THE SCHOOL DISTRICT OF PHILADELPHIA

Research Brief: Health & Nutrition

The Feasibility of Conducting an Impact Study of Share Produce Stands: Findings from a Pilot Study

Soula Servello, Program Manager; Lis Fornaro, Research Specialist; Erin Cassar, Senior Research Associate

Key Findings

This brief focuses on findings from a pilot study completed in Spring 2019 to determine the feasibility of conducting an impact study to evaluate the effects of the Share produce stands on healthy eating or food insecurity rates. Key findings include:

- Under current conditions, ORE does not recommend conducting an impact study due to low response rates and frequency of produce stand implementation and usage.
- Attitudes and self-efficacy about healthy eating and readiness to eat more fruits and vegetables are not appropriate outcomes measures in a future impact study because levels of these measures are already high at baseline.
- Fruit and vegetable consumption and food insecurity are appropriate outcomes measures for a future impact study.

Overview and Context

During the 2018-19 school year, Eat Right Philly (ERP) used federal SNAP-Ed funding to support monthly produce stands in partnership with the Share Food Program at 24 schools in the School District of Philadelphia (SDP). At selected schools, families and school communities were able to purchase fresh produce at cost, utilizing various payment methods, and also receive recipes and healthy eating tips from ERP program staff.

Philadelphia has a high poverty rate, and it is estimated that one in five Philadelphians suffers from food insecurity (Taylor, 2017). Ensuring access to fresh, healthy foods is especially important in the school setting, where children cannot learn if they are hungry. ERP expressed interest in evaluating whether programs like the Share produce stands increase food access, improve healthy eating behaviors, and help parents manage food resources.

The Office of Research and Evaluation (ORE) conducted a pilot study in Spring 2019 to answer two research questions:

1. What is the feasibility of conducting a future impact study based on the current program structure?

2. What are appropriate outcomes measures and survey tools for the intended population in a future impact study?

What We Did

This pilot study was designed to assess whether a future study of the impact of produce stands on four possible outcomes – 1) attitudes and self-efficacy about healthy eating, 2) readiness to eat more fruits and vegetables, 3) fruit and vegetable consumption, and 4) food insecurity– would be feasible. To do so, we developed and administered a survey to produce stand participants, tested different recruitment methods for administering surveys, and conducted interviews with participants about the produce stands and our study. Each of these is described in detail below.

Developing the Survey

First, we developed a survey to assess the four key outcomes that produce stands might affect. The final survey had three sections, which was a combination of all of the items in three validated tools:

1. **UC Davis Fruit and Vegetable Inventory[1]:** A two-page survey with 13 questions shown to be related to fruit and vegetable intakes. The inventory measures perceived benefits of healthy eating, self-efficacy for eating fruits and vegetables, and readiness to eat more fruits and vegetables.

2. **Block Fruit/Vegetable/Fiber Screener[2]**: Includes seven questions about fruit and vegetable intake and three questions about foods high in fiber. It takes about five minutes to complete and ranks individuals according to their usual intake of fruits and vegetables.

3. **U.S. Household Food Security Survey Module Six-Item Short Form[3]:** The six-item short form was developed by researchers at the National Center for Health Statistics in collaboration with Abt Associates and is an acceptable substitute to the full 18-item survey. The survey is used to identify households with low and very low food security.

Administering the Survey

We first selected nine schools in diverse locations with high numbers of people visiting the produce stands. We then tested two recruitment methods for administering the survey.

First, we asked ERP program staff to distribute survey packets in the bags provided to produce stand customers in six of the nine schools. Survey packets distributed by ERP staff included a letter about the produce stand study; a copy of the survey; a pre-addressed and pre-stamped envelope to return the survey to ORE; and a pre-stamped postcard for participants to send back with their name, address, and contact information so ORE could send a voucher for a salad shaker. The postcard also included a checkbox for participants to mark if they were interested in participating in an interview in exchange for a $5 coupon provided by Share to use at a future produce stand.

[1] https://townsendlab.ucdavis.edu/evaluation-research-tools/mediators-of-behavior-change/
[2] https://nutritionquest.com/assessment/list-of-questionnaires-and-screeners/
[3] https://www.ers.usda.gov/media/8282/short2012.pdf

In the second recruitment method, two ORE staff members visited three schools during produce stand operation to administer surveys in person. ORE approached produce stand customers to ask if they were interested in completing the survey on-site in exchange for a salad shaker. We also passed around a sign-up sheet for participants who were interested in participating in an interview.

Using the first recruitment method, in which ERP put survey packages in produce stand bags, ORE received 2-6 surveys per site, with an average response rate of 7%. When ORE administered surveys in person, we received 12-21 surveys per site, with an average response rate of 24%.

Conducting Interviews

ORE developed semi-structured interview protocols for participants who used the produce stand and completed the survey. Interview questions were about participant opinions of the produce stands, reactions to the survey, and what other impacts the produce stands might have on participants. ORE tracked survey respondents who indicated interest in participating in an interview and contacted respondents within 2-3 weeks of survey completion via email or phone.

In total, 38 survey respondents indicated interest in participating in an interview, either by marking the box on the postcard they mailed back or by signing up in person. ORE contacted 27 respondents (71%) via email or phone and followed up at least twice with each person. Interviews were conducted with ten participants by phone and recorded with verbal consent.

What We Found

Research Question 1: What is the feasibility of conducting a future impact study based on the current program structure?

We considered four factors to determine the feasibility of an impact study:

1. Sample size
2. Frequency of program
3. Frequency of participation
4. Scope of participation

In this section, we describe the existing literature and what we learned from the pilot study related to each factor.

Sample Size

Existing Research Says: The sample must be large enough to represent the population *and* a control group is needed to determine the impact of the program.

One important factor in conducting a successful impact study is ensuring an adequate sample size that will allow us to correctly attribute any changes in attitudes, behavior, and/or food insecurity

levels to the produce stand. If we include too few participants in our study, the results cannot be generalized since the sample will not represent the target population (i.e., produce stand customers). In addition, an impact evaluation requires a control or comparison group in order to "measure the net change in outcomes for a particular group of people that can be attributed to a specific program" (USDA, 2014, p. 4).

Finding from our Pilot Study: Recruiting an adequate sample would require costly outreach and incentives and may not be possible.

ORE calculated the sample size necessary to answer the simple question, "What is the prevalence of food insecurity among Share customers?" We estimate that we would need a minimum sample size of 381 produce stand participants to measure any impact with statistical power.[4]

This number does not take into account the attrition rate (i.e., the number of participants who drop out of the study), which means the initial sample should be even higher to ensure the final sample for a pre/post impact study is close to 381. In a 2017-18 study of parent/caregivers participating in a series of nutrition education workshops, ORE had an attrition rate of over 75%. Even with a more modest attrition rate of 50%, ORE would need a starting sample of 762 parents/caregivers.

To obtain an adequate sample size, surveys would most likely need to be delivered in person during every produce stand. Given that there are approximately 192 total produce stands per year (24 schools with monthly produce stands over eight months), two ORE staff would each need to spend at least two hours collecting data at each site, for a total of 786 hours of evaluation staff time.

Finally, to determine whether the produce stand is responsible for changes in behavior, ORE would need to identify a control group of parents/caregivers at schools that do not have a produce stand. Because there would be no physical program where ORE could administer surveys in person, we would have to administer the surveys in other ways, and we can expect a low response rate.

Frequency of Program

Existing Research Says: Produce stands offered once a month are not enough to detect a measurable change in a person's behaviors.

In general, research on farmers' markets and market subsidy programs links them to desirable health outcomes, including increased fruit and vegetable consumption (Jonason, 2017). Still, "small-scale impacts take time to build up to the point where they are measurable in larger society" (Jonason, 2017, p. 167).

Cost, convenience, transportation, and perishability are major barriers low-income individuals face to fruit and vegetable consumption (Haynes-Maslow, Auvergne, Mark, Ammerman & Weiner,

[4] To estimate the minimum sample size, ORE used data from the pilot study survey that measured one of the potential research questions for an impact study: *What is the prevalence of food insecurity among Share produce stand participants?* Based on survey data, 54.5% of participants are food secure, while 45.5% are food insecure at some level. With this data, ORE used Cochran's formula to calculate the sample size using a .05 margin of error: N=.545*.455*(1.96/.05)^2=381.

2015). A once-monthly produce stand only reduces these barriers for a limited amount of time, until the fruits and vegetables are consumed or perish.

In addition, behavior changes may not emerge if produce stands are only offered once monthly, as the frequency does not provide enough exposure to fresh fruits and vegetables to detect a measureable behavior change. "Research also indicates that it can take up to 10-15 new food exposures for a person to show a shift in taste preference and attitude toward certain foods" (Metzler, 2017, p. 5).

Finding from our Pilot Study: The produce stand program needs to operate more frequently to detect measurable behavior changes.

ORE suggests a frequency of at least two produce stands per month (ideally, one per week) for a feasible impact study. Interview participants acknowledged the limitation of monthly produce stands indicated in the research. For instance, one interview participant stated:

> *I eat more from the stand, because I buy a lot of fruits and vegetables and everything, so I do more stuff with that during that two weeks. But then after that, I eat less than that because everything then is gone.*

Four participants specifically asked for the produce stands to be offered more frequently. One participant stated, "Once a month for an hour is not enough. If it would be at least twice a month, or at least on the weekends, I think it would benefit a lot more people. Once a month is not cutting it."

Frequency of Participation

Existing Research Says: Participants who report frequently shopping at produce stands increase their fruit and vegetable intake.

Existing research has shown that increased access to fruits and vegetables, in terms of geographic proximity, does not directly lead to increased consumption or other effects (Jonason, 2017). Leone, Haynes-Maslow, and Ammerman (2017) found that participants who reported *frequently* shopping at a mobile produce stand increased their fruit and vegetable intake by 1.6 servings more per day than those who *rarely* or *never* shopped at the mobile produce stand.

Finding from our Pilot Study: Participants in an impact study have to use the produce stands on a regular basis to detect a measurable behavior change.

In our pilot study, we found a range of how often participants use the produce stands. For instance, three interview participants accessed a produce stand only once after passing by or hearing about it the day it was offered, while several reported visiting the stand monthly. Participant tracking data from the ERP program office also shows that weather can impact the number of people shopping at a produce stand: one school site that had over 50 participants on average only served six participants on a rainy day.

Not including a threshold for *frequency of access* could skew the results of an impact study, as those who rarely use the produce stand may not show behavioral changes. This would require an even larger sample size to ensure we are capturing enough frequent participants in the study.

Scope of Participation

Existing Research Says: Impact study participants have to purchase a minimum amount of fruits and vegetables from a produce stand to detect a measurable behavior change.

Research has shown that increasing food access may not improve diet, as cost still inhibits the purchasing of fresh fruits and vegetables (Mayer, Hillier, Bachhuber, and Long, 2014). Even at reduced cost, participants might be limited in the amount of produce they can buy, limiting fruit and vegetable consumption despite a potential desire to change related behaviors. As stated previously, research indicates it can take up to 10-15 new food exposures for a person to show a shift in taste preference and attitude toward certain foods (Metzler, 2017). Thus, purchasing one fresh fruit or vegetable (e.g., purchasing one apple as a snack) may not provide sufficient exposure to fresh fruits and vegetables to produce measurable behavior changes.

Finding from our Pilot Study: Produce stand customers purchase varying amounts of fruits and vegetables, which may not provide sufficient exposure to produce measurable behavior changes.

In our pilot study, we observed produce stand customers purchasing different amounts of fruits and vegetables, from several bags worth of groceries to a few pieces of fruit as a snack. To ensure participants in our sample were purchasing and consuming enough fresh fruits and vegetables from the produce stands to lead to measurable behavior changes, we would need to create a minimum threshold of purchased produce. Only produce stand customers who met this purchase threshold would be included in the impact study. This would require a larger sample size to capture those who purchase enough to provide sufficient exposure to fresh fruits and vegetables to produce measurable behavior changes.

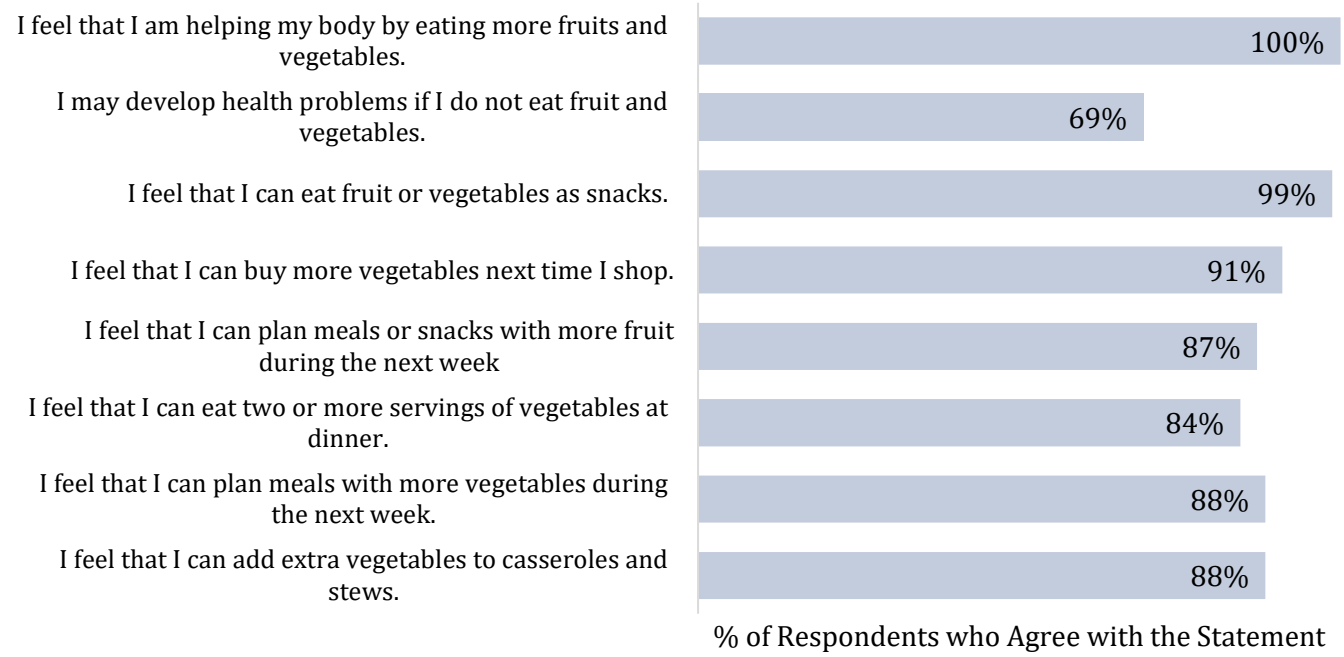
Research Question 2: What are appropriate outcomes measures and survey tools for the intended population in a future impact study?

ORE piloted a survey tool to measure four possible outcomes in a future impact study: 1) attitudes and self-efficacy about healthy eating, 2) readiness to eat more fruits and vegetables, 3) fruit and vegetable consumption, and 4) food insecurity. This section summarizes key findings from 77 survey responses and ten interviews to explore which outcomes would be appropriate to measure for a future impact study, and whether the survey tools we piloted are appropriate for the intended population.

Attitudes and self-efficacy about healthy eating are not appropriate outcome measures for a future impact study

The first section of the survey asked 13 questions about attitudes toward healthy eating, self-efficacy for eating fruits and vegetables, and readiness to eat more fruits and vegetables. Most participants agreed with the statements in the first eight questions, indicating produce stand customers already have positive attitudes toward healthy eating and high self-efficacy for eating more fruits and vegetables (Figure 1).

Figure 1. Most respondents agreed with statements about attitudes and self-efficacy for eating fruits and vegetables (n=77)

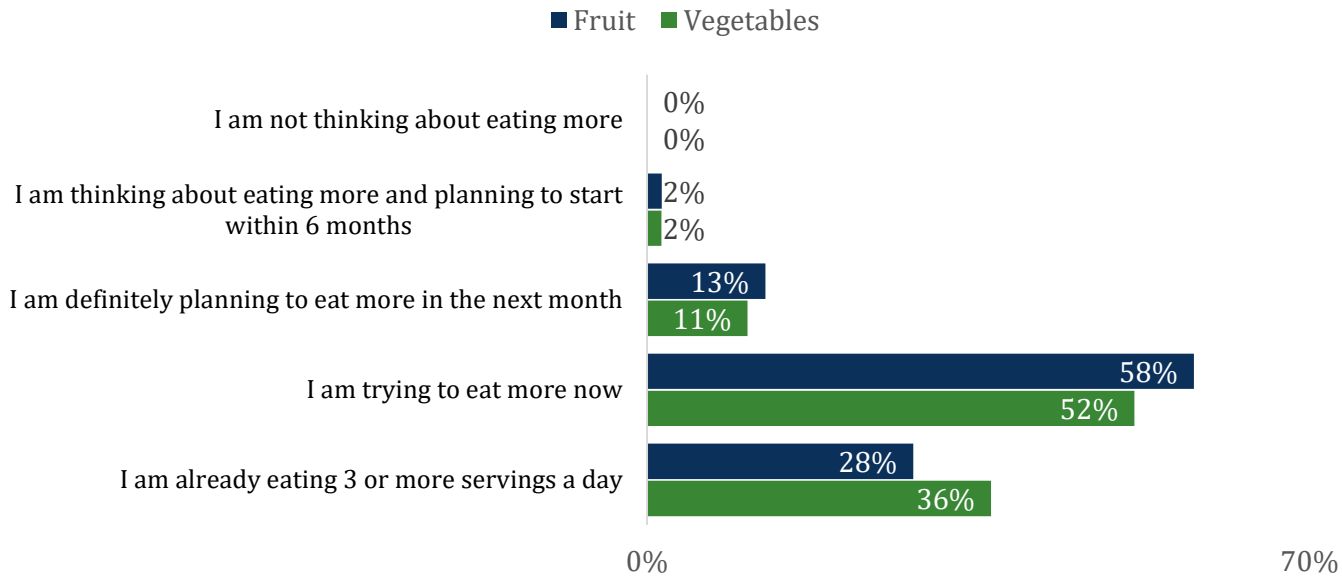


Because attitudes and self-efficacy are already high for produce stand participants, we do not think these are appropriate outcomes to measure in a future impact study.

Readiness to eat more fruits and vegetables is not an appropriate outcome for a future impact study

Most survey respondents also reported that they are either trying to eat more fruits and vegetables now or that they are already eating three or more servings a day (Figure 2), indicating produce stand participants already intend to improve or maintain a healthy diet.

Figure 2: Most respondents report that they are trying to eat more fruits and vegetables or that they are already eating three or more servings a day (n=77)



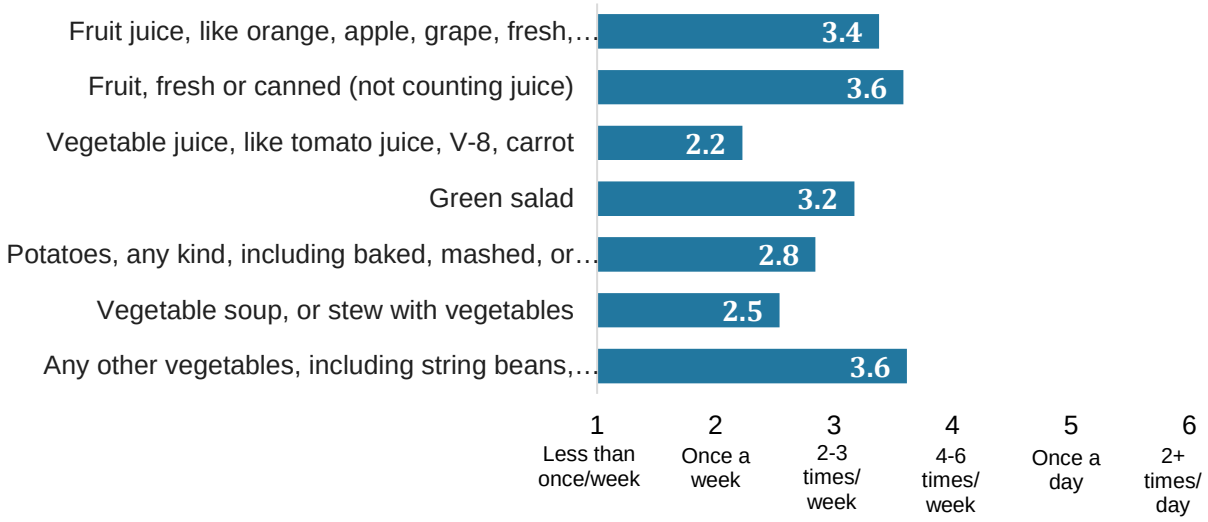
Because produce stand participants in the pilot study reported having the intention to eat more fruits and vegetables, or that they already eating three or more servings per day, we do not think this is an appropriate outcome to measure in a future impact study.

Fruit and vegetable consumption is an appropriate outcome for a future impact study

The second section of the survey asked how often participants typically eat ten categories of fruits, vegetables, and grains. For each category, participants could select from the following choices: less than once a week, once a week, 2-3 times a week, 4-6 times a week, once a day, or 2+ times a day.

Each response was assigned a score of 1-6, where "1" means less than once a week and "6" means two or more times a day. For each category of fruits and vegetables, ORE calculated an average score to assess which items participants report eating more often. According to the survey data, respondents report eating fruit (fresh or canned, not including juice) and "other" vegetables most often (Figure 3).

Figure 3: Average participant score for each category of fruits and vegetables on the Block Fruit/Vegetable/Fiber Screener (n=77)



Eight of the ten interview participants said that by providing access to varied, high-quality produce at good prices, the produce stands increased their fruit and vegetable consumption. One participant stated, "When we get it from the stand, we actually eat more [fruits or vegetables] versus if we go to the supermarket... It's more variety, and also with the pricing, and it tastes better."

Of those participants that stated the produce stands did not increase their or their families' fruit and vegetable consumption, one participant said it didn't change their eating behaviors, but they saw how it could benefit others by increasing exposure to fruits and vegetables. Another said the stands did not change their fruit and vegetable consumption because they often froze what they purchased at the store. Participants also reported that produce stands provided convenience, good prices, and a positive shopping experience, and that they made it "easier to get fresh vegetables and fruits."

Because interview participants pointed to increased consumption of fruits and vegetables as a potential impact of the produce stands, we think fruit and vegetable consumption is an appropriate outcome to measure for a potential impact study. The Block Fruit/Vegetable/Fiber screener can be used as a pre/post tool to measure increases in consumption of particular fruits and vegetables.

Food insecurity is an appropriate outcome for a future impact study

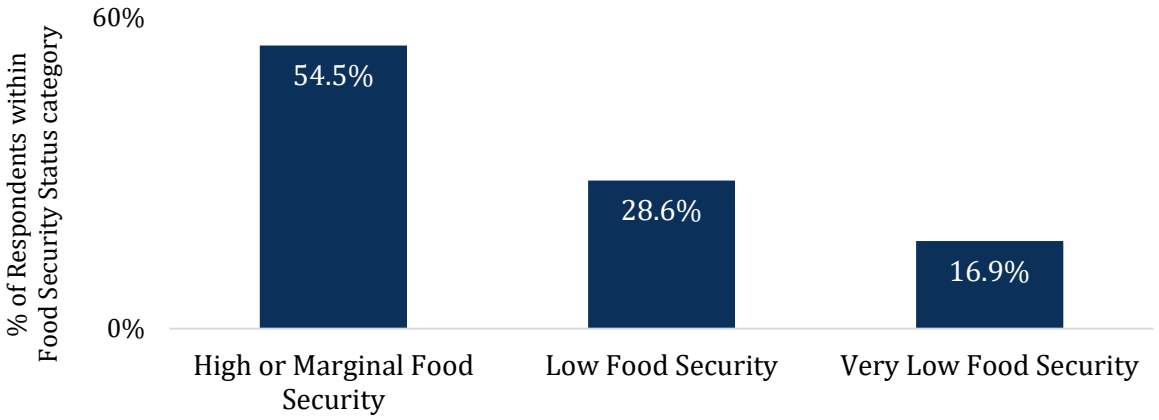
The third section of the survey asked six questions that measure levels of household food security. According to the survey's user notes generated by the USDA, responses to each of the questions are coded as either "yes" or "no," and the sum of affirmative responses to the six questions in the

module is the household's raw score.[5] After calculating the raw scores, food security status was assigned as follows:

- Raw score 0-1: High or marginal food security
- Raw score 2-4: Low food security
- Raw score 5-6: Very low food security

Based on responses to the six-item food security questionnaire, 28.6% of our pilot study respondents had low food security and 16.9% had very low food security (Figure 4). The rates of food insecurity in our survey population were higher than the estimated average of food insecurity in Philadelphia (21%).

Figure 4. Food Security Status based on responses to USDA six-item food insecurity questionnaire (n=77)



The inability to afford food is a barrier to maintaining food security status. During interviews, more than half (8) of participants mentioned lower prices at the produce stand than at other stores. One participant said, "It gives us access to the fruits and veggies for cheaper than they are at the market." The produce stands could therefore provide an opportunity for low-income customers to afford more food for their families and reduce levels of food insecurity. We think that food insecurity is an appropriate outcome to measure in a future impact study, and the six-item U.S. Household Food Security Survey is an appropriate validated tool to measure food insecurity in the intended population.

Next Steps

Based on the results of this pilot study, we do not currently recommend moving forward with an impact study to evaluate the effects of the Share produce stand on fruit/vegetable consumption or food insecurity rates. The program does not currently operate with the frequency required to

[5] For example, responses of "often" or "sometimes" to the question "How often was the following statement true in the last 12 months for your household: The food that we bought just didn't last, and we didn't have money to get more" would be coded as affirmative, while responses of "never" or "don't know" would be coded as negative.

detect measurable changes. We are unlikely to obtain the sufficient sample size of matched survey responses required for a rigorous impact study. If program structure changed to increase the feasibility of and impact study, we recommend using fruit and vegetable consumption and food insecurity as outcome measures.

While measuring the impact on individual-level outcomes like fruit and vegetable consumption and food insecurity levels is not feasible at this time, research indicates there might be other positive outcomes of alternative food institutions that we could explore in the future , such as an increased sense of community and community engagement (Jonason, 2017). Engaging stakeholders, such as parents, at both the school and community level is a vital step in improving student nutrition (Chatterjee et al., 2016; Goh et al., 2009). While much of the existing research focuses on community gardens (i.e., Litt, Soobader, Turbin, Hale, Buchenau & Marshall, 2011; Ghose & Pettygrove, 2014), it could be worthwhile to understand the effects produce stands have on measures of community and community engagement, particularly at schools. Similarly, Fang et al. (2013) attest that the presence of a farmers' market sends a message that communities care about nutrition, and other researchers have found that farmers' markets bring people together on a regular basis (Obach and Tobin, 2013).

At a school site, the produce stands could lead to partnerships between community members and school stakeholders and to parent/caregiver engagement. In order to further explore these aspects of produce stand work, ORE will conduct a qualitative study in 2019-20 to assess different produce stands models including Common Market, Philabundance, and Produce in a SNAP. ORE will explore each model's conditions for success, as well as school- and community-level benefits of produce stand implementation, such as increased parent and community engagement.

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