVs; and increase motivation to purchase, prepare, and consume FVs) and is thus promoting changes in practice from multiple directions. The proposed work will contribute to our understanding of how structural interventions can be used alone (e.g. in DUFEB) or in combination with agentic interventions (e.g. in F3HK) to promote the adoption and long-term practice of healthy behaviors.

Figure 2-1. Visual Representation of Giddens' Structuration Theory with Bronfenbrenner's Ecological Model



CHAPTER 3

A MIXED METHODS PROCESS EVALUATION OF THE *FARM FRESH FOODS FOR HEALTHY KIDS (F3HK)* INTERVENTION

Abstract

Objective: We conducted an in-depth process evaluation of an economic intervention, *Farm Fresh Foods for Healthy Kids (F3HK)*, to assess dose and fidelity from the perspective of stakeholders, including caregivers, educators, and site coordinators.

Methods: F3HK was designed to improve low-income families' access to and consumption of fruit and vegetable, with the long-term objective of improving dietary quality and reducing childhood obesity risk. The intervention included a 50% subsidized, weekly Community Supported Agriculture (CSA) produce share and nine healthy eating classes designed to build skills needed to use the produce and form healthy household eating habits. In 2016, a 2-arm randomized controlled trial of F3HK was initiated at eleven sites across four states. Families were randomized 1:1 at each site. Data were collected using mixed methods: CSA pick-up logs and lesson sign-in sheets captured intervention participation ("dose delivered"); post-lesson participant surveys captured families' use of the CSA and perceptions of lesson utility ("dose received"); and post-lesson educator surveys and site coordinator audits captured fidelity. Semi-structured interviews with educators (n=9) explored site-specific factors impacting intervention fidelity and participation ("dose delivered"). Themes were identified using template analysis.

Results: Per the Medical Research Council's recommendation, we report our process data here, prior to analysis of trial outcomes to avoid biased data interpretation. Dose

delivered: 70% of enrolled adults and 55% of children attended at least one lesson; attendance decreased by 26% across the program season. Educators cited inconsistent schedules as one factor. Fifty seven percent of households picked up at least three-quarters of their weekly shares. Dose received: Median attendee rating of lesson activities was 5, or “very useful”, and 77% of survey responses indicated that most, if not all, CSA produce was consumed by the household. Fidelity: All pick-up sites functioned with high fidelity. Most educators reported adapting lesson order and content to accommodate field trip scheduling and participant preferences; one educator taught the curriculum as ordered and written.

Conclusions: Researchers and practitioners involved in the design, implementation, and evaluation of multilevel food systems interventions may find the results useful in informing both program and process evaluation design.

Introduction

Low-income and food insecure populations experience a higher prevalence of obesity and chronic disease^{8-10,79} and consume diets that are low in fruits and vegetables (FVs)^{12,80,81} and of significantly less nutritional quality than the diets of those with higher food security and socioeconomic status.¹³ Poor diet quality is a likely contributor to their elevated risk for obesity and chronic disease; diets high in FVs are associated with the prevention of chronic disease and fewer negative health outcomes.¹⁴⁻¹⁶

Community Supported Agriculture (CSA) has emerged as a strategy for linking community members directly to their local food system and a growing body of evidence indicates their potential for improving healthy eating habits and produce consumption.^{55,56,82,83} In a standard CSA program, consumers, also called members or shareholders, pay upfront to receive a share of a local farm's harvest throughout the growing season. CSA shareholders are typically well-educated and from high-income households.^{56,84} Less utilization of CSA by lower-income households has been attributed, in part, to share cost.⁸⁵ In response to this disparity in access and to the diet and health disparities of low-income consumers, cost-offset – or subsidization – structures have been integrated into some CSA programs in the U.S. to improve share affordability.^{74,86-89}

Despite the potential of subsidized CSAs to facilitate improved diet quality in those households at elevated risk for obesity and chronic disease, there have been no rigorously-designed studies of the implementation and effectiveness of such programs.

Farm Fresh Foods for Healthy Kids (F3HK) is a cost-offset CSA (CO-CSA) intervention designed by Seguin and colleagues that is being tested in a multisite, two-arm randomized controlled trial to address this gap.^{90,91} It is primarily an economic intervention that incorporates environmental and behavioral supports. F3HK provides low-income families with children in New York, Vermont, North Carolina and Washington state the opportunity to purchase a 50%-subsidized CSA summer share; to pay for their portion of the share weekly and with their Supplemental Nutrition Assistance Program (SNAP) benefits, if applicable and desired; to receive 2-4 pieces of free cooking equipment of their choice (from a range of options); and to attend nine, CSA-tailored healthy eating classes taught by a community health educator (or receive the corresponding educational materials for at-home use).

It is now recommended that process evaluations be conducted alongside the testing of interventions as a means to understand implementation-, mechanistic-, and context-specific factors that may impact intervention effectiveness and replicability and that results be shared before analysis of primary outcomes.⁹² Process evaluations may be particularly useful for multisite trials, such as that being done to test F3HK, given the potential for variable fidelity across research sites.⁹³ The purpose of this study was to conduct a process evaluation of F3HK and, more specifically, to evaluate dose delivered, dose received and fidelity of F3HK from the perspective of multiple stakeholders using mixed methods.

Methods

The full F3HK intervention and evaluation plan has been summarized elsewhere.⁹⁰ All study protocols were reviewed and approved by Institutional Review Boards (IRBs) at both University of Vermont and Cornell University (protocol ID # 1501005266).

Participants were recruited in 11 rural and micropolitan communities across New York (n=3), Vermont (n=3), North Carolina (n=3) and Washington state (n=2). To be eligible, community members had to be 18 years of age or older; English-speaking; the parent or legal guardian (i.e. caregiver) of a child between the ages of two and twelve years; have a self-reported household income \leq 185% of the Federal Poverty Level; have not been a CSA participant in at least three years; be willing to pay weekly for a 50% subsidized CSA share using their own money or SNAP benefits; have access to internet and an active email address at which to be contacted; and express willingness to attend the CSA-tailored healthy eating classes in their community.

Interested and eligible adults enrolled as a dyad with one of their children between the ages of two and twelve years at the time of enrollment. The study employed a two-arm, delayed parallel design; all enrolled dyads were randomized 1:1 to either the intervention or control groups. Prior to randomization, enrolled caregivers completed a baseline survey that included questions regarding caregiver and child demographics, household characteristics, and assessments of caregivers' nutrition-related knowledge, attitudes, beliefs, and self-efficacy.

Nutrition-related knowledge, attitudes, beliefs, and self-efficacy were measured with both original and tested tools. Nutrition-related knowledge was measured via a categorical, MyPlate-inspired question asking caregivers what portion of the dinner plate should be filled with FVs. Four ordinal responses were provided: $\frac{1}{8}$ plate, $\frac{1}{4}$ plate, $\frac{1}{2}$ plate, and $\frac{3}{4}$ plate. Attitudes toward cooking were measured using the 5-point Negative Cooking Attitude scale (1 = Strongly disagree, 5 = Strongly agree) for which a lower score indicates a more positive attitude toward cooking.⁹⁴ Nutrition-related beliefs were measured using the 4-point General Nutrition Knowledge Belief scale (1 = not at all important, 4 = very important).⁹⁵ Cooking self-efficacy was measured using the 5-point Cooking Techniques and Meal Preparation Self-Efficacy scale (1 = not at all confident 5 = extremely confident).⁹⁴ An expanded version of the scale was created to include techniques applicable to the preparation of CSA-acquired FVs that were included in the F3HK curriculum.⁹⁰ Self-efficacy to prepare FV was measured using a modified version of the Self-Efficacy for Eating and Cooking Fruits and Vegetables scale for which only questions specific to FV were included and response options included only four ordinal categories (1 = not at all confident, 4 = extremely confident).⁹⁴

The F3HK process evaluation sought to characterize the intervention dose delivered to and received by participants and to compare intervention fidelity across program sites. The three constructs of interest (dose delivered, dose received and fidelity), their definition, data sources and measures for each primary component of the intervention (CO-CSA share and Healthy Eating Classes) are provided in Table 3-1. This study

reports findings from the process evaluation data collected during the first year of F3HK implementation during the 2016 CSA season.

“Dose delivered” refers to the receipt of weekly CSA shares and attendance at the offered health eating classes and was evaluated using data from CSA share pick-up logs kept by participating farmers and lesson sign-in sheets (Appendix A) kept by participating educators.

“Dose received” refers to the self-reported use of received produce shares and the perceived utility of lesson content among attendees. These constructs were measured using data from post-lesson, paper-based questionnaires completed by adults attending each class (Appendix B). The questionnaires were made identifiable via a sticker printed with the attendee’s ID number so that baseline, process and outcome data could be linked. Post-lesson questionnaires asked attendees to report their perceived utility of lesson activities and recipes (on a 5-point scale for which five equals “very useful”); their intention to try featured recipes and activities at home (Yes/No); and the portion of their most recent share that was consumed, preserved, spoiled, or given away (using a 7-point scale ranging from “none” to “all”). The questionnaire included brief, open-ended questions that participants could use to explain their activity ratings, share what they liked best and least about the lesson, suggest improvements, list share contents that were used, and, if applicable, explain what prevented them from picking up their most recent share.

“Fidelity” refers to produce quality and the functionality of CSA pick-up sites as well as educators’ adherence to the healthy eating class curriculum. This construct was evaluated using data from Qualtrics-based post-lesson educator questionnaires (Appendix C) and on-line surveys completed during site coordinator quality assurance (QA) visits to CSA pick-up sites (Appendix D) and education sites (Appendix E). Project management in each state was asked to audit each pick-up and education site twice per program season, once toward the season’s start and again near its end.

Fidelity surveys assessed a wide variety of variables. Pick-up site QA audits by site coordinators assessed share sizes and contents and the site’s adherence to a set of minimum standards regarding pick-up hours, organization, cleanliness, safety, staff support, payment options, and produce labeling and arrangement (if a market-style CSA where consumers get to choose certain amounts of a variety of options). Post-lesson educator questionnaires included a checklist of lesson activities; Likert-type scales with which to rate each activity’s perceived acceptability and facilitation feasibility; reporting of featured recipes and physical activity breaks; a Likert-type scale with which to rate the perceived relevance of the lesson (for participants) overall; and open-ended questions that allowed for reporting of lesson issues and suggestions. Education site QA visit surveys completed by site coordinators mirrored those completed by educators to provide partial validation of their self-reported curriculum fidelity. QA surveys also included questions to evaluate educator qualities and techniques of importance to adult education on a 5-point scale: preparedness, adaptability, knowledge, respectfulness, facilitation of group cohesion, promotion of a

safe (i.e. trusting) environment, promotion of content immediacy (i.e. usefulness), and participant engagement.

During F3HK implementation, a record of process evaluation paperwork submission was maintained and updated regularly. As needed, farmers, educators and site coordinators were contacted to encourage completion and submission of requested pick-up sheets, sign-in sheets, post-lesson questionnaires and QA surveys.

Quantitative data were entered in Microsoft Excel 2016 and SPSS Statistics (version 24.0, IBM Corp., Armonk, NY) and analyzed using descriptive statistics.

Following F3HK implementation, a single in-depth semi-structured interview was conducted with each F3HK educator (n=10) to explore barriers and successes experienced over the course of curriculum implementation and factors perceived by educators as impacting class attendance (Appendix F). Interviews lasted one to two hours. They were conducted by phone, recorded, transcribed verbatim and uploaded into NVivo program (QSR International) for coding of key themes via template analysis.⁹⁶ The initial coding framework was composed of descriptive codes regarding challenges, success, and attendance factors and revised to reflect emergent themes.

Results

Ninety-seven caregiver-child dyads were enrolled in F3HK and randomized to the intervention during the first year of program implementation (Table 3-2). Most participating caregivers were women (96%), white (67%), and either employed (47%)

or a homemaker (37%) with a mean age of 35.6 years. At baseline, caregivers had a mean nutrition belief score of 3.3 out of 4, a mean negative cooking attitude score of 2.0 out of 5, a mean basic cooking self-efficacy score of 4 out of 5 for the original version and 3.8 out of 5 for the expanded version, and a mean fruit and vegetable self-efficacy score of 3.8 out of 5. Fifty-two percent knew that at least half of one's plate should be composed of FVs. Children were an approximately equal mix of boys and girls with a mean age of 6.4 years. Intervention-randomized households were commonly composed of two adults (57%) and multiple children (69%) and 56% had participated in the Supplemental Nutrition Assistance Program within a month of baseline.

Table 3-1. Constructs and Measures of the F3HK Process Evaluation

	Dose Delivered	Dose Received	Fidelity
<i>CO-CSA share</i>			
Definition	Receipt of weekly share	Use of CSA shares	Produce quality and CSA pick-up site functionality
Measure	% of shares picked up	% of CSA share used	Checklist (yes/no) evaluating produce quality and site functionality
Source	Pick-up logs	Post-lesson participant surveys	Site coordinator QA pick-up site audits
<i>Healthy Eating Classes</i>			
Definition	Class attendance	Perceived lesson utility	Similarity of curriculum delivery across sites
Measure	% of classes attended	Average lesson utility rating; % intending to apply skills	% of sites adhering to curriculum; % of lesson activities completed; educator quality ratings
Source	Class sign-in sheets; Post-lesson participant surveys	Post-lesson participant surveys	Post-lesson educator surveys; Site coordinator QA lesson audits

Table 3-2. F3HK Participant Characteristics, Intervention Group, Year One (n=97)

Caregiver Characteristics	<i>N</i>	mean	S.D.
Age	90	36.5	8.2
Negative Cooking Attitudes	97	2.0	0.9
Nutrition Belief Score	96	3.3	0.4
Self-Efficacy Scores			
Cooking Scale, Original	97	4.0	0.8
Cooking Scale, Expanded	97	3.8	0.8
Eating & Cooking FVs	97	3.8	0.9
	<i>N</i>	count	%
Female	92	88	96
Race	95		
White		65	67
Black/African American		21	22
Multiracial		4	4
None of the above		5	5
Hispanic/Latino	95	7	7
Education	97		
High school/GED or less		18	19
Some college or tech school		31	32
College graduate		35	36
Graduate or professional degree		13	13

Table 3-2. Continued

Employment Status	97		
Employed		46	47
Out of work		9	9
Homemaker		36	37
Student		3	3
Retired		3	3
Nutrition Knowledge			
Correct portion of FVs on plate	96	50	52
Child Characteristics	<i>N</i>	mean	S.D.
Age	97	6.4	3.0
	<i>N</i>	count	%
Female	97	51	53
Household Characteristics	<i>N</i>	count	%
Number of adults	97		
1 adult		34	35
2 adults		55	57
3+ adults		8	8
Number of children	97		
1 child		30	31
2 children		38	39
3+ children		29	30

Table 3-2. Continued

Program Participation	97	
SNAP received in past month	54	56
WIC received in past month	34	35
HeadStart used in the past month	10	10

FVs: fruits and vegetables; SNAP: Supplemental Nutrition Assistance Program; WIC: Special Supplemental Nutrition Program for Women, Infants, and Children

Dose Delivered

Fifty-seven percent of households picked-up at least three-quarters of their weekly CSA shares (n=74). A total of 108 healthy eating classes were scheduled across the eleven F3HK intervention sites. All sites offered each of the nine classes once except for a single site at which enrollment was higher and an additional offering was scheduled for each class. Of the 108 scheduled classes, three were cancelled due to lack of attendance and one was combined with another nearby site for logistical purposes resulting in a total of 104 completed classes.

All class sign-in sheets were submitted by educators. Seventy percent of enrolled adults and 55% of children attended one or more education classes (Figure 3-1).

Attendance at the F3HK classes was open to adults and children randomized to the intervention as well as other household or family members. Average class attendance was 8.1 persons, including an average of 3.8 adults (2.8 enrolled, 1.0 guest) and 4.3 children (2.2 enrolled, 2.1 guests), though attendance dropped over time; 53% of

participants attended their site's first session, but just 27% were present for the final class (Figure 3-2).

Dose Received

Educators submitted post-lesson participant surveys for all completed classes for a total of 324 survey responses. Seventy-seven percent of participant responses (n=270) indicated that “most”, “almost all” or “all” of the produce in their most recent CSA was consumed. In response to questions regarding the preservation of CSA produce, 54% of responses (n=260) indicated that they preserved “none” and 34% indicated they had preserved less than half of their most recent share. Fifty-five percent (n=265) reported that none of the produce in the household's most recent share had spoiled, while 40% admitted that “a little” had gone bad. Fifty-seven percent (n=265) did not give away any of the produce in their most recent share and 34% reported giving away only “a little”. The median lesson activity score across all post-lesson participant surveys was five, or “very useful” (n=1691, IQR = 1). The median recipe score was also five (n=279, IQR = 1). Overall, 96% of responses (n=262) indicated an intention to try at least one of the featured recipes.

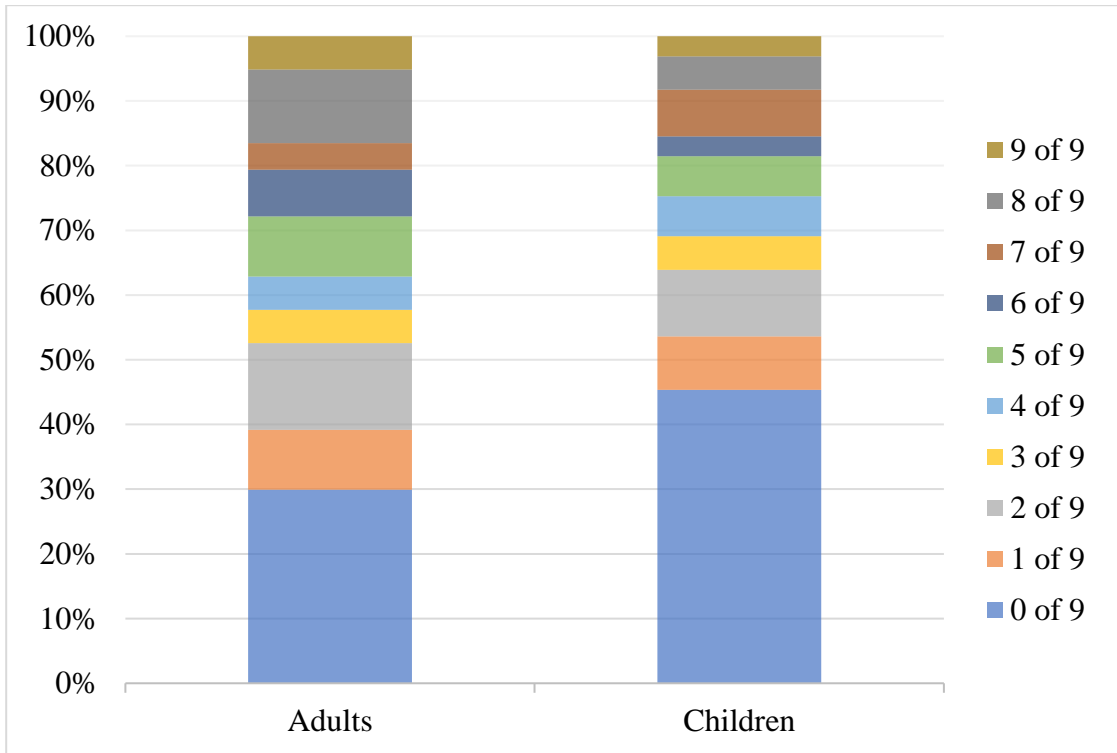


Figure 3-1. F3HK Class Attendance Frequency

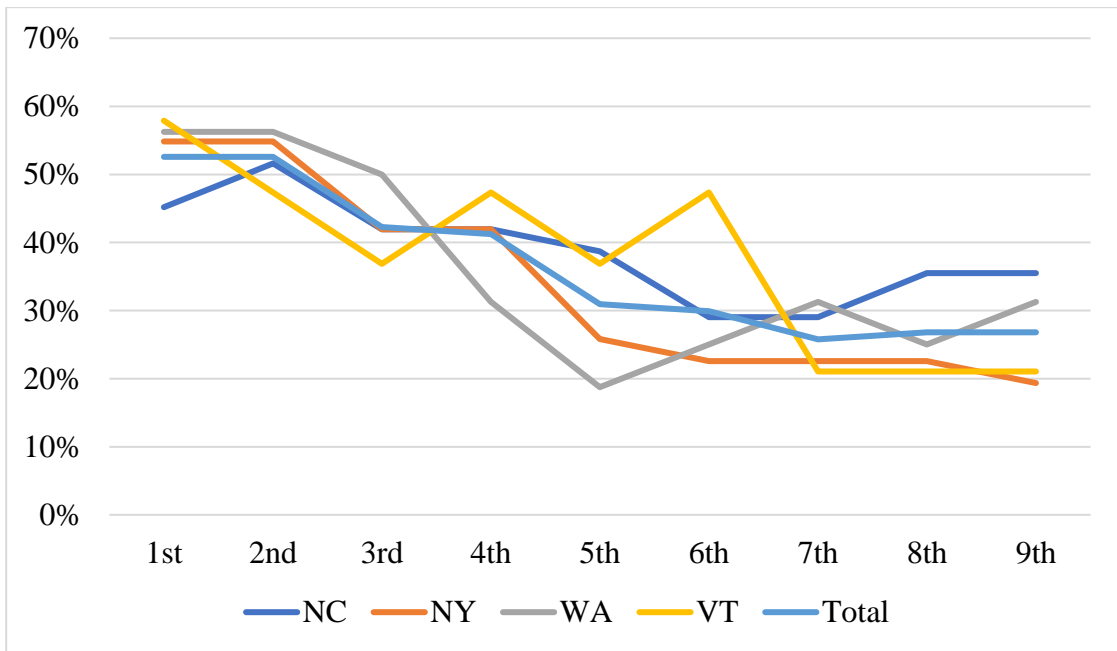


Figure 3-2. Percentage of Enrolled Adults Attending F3HK Classes, By State

Fidelity

Pick-up site QA audits by site coordinators found that all sites met minimum project standards. Except in cases of a cancelled class, educators completed all request post-lesson educator surveys. Post-lesson educator surveys revealed that classes were taught out of their intended order at 82% of sites and educators taught between 60% and 100% of planned class activities. In the open-ended portions of their respective post-lesson surveys, both educators and attendees requested lessons longer than one hour. Site coordinators conducting the education site QA audits gave educators a median score of five across all eight of the evaluated categories: preparedness, adaptability, knowledge, respectfulness, facilitation of group cohesion, and promotion of a safe and trusting environment, immediacy of content, and participant engagement.

Educator Interviews

Eighty percent of educators were affiliated with Cooperative Extension in their state and were able to compare their experience teaching the F3HK curriculum to that of other experiences they had working with low-income households. The primary successes discussed by educators were the in-class cooking activities and the field trips (which represented two of the nine classes). Hands-on cooking was perceived as more successful than other activities in engaging both children and adults. In-class cooking and recipe tasting also allowed caregivers to try new recipes and kids to taste new vegetables without risk of waste. For example, one educator stated,

“...the cooking and tasting of the recipes was really, really helpful because they don't have to take the chance on buying this vegetable or cooking this

recipe that maybe they don't like... when we were in class and they were able to make it and try it, it opened them up to wanting to eat different things like fennel or fresh corn in a stir fry or something like that.” (WA-based, Extension-affiliated educator)

Though they deviated from the typical nutrition- and food preparation-focused classes, field trips to the site’s CSA farm and the grocery store were perceived by educators as helpful and fun for attendees. The farm tour allowed participants and their children to understand how and where their produce is grown and to see the farm in action:

“I think for the kids, I think it's huge. I was telling one of the kids, I was like, "These vegetables came from the farm." "No they didn't, they came from the store!" "Yeah, but first they came from the farm." "No they didn't, they came from the store! (laughs) So many kids are disconnected now... so it's nice to have that connection... they're seeing different things that they don't normally see... They're trying new things...” (WA-based, Extension-affiliated educator)

The grocery store tour allowed participants to develop and practice skills – such as comparing unit prices and reading nutrient labels – that may facilitate healthy choices outside the CSA growing season.

A primary challenge discussed by educators was the curriculum itself; it did not address the wider-than-expected range of knowledge and behaviors among attendees:

“...the participants in this project were very different from what we typically see... I think because of the way that people were screened, or the length of the

research project, the participants came to these classes with a lot more background knowledge and already really valued food, cooking, and physical activity, like all of these healthy habits...” (NY-based, Extension-affiliated educator)

This resulted in educators modifying planned lessons to minimize content familiar to participants (e.g. MyPlate) and emphasize and add content of greater interest to participants (e.g. cooking skills).

Unpredictable seasonality was an often-cited issue. Such unpredictable seasonality of local produce meant that, despite attempts to align recipes with local crop schedules, suggested recipes in the curriculum did not always align with local harvests or CSA contents. This required educators to use CSA websites and other means to adapt lessons with relatively little notice so that lessons would be applicable to the produce items received by attendees.

Low and variable attendance was also a frustration for many educators, as it made discussion-focused portions of class difficult to facilitate and seemed to hinder group cohesion. Educators identified three primary factors that they perceived as impacting class attendance: friends and family; baseline nutrition knowledge, attitudes, and behaviors; and shifting family schedules. In some cases, friends and family seemed to function as a facilitator of attendance: *“I’d say definitely the families who already knew someone coming or made friends with other people in their groups seemed to come more. And families who had children that were really interested in the cooking*

aspect, I think it was definitely, it made them more interested in coming each week.”

(NC-based educator) Caregivers with younger children, though, were perceived to be more distracted during the lessons, less able to participate, and more likely to stop coming over time.

Educators noted the diversity of nutrition-related knowledge, attitudes, and behaviors represented in their group at the season’s start. Interviews revealed, though, that such diversity made teaching challenging: *“that’s the thing, I had three families and one family, it was new to all of them, but the other two it was like, well I know all of this. So that’s kind of ... the hard place because you want to ... you want to teach it to the family who doesn’t know any of it, but...”* (NY-based educator) Such diversity seemed to impact attendance in that those who demonstrated less positive attitudes and behaviors at baseline seemed intimidated by and to feel some shame due to the presence and participation of those with much greater knowledge or more positive beliefs or behaviors. Conversely, those with the greatest attitudes and behaviors seemed dissuaded from attending due to the relative lack of content utility for them.

Attendance was also impacted by variable schedules. Because the nine healthy eating classes were spread out across the growing season, educators struggled to find a time that worked for most participants. Shifting work and school schedules, specifically, seemed to preclude consistent availability across the entire growing season: *“We noticed it was very difficult to [find a good class time] once school had started. Um, because there are after school activities and things like that.”* (NC-based educator)

Interview data suggest that sites were differentially-equipped for the intensive food preparation planned for many classes: *“I didn't have a kitchen where I was doing the classes and it turned out we didn't even have water, only in the bathroom. I probably did end up doing a couple more taste-testings than actual cooking. We cooked probably only three times I think the entire series...”* (VT-based, Extension-affiliated educator) This limited hands-on cooking opportunities for a subset of participants.

Discussion

Adapting CSA for access by low-income consumers has been done previously, but with some documented difficulty; Andreatta and colleagues (2008) developed a program in NC that covered the full cost of a CSA share for low-income families and discussed difficulties related to the unpredictability of the growing season and of the harvest and unreliable participation by their low-income shareholders.⁸⁵ This process evaluation contributes to the growing conversation about successes and challenges associated with administering a non-urban CO-CSA. Implementation of F3HK was evaluated using a complement of quantitative and qualitative methods and an extensive set of data collection tools that recorded the experiences and perspectives of multiple project stakeholders. Maintaining detailed records of paperwork submission and occasional reminders worked well to ensure complete data collection and allowed project managers to stay abreast of and be responsive to site-specific issues.

Results revealed that a majority of participating households picked up most but not all of their shares. In addition to cost, inconvenience associated with the location – both with regard to distance and parking – and timing of markets and farms have also been cited as reasons for low CSA participation.⁸⁴ In a sample of CSA members, both affordability and convenient pickup or delivery locations were considered more important attributes among low-income households than higher-income households.⁸³ As with the healthy eating classes, participant schedules and availability during pick-up may have also been a factor. In a CSA employing a “pay-as-you-go” model, 39% of subscribers opted to purchase a share two to three times per month and another 44% purchased one or fewer shares per month.⁹⁷

A majority of enrolled adults and over half of enrolled children had at least some exposure to the F3HK healthy eating classes, but attendance never exceeded 53% of total households and dropped to 27% between the start and end of the CSA season. While disappointing, this is better than some prior experiences. Participants in a CSA organized by Andreatta et al. (2008) were interested in taking a class about cooking and preserving produce, but none were held due to issues of transportation and conflicting schedules.⁸⁵ During the interviews for F3HK, educators revealed similar issues with scheduling, but also cited greater-than-expected nutrition knowledge and skills as a factor, which is corroborated by participants’ positive nutrition knowledge, attitudes, beliefs and self-efficacy at baseline. Educators also noted that caregivers with younger children seemed distracted during class and that this may have played a role in their attendance. Future CO-CSA educational efforts might consider offering

classes at multiple times to accommodate more schedules; delivering educational content online for easier accessibility; designing tiered classes and content (e.g., beginner and advanced) to accommodate varied skill sets; and, providing child care services if caregivers with young children are enrolled.

Post-lesson participant survey data indicated that most, if not all, CSA contents were consumed by participating households, although this is based on data collected from class attendees, who may be more likely than non-attendees to both pick-up and use their share. Among these respondents, preservation, sharing and spoilage of CSA contents was uncommon, suggesting that participants chose CSA shares of an appropriate size for their household. Post-lesson survey respondents also reported high satisfaction with lesson activities and featured recipes, though this may simply reflect self-selection of class attendees – i.e. those who attended and completed the survey may have also been those who had lesser knowledge or lower self-efficacy at baseline and thus gained greater values from the classes.

Pick-up site QA audits revealed no major issues that may have detracted from participants' experiences. Post-lesson educator surveys and sign-in sheets revealed that the vast majority of sites taught the nine F3HK lessons out of their intended order, typically for logistical reasons (e.g. the field trips were scheduled in accordance with farmer availability and store scheduling). In some cases, educators chose to host the farm tour, meant for lesson 7, as lesson 1 to provide participating families with an introduction to the farm as soon as possible. Such decisions compromised fidelity as

technically defined, but may have promoted participant engagement and intervention success; indeed, some scholars recommend a hybrid or responsive approach to intervention design that values fidelity while allowing for “built in” adaptations to improve program fit and, potentially, effectiveness.^{98,99} Lack of time prevented 100% completion of planned activities at all classes. Given these issues, future classes of this nature may benefit from clearer allowances for adaptation; less frequent scheduling and longer time allotments; and stronger use of online resources to extend learning beyond the allotted class time.

Limitations of this study included reliance upon self-report participant data and upon educators’ perceptions, which may not be valid representations of participants’ actual experiences. This limitation was demonstrated in a study of EFNEP professionals and paraprofessionals that found both categories of staff to have inaccurate perceptions of clients’ knowledge, values, and behaviors.¹⁰⁰ Focus groups were held with F3HK participants. It may be helpful to juxtapose analysis of participant comments regarding the educational aspect of F3HK with educator perceptions discussed in this paper.

Conclusions

Conducting a process evaluation from the perspective of multiple stakeholders with mixed methods allowed for collection and integration of a rich set of data. Researchers and practitioners involved in the design, implementation, and evaluation of behavioral and food systems interventions may find the results useful in informing both program and process evaluation design. Data indicated that the CSA portion of F3HK was

implemented with high fidelity across all sites in VT, NY, NC and WA and that the education portion of F3HK was implemented with less consistency. Though CSA pick-up and health eating class attendance were low overall, those who attended reported good use of CSA produce and high utility of lesson content. Even so, local foods curricula should consider the potentially unique knowledge, attitudes, skills, and behaviors of those who self-select to participate and be designed for maximal adaptability across the growing season and across sites. More thorough documentation by researchers of their approach to such adaptations will be of benefit to interventionists and community educators. For this and other multi-modal interventions, differential engagement with intervention activities should be explored in the context of intervention outcome data to understand the relative contribution of intervention elements to observed outcomes.

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CHAPTER 4
COST EFFECTIVENESS OF A SUBSIDIZED COMMUNITY SUPPORTED
AGRICULTURE INTERVENTION FOR LOW-INCOME FAMILIES

Abstract

Objective: To quantify the costs associated with program administration of and participation in a cost-subsidized community supported agriculture program and to calculate program cost-effectiveness using intermediate outcome data on changes in participants' nutrition-related knowledge, attitudes, beliefs, and self-efficacy and measures of household food access.

Methods: This analysis draws upon caregiver and household outcome data and program and participant cost assessments from the *Farm Fresh Foods for Healthy Kids* (F3HK) randomized controlled trial. Outcomes include caregivers' FV portion knowledge, cooking attitudes, nutrition-related beliefs, general cooking self-efficacy, self-efficacy to prepare FVs, and FV snack preparation. Household-level outcomes include FV availability, FV accessibility, and food security status. Programmatic cost data were estimated from program administration and budget records. Participant costs were estimated based on self-reported travel and time costs. Incremental cost-effectiveness ratios (ICERs) were calculated by dividing the cost of the program, per household, by the change in studied outcomes between baseline and endpoint for those outcomes that improved significantly between timepoints. ICERs were completed from both the narrow program and broad societal perspectives.

Results: One hundred and forty-eight caregiver-child dyads were enrolled in F3HK in years one and two of implementation. Of these, 80% (n=119) completed both baseline

and endpoint surveys and were included in these analyses. Cooking attitudes, all self-efficacy scores, home FV availability and accessibility, and FV snack preparation improved significantly ($p < 0.005$) between timepoints. The total estimated cost of F3HK was \$1,853.29 per household annually, including \$1,544.55 in implementation-related expenses and \$308.74 in participation-related costs. The ICERs range from \$94.82 to \$15,444.08 across studied outcomes.

Conclusions: Given the relative dearth of cost-effectiveness analyses for public health interventions, this work is critical to informing future analyses, building the evidence base, and guiding the evidence-based allocation of local, state, and federal public health resources toward the most effective and efficient strategies for reducing persistent diet and health disparities.

Introduction

Among both adults and children, health exhibits a socioeconomic gradient such that those with the lowest incomes and least education have the worst health outcomes.¹⁰¹

Such associations are attributed to upstream disparities in dietary intake related not only to socioeconomic factors, but also to psychosocial factors (such as knowledge, beliefs and self-efficacy), environmental factors (such as the availability and cost of healthy foods), and cultural factors (such as food traditions and preferences).¹⁰²

Nutrition-related psychosocial factors are considered particularly important mediators of nutrition-related behavior among community interventionists. Beydoun et al. (2008) found that nutrition knowledge and beliefs modified the relationship between socioeconomic status and diet quality; poor knowledge and beliefs eliminated the relationship between education and diet quality and better knowledge and beliefs strengthened the relationship.⁹⁵ For this reason, measures of nutrition-related knowledge, attitudes, beliefs, and self-efficacy are used often in community-based interventions to assess short-term effectiveness and long-term potential, and in epidemiological studies to understand the intermediate pathways by which dietary patterns may be improved.¹⁰³⁻¹⁰⁶

Neff et al. (2009) argued that conditions of the food system have a direct impact on the persistence of diet and health disparities and that feedback loops – via perceived or actual demand for healthy foods in a community’s food system – can help to influence greater access to and consumption of such foods.¹⁰⁷ Cost-offset (i.e. subsidized) community supported agriculture (CO-CSA) programs are being explored as one

possible food systems-based approach for reducing diet and health disparities.

Through CO-CSA, low-income households receive reduced-priced weekly shares of produce from a local farmer during the growing season. Although the literature on this approach is in its infancy, initial studies indicate that CSAs can have a positive impact on fruit and vegetable (FV) intake and overall diet quality.^{55,56,82,83} Farm Fresh Foods for Healthy Kids (F3HK) is an economic, CO-CSA intervention for low-income families with children that also incorporates environmental and behavioral supports via the provision of cooking equipment and a series of CSA-tailored, skill-building nutrition and cooking classes.^{90,91}

Measuring short- and long-term outcomes of community-based interventions has comprised the backbone of program evaluation efforts, but understanding such programs' relative costs is also important, especially in the context of limited public health funding. The objectives of this study were to quantify the costs associated with program administration of and participation in F3HK and to calculate program cost-effectiveness using intermediate outcome data on changes in F3HK participants' nutrition-related knowledge, attitudes, beliefs, and self-efficacy.

Methods

The research reported here was completed as part of a multi-state, two-arm randomized controlled trial of F3HK. To be eligible, families had to be willing to enroll both a caregiver over 18 years of age and a child between the ages of 2 and 12 years; be English-speaking; have an annual household income \leq 185% of the Federal

Poverty Level; be either new to CSA or have not participated in one for at least three years; agree to pay for a half-priced CSA share (with weekly SNAP payment structure available); provide an active email address and be able to access the internet for purposes of data collection; and express interest in attending the associated CSA-tailored healthy eating classes. Additional details regarding participant recruitment, randomization, the intervention, and data collection are reported elsewhere.⁹⁰ This analysis draws upon caregiver and household outcome data and program and participant cost assessments from years two and three and as part of component four of the overarching study. All methods and data collection tools were reviewed and approved by the Institutional Review Boards (IRBs) at the University of Vermont and Cornell University (protocol ID #1501005266).

Participant Measures

Participant outcomes studied in this analysis include caregivers' FV portion knowledge, cooking attitudes, nutrition-related beliefs, general cooking self-efficacy, self-efficacy to prepare FVs, and FV snack preparation. Household outcomes include FV availability, FV accessibility, and food security status. Only baseline and fall (CSA season endpoint) data for intervention group participants are included in this paper.

Outcomes were assessed using validated tools, where possible. Attitudes toward cooking were measured using the Negative Cooking Attitude scale.⁹⁴ Nutrition-related beliefs were measured using the General Nutrition Knowledge Belief Score.⁹⁵ Cooking self-efficacy was measured using the Cooking Techniques and Meal

Preparation Self-Efficacy scale.⁹⁴ Self-efficacy to prepare FV was measured using a modified version of the Self-Efficacy for Eating and Cooking Fruits and Vegetables scale.⁹⁴ Modifications included retaining questions related to fruits and vegetables and reducing the response options to four ordinal categories. FV availability and accessibility in the home were measured using 3- and 4-question scales, respectively, based on scales developed and tested by Robinson-O'Brien et al. (2009).¹⁰⁸ Food security status was measured using the 6-item short form of the USDA Food Security Survey Module (FSSM) with a 30-day reference period.¹⁰⁹

Caregiver knowledge of FV portioning and FV snack preparation were measured using questions devised by the F3HK research team. Knowledge of FV portioning was measured using a categorical question with four ordinal response options asking caregivers what portion of a dinner plate should be filled with FVs. FV snack preparation was measured by asking caregivers to report the frequency with which they prepared nine specific FV-based snacks for their children monthly. These snacks aligned with ideas presented in the F3HK curriculum and included apple wedges, melon slices, plain berries, other fruits, carrot sticks, celery sticks, cucumber sticks, pepper slices, or other vegetables.

Cost Measures

Costs associated with implementation of F3HK were estimated using program administration and budget records. These costs constituted expenses from the 'narrow program perspective' and included salaries, wages, and benefits; facilities and utilities;

and equipment, supplies, and travel. Because universities, such as those associated with this intervention, pay for facilities and utilities across campus by charging for “indirect costs” at a rate that is likely to exceed that required by program administrators in industry or nonprofit settings, we conducted a sensitivity analysis using the typical (non-university) indirect rate of 22%. Costs from the ‘broad societal perspective’ included both those programmatic costs included in the narrow program perspective as well as those costs – both actual expenses and opportunity costs – incurred by participants taking part in the intervention. Participant expenses included travel-related costs incurred in transit to and from their CSA pick-up site and healthy eating classes. Participant opportunity costs included time spent in intervention-related activities (i.e. in transit to and from and at pick-up sites and healthy eating classes).

Travel expenses and opportunity costs were estimated using self-reported participant data collected at endpoint (Appendix G). Participants reported the mode by which they traveled to intervention activities; mileage; other associated costs (e.g. taxi or bus fares); time in transit (regardless of travel mode); and time typically spent at the pick-up site and, if applicable, the healthy eating classes. Among those who drove a vehicle to intervention activities, the roundtrip mileage was multiplied by the 2017 government mileage reimbursement rate (\$0.535). For both CSA pick-up and class attendance, those who walked or took “other” forms of transit were assumed to have zero direct travel expenses. For CSA pick-up, per trip travel expenses were multiplied by the average number of weeks in the CSA season (19.5 weeks) and

weighted according to the percentage of household using each mode of transit. For class attendance, per trip travel expenses were multiplied by the average number of classes attended (n=3, per unpublished F3HK process evaluation data) and weighted according to the percentage of household using each mode of transit. Reported time spent in relevant activities (i.e. time spent at and in transit to and from program sites) and was summed and valued according to the federal minimum wage rate of \$7.25 per hour. Median hours spent in intervention-related activities over the course of a program season were multiplied by this rate to estimate the opportunity cost of participant time.

Outcome Analyses

All outcome data were analyzed in SPSS Statistics (version 24.0, IBM Corp., Armonk, NY). Caregiver and household demographics were analyzed using descriptive statistics. Baseline and endpoint data for the two categorical variables, FV portion knowledge and household food security status, were compared via Pearson's χ^2 tests. Baseline and endpoint data for all other variables were compared via a paired samples t-test. To account for multiple comparisons, the Bonferroni correction was made and an alpha of 0.005 was set to determine statistical significance.

Cost-Effectiveness Analyses

Incremental cost-effectiveness ratios (ICERs) are a metric used to compare the relative resource burden and effectiveness of multiple interventions designed to improve a

given outcome.¹¹⁰ There is no standard of care or programmatic alternatives to which F3HK was compared in this analysis, so the assumed costs and effectiveness of the theoretical secondary option were set at zero. The ICERs were calculated by dividing the cost of the program, per person, by the change in studied outcomes between baseline and endpoint. This was done only for outcomes that improved significantly between time points. For each outcome, an ICER from both the narrow program perspective and broad societal perspective was calculated.

Results

A total of 148 caregiver-child dyads were enrolled in F3HK and randomized to the intervention in years one and two of implementation. Of these, 80% (n=119) completed both the baseline and endpoint surveys and were included in the outcome and cost analyses. Demographic descriptive data are shown in Table 4-1. Most participating caregivers were female (93%), white (75%), and non-Hispanic (94%). Mean caregiver age was 36 ± 7.5 years. Over half (52%) had a college degree or held an advanced degree. On average, participating households were composed of two adults and two children.

Psychosocial and household measures are presented in Table 4-2. Cooking attitudes, cooking- and FV-related self-efficacy, home FV availability, home FV accessibility, and preparation of FV snacks all improved significantly ($p < 0.005$) between baseline and endpoint. FV portion knowledge, nutrition-related beliefs, and household food security did not improve significantly between timepoints.

Table 4-1. F3HK Intervention Group Demographics (n=148)

Characteristics	<i>N</i>	mean	S.D.
Caregiver Age	140	35.6	7.5
Number of adults in household	148	1.8	0.7
Number of children in household	148	2.3	1.2
		count	%
Caregiver - Female	143	138	93
Caregiver - Race	148		
White		111	75
Black/African American		22	15
Multiracial		7	5
None of the above		6	4
Caregiver – Non-Hispanic/Latino	146	137	94
Education	148		
High school/GED or less		24	16
Some college or tech school		48	32
College graduate		56	38
Graduate or professional degree		20	14

Table 4-2. F3HK Intermediate Outcome Data, Intervention Group

Outcomes	N	Baseline	Change	Change	P
		Mean/%	Mean/%	S.D.	
FV Portion Knowledge	117	76.1	10.2		0.023
Negative Cooking Attitudes	119	2.09	-0.22	0.62	<0.001
Nutrition Belief Score	118	3.23	-0.02	0.32	0.555
Self-Efficacy Score					
Cooking Scale, Original	119	3.93	0.22	0.50	<0.001
Cooking Scale, Expanded	119	3.75	0.31	0.48	<0.001
Eating & Cooking FVs	119	3.75	0.35	0.79	<0.001
Home FV Availability	118	3.48	0.12	0.38	0.001
Home FV Accessibility	117	3.40	0.17	0.50	<0.001
Preparing FV as Snacks	119	68.71	16.29	37.92	<0.001
Household is Food Secure	117	43.6	12.0		0.007

Cost analyses are provided in Table 4-3. The total annual program cost associated with salaries, wages and benefits was \$65,478.38, including salary and fringe paid to educators (n=9 in 2016, n=10 in 2017) for 0.2 FTE plus half the salary and fringe paid for a site coordinator in each state. Only half of each site coordinator's salary and fringe are included to account for the portion of their responsibilities that was research-specific and thus not relevant to this analysis. The average indirect rate charged by the universities associated with this study was 48%; accordingly, annual facility and utility costs levied by these universities totaled \$31,161.00. At the standard non-university indirect rate of 22%, annual facility and utility costs

would be \$14,405.00. Equipment, supply, and travel costs were estimated to total \$17,657.00, including a one-time expense associated with stocking sites with necessary kitchen equipment and annual costs associated with purchasing the kitchen equipment selected by each intervention household, class attendance incentives, F3HK cookbook printing, and cooking ingredients for each site. Overall program expenses were estimated at \$114,296.02 annually, or \$1,544.54 per household. Using the non-university indirect cost estimate, overall program expenses are estimated at \$97,540.59 annually, or \$1,318.12 per household.

Participant costs averaged \$181.86 in direct, travel-related expenses, including \$157.30 in CSA-related travel and \$24.56 in class-related travel. Households either drove (93%), took a taxi (0.8%), walked (3.4%) or took another, unknown form of transport to pick up their CSA share. For those who drove, the CSA pick-up site was a median distance of 16 (IQR: 8, 30) miles roundtrip. The one household that took a taxi reported it cost them \$40 per month to do so. Those households who reported attending at least one healthy eating class, either drove (95%), took the bus (1.2%), walked (2.4%) or took another, unknown form of transportation (1.2%) to get there and back. Those who drove traveled a median of 16 (IQR: 6, 30) miles roundtrip. The one household that took a bus paid \$2.50 per trip to do so.

The opportunity cost of participants' time averaged \$126.88 per season. Median time spent traveling to and from CSA pick-up was 30 minutes and median time spent at the pick-up site was 10 minutes for a total time cost, per trip, of 40 minutes. Over the course of the average CSA season, this equated to 13 hours, or \$94.25, in opportunity costs. Median time spent in travel to and from healthy eating classes was 30 minutes and median time spent in class was 60 minutes for a class-related time cost of 90 minutes per trip. For the average participant attending three of the nine offered classes, this equated to 4.5 hours, or \$32.63, in opportunity costs.

Cost-effectiveness analyses from both the narrow program perspective and broad societal perspective were completed for the eight outcomes that improved significantly between baseline and endpoint (Table 4-4). The incremental cost-effectiveness ratios indicate the estimated cost of a one-unit improvement in each outcome. The outcome with the lowest cost per unit improvement was preparation of FV for snacking and the outcome with the greatest cost per unit improvement was home FV availability.

Table 4-3. F3HK Cost Analysis, 2016-2017

Cost Categories	Dollars
Program Costs ^a	
Salaries, Wages, and Benefits	\$65,478.38
Facilities and Utilities	\$31,161.00
Equipment, Supplies, and Travel	\$17,657.00
Program Costs – Total, Annually	\$114,296.02
Program Costs – Per Household ^b	\$1,544.54
Participant Costs – Median (IQR)	
Participant Travel	\$181.86
Opportunity Costs ^c	\$126.88
Participant Costs – Per Household	\$308.74
Total Costs – Per Household	\$1,853.28

^a Subtotals represent average costs from 2016 and 2017.

^b An average of 74 households were reached by F3HK per year.

^c Median time spent in F3HK-related activities per season was 17.5 hours. This was multiplied by the federal minimum wage, \$7.25.

Table 4-4. Cost-Effectiveness of Improving Intermediate Outcomes via F3HK in University and Non-University Settings

	Narrow (Univ.)	Societal (Univ.)	Narrow (Non-Un.)	Societal (Non-Un.)
Total Cost, Per Participant	\$1,544.54	\$1,853.28	\$1,318.12	\$1,626.86
Change – Cooking Attitudes	-0.22	-0.22	-0.22	-0.22
C/E – Cooking Attitudes	\$7,020.64	\$8,424.00	\$5,991.45	\$7,394.82
Change – Cooking Self-Efficacy	0.22	0.22	0.22	0.22
C/E – Cooking Self-Efficacy	\$7,020.64	\$8,424.00	\$5,991.45	\$7,394.82
Change – Eating FV Self-Efficacy	0.35	0.35	0.35	0.35
C/E – Eating FV Self-Efficacy	\$4,412.97	\$5,295.09	\$3,766.06	\$4,648.17
Change – Home FV Availability	0.12	0.12	0.12	0.12
C/E – Home FV Availability	\$12,871.17	\$15,444.00	\$10,984.33	\$13,557.17
Change – Home FV Accessibility	0.17	0.17	0.17	0.17
C/E – Home FV Accessibility	\$9,085.53	\$10,901.65	\$7,753.65	\$9,569.76
Change – Preparing FV Snacks	16.29	16.29	16.29	16.29
C/E – Preparing FV Snacks	\$94.82	\$113.77	\$80.92	\$99.87

Discussion

In this study, most evaluated outcomes improved significantly between baseline and endpoint measurement except for FV portion knowledge, nutrition-related beliefs, and household food security. It is worth noting, though, that the Bonferroni correction for multiple comparisons is considered a conservative measure and that changes in FV portion knowledge and household food security status would be significant if an alpha of 0.05 had been set to determine significance.

Improvements in cooking attitudes, cooking self-efficacy, self-efficacy to eat FV, and home FV availability and accessibility were all less than half of a unit change on their respective scales. FV portion knowledge, preparation of FV snacks, and food security improved more substantially, though not significantly in all cases. At endpoint, there was a 10% increase in caregivers who knew that half or more of the plate should be filled with FVs; caregivers were preparing FVs as snacks 16 times more per month (i.e. roughly four more times per week); and, 12% fewer household were categorized as food insecure. Though the magnitude of some of these changes may be perceived as small, it is notable that this multi-level intervention was successful in improving a wide range of important intermediate outcomes. These behavioral shifts may work synergistically to induce long-term

changes in primary outcomes of interest, such as FV consumption, overall dietary quality, and health status.

Because the questions used to measure FV portion knowledge and FV snack preparation were original, we are unable to compare the magnitude of the improvement with that of other interventions. For the outcomes measured using previously-tested tools, we found few other comparable uses of these tools in the literature. A case study by Polak et al. (2017) evaluated the effectiveness of a culinary coaching program using the Negative Cooking Attitudes and the Cooking Techniques and Meal Preparation scales, both of which improved significantly between the pre-post measures; the cooking attitude scale score improved by 0.94 points and the cooking technique scale by 0.7 points.¹¹¹ The magnitude of these changes are greater than the changes seen among F3HK participants, but this is not surprising given the relatively little exposure participants had to cooking compared to those in the coaching program.

Programmatic costs associated with administration of F3HK (\$1,544.54 per household per season) exceeded the direct and opportunity costs incurred by enrolled households related to their participation (\$308.74 per household per season). The high administration costs are a reflection of the team of educators and

coordinators required to implement an economic and behavioral intervention of this type. As mentioned previously, the total estimate may still be inflated, however, due to university overhead costs. Such funds are used to cover facilities and utilities but are also used to fund resources across campus (e.g. libraries and statistical support) that are not relevant to F3HK implementation; thus, implementation in other contexts would likely cost considerably less. We attempted to simulate a more realistic cost estimate by conducting a sensitivity analysis of all ICERs using a facility and utility total more in-line with non-university settings. Results indicate that, if implemented in a non-university setting, F3HK costs could be expected to be 15% lower from the narrow program perspective and 12% lower from the broad societal perspective.

The calculated ICERs range from \$94.82 per one unit increase in FV snack preparation (i.e. per one additional FV snack per month) from the narrow program perspective to \$15,444.00 per one unit improvement on the home FV availability scale from the broad societal perspective (or \$80.92 and \$13,557.17, respectively, if using the non-university indirect rate). Because cost-effectiveness is a relative metric – that is, one whose value lies squarely in its use to compare multiple alternative approaches – these values, by themselves, do not allow us to evaluate whether this approach is a “good” deal. Rather, they may inspire future researchers

to incorporate such outcomes in their own cost-effectiveness evaluations and thereby serve as a basis for comparison.

Despite the methodological hurdles associated with cost-effectiveness evaluations of public health interventions (e.g. the measurement and valuing of outcomes)¹¹², such analyses are critical to understanding the relative value of various public health interventions for the purposes of program planning and resource allocation; thus, public health researchers – and those in the area of community nutrition, specifically – should consider their role in growing this body of literature so that community-based nutrition interventions can be compared more effectively.

Strengths of this analysis include using outcome data from a randomized controlled trial, defining effectiveness using constructs and measures of common interest to those working in community nutrition, and calculating cost-effectiveness from both the narrow program perspective (to reflect the burden of resource that programmers may expect to bear) and the broad societal perspectives (to reflect both programmatic costs and any expenses or time costs incurred by participants).^{110,113} Limitations of this research include use of a localized, volunteer, and relatively small sample; reliance on a pre-post outcome analysis; lack of an extended time horizon, or period, over which maintenance of studied outcomes

and long-term cost-effectiveness are examined; and inherent weakness in cost-effectiveness methodology that allows for analysis of only one outcome at a time, which means that each ICER necessarily underestimates the full utility of the estimated expenses.

Conclusion

In this intermediate outcome and cost-effectiveness analysis of F3HK, intervention group participants had significantly improved cooking attitudes, cooking self-efficacy, self-efficacy to prepare and consume FVs, home FV availability, home FV accessibility, and preparation of FV as snacks. The total estimated cost associated with F3HK was \$1,853.28 per household annually, including \$1,544.55 per household in administrative and implementation-related expenses and \$308.74 per household in participation-related costs. The ICERs ranged widely across studied outcomes and little previous research exists to which they can be compared. Given the lack of cost-effectiveness analyses for public health interventions, this work may inform future studies and eventually help to guide the evidence-based allocation of local, state, and federal public health resources toward the most effective and efficient strategies for reducing persistent diet and health disparities.

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CHAPTER 5

OUTCOME ANALYSIS AND COST-EFFECTIVENESS OF A FARMERS MARKET INCENTIVE PROGRAM FOR SNAP USERS

Abstract

Objective: To analyze whether fruit and vegetable (FV) intake and food security status change over the course of DUFB program participation; quantify the costs associated with program administration and participation; and, calculate program cost-effectiveness for any outcomes that improved during a single program season.

Methods: During July and August of 2016 and 2017, a convenience sample of DUFB participants were recruited for an observational study of the program at six markets in Western New York. Outcome measures included FV intake and household food security status. Data was collected at baseline and program end. Differences in outcomes were analyzed using paired samples t-tests, Wilcoxon signed rank test, and Pearson's χ^2 test. Programmatic cost data were collected using administrative records. Participant costs were estimated using self-reported travel and time use. Incremental cost-effectiveness ratios (ICERs) were calculated by dividing the per-individual cost of the program by the change in studied outcomes between timepoints for any outcomes that improved significantly. ICERs were completed from both the narrow program and broad societal perspectives.

Results: One hundred eighteen participants completed both the baseline and endpoint surveys. FV intake (as measured by the NCI FV screener) and household food security status changed significantly from baseline to endpoint ($p < 0.05$), but only food

security improved. Total cost of DUFEB was estimated at \$184.31 per participant annually, including \$44.23 in programmatic costs and \$140.08 in participant costs. The ICER per unit change in food security score is \$65.72 from the narrow perspective and \$273.86 from the broad societal perspective.

Conclusions: It is not yet common practice to include economic analyses in the evaluation of food assistance programs, so this work may serve to inspire the inclusion of such methods in future analyses and the future comparison of community-based efforts designed to improve FV intake and food security status. More specifically, it may help to guide policymakers at the local, state, and federal levels to compare various approaches to SNAP reform and to allocate resources toward approaches with minimal costs and greater relative benefits.

Introduction

The Supplemental Nutrition Assistance Program (SNAP) is the primary mechanism by which the U.S. federal government assists low-income households to increase their financial access to food.³¹ Eligibility is based on household size and monthly income; gross monthly income must be less than 130% of the federal poverty level and net monthly income less than 100% of the federal poverty level. For a household of four, this equates to less than \$2,665 in gross income and less than \$2,050 in net income.³¹ During the 2017 fiscal year, SNAP provided assistance to 42.2 million individuals with an average monthly benefit per person of \$125.80. Program costs, including benefits and administration, totaled \$68.1 million.¹¹⁴

SNAP benefits are distributed monthly via Electronic Benefits Transfer (EBT), which functions like a debit card and can be used at SNAP-eligible retailers to purchase food for home consumption. To be eligible, retailers must meet minimum stocking requirements for staple foods (i.e., FVs; breads and cereals; meats, fish and poultry; and dairy products) or have staple foods compose more than 50% of gross sales.³¹ Participants are not restricted in the food or beverage items that they may purchase.

SNAP was not designed with specific nutrient intake or dietary pattern objectives in mind, but rather to reduce hunger and food insecurity.¹¹⁵ As acknowledged by Ratcliffe et al. (2011), study results have been mixed on whether SNAP accomplishes this goal, although much of this can be attributed to the wide variety of methods and datasets used to explore the SNAP – food security relationship. Building upon the

limitations of prior analyses, Ratcliffe et al. (2011) estimates that SNAP participation may reduce the risk of food insecurity by as much as 30%.¹¹⁶ Even so, concerns exist regarding the monthly benefit distribution system and associated cycles of food restriction.²⁶

Analyses of purchase data from SNAP indicate mixed results regarding the nutritional quality of foods purchases using EBT dollars. An analysis by Garasky et al. (2016) found “no major differences in the expenditure patterns of SNAP and non-SNAP households”; both SNAP-using and non-SNAP-using households made food purchases inconsistent with the Dietary Guidelines for Americans.¹¹⁷ Grummon et al. (2017) completed an analysis in which they controlled for sociodemographic characteristics and found that while SNAP-using households did not differ from income-eligible non-participating households with regard to vegetable or “junk food” purchases, SNAP-using households did purchase significantly fewer calories from fruit and more calories from processed meat and sugar-sweetened beverages (which were distinguished from other “less-healthy” foods in their analyses).¹¹⁸

Recent analyses of consumption data elucidate further potential differences in diet quality by SNAP participation. Using NHANES dietary intake data in two separate papers, Leung and colleagues found no significant differences in total energy intake, macronutrient intake, or in dietary quality between SNAP participants aged 4 to 19 and their income-eligible, but non-participating counterparts¹¹⁹, but found that adult SNAP participants had significantly poorer dietary quality than income-eligible non-

participants.¹²⁰ A systematic review by Andreyeva et al. (2015) concurred; children using SNAP had diets similar in quality to their lower-income but nonparticipating counterparts, but lesser quality diets compared to their higher-income, ineligible counterparts.²⁷ Among adults, SNAP participants were similar to income-eligible non-participants with regard to caloric intake, micronutrient and macronutrient content, but inferior to income-eligible non-participants and higher-income, ineligible individuals in terms of overall diet quality.²⁷

Collectively, these considerations have informed a growing national debate about SNAP reform.¹¹⁵ Surveyed stakeholders from academia, advocacy groups, government, health care organizations and the food industry disapproved of current benefit levels, but thought that incentives for purchasing healthy foods were more likely than other approaches to improve participant diet quality.¹²¹ Even so, close to 80% also supported making soda an ineligible purchase.¹²¹ A qualitative study of a different sample of stakeholders revealed support for healthy food incentives and purchase restrictions in addition to four other potential approaches: modifying SNAP distribution frequency, bolstering nutrition education efforts, improving purchasing options at SNAP retailers, and improving program coordination and implementation at the state and federal levels.¹²² A telephone survey of over 3,000 adults indicated a high level of public support for the maintenance or increase of SNAP benefits and the provision of additional benefits to support healthy food purchases.¹²³ Fewer respondents were in favor of restricting sugary drink purchases with SNAP benefits.¹²³ This aligns with concerns outlined by Richards and Sindelar (2013) that such

restrictions would not only be politically infeasible, but also ineffective in improving participants' diets and unrealistic to manage.³⁰

Farmers market incentive programs (FMIPs) have emerged as a potential mutually-beneficial solution for enhancing SNAP. Such programs subsidize the cost of fresh FVs for SNAP-using customers when benefits are spent at participating markets. This approach seeks to improve participants' overall purchasing power, incentivizes the purchase of healthy foods – FVs, specifically – and theoretically has potential to expand participating farmers' consumer base. Farmers markets are relatively less accessible than traditional retailers, but access is improving quickly; there was a 130% increase in direct marketing farmers and farmers markets authorized to accept EBT payments between fiscal years 2012 and 2017 and benefit redemption at such venues increased on average by 35%.¹²⁴ As of May 2018, a total of 3,503 markets across the U.S. were approved to accept EBT.¹²⁴

Double Up Food Bucks (DUFb) is a FMIP implemented by the non-profit Fair Food Network and regional partners across 23 states.⁷¹ In DUFb, SNAP participants receive one dollar toward the purchase of locally-grown (i.e. state-grown) FVs for every dollar of SNAP benefits used at participating farmers markets. Program implementation varies across regions. In Western New York, where this study was completed, participants can receive up to twenty dollars in extra benefits per market visit per \$20 spent, essentially doubling their purchasing power for fresh FVs.

The objectives of this study were to: 1.) analyze whether FV intake and food security status change over the course of DUFB program participation; 2.) quantify the costs associated with program administration and participation; and, 3.) calculate program cost-effectiveness for any outcomes that improved during a single program season.

Methods

Sample

During July and August of 2016 and 2017, a convenience sample of DUFB participants were recruited for an observational study of the program at six markets in Western New York. Individuals were approached about the opportunity to complete a series of online surveys after study staff observed them completing an EBT/DUFB transaction at one of the six markets. No demographic quotas were set; all potentially-eligible participants were approached by study staff. To be eligible, participants had to be 18 years of age or older, be able to speak and read English, have an active email account, be a current SNAP participant and be a new user of the DUFB program (i.e. have never participated in DUFB prior to the summer they were recruited). Study staff completed a verbal eligibility screening with any interested participants. All study activities and materials were approved by the Institutional Review Board at Cornell University (protocol ID # 1606006419). All participants provided informed consent.

Eligible and interested DUFB participants provided their name and email address and were sent a Qualtrics-based baseline survey within two days of initial contact.

Baseline survey completers were invited to complete a second online survey near the

end of the farmers market season in mid-October. At each time point, survey respondents were e-mailed a \$25 Amazon e-gift card as compensation for their time.

Participant Measures

The primary study outcome was FV intake, which was measured in three ways: a version of the National Cancer Institute's All-Day Fruit and Vegetable Screener (NCI FVS) adapted for online use¹²⁵; a newly-designed food frequency questionnaire designed to capture intake of 18 seasonal fruits and 28 seasonal vegetables; and a simple two-item survey taken from the American Heart Association's Life's Simple 7 Health Assessment¹²⁶ that asks participants to estimate how many cups of fruits and of vegetables they typically consume in a day. Sample size calculations indicated that 128 individuals were needed to observe significance of a change in FV consumption of one-third of a serving with 95% confidence and 80% power.

The NCI FVS is a validated instrument used to assess the frequency and quantity of FV consumption, combined, within the past month.¹²⁷ Though not validated, the latter two measures were included so that intake of FVs could be explored independently. Household food security was measured using the USDA Economic Research Service's validated Six-Item Short Form Food Security Module (FSM).¹⁰⁹ The FSM scores range from zero to six with a lower score indicating a greater level of food security. Scores of zero or 1 indicate high or marginal food security; scores of two to four indicate low food security; and scores of five or six indicate very low food security. The two-item FV survey and USDA FSM were included in the surveys completed by

the cohort of participants recruited in 2017, but not 2016. All baseline surveys included standard demographic questions regarding gender, race, ethnicity, age, educational attainment, household composition, and annual household income.

The cost of participating in DUFB was assessed using questions in the endpoint survey regarding participant time spent in program-related activities, including traveling to and from and shopping at the market, and any financial costs incurred in the process, including those related to transportation, parking, and child care (Appendix G). Due to the burden associated with the series of cost-related questions at endpoint, the above-described measures of FV intake and household food security status were chosen for their brevity to minimize total participant burden at endpoint.

Statistical Analyses

Participant survey data were downloaded from Qualtrics into SPSS Statistics (version 24.0, IBM Corp., Armonk, NY). Demographic data were analyzed using descriptive statistics. FVS data were cleaned and scored as directed by the NCI to provide an estimate of daily FV intake in cups.¹²⁸ Given the recommendation in the Dietary Guidelines for Americans to consume “mostly whole fruits”, the screener was scored both with and without use of the juice-related questions.¹²⁹ The seasonal FV questionnaire was scored similarly and used to calculate daily estimate intake of fruit, vegetable, and combined fruit and vegetable intake in cups. Extreme outliers were defined as participants who reported greater than 15 cups of FVs per day at either time point; these individuals were excluded from analyses. Due to non-normality of the

data, a Wilcoxon signed rank test was used to examine differences between baseline and endpoint values for the juice-inclusive and juice-exclusive NCI FVS and seasonal FV scores. Baseline and endpoint values from the two-item FV survey were compared via a paired samples t-test. Food security module data were scored as directed by the USDA.¹⁰⁹ Raw scores were compared across timepoints via a paired samples t-test and status frequencies were compared via a Pearson's χ^2 test. For all outcomes, separate subanalyses were completed for households with and households without children. An alpha of 0.05 was set to determine statistical significance.

Cost Analyses

Costs related to program administration were assessed based on expense records shared by Field & Fork Network, the nonprofit group administering the program.¹³⁰ Costs were first analyzed from the narrow program perspective and included only those financial costs incurred directly during preparation for and implementation of the program. Program cost categories included salaries, wages, and benefits; facilities and utilities; equipment, supplies, and travel; staff training; and in-kind contributions.

Costs were also analyzed from the broad societal perspective and included totaled costs from the narrow program perspective plus any costs incurred by participants. Participant costs included travel-related expenses and opportunity costs (i.e. the cost of time that could have been used in other valued ways). Travel expenses were assessed based on the mode by which participants reported traveling to and from the market and any associated expenditures. For those who walked or biked to the market, no

such costs were incurred. For those who drove, data were collected regarding the mileage covered round-trip, multiplied it by the 2017 government mileage reimbursement rate (\$0.535), and added to any reported toll or parking costs. Those who used public transportation, taxi or shuttle services reported their one-way cost of using that service, which was multiplied by two.

The opportunity cost of participant time spent in program-related activities was calculated for each participant by adding all reported time spent traveling to and from and at the market over the course of the program season. It is standard practice to value participant time using between one-third and 100% of the applicable wage rate.¹³¹ In this study, the full value of the local minimum wage rate was used due to the focus on low-income households. At the time of data collection during 2016 and 2017, the New York State minimum wage was \$9.70 and \$10.40, respectively. These values were averaged to \$10.05 so that a single value could be used consistently for all calculations. The median hours spent in market-related activities was multiplied by this value to estimate the opportunity cost of participants' time.

Cost-Effectiveness Analyses

Incremental cost-effectiveness ratios (ICERs) are considered a comparative metric used to indicate the cost-effectiveness of an intervention for a given outcome relative to the standard of care or a secondary approach. For this analysis, the alternative to DUFB was not having such a program, rendering the comparative costs and effectiveness of the counter approach to be zero. The ICERs for this analysis were thus

calculated by dividing the cost of the program, per person, by the change in studied outcomes between baseline and endpoint. This was done only for outcomes that improved pre-post. A total of two ICERs per outcome were calculated to account for the cost analyses done from the narrow program perspective and the broad societal perspective.

Results

During July and August of 2016 and 2017, 277 DUF� participants were approached, deemed eligible, and sent the baseline survey. Of these, 158 individuals (57%) completed the survey. Three-quarters of baseline respondents also completed the endpoint survey (n=118, 75%); these individuals composed the final analytical sample. Individual and household characteristics of participants are shown in Tables 5-1 and 5-2, respectively. Respondents were female (83%), white (63%), non-Hispanic (91%), and had some college or technical education (43%) or were college graduates (30%) and were middle-aged (mean: 41.8 ± 14.0 years). The households of which they were a part included one or two adults (45% and 41%, respectively), either no children (42%) or one to two children (44%) and had annual household incomes of less than \$10,000 (44%) or between \$10,000 and \$24,999 (45%).

Table 5-1. Demographic Attributed of DUFB Study Participants

Characteristics	Total (n=118)	2016 Cohort (n=61)	2017 Cohort (n=57)
Gender, n (%)			
Male	19 (17%)	6 (10%)	13 (25%)
Female	93 (83%)	54 (90%)	39 (75%)
Race, n (%)			
White	72 (63%)	36 (62%)	36 (63%)
Black/African American	27 (24%)	13 (22%)	14 (25%)
Multiracial	11 (10%)	8 (14%)	3 (5%)
None of the above	5 (4%)	1 (2%)	4 (7%)
Ethnicity, n (%)			
Non-Hispanic	103 (91%)	50 (88%)	53 (95%)
Hispanic	10 (9%)	7 (12%)	3 (5%)
Education, n (%)			
H.S. graduate/GED or less	31 (27%)	15 (26%)	16 (28%)
Some college or tech school	49 (43%)	27 (47%)	22 (39%)
College graduate	35 (30%)	16 (28%)	19 (33%)
Age, mean (S.D.)	41.8 (14)	41.1 (15)	42.7 (13)

Subtotals do not always add up to total sample size due to missing data.

Table 5-2. Household Characteristics of DUF� Study Participants

Characteristics	Total (n=118)	Cohort 1 (n=61)	Cohort 2 (n=57)
Number of adults, n (%)			
1 adult	50 (45%)	22 (37%)	28 (54%)
2 adults	46 (41%)	27 (45%)	19 (37%)
3 or more adults	16 (14%)	11 (18%)	5 (10%)
Number of children, n (%)			
0 children	49 (42%)	21 (34%)	28 (49%)
1 or 2 children	52 (44%)	32 (53%)	20 (35%)
3 + children	17 (14%)	8 (13%)	9 (16%)
Annual household income, n (%)			
Less than \$10,000	50 (44%)	23 (39%)	27 (48%)
\$10,000 - \$24,999	52 (45%)	29 (49%)	23 (41%)
\$25,000 or more	13 (11%)	7 (12%)	6 (11%)

Subtotals do not always add up to total sample size due to missing data.

Study outcomes are provided in Table 5-3. Two outcomes changed significantly from baseline to endpoint: NCI FVS (both with and without juice included) and food security status. The median NCI FVS decreased from 2.91 to 2.84 cup equivalents per day ($p < 0.05$). With juice excluded, the median NCI FVS decreased from 2.52 to 2.30 cup equivalents per day ($p < 0.05$). Food security status improved significantly

between baseline and endpoint; the raw scale score improved by 0.68 ($p < 0.05$) and 22% more participants were categorized in the highest food security category at endpoint than at baseline ($p < 0.001$). Seasonal FV intake and the two items regarding total daily cups of FV intake did not change significantly between timepoints.

Table 5-3. DUFEB Study Outcome Measures

	<i>N</i> ^a	Baseline	Endpoint	Change	<i>P</i>
		Median (IQR)	Median (IQR)		
NCI FVS	111	2.91 (1.7, 5.7)	2.84 (1.6, 4.3)	-0.07	0.041*
NCI FVS, no Juice	114	2.52 (1.3, 4.8)	2.30 (1.4, 3.6)	-0.22	0.026*
Seasonal FV Score	93	2.74 (1.6, 5.2)	3.96 (2.2, 6.3)	+1.22	0.075
Seasonal Fruit Score	97	0.90 (0.4, 2.0)	1.15 (0.5, 2.2)	+0.25	0.096
Seasonal Veg Score	101	2.03 (1.1, 3.7)	2.40 (1.4, 4.7)	+0.37	0.120
		Mean (S.D.)	Mean (S.D.)		
Cups of Fruit	56	2.24 (1.4)	2.22 (1.6)	-0.02	0.930
Cups of Vegetables	56	2.38 (1.1)	2.39 (1.2)	+0.01	0.952
Food Security Score	55	2.75 (2.1)	2.07 (2.1)	-0.68	0.021*
Food Security Status	55	N (%)	N (%)		< 0.001**
High/Marginal		19 (34.5)	31 (56.4)	+21.9	
Low		22 (40.0)	14 (25.5)	-14.5	
Very Low		14 (25.5)	10 (18.2)	-7.3	

^a N varies due to differential responsiveness across measures and inclusion of certain measures in the 2017 surveys only. * $p < 0.05$, ** $p < 0.001$

When households with and without children were analyzed separately, the only variable that improved significantly for both households with and without children was food security status (Table 5-4). For households without children, 26% more were categorized as having marginal or high food security at endpoint than baseline ($p<0.01$). For households with children, 39% more were categorized as having marginal or high food security at endpoint than baseline ($p<0.05$). The raw food security score did not change significantly, though, for either household category. As with the analysis of the total sample, the median NCI FVS decreased both with and without juice included, but only for households with children. It decreased by 0.75 cup equivalents per day with juice included ($p<0.05$) and by 0.35 cup equivalents per day when juice was excluded ($p<0.01$). Other measures of FV intake did not change significantly for either household category.

Table 5-4. DUFB Study Outcome Measures for Households with and without Children

	<i>Households without Children</i>				<i>Households with Children</i>			
	<i>N</i> ^a	Baseline	Change	<i>P</i>	<i>N</i> ^a	Baseline	Change	<i>P</i>
		Median (IQR)				Median (IQR)		
NCI FVS	47	2.15 (1.5, 4.8)	+0.22	0.975	64	4.02 (1.9, 6.1)	-0.75	0.012*
NCI FVS, no Juice	47	1.97 (1.3, 3.2)	+0.14	0.849	67	3.03 (1.5, 5.8)	-0.35	0.004**
Seasonal FV Score	35	2.56 (1.6, 4.8)	+1.10	0.207	46	2.92 (1.7, 6.1)	+1.34	0.221
Seasonal Fruit Score	42	0.71 (0.5, 1.3)	+0.31	0.062	55	1.09 (0.3, 2.3)	+0.11	0.538
Seasonal Veg Score	42	2.00 (1.0, 3.6)	+0.30	0.100	59	2.31 (1.2, 3.7)	+0.27	0.493
		Mean (S.D.)				Mean (S.D.)		
Cups of Fruit	27	2.09 (1.27)	+0.07	0.812	29	2.38 (1.43)	-0.10	0.704
Cups of Vegetables	27	2.09 (0.81)	+0.24	0.289	29	2.66 (1.34)	-0.21	0.289
Food Security Score	27	2.85 (2.1)	-0.66	0.077	28	2.64 (2.25)	-0.68	0.134
Food Security Status	27	N (%)		0.001**	28	N (%)		0.032*
High/Marginal		8 (30)	+7 (26)			11 (39)	+5 (18)	
Low		13 (48)	-7 (26)			9 (32)	-1 (4)	
Very Low		6 (22)	-0 (0)			8 (29)	-4 (14)	

^a N varies due to differential responsiveness across measures and inclusion of certain measures in the 2017 surveys only.

* $p < 0.05$, ** $p < 0.01$

Costs related to administration of and participation in DUFB are shown in Table 5-5. Average program-related costs during the 2016 and 2017 seasons totaled \$99,052. During these seasons, Field & Fork Network records indicate that the program reached an estimated 4,479 new users, or an average of 2,239.50 new users per program season. Thus, the per participant cost of programming annually was estimated to be \$44.23. Participant costs totaled \$140.08 per person for a single program season, including a median expenditure of \$16.46 per person on program-related travel and an estimated \$123.62 in opportunity costs resulting from a median of 12.3 hours (IQR: 4.23, 20.51) spent in market-related activities.

A cost-effectiveness analysis was completed for the one outcome that improved between baseline and endpoint: food security status. For this analysis, the raw food security scores at baseline and endpoint were treated as continuous variables and a paired t test was run to discern the mean difference pre-post. The test found a significant decrease of 0.68 from the mean score of 2.75 at baseline to 2.07 at endpoint ($p < 0.05$). From the narrow program perspective, this results in a cost of \$65.04 per unit improvement in food security status from the narrow program perspective and a cost of \$271.04 per unit improvement from the broad societal perspective (Table 5-6).

Table 5-5. Costs Related to Administration of and Participation in DUFB

	Dollars
Program Costs ^a	
Salaries, Wages, and Benefits	\$77,778
Facilities and Utilities	\$13,059
Equipment, Supplies, and Travel	\$5,676
Staff Training	\$1,639
In-Kind Contributions	\$900
Program Costs – Total	\$99,052
Program Costs – Per Participant ^b	\$44.23
Participant Costs – Median (IQR)	
Participant Travel	\$16.46 (0.00, 55.95)
Opportunity Costs ^c	\$123.62 (42.51, 206.13)
Participant Costs – Per Person	\$140.08
Total Costs	\$184.31

^a Subtotals represent average costs from 2016 and 2017.

^b An average of 2,239.50 began using DUFB over 2016-17.

^c The median time spent in market-related activities per season was 12.3 hours (IQR: 4.23, 20.51). This was multiplied by the minimum wage for 2016 and 2017, \$10.05.

Table 5-6. Cost-Effectiveness of Improving Food Security via DUFB

	Narrow Perspective	Societal Perspective
Total Cost, Per Participant	\$44.23	\$184.31
Change in Food Security ^a	-0.68	-0.68
Cost-Effectiveness Ratio	\$65.04	\$271.04

^aThis value represents the decrease (improvement) in the raw food security score between baseline and endpoint among sampled DUFB participants.

Discussion

In this sample of DUFB participants, median FV intake decreased between the two time points examined, both with and without juice included. While statistically significant, these changes may not represent clinically meaningful decreases.

Importantly, these results may be confounded by seasonal trends in FV intake and issues related to token administration. The DUFB market season begins (and thus baseline began) in July at the height of the growing season and thus it would be expected that FV intake would peak at this time. Though not recorded formally as part of data collection, many participating markets reported intermittent issues with DUFB token administration related both to quickly-expanding demand and hoarding of tokens by patrons seeking to save them for bulk purchasing of preservable FVs later in the growing season. Both phenomena contributed to temporary token shortages throughout the season and may have influenced respondents' FV shopping and consumption patterns.

Changes in household dynamics may have also impacted trends in studied outcomes. Most of the sample (58%) had one or more children. In these households, the food burden and food practices may have shifted between summer/baseline (when children were home) and fall/endpoint (when children were back in school). The total food burden may be less when children are in school such that household food security status may be expected to be greater in the fall and spring and worse in the summer. Moreover, it is typically assumed that parental intake of FV may influence child and adolescent FV intake¹³², but the reverse may also be true in that parents may feel less pressure to model positive eating behaviors when not eating in the presence of their children. Indeed, when changes in outcomes were analyzed separately between households with and without children, it was only for households with children that the NCI FVS decreased significantly between timepoints.

Interestingly, seasonal FV intake increased by 1.22 servings per day, seasonal fruit intake by 0.25 servings per day, and seasonal vegetable intake by 0.37 servings per day in the total sample. These improvements in intake were not statistically significant but may represent outcomes worth further exploration in future evaluations. Also of great priority, though, is work to test the scale used to measure seasonal FV intake; it is an original tool that allows for a more nuanced analysis of FV intake by asking about specific types of produce common at farmers markets and by allowing for separate analysis of fruits and vegetables. Future work should evaluate its validity and reliability, especially among patrons of farmers market and other direct-to-consumer venues of local, seasonal produce.

Our results may be interpreted in the context of other studies to evaluate FV intake among farmers market and farmers market incentive program users. A cross-sectional study of SNAP participants in North Carolina found a significant positive association between shopping at the farmers market and FV consumption.¹³³ A longitudinal study of farmers market incentive program users found significant improvements in FV intake after program participation, but this was based on responses to a single, self-report question: “On average, how many servings of fruits and/or vegetables do you usually eat each day?”¹³⁴ A different longitudinal study employed face-to-face surveys to evaluate self-reported changes in produce intake between incentive program users and nonusers at markets in low-income communities. Incentive program users were significantly more likely than nonusers to report improved FV intake based on responses to the following question: “Since becoming a customer at this market, do you eat more, less, or the same amount of fruits and vegetables?”⁴⁷ The lack of congruence between our results and those of these studies may be a function of the varying designs and incentive levels of such programs, the varied ways in which FV intake was measured, different populations of participants, and the aforementioned issue of seasonality.

The sole outcome to improve significantly in this pre-post evaluation was household food security status. This finding aligns with that of another study that employed a pretest-posttest design and measured food security using the 6-item USDA Food Security Module.¹³⁵ Although it is not surprising that food security improved in

response to an intervention that doubles participants' purchasing power, this finding cannot be attributed with certainty to DUFB participation due to the lack of a control group. Given that food insecurity is adversely associated with overall diet quality among adults^{12,136}, this finding may indicate long-term potential of DUFB to improve participant diet quality. Future evaluations of such programs might consider inclusion of the Healthy Eating Index or another measure of overall diet quality to test this hypothesis.

The cost analyses revealed that participant opportunity costs (\$123.62 per person per season) exceeded the average expenses incurred by participants on program-related travel (\$16.46 per person per season) and that total participant costs (\$140.08 per person) exceeded programmatic costs (\$44.23 per person). It is not surprising, then, that the ICER from the broad societal perspective is 4.17 times that of the ICER calculated from the narrow program perspective. A recent analysis of SNAP users in North Carolina found that a majority never shop at the farmers market; that a primary barrier of doing so is the market being "out of the way"; and that those who report shopping at the market live further from it than those who do not.¹³³ Thus, DUFB users may represent a segment of the SNAP-using population for whom the perceived opportunity costs are lower or the perceived value of participation – whether such value be economic, psychological, social, or cultural – outweighs any incurred expenses.

To our knowledge, no other studies have reported the per person programmatic costs nor estimated the direct and opportunity costs experienced by participants of a farmers market incentive program like DUFB. Another unique feature of this analysis is the practical approach taken to estimating the program's relative cost-effectiveness; health outcomes are often measured in terms of years of life gained or quality-adjusted life years.¹¹⁰ Although this may allow for comparisons of public health programs with differing goals (e.g. a smoking cessation program versus a FV incentive program), it is less helpful to local stakeholders seeking to understand, more tangibly, the relative efficiency of their resources in improving a given outcome of agency or local government interest. Additional strengths of this study include its prospective design; the use of validated surveys to measure FV intake and food security status; the collection of data via email to maximize anonymity and thus minimize the potential effects of response bias; retention of 75% of baseline respondents; and completion of the cost-effectiveness analysis from both the narrow (program) and broad (program and participant) perspectives.

Limitations

This study was not without its limitations. The conclusions that can be drawn from the outcome analyses are limited by the lack of a control group. Future studies should utilize more sophisticated study designs and/or leverage data from regionally- or nationally-representative datasets to compose a suitable comparison group. Because the participants of this study were a convenience sample, reported costs and outcomes may not be representative of the experiences of participants in other regions or

incentive programs and the sample size may not have been sufficient to detect differences among all outcomes. Additionally, because outcomes were assessed at only one follow-up timepoint, longitudinal studies of a longer duration would be needed to understand whether any changes are maintained during the market off-season. Finally, program effectiveness was limited to evaluations of the participant's FV intake and household food security status, and not all measured of FV were validated. Participation in farmers market incentive programs may impact other outcomes at the individual, household, and community levels, including household members' FV intake; participant and household member dietary quality; household FV availability; frequency of other behaviors, such as physical activity; weight management; chronic disease risk; community cohesion; and others.

Conclusions

This study of DUFB participation in Western New York found a small, but significant decrease in FV intake ($< \frac{1}{4}$ serving) and a significant improvement in food security status between study timepoints. This held true when outcomes were analyzed separately for households with and without children, except that households without children saw no significant change in FV intake. Estimated costs of participating in DUFB were greater than the estimated per person costs of program administration. The ICERs revealed a cost of \$65.72 and \$273.86 for a one unit improvement in food security score from the narrow and broad societal program perspectives, respectively. It is not yet common practice to include such economic analyses in the evaluation of food assistance programs, so this work may serve to inspire the inclusion of such

methods in future analyses and the future comparison of community-based efforts designed to improve FV intake and food security status. More specifically, it may help to guide policymakers at the local, state, and federal levels to compare various approaches to SNAP reform and to allocate resources toward approaches with minimal costs and greater relative benefits.

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CHAPTER 6

SUMMARY, IMPLICATIONS, AND FUTURE DIRECTIONS

At its core, the purpose of this dissertation was to explore whether and how the seeming bounty of local food systems might be tapped and leveraged for the benefit of low-income households who experience inconsistent and insufficient access to food – and to healthy food in particular – despite the existence of a stable food assistance safety net. It was motivated by the academic and political debates regarding the design of SNAP and the role that food assistance programming and policy, more broadly, could (and some say should) play in promoting healthy behaviors among a subset of our population that bears a disproportionate burden of obesity and chronic disease. Specifically, this work aimed to evaluate the implementation and effectiveness of two types of programs – farmers market incentive programs and cost-offset community supported agriculture – that have gained attention in recent years as promising mechanisms by which to reduce the mentioned diet and disease disparities.

Key Findings

Chapter 1 highlighted the lack of evaluations of FMIPs and CO-CSA programs and introduced an array of research questions that require pursuit to understand

whether these approaches are as promising as has been proposed. Through the studies described in Chapters 3, 4, and 5, we have begun to answer those questions.

The mixed methods process evaluation of F3HK (Chapter 3) – through its detailed analysis of participants’ exposure to and interaction with the intervention and the program’s on-the-ground fidelity – elucidated contextual and logistical factors that may impact the long-term feasibility and impact of the CO-CSA approach. For example, findings highlighted the challenge of engaging participants in all facets of a multi-modal intervention and the need for an adaptable approach to such programming given the unpredictability of seasonality and the greater-than-expected range of nutrition-related knowledge and skills demonstrated by enrolled households.

The outcome and cost-effectiveness analysis of F3HK (Chapter 4) demonstrated a potential role for the program, and the model more broadly, to contribute to improvement of a wide range of psychosocial and household-level outcomes, including FV portioning knowledge; cooking attitudes; self-efficacy to cook and to prepare and consume FV, specifically; home FV availability and accessibility; and household food security status. Because control group data could not be used for this analysis, it is not possible to attribute such improvements to the intervention; more robust research designs and analyses are needed. A key contribution of this analysis,

though, is the estimation of costs associated with such programming (\$1,544.55 per household annually in program expenses and \$308.74 in participation-related costs) and the incremental cost-effectiveness ratios that demonstrated the variability of the program's resource burden relative to its outcomes depending up on the outcome by which it is being evaluated.

The outcomes and cost-effectiveness analysis of DUFB (Chapter 5) revealed the possible confounding nature of seasonality for such studies, but also the program's potential to influence a positive shift in participants' food security status. This is an exciting finding given the increasing accessibility of such programs across the country and the potential role they could potentially play in helping SNAP users to stretch their food dollars throughout the entire monthly benefit cycle. The cost- and cost-effectiveness analyses revealed that the per person programmatic cost of DUFB (\$44.23 annually) is substantially lower – just 3% - of the programmatic resource burden associated with F3HK and that participation-related costs (\$140.08 annually) are about half of that incurred on average by F3HK participants. Interestingly, DUFB incurs more costs to participants than it does, per person, to program administrators; whereas the opposite is true for F3HK. This is likely because DUFB is layered upon existing programming (i.e. farmers market-based processing of EBT) and thus requires less overall inputs. Future studies should employ control groups and comparable outcomes for both programs – and any other program under consideration by interventionists and policymakers – to discern whether program effectiveness differs.

Future Directions

This research drew upon the perspectives and methods of diverse disciplines to demonstrate the varied ways in which multi-level, community-based programs can be evaluated and to begin exploring the potential of FMIPs and CO-CSA models to improve psychosocial, dietary and household food outcomes among low-income individuals and families. Much remains to be learned, including whether such models can translate in the long-term to a sustainably-improved diet and reduced prevalence of obesity and chronic; whether these models provide economic benefit to participating farmers, as has been projected; and, whether variability in the fidelity or design of such programs across sites translates into differential program effectiveness.

Evaluations of community-based interventions aimed at reducing diet and health disparities – whether of the FMIP or CO-CSA model or not – should also consider evaluating program cost and cost-effectiveness from the perspective of both administrators and participants. Over time, analyses of this nature would allow scholars, advocacy groups, policymakers, and other stakeholders to understand the relative utility of programs and to allocate resources and align efforts more strategically so that real progress can be made in alleviating these pervasive issues.

APPENDIX B

Participant Feedback Form

Place label here

1. Did you bring a child with you to class today? (Circle one option.) Yes or No

If Yes: What is/are their age(s)? _____

If Yes: Did you bring the child that is enrolled in this project? (Circle one option.) Yes or No

2. We hope these sessions support you and your family's healthy eating and activity habits. With this in mind, How useful were each of the activities for you?* (Circle one option for each activity.)

Activity 1: Very Useless Somewhat Useless Neutral Somewhat Useful Very Useful

Activity 2: Very Useless Somewhat Useless Neutral Somewhat Useful Very Useful

Activity 3: Very Useless Somewhat Useless Neutral Somewhat Useful Very Useful

Activity 4: Very Useless Somewhat Useless Neutral Somewhat Useful Very Useful

What are some reasons you rated the above activities in the way that you did?

3. Were any recipes featured during today's session? (Circle one option.) Yes or No

If Yes: How useful were the recipes in showing you how you can use your CSA produce?

Very Useless Somewhat Useless Neutral Somewhat Useful Very Useful

If Yes: Do you plan to try any of the recipes at home? (Circle one option.) Yes or No

If No: Why not? _____

4. Were any physical activities featured during today's session? (Circle one option.) Yes or No

If Yes: How useful were they in showing you how to fit physical activity into your day?

Very Useless Somewhat Useless Neutral Somewhat Useful Very Useful

If Yes: Do you plan to try this physical activity at home with your family? Yes or No

If No: Why not? _____

5. What did you like best about today's session? _____

6. What did you like least about today's session? _____

7. How could we improve the session for next time? _____

Please also answer the question on the back of this page.

Participant Feedback Form

8. Were you able to pick up your CSA share in the last week? Yes or No

If Yes:

How much of the produce provided in last week's share did your family eat?

None	A Little	Almost half	Half	Most	Almost All	All
0%	1-24%	25-49%	50%	51-74%	75-99%	100%

Of the share's contents, which produce items did you or your family prepare to eat?

Of the produce that you did not consume or prepare:

Did you preserve (e.g. freeze or dry) any of it?

None	A Little	Almost half	Half	Most	Almost All	All
0%	1-24%	25-49%	50%	51-74%	75-99%	100%

Did any of the produce spoil before your family could eat it?

None	A Little	Almost half	Half	Most	Almost All	All
0%	1-24%	25-49%	50%	51-74%	75-99%	100%

Did you give any of the produce away to friends or family?

None	A Little	Almost half	Half	Most	Almost All	All
0%	1-24%	25-49%	50%	51-74%	75-99%	100%

If No:

What was the reason you were unable to pick up your share? _____

*Lesson evaluations will include a list of activities specific to that lesson.

APPENDIX C

CO-CSA Process Evaluation – Educator Survey

1. **Date** (mm/dd/yyyy): _____
2. **Lesson location:** (Dropdown menu of each site across VT, NY, NC, and WA)
3. **Lesson duration** (in minutes): _____
 - a. Did any participants arrive late or leave early? (Yes/No)
 - i. If yes, please explain.
4. **Which of the following planned activities did you complete during this lesson?**
 - a. **Activity 1** (Yes/No)
 - i. Overall, how well received was this activity by participants?
(5-point scale, 1 = received very poorly, 5 = very well received)
 - ii. How easy or difficult was it to facilitate this activity?
(5-point scale, 1 = very difficult, 5 = very easy)
 - iii. How easy or difficult was it to include children in this activity?
(5-point scale, 1 = very difficult, 5 = very easy, with an NA option if there were no children present)
 - b. **Activity 2** (Yes/No)
 - i. Overall, how well received was this activity by participants?
(5-point scale, 1 = received very poorly, 5 = very well received)
 - ii. How easy or difficult was it to facilitate this activity?
(5-point scale, 1 = very difficult, 5 = very easy)
 - iii. How easy or difficult was it to include children in this activity?
(5-point scale, 1 = very difficult, 5 = very easy, with an NA option if there were no children present)
 - c. **Activity 3** (Yes/No)
 - i. Overall, how well received was this activity by participants?
(5-point scale, 1 = received very poorly, 5 = very well received)
 - ii. How easy or difficult was it to facilitate this activity?
(5-point scale, 1 = very difficult, 5 = very easy)
 - iii. How easy or difficult was it to include children in this activity?
(5-point scale, 1 = very difficult, 5 = very easy, with an NA option if there were no children present)

CO-CSA Process Evaluation – Educator Survey

d. Activity 4 (Yes/No)

- i. Overall, how well received was this activity by participants?
(5-point scale, 1 = received very poorly, 5 = very well received)
- ii. How easy or difficult was it to facilitate this activity?
(5-point scale, 1 = very difficult, 5 = very easy)
- iii. How easy or difficult was it to include children in this activity?
(5-point scale, 1 = very difficult, 5 = very easy, with an NA option if there were no children present)

e. Did you feature any recipes during this lesson? (Yes/No)

- i. If No: Qualtrics will skip to next question.
- ii. If Yes:
 - 1. What is/are the name(s) of the recipe(s) that you featured?
(Open-ended)
 - 2. For each recipe listed:
 - a. How did you feature (insert name of recipe)?
(Tasting/Demonstration/Group Preparation)
 - i. If "Group Preparation": How easy or difficult was it to include children in this recipe? (5-point scale, 1 = very difficult, 5 = very easy, with an NA option if there were no children present)
 - b. How easy or difficult was it for you to feature this recipe?
(5-point scale, 1 = very difficult, 5 = very easy)
 - c. From your perspective, how well received was this recipe by participants? (5-point scale, 1 = received very poorly, 5 = very well received)
 - d. Were you able to relate the recipe to vegetables in this week's CSA box? (Yes/No; Please explain)

f. Did you feature any physical activities during this lesson? (Yes/No)

- i. Please explain (include name and/or description of activity or explanation of why no physical activity was included, e.g. lack of time).

5. Did any participants *refuse* to take part in one or more activities? (Yes/No)

- a. If yes: Please explain.

CO-CSA Process Evaluation – Educator Survey

6. **Were there any child behavioral issues during the lesson? (Yes/No)**
 - a. If yes: Please explain.

7. **On a scale of 1 to 5, where 1 is not very relevant and 5 is very relevant, how would you rate this lesson (as it is written) on promoting relevance, that is, “designing the learning to be of importance to and applicable to all learners?”** 1 2 3 4 5
 - a. Please explain: (open ended)

8. **Do you have any recommendations for making this lesson more effective?**
(open-ended)

9. **Is there anything else about this lesson that you would like to tell us?** (open-ended)

10. Please remember to:
 - a. Scan and upload the sign in sheet to Cornell Box within 24 hours.
 - b. Scan and upload your marked-up lesson guide, including notes on how long activities actually took (versus the provided estimate).

APPENDIX D

CO-CSA Process Evaluation – Coordinator Survey – CSA Operations

1. **Date** (mm/dd/yyyy): _____
2. **Pick-up location:** (Dropdown menu of each pick-up site)
3. **How many share size options are offered?** _____
 - a. Please list the names of each share options along with the type, quantity, and quality of produce offered for that share.

Share Name/Size:		
Produce type	Quantity	Quality
<i>Example: Chard</i>	<i>2 bunches</i>	<i>Acceptable</i>

Share Name/Size:		
Produce type	Quantity	Quality
<i>Example: Chard</i>	<i>2 bunches</i>	<i>Acceptable</i>

Note: Rate the quality of produce as Unacceptable if the majority of a given type of fruit or vegetables is clearly bruised, old-looking, over-ripe, or spotted.

1. **Was share pick-up available during the advertised times?** (Yes/No)
 - a. If no, please explain:
 - b. If yes, add any additional notes here:
2. **Was share pick-up organized well?** (Yes/No)
 - a. If no, please explain:
 - b. If yes, add any additional notes here:
3. **Did the pick-up area appear clean?** (Yes/No)
 - a. If no, please explain:
 - b. If yes, add any additional notes here:
4. **Did the pick-up area seem to promote personal safety?** (Yes/No)
 - a. If no, please explain:
 - b. If yes, add any additional notes here:

CO-CSA Process Evaluation – Coordinator Survey – CSA Operations

5. **Was a farm representative available to shareholders during pick up?** (Yes/No)
 - a. **If no, please explain:**
 - b. **If Yes: Were participants treated with respect by farm staff?** (Yes/No)
 - i. If no, please explain:
 - ii. If yes, add any additional notes here:
 - c. **If Yes: Did you see the SNAP/ EBT machine working properly?** (Yes/No)
 - i. If no, please explain:
 - ii. If yes, add any additional notes here:
 - d. **Were receipts given to shareholders who paid with SNAP/EBT?** (Yes/No)
 - i. If no, please explain:
 - ii. If yes, add any additional notes here:
6. **If the CSA was free choice, was the produce labeled thoroughly?** (Yes/No)
 - a. If no, please explain:
 - b. If yes, add any additional notes here:
7. **If the CSA was free choice, was the produce attractively arranged?** (Yes/No)
 - a. If no, please explain:
 - b. If yes, add any additional notes here:
8. **Are there any other aspects of the CSA operation and CSA pick-up that you would like to report?** For example, notable interactions with participants or observations not solicited in earlier questions? (open ended)
9. **Time spent at pick-up site** (in minutes): _____

APPENDIX E

CO-CSA Process Evaluation – Coordinator Survey – Session Audit

Session-specific Questions

1. **Date** (mm/dd/yyyy): _____
2. **Lesson location:** (Dropdown menu of each lesson site across VT, NY, NC, and WA)
3. **Lesson duration** (in minutes):
 - a. Did any participants arrive late or leave early? (Yes/No)
 - i. If yes, please explain.

Curriculum Fidelity Questions

4. Which of the following planned activities did the educator complete during this lesson?
 - a. **Activity 1** (Yes/No)
 - i. Overall, how well received was this activity by participants? (5-point scale, 1 = received very poorly, 5 = very well received)
 - ii. In your opinion, how easy or difficult was it for the educator to facilitate this activity? (5-point scale, 1 = very difficult, 5 = very easy)
 - b. **Activity 2** (Yes/No)
 - i. Overall, how well received was this activity by participants? (5-point scale, 1 = received very poorly, 5 = very well received)
 - ii. In your opinion, how easy or difficult was it for the educator to facilitate this activity? (5-point scale, 1 = very difficult, 5 = very easy)
 - c. **Activity 3** (Yes/No)
 - i. Overall, how well received was this activity by participants? (5-point scale, 1 = received very poorly, 5 = very well received)
 - ii. In your opinion, how easy or difficult was it for the educator to facilitate this activity? (5-point scale, 1 = very difficult, 5 = very easy)
 - d. **Activity 4** (Yes/No)
 - i. Overall, how well received was this activity by participants? (5-point scale, 1 = received very poorly, 5 = very well received)
 - ii. In your opinion, how easy or difficult was it for the educator to facilitate this activity? (5-point scale, 1 = very difficult, 5 = very easy)
 - e. **Were any recipes featured during this lesson?** (Yes/No)
 - i. If No, Qualtrics will skip to next question.
 - ii. If yes, what is/are the name(s) of the recipe(s) that were featured?

CO-CSA Process Evaluation – Coordinator Survey – Session Audit

(Questions 1-4 below will be asked for each recipe listed)

1. How was this recipe featured? (Dropdown menu:
Tasting/Demonstration/Group Preparation)
 - a. If “Group Preparation”: In your opinion, how easy or difficult was it for the educator to include *children* in the making of this recipe? (5-point scale, 1 = very difficult, 5 = very easy, with an NA option if there were no children present)
 2. In your opinion, how easy or difficult was it for the educator to feature this recipe? (5-point scale, 1 = very difficult, 5 = very easy)
 3. From your perspective, how well received was this recipe by participants? (5-point scale, 1 = received very poorly, 5 = very well received)
 4. Please list the type of produce featured in this recipe (e.g. spinach, cucumber, etc.):
 5. Did the educator relate the recipe to vegetables in this week’s CSA box? (Yes/No)
-
5. **Did any participants refuse to take part in one or more activities?** (Yes/No)
 - a. If yes: Please explain.
 6. **Were there any child behavioral issues during the lesson?** (Yes/No)
 - a. If yes: Please explain.

Educator Quality Questions

1. On a scale of 1 to 5, where 1 is very unprepared and 5 is very prepared, how would you rate the educator on their **preparedness** when facilitating planned activities?
 - a. Provide any supporting evidence here: (open ended)
2. On a scale of 1 to 5, where 1 is very unadaptable and 5 is very adaptable, how would you rate the educator on their **adaptability** when facilitating planned activities?
 - a. Provide any supporting evidence here: (open ended)
3. On a scale of 1 to 5, where 1 is very unknowledgeable and 5 is very knowledgeable, how would you rate the educator on their **knowledge** when faced with participant questions and concerns?
 - a. Provide any supporting evidence here: (open ended)
4. On a scale of 1 to 5, where 1 is no facilitation of group cohesion and 5 is high facilitation of group cohesion, how would you rate the educator on their **facilitation of group cohesion**?
 - a. Provide any supporting evidence here: (open ended)

CO-CSA Process Evaluation – Coordinator Survey – Session Audit

5. On a scale of 1 to 5, where 1 is very disrespectful and 5 is very respectful, how would you rate the educator on **respect**, that is, “being nonjudgmental, showing politeness, listening without interruption?”
 - a. Provide any supporting evidence here: (open ended)
6. On a scale of 1 to 5, where 1 is very unsafe and 5 is very safe, how would you rate the educator on **promoting a safe environment**, that is, “creating trust in the learning environment?”
 - a. Provide any supporting evidence here: (open ended)
7. On a scale of 1 to 5, where 1 is low immediacy and 5 is high immediacy, how would you rate the educator on **promoting immediacy**, that is, “providing a learning experience that is of immediate usefulness to the learners?”
 - a. Provide any supporting evidence here: (open ended)
8. On a scale of 1 to 5, where 1 is low engagement and 5 is high engagement, how would you rate the educator on **engagement**, that is, “getting learners involved in their learning?”
 - a. Provide any supporting evidence here: (open ended)
9. **Are there any other aspects of your lesson observation that you would like to report?**
For example, notable interactions with participants or observations not solicited in earlier questions? (open ended)

APPENDIX F

Post-Intervention Educator Interview Guide

Interview Introduction and Oral Consent:

We are asking you to participate in an interview regarding your role as an educator for the research study entitled *Farm Fresh Foods for Healthy Kids*. The interview will last between 60 and 75 minutes. We know how much time and effort you put into making the education sessions a success at your site and want to understand what went well and what could have gone better as you prepared for and implemented the F3HK curriculum. We are also interested in your perspective on the sustainability of this program, as you had the opportunity to talk with and get to know the CO-CSA families in a way that the research staff did not.

We do not anticipate any risks from participating in this research, but there are also no benefits to you. Your participation is completely voluntary. You may refuse to participate before the study begins, may skip any questions, or withdraw from the study at any time. We would like to audio-record the interview so that it can be accurately recalled and reflected on your answers.

Do you have any questions? *<provide answers>*

If ever you had a question or concern, you could contact Dr. Rebecca Seguin or myself at any time.

Do you agree to participate? *<If yes, continue. If no, thank you for your time>*

Do you agree to have this interview audio recorded? *<If yes, record. If no, take detailed notes.>*

Section 1: Preparation and Logistics

In the first section of questions, we're going to discuss the logistics of preparing for and implementing the curriculum at your site.

- 1) As you reflect back on your experience, what helped you implement the curriculum at your site? (Probe, if needed: What specific skills did you draw upon? What prior, relevant experiences did you draw upon?)
 - a) What, if any, additional skills would have been helpful to your implementation of the F3HK curriculum?
 - b) What, if any, additional training would have been helpful to your implementation of the program?
 - c) What, if any, additional materials would have been helpful to your implementation of the program?

- 2) Because the curriculum was implemented in the context of a research trial, your work was done in collaboration with research staff in your state and at Cornell. Who were your main points of contact on the research team? How have you worked with them?
 - a) How well integrated do you feel with others in your state working on the study?
 - b) Did you have enough, too little, or too much contact with project staff?
 - c) What, if anything, would you change about your interactions with others working on the project?
 - d) (If applicable) What, if any, additional organizational support from staff in your office would have been helpful to your implementation of the program?

Post-Intervention Educator Interview Guide

- e) What, if any, additional organizational support from the research team would have been helpful to your implementation of the program?

- 3) Tell me a little about your responsibilities outside of the Farm Fresh Foods for Healthy Kids (F3HK) program (e.g. EFNEP programming, research-related tasks). How have you managed your F3HK responsibilities with these other responsibilities?

Section 2: Implementation of the Curriculum

In the second section of questions, we're going to discuss the participants you worked with and the curriculum's design.

- 4) Please describe how your *<insert site name if educator taught more than one group>* participants were as a group:
 - a) How did they compare to other groups you've taught?
 - b) How engaged were they with the session content?
 - c) Compared to others groups you've taught (or compared to each other, if educator taught at multiple sites), how cohesive did the group seem?
 - d) Did the group's level of cohesion change over the course of the program? How cohesive did they seem as a group?

- 5) What aspects of the curriculum do you think were most helpful for your participants?
 - a) Were there specific lessons or activities that engaged participants more than others?

- 6) If you could re-design the curriculum, what would you change? Please explain.

- 7) What (Probe, if needed: What, if any, topics could be removed? What, if any, activities could be removed? What, if any, topics should be covered that weren't? What, if any, activities should be included that weren't? Why?)

- 8) What was your impression of your participants' nutrition-related knowledge upon starting the program? Could you provide specific examples?

Post-Intervention Educator Interview Guide

- a) Did their nutrition-related knowledge seem to change over the course of the program?
 - i) If yes: Could you explain how so? If no: what are some reasons for this?

- 9) What was your impression of your participants' attitudes and beliefs related to nutrition at the start of the program? Could you provide specific examples?
 - a) Did their attitudes or beliefs seem to change over the course of the program?
 - i) If yes: Could you explain how so? If no: Why do you think this was?

- 10) What was your impression of your participants' nutrition behaviors at the start of the program? Could you provide specific examples?
 - a) Based on your conversations with participants individually and during group discussion, did you get any sense for whether participants' nutrition behaviors were changing over the course of the program?
 - i) If yes: Could you explain? If no: Why do you think this was?

- 11) What were your participants' cooking skills like when they started F3HK? Could you provide specific examples?
 - a) Were you able to observe participants' cooking skills improve over the course of the program?
 - i) If yes, could you explain? If no, why do you think that was?
 - b) What, if any, additional food preparation skills should be taught during the program?
 - c) Are there skills being taught in the program currently that should be highlighted more often throughout the sessions?

- 12) How did trying to feature local, seasonal foods in the F3HK lessons go for you?

- 13) How did the store tour go for your site?
 - a) What was successful about the store tour lesson?
 - b) What difficulties did you encounter?

- 14) How did the farm tour go for your site?
 - a) What was successful about the farm tour lesson?

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b) What difficulties did you encounter?

15) Could you explain how your site integrated children into the lessons when they were present?

a) What successes can you share about engaging both children and adults in the lessons?

b) What challenges did you face when trying to engage both children and adults in the lessons?

Section 3: Intervention Sustainability

In the third and final section of questions, we're going to discuss your thoughts on the intervention as a whole and factors that might impact the program's sustainability.

16) As an educator, you had the opportunity to observe the intervention – that is, the CO-CSA shares, education, and kitchen tool provision – from a different vantage point than most of the other project staff. From this vantage point, what is your overall perspective of this intervention? Please explain.

17) What factors might have *positively* impacted CO-CSA families' participation in the *education classes*?

(Probe, if needed: Session accessibility? Session schedule? Staff support? Affordability of participation? Acceptability of session content?)

18) What factors might have *negatively* impacted CO-CSA families' participation in the *education classes*?

(Probe, if needed: Session accessibility? Session schedule? Staff support? Affordability of participation? Acceptability of session content?)

a) How do you think participation could have been improved?

19) What factors might have impacted the usefulness of the program for the participants you worked with?

a) Can you think of factors within families or households that *positively* impacted the program's utility for your participants?

b) Can you think of factors within families or households that *negatively* impacted the program's utility for your participants?

c) Can you think of community-level factors that *positively* impacted the program's utility for your participants?

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- d) Can you think of community-level factors that *negatively* impacted the program's utility for your participants?

- 20) Based on conversations with your participants, what factors might have *positively* impacted their likelihood of picking up their *CSA share*?

- 21) What factors might have *negatively* impacted their likelihood of picking up their *CSA share*?

- 22) [If an Extension educator] Do you feel like this type of program could be sustainable and integrated long term into Extension services? Why or Why not?
 - a) What could help make it more sustainable?

- 23) [If not in Extension] Do you feel like this type of program could be sustainable in the long term? Why or Why not?
 - a) What could help make it more sustainable?

- 24) Is there anything else that you would like to share that wasn't covered during the interview?

APPENDIX G

Baseline Questionnaire

Instructions: The questions in this survey ask about the time and costs spent on grocery shopping and planning and preparing meals for your household. Please answer each question to the best of your ability.

1. In the past 6 months, did you buy any tools or supplies used for food preparation, cooking, or food preservation (such as knives, jars, cutting boards, a blender, etc.)? ___Yes ___No
 - a. If Yes: What tools or supplies did you buy?
 - i. Item 1: _____
 1. How much did you pay for this item? \$____.____
 - ii. Item 2: _____
 1. How much did you pay for this item? \$____.____
 - iii. Item 3: _____
 1. How much did you pay for this item? \$____.____
 - iv. Item 4: _____
 1. How much did you pay for this item? \$____.____
 - v. Item 5: _____
 1. How much did you pay for this item? \$____.____
2. In a typical month, how many times do you go grocery shopping? _____ times per month
 - a. About how much money did you usually spend on groceries per trip? \$____.____
3. How do you *usually* travel to the grocery store?
___Car ___Public bus ___Taxi ___Walk ___Other (specify) _____
 - a. If by Car or Walking: How many miles is it from your home to the grocery store (one way, rounded to the nearest whole mile)? _____ miles
 - b. If by Bus or Taxi: How much money does it cost to take the (Bus/Taxi)? \$____.____
4. How long does it take you to travel to the grocery store? _____ minutes
5. How long are you usually in the grocery store shopping? _____ hours, and _____ minutes
 - a. Do your child(ren) come with you when shopping for food? (choose one)
___Never ___Sometimes ___Often ___Always
6. During a typical week, how much time do you spend planning your meals?
_____ hours, and _____ minutes
 - a. Do your child(ren) assist with meal planning? (choose one)
___Never ___Sometimes ___Often ___Always
7. During a typical week, how much time do you spend cooking meals? _____ hours
 - a. Do your child(ren) assist with meal preparation? (choose one)
___Never ___Sometimes ___Often ___Always
8. During a typical week, how many times does your family sit down to eat a meal together? _____ times
9. In a typical month, how often do you eat out? _____ times per month
 - a. If > 0: How much money do you spend on eating out per month (including the purchase of prepared meals *and* snacks)? \$____/month

Endpoint Questionnaire

Instructions: The questions in this survey ask about the time and costs spent on grocery shopping, planning and preparing meals, and participating in the (CO-CSA/DUFB-FM) program. Please answer each question to the best of your ability.

The first portion of the survey focuses on time and money spent on grocery shopping and planning and preparing meals.

General questions

1. *Since starting the study*, have you bought any tools or supplies used for food preparation, cooking, or food preservation (such as knives, jars, cutting boards, a blender, etc.)?
___Yes ___No
 - a. If Yes: What tools or supplies did you buy?
 - i. Item 1: _____
 1. How much did you pay for this item? \$_____
 - ii. Item 2: _____
 1. How much did you pay for this item? \$_____
 - iii. Item 3: _____
 1. How much did you pay for this item? \$_____
 - iv. Item 4: _____
 1. How much did you pay for this item? \$_____
 - v. Item 5: _____
 1. How much did you pay for this item? \$_____
2. In a typical month, how many times do you go grocery shopping? _____ times per month
 - b. About how much money do you usually spend on groceries per trip? \$_____
3. How do you *usually* travel to the grocery store?
___Car ___Public bus ___Taxi ___Walk ___Other (specify) _____
 - a. If by Car or Walking: How many miles is it from your home to the grocery store?
___ miles
 - b. If by Bus or Taxi: How much money does it cost to take the (Bus/Taxi)? \$_____
4. How long does it take you to travel to the grocery store? _____ minutes
5. How long are you usually in the grocery store shopping? _____ hours, and _____ minutes
 - a. Do your child(ren) come with you when shopping for food? (choose one)
___Never _____ Sometimes ___Often ___Always
6. During a typical week, how much time do you spend planning your meals?
_____ hours, _____ minutes
 - a. Do your child(ren) assist with meal planning? (choose one)
___Never ___Sometimes ___Often ___Always
7. During a typical week, how much time do you spend cooking meals? _____ hours
 - a. Do your child(ren) help with meal preparation? (choose one)
___Never ___Sometimes ___Often ___Always
8. During a typical week, how many times does your family sit down to eat a meal together? _____ times per week

9. In a typical month, how often do you eat out? ____ times per month
 a. If more than 0: In a typical month, how much money do you spend on eating out (including the purchase of prepared meals *and* snacks)? \$ ____ . ____ per month
10. When were you last employed? (Choose only 1)
 ____ Currently employed
 ____ Just before starting the CSA program, but not currently
 ____ Within the past 12 months
 ____ Longer than 12 months ago
 ____ Never employed
- a. If currently employed: Does participation in the CSA program interfere with your work? ____ Yes ____ No
 i. If Yes: How many hours do you *miss* from work to attend this program, per week? ____ hours per week
11. What type of job did or do you have? (Check all that apply)
 ____ Management/Professional (manager, engineer, architect, accountant, teacher, RN)
 ____ Technical support (computer programmer, health technician, science technician)
 ____ Sales (sales representative, insurance agent, real estate broker, sales clerk)
 ____ Administrative support (clerk, secretary, data processor, telephone operator)
 ____ Service (security guard, food service, nurse aide, janitor)
 ____ Production, construction, or operation (mechanic, carpenter, machine operator)
 ____ Transportation (motor vehicle operator, moving equipment operator)
 ____ Not Applicable/Never employed
 ____ Other (specify) _____
12. How many hours per week did you/do you typically work in your last or current job? (If you have more than one job, think about your primary job or most recent job) ____ hours per week
13. What is or was your rate of pay in that job, before taxes, including tips and other compensation?
 (fill in the wage amount and choose the correct time period)
 \$ ____ . ____ per (choose one: ____ hour ____ week ____ month ____ year)

The second portion of the survey focuses on time and money spent (picking up your family's CSA share/taking part in the DUFB-FM program).

Questions specific to CSA share/DUFB program

1. How do you usually travel to the (CSA pick-up site/farmers' market)?
 ____ Car ____ Public bus ____ Taxi ____ Walk ____ Other (specify) _____
- a. If by Car: How many miles is it from your home to the (CSA pick-up site/farmers' market) (one way, rounded to the nearest whole mile)? ____ miles
- i. Do you have to pay tolls during your drive to the (pick-up site/market)?
 ____ Yes ____ No
 1. If Yes: How much do these tolls cost (one way)? \$ ____ . ____
- ii. Do you have to pay for parking at the (pick-up site/market)? ____ Yes ____ No
 1. If Yes: How much do you pay to park? \$ ____ . ____
- b. If by Walking: How many miles is it from your home to the (pick-up site/market) (one way, rounded to the nearest whole mile)? ____ miles

- c. If by Bus or Taxi: How much money does it cost to take the (Bus/Taxi) one way?
\$ __. __
2. How long does it take you to travel to the (pick-up site/market) (one way)? ____ minutes
3. How long are you usually at the (pick-up site/market)? ____ hours, and ____ minutes
4. Do your child(ren) come with you when (picking up your CSA/visiting the market)? (choose one)
__Never __Sometimes __Often __Always
- a. If less than 'Always': Do you ever have to pay for child care while you (pick up your CSA share/go to the market)? __Yes __No
- i. If Yes: How often do you have to pay for child care when (picking up your CSA share/going to the market)?
__1x/month __2x/month __3x/month __4x/month
- ii. If Yes: How much do you pay in child care each time you hire someone to watch your child(ren) while you are (picking up your CSA share/at the market)?
\$ __. __
5. Do you incur any other expenses in the process of (picking up your CSA share/taking part in the DUFB program)?
__Yes __No
- a. If Yes: Please specify: _____
- b. If Yes: What is the total value of these expenses over the course of a month? \$ ____.
6. Did you make any contributions to the (CSA/DUFB) program (for example, volunteering time or donating supplies) since starting the study? __Yes __No
- a. If yes, what type of contributions did you make?
__Volunteer __Donate supplies __Other: _____
- i. If you volunteered: How many hours did you usually volunteer per week? ____ hours
- ii. If you donated supplies: What was the approximate value of these contributions? \$ __. __

The final portion of the survey focuses on time and money spent attending the educational group classes offered along with the CSA share. THIS PORTION DOES NOT APPLY TO THE DUFB EVALUATION.

Questions specific to education classes

1. How do you usually travel to the CSA group classes?
__Car __Public bus __Taxi __Walk __Other (specify) _____
- a. If by Car: How many miles is it from your home to the CSA class location (one way, rounded to the nearest whole mile)? ____ miles
- a. Do you have to pay tolls during your drive to the group classes? __Yes__No
- i. If Yes: How much do these tolls cost (one way)? \$ __. __
- b. Do you have to pay for parking at the group classes? __Yes__No
- i. If Yes: How much do you pay for parking? \$ __. __

- b. If by Walking: How many miles is it from your home to the group classes (one way, rounded to the nearest whole mile)? ____ miles
 - c. If by Bus or Taxi: How much money does it cost to take the (Bus/Taxi) one way?
\$ ____ . ____
- 2. How long does it take you to travel to the CSA group classes (one way)? ____ minutes
- 3. How long are you usually at the CSA group classes? ____ hours, and ____ minutes
- 4. Do your child(ren) come with you to the CSA group classes? (choose one)
 Never Sometimes Often Always
 - a. If < Always: Do you ever have to pay for child care while you go to the group classes?
 Yes No
 - i. If Yes: How often do you have to pay for child care when going to the CSA group classes?
 ____ 1x/month ____ 2x/month ____ 3x/month ____ 4x/month
 - ii. If Yes: How much do you pay in child care each time you hire someone to watch your child(ren) while attend a CSA group class? \$ ____ . ____
- 5. Do you incur any other expenses in the process of attending the group classes? Yes No
 - a. If Yes: Please specify: _____
 - b. What is the total value of these expenses over the course of a month? \$ ____ . ____
- 6. Did you make any contributions to the classes (for example, volunteering time or donating supplies) since starting the study? Yes No
 - a. If yes, what type of contributions did you make?
 Volunteer Donate supplies Other: _____
 - i. If you volunteered, how many hours did you usually volunteer per week? _____
 - ii. If you donated supplies, what was the approximate value of these contributions? \$ ____ . ____

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