Assessing the Impact of Post-Purchase Barriers on Fruit and Vegetable Consumption: A Secondary Analysis of a Survey of SNAP Recipients at Seattle Farmers Markets

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Abstract

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Objectives: This secondary analysis identifies and describes the impact of self-reported barriers between purchasing produce at farmers markets and consuming that produce at home. This analysis also compares demographic characteristics between participants who did report barriers to fruit and vegetable consumption and those who did not. Finally, we examine differences in self-reported fruit and vegetable shopping behaviors and consumption between participants who did or did not report barriers, and compare these to the USDA 2010 Dietary Guidelines for Americans. **Study design:** This is a secondary analysis of data collected during an evaluation of the 2013 Fresh Bucks Program, a fruit and vegetable incentive program available at Seattle farmers markets. The original evaluation collected data from a convenience sample of Supplemental Nutrition Assistance Program (SNAP) participants who chose to participate in the Fresh Bucks Program. The Fresh Bucks evaluation surveyed participants at three time points: 1) before they shopped, 2) after they shopped on the same day, and 3) one-to-two months later by phone. Our analysis used data collected from all three of the surveys. **Methods:** These three surveys asked questions related to the purchase, preparation, and consumption of fruits and vegetables. For this analysis, we divided participants into those who reported barriers to fruit and vegetable consumption and those who did not. Differences between the two groups were

assessed with student-t and Fisher's exact tests. Barriers and solutions reported by participants were categorized and reported by themes. **Results:** Of 70 participants, 35 did not report barriers and 35 did report at least one barrier. The most common barriers to full consumption of all produce were purchasing too much produce at once and that the produce spoiled before it could be eaten. Sixty-nine respondents indicated that they consumed more than half or all of their produce, and there was no statistically significant difference in full consumption of all produce those who reported some barriers and those who did not report barriers. The group that did not report barriers reported a significantly greater number of children per household ($p=0.02$), and were more likely to report that they knew how to prepare all items they purchased ($p<0.01$). Both groups were comprised predominately of white, non-Hispanic, English-speaking females from households of an average of 3 persons. The majority of both groups appear to meet the USDA 2010 Dietary Guidelines for Americans for daily vegetable consumption, though less so for fruit. **Conclusions:** The majority of participants were able to consume most of the produce purchased, and met national guidelines for vegetable consumption. The population represented in this analysis is much different from typical SNAP shoppers in demographic and other characteristics. Future incentive programs should target locations where SNAP participants who do not consume enough fruits and vegetables typically shop. Future research should further understanding of the magnitude of the major barriers reported in our analysis: purchasing more produce than can be eaten before it spoils, and the rapid spoilage of produce.

Key words: SNAP, purchasing power, Fresh Bucks, healthy food incentives, barriers to fruit and vegetable consumption

Introduction

Low-income individuals and families in the United States experience a number of barriers to accessing and consuming healthy foods. Price appears to be the number-one deterrent to purchasing fruits and vegetables for low-income shoppers [1, 2, 3]. Lack of physical access also hinders the purchase of produce among low-income populations [4]. For example, Supplemental Nutrition Assistance Program (SNAP)[1] participants and other low-income persons are less likely to live in neighborhoods with nearby access to supermarkets [5, 6, 7], and are less likely to eat adequate amounts of fruits and vegetables [5]. Psychological stress [8], work and financial demands [9, 10], and poor nutrition knowledge [11] negatively influence the food choices of low-income families as well. Even during economic hardship, low-income US adults are resistant to behavior changes such as cooking at home instead of eating out, even though the latter is more expensive [12]. Low-income persons generally consume less than the recommended amounts of fruits and vegetables, as well as whole grains, fish, nuts, seeds, and legumes [13, 14, 15, 16, 17]. Lack of access to these healthy foods contributes to the disproportionately higher rates of negative health outcomes observed among low-income populations, including overweight and obesity, diabetes, and cardiovascular disease [18, 19]. Thus, reducing the obstacles to fruit and vegetable consumption by low-income consumers is an important public health objective.

In recent years, a number of incentive programs have sought to reduce financial barriers to fruit and vegetable consumption. One such program, the Healthy Incentives Pilot (HIP), was funded by the Food, Conservation, and Energy act of 2008 to investigate the impact of making fruits and vegetables at grocery stores more affordable for SNAP recipients in one county in

[1] SNAP is a domestic financial and educational nutrition assistance program for US citizens meeting low-income requirements.

Massachusetts. The USDA Food and Nutrition Service designed HIP to provide a financial incentive of 30 cents per dollar spent on selected fruits and vegetables between November 2011 and December 2012. HIP participants reported purchasing a greater volume and variety of produce, and spent more of their own SNAP dollars on produce. Interim results indicate that HIP participants consumed one-fifth of a cup (25 percent) more fruits and vegetables per day compared to SNAP recipients who did not participate [17]. According to the HIP report, this change decreased the gap between SNAP participants' baseline fruit and vegetable consumption and the Healthy People 2020 objectives by 17 percent [17, 20]. Though many participants increased their fruit and vegetable intake, 40 percent of participants reported one or more of the following barriers: difficulty understanding how the incentive worked, difficulty remembering which produce items were eligible, and being wholly unaware of the incentive. The positive impact of financial incentive programs on dietary intake of fruit and vegetables might improve if these barriers were reduced.

In addition to grocery stores, increased funding and effort are being put toward incentive programs at farmers markets across the nation. Recent evaluations of farmers market incentive programs (such as matching SNAP dollars through electronic benefits transfer (EBT) cards) report findings similar to the Healthy Incentives Pilot: increased total EBT users at markets, increased EBT dollars spent at markets, and increased quantity and variety of produce purchased by low-income populations[21, 22, 23, 24, 25, 26]. However, these studies did not measure how much of the produce purchased with incentives was consumed at home. Barriers at home might limit fruit and vegetable consumption even after the financial barriers are removed. For example, recent literature suggests that low-income adults are less likely to cook at home due to time limitations [9, 10, 27], lack of knowledge or skills related to food preparation, inadequate storage

or refrigeration space, or poor menu planning ability [28, 29, 30]. We suspect that the low-income shoppers who participate in farmers market incentive programs are affected by these post-purchase barriers to fruit and vegetable consumption.

The Seattle Fresh Bucks Program offers an opportunity to learn more about the barriers to consumption of fruit and vegetables obtained through a SNAP incentive program. Fresh Bucks was piloted in seven[2] Seattle farmers markets in 2012 and expanded to all Seattle farmers markets in 2013. The main goals of the program were 1) to increase fresh fruit and vegetable purchasing power for low-income shoppers, and 2) to increase the number of shoppers using EBT at local farmers markets, thus increasing market share for local farmers [21]. Between July and October 2013, 2,613 SNAP participants swiped their electronic benefits transfer (EBT) card at a farmers market, and were matched up to $10 per day in Fresh Bucks. Fresh Bucks could only be redeemed for fresh fruits and vegetables at any time before the end of the program in October[3]. In total, participants spent $87,209 in EBT benefits and received $62,345 in Fresh Bucks [31].

In light of the findings from the HIP, identifying whether participants actually consume fruits and vegetables purchased with Fresh Bucks is a necessary aspect of evaluating and improving this and other incentive programs. It is not clear whether barriers after purchase negatively affect fruit and vegetable consumption among farmers market incentive participants. The purpose of this analysis is to identify barriers between purchasing produce at farmers markets and preparing and consuming that produce at home. In addition, the analysis describes the impact of post-purchase barriers on the amount of produce participants were able to

[2] The seven pilot markets were located in Broadway, Columbia City, Lake City, Magnolia, Phinney Ridge, University District, and West Seattle.

[3] Fresh Bucks participants were told when they received Fresh Bucks that they could be used any day until the program ended in October. Late in the season, the Fresh Bucks Program was extended until December due to sufficient funding, but data collection at markets did not continue.

consume. Finally, this analysis compares participants who did and did not report barriers by demographic characteristics: sex; ethnicity; primary language spoken at home; number of persons in a household; and number of children in a household.

Methods

This is a secondary analysis of data collected from September through December 2013 during an evaluation of the Fresh Bucks Program. Data collection at all 15 Seattle Neighborhood Farmers Markets[4] occurred in September and October 2013, and follow-up phone call surveys were conducted in November and December 2013. Researchers piloted each of the survey tools at markets and revised questions for clarity before data collection started. Customer surveys were written by the Center for Public Health Nutrition (CPHN) in collaboration with staff from the City of Seattle and the Washington State Farmers Market Association. Surveys included questions from the 2012 Fresh Bucks Program pilot [21] to allow for comparison to the prior year. Some questions were based on evaluations of similar initiatives around the country to allow for comparisons to other programs. The surveys were intended to be an evaluation of the program's financial impact on shoppers and farmers, and therefore were heavily informed by the specific interests of Fresh Bucks Program leadership and stakeholders [32]. See Appendix A for a copy of the surveys.

In September and October 2013, participants were surveyed at each of the markets before and after shopping. Researchers trained to administer the survey conducted surveys in four-hour shifts. Each of the 15 markets were surveyed on two separate market days. At each market, participants swiped their EBT card at the information tent in order to receive Fresh Bucks. A researcher then approached the participant and asked them if they were willing to be surveyed.

[4] The 15 markets were located at Broadway, Colombia City, Lake City, Magnolia, Phinney, University District, West Seattle, Pike Place, Occidental Park/Pioneer Square, City Hall, South Lake Union, Ballard, Madrona, Wallingford, and Queen Anne.

Participants who agreed to take the first survey prior to shopping were offered $4-6 in additional Fresh Bucks[5] to participate in a second survey after they finished shopping. These first two surveys asked about participants' perceptions of farmers markets, the impact of the incentive on their family's diet, their demographic information, and what they purchased. Participants who completed the post-shopping survey were asked to participate in a follow-up phone call survey. Phone surveys were conducted in November and December 2013.This survey asked about the participant's experience using Fresh Bucks, including preparing, storing, and consuming the produce they purchased. Participants who completed the phone survey were offered a $5 Target gift card.

The University of Washington Institutional Review Board granted an exemption to use the data collected by the CPHN's Evaluation of the Fresh Bucks Program in April 2014. Only participants who completed all three surveys (n=79) were considered for analysis. Participants who could not remember how much of the purchased produce they consumed were excluded from the analysis (n=3). The responses given to questions 5 and 8 of the follow-up phone call survey[6] were used to divide participants into two groups. Participants who gave a "Yes" response to either of these barrier assessment questions were grouped together (n=35), and those who gave a "no" response to both questions comprised a second group (n=35). Participants who could not give responses to either question 5 or 8 of the follow-up survey were excluded (n=6). These questions were not collapsed into one category because question 5 (i.e., whether someone had trouble preparing the produce at any time after purchase) loosely approximates cooking

[5] The incentive offered to participants varied depending on the number of coupons available at each location on each day, and the amount of funding available during the course of the survey period.

[6] Question 5: Can you remember any specific fruits and vegetables that you bought with Fresh Bucks that were difficult to prepare? Question 8: Do you remember any specific fruits and vegetables that you bought that you had trouble finishing or storing before they went bad?

knowledge, skill, and planning skills, whereas question 8 asked about produce that spoiled before the shopper had a chance to use it (e.g., wilted overnight in the refrigerator).

Barriers and solutions reported in open-ended responses to questions 5, 6, 7, and 8 were categorized and reported by themes. Questions 6 and 7 asked how much of the produce was used before it spoiled, and how participants prepared the produce. Differences in demographic characteristics[7], whether participants knew how to prepare produce they purchased, how much of the produce was consumed, and typical daily fruit and vegetable consumption[8] between those who did or did not report barriers were assessed with student-t tests and Fisher exact tests (due to small sample sizes) with α set at 0.05. Finally, we compared average fruit and vegetable consumption from the follow-up phone call survey data between the two groups with a chi-square test. For the purpose of this analysis, participants reporting 2-3 cups per day or greater for fruit and 2-3 cups per day for vegetables met these recommendations.

Results

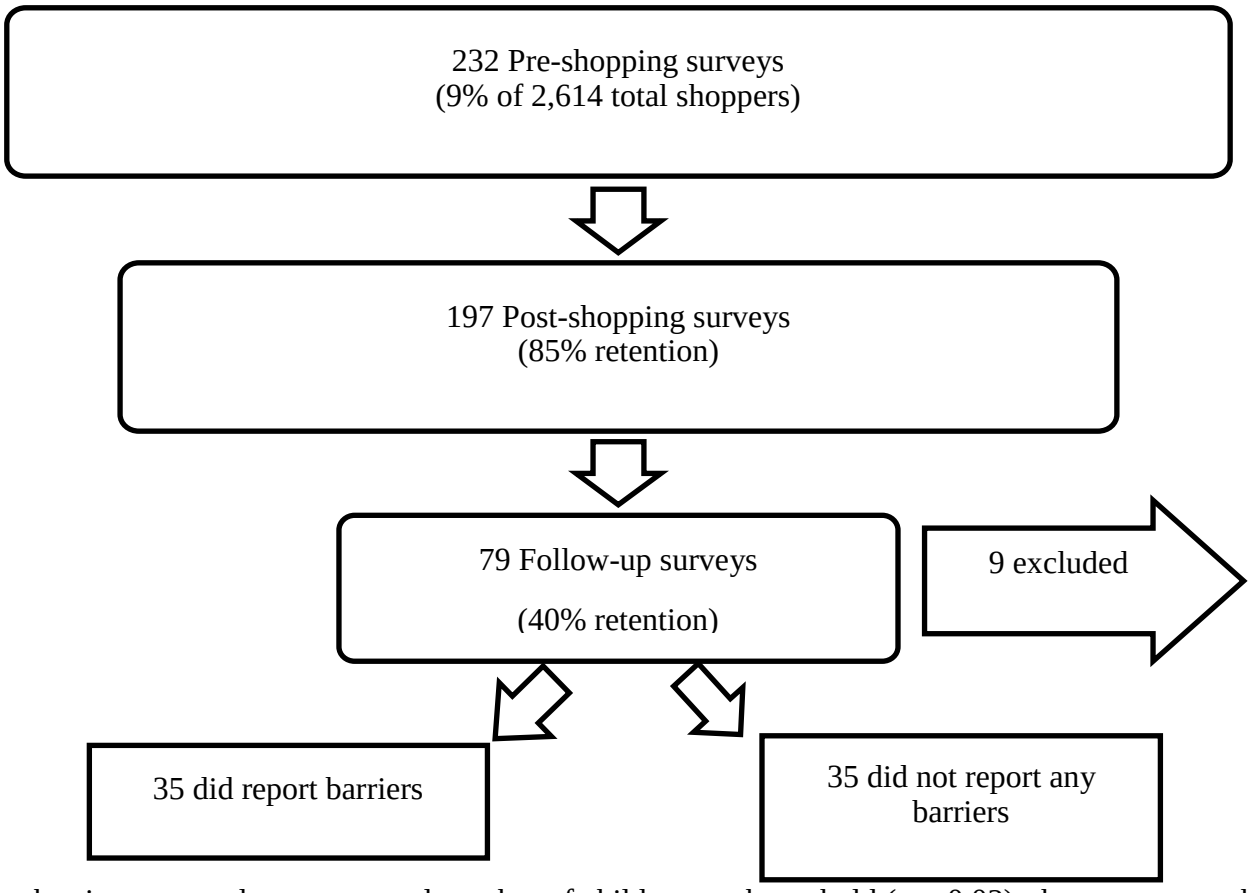
The market survey sample of 232 Fresh Bucks participants represents approximately nine percent of the estimated 2,614 Fresh Bucks participants who shopped between July and October 2013. Of the 232 shoppers who agreed to participate in the initial survey, 197 (85%) returned to complete the post-shopping survey, and 79 participated in the follow-up phone call survey to complete all three surveys. Six participants indicated that they could not remember or did not answer one or both of the barrier questions, and three indicated they could not remember how much produce they were able to finish. These nine participants were excluded, leaving 70 participants for analysis. Figure 1 depicts the number of participants who took each survey, and the final number of participants included in this analysis. Thirty-five participants denied

[7] These data were collected in questions 11-15 of the pre-shopping survey: number of persons in a household, number of children in a household, race, ethnicity, primary language spoken at home, and sex.
[8] These data were collected in questions 4,7,20, and 21 of follow-up phone call survey.

experiencing any barriers to preparing, consuming, or storing produce before it spoiled. Thirty-five participants reported at least one barrier. Of the thirty-five who reported barriers, nine indicated that they had trouble preparing items they purchased, sixteen indicated they had trouble finishing or storing items before they spoiled, and ten participants indicated they experienced both barrier types.

Figure 1 – Of 232 initial contacts, 79 participants completed all three surveys, and 70 were included in this analysis.

Characteristics of the sample are described in Table 1. The group that did not report any



barriers reported a greater total number of children per household ($p = 0.02$); there were no other demographic differences between the groups. The majority of participants were white, non-Hispanic, female, did not live in a household with children, and spoke primarily English at home.

Other languages spoken included Russian, Arabic, Japanese, Tagalog, Mandarin, Romanian, German, and Swedish. Two participants from each group reported speaking English and one other language equally at home. Slightly less than one-third of participants self-identified with any ethnic or cultural group, which included American, Irish, Chinese, Russian, Persian, Japanese, German, Filipino and Hungarian with no apparent patterns between the two groups. Though not statistically significant, more males reported barriers, and more females did not report barriers.

Table 1 – Characteristics of participants in the Fresh Bucks incentive program (n=70)

	Reported barriers[a]	Did not report barriers[b]	p-value
Total number in group	35	35	
Reported trouble preparing items	9		
Reported trouble finishing or storing items	16		
Reported both	10		
Total persons in all households	103	97	0.81
Average Number of Children per household ± SD [†]	0.1 ± 0.3	0.5 ± 1.0	0.02
Average Number of Persons per household ± SD	2.9 ± 3.0	2.8 ± 2.9	0.81
Race			0.75
White	30	28	
Other	5	7	
Hispanic	2	1	>0.99
Identify with any ethnic or cultural group	10	12	0.80
Primary Language at Home			0.48
English	33	30	
Other[c]	4	7	
Sex			0.06
Males	12	5	
Females	23	30	

[a]This group responded "yes" to questions 5 or 8 or both on the follow-up phone call survey. These questions asked whether the participant experienced difficulties preparing or storing produce before it spoiled.
[b]This group responded "no" to both questions 5 and 8 on the follow-up phone call survey.
[c]Two members of each group indicated in their survey that they spoke English and another language equally at home.
[†]The difference between those who reported barriers and those who did not were statistically significantly for this characteristic (p = 0.02).

Table 2 – Responses to follow-up phone call survey questions concerning fruit and vegetable purchases, preparation and cooking knowledge, amount of produce consumed, and typical fruit and vegetable consumption (n=70)

	Reported barriers[a]	Did not report barriers[b]	p-value
Amount of produce purchased on survey date compared to typical shopping trip[c]:			0.21
Purchased more than usual	24	21	
Purchased the same as usual	3	6	
Purchased less than usual	1	3	
Purchased something they do not typically purchase	10	16	0.22
Knew how to prepare all items purchased†	22	33	<0.01
Finished all produce purchased[d]	24	30	0.10
Reported fruit consumption per day:			0.77
Less than 1 cup	7	7	
1-2 cups	11	8	
2-3 cups	8	13	
3-4 cups	4	4	
4+ cups	4	3	
Reported vegetable consumption per day:			0.33
Less than 1 cup	0	1	
1-2 cups	5	8	
2-3 cups	11	12	
3-4 cups	7	2	
4+ cups	10	12	

[a]This group responded "yes" to questions 5 or 8 or both on the follow-up phone call survey. These questions asked whether the participant experienced difficulties preparing or storing produce before it spoiled.
[b]This group responded "no" to both questions 5 and 8 on the follow-up phone call survey.
[c]14 participants were unable to say how this shopping trip compared to a typical shopping trip.
[d]This survey question asks how much of the produce purchased on the shopping day the participant was surveyed had been consumed.
†The difference between those who reported barriers and those who did not were statistically significantly different for this characteristic ($p < 0.01$).

Table 2 displays reported produce shopping behaviors, typical fruit and vegetable consumption, and the amount of farmers market produce consumed after purchase for each group. Participants who did not report barriers were significantly more likely to know how to

prepare all the produce they purchased on that market day compared to those who did report barriers (22 who did report barriers, 33 who did not, $p < 0.01$). The majority of both groups reported that they purchased more fruits and vegetables with the Fresh Bucks incentive than on a typical shopping trip (to a farmers market or elsewhere), and that they were able to finish all of the produce they purchased. More of the participants who did not report barriers reported purchasing the same amount of produce or less than a typical shopping trip, though this difference was not significant. Another ten participants reporting barriers and four who did not consumed "more than half" of the produce they purchased, so 69 out of 70 participants indicated that they consumed more than half or all of their produce.

Although the difference was not statistically significant, participants who did not report any barriers consumed more fruits and vegetables each day than those who did report barriers. Most participants who reported barriers indicated they consumed 1-2 cups per day, compared to 2-3 cups per day among participants who did not report barriers. Vegetable consumption appeared to have a nearly bimodal distribution. Average vegetable consumption in both groups showed peaks at 2-3 cups and 4 or greater cups of vegetables per day. The bimodal nature of vegetable consumption may be due to a ceiling effect in the survey[9]. Figures 2 and 3 compare reported typical fruit and vegetable consumption patterns between the two groups. The USDA 2010 Dietary Guidelines for Americans [33] recommends that the average adult consume two cups of fruit, and two and a half cups of vegetables daily. For the purpose of this analysis, participants reporting 2-3 cups per day or greater for fruit and 2-3 cups per day for vegetables were assumed to meet these recommendations. Among participants who reported barriers, 16 met recommendations for fruit intake, and 20 participants met the recommendations for

[9] Participants could select from the following choices to answer this survey question: A) less than ½ cup, B) ½ to 1 cup, C) 1-2 cups, D) 2-3 cups, E) 3-4 cups, F) 4 or greater cups, or G) I don't remember. The survey did not adequately differentiate between groups consuming greater than four cups of vegetables per day.

vegetables. Among participants who did not report barriers, 20 met these recommendations for fruit and 26 met recommendations for vegetable intake.

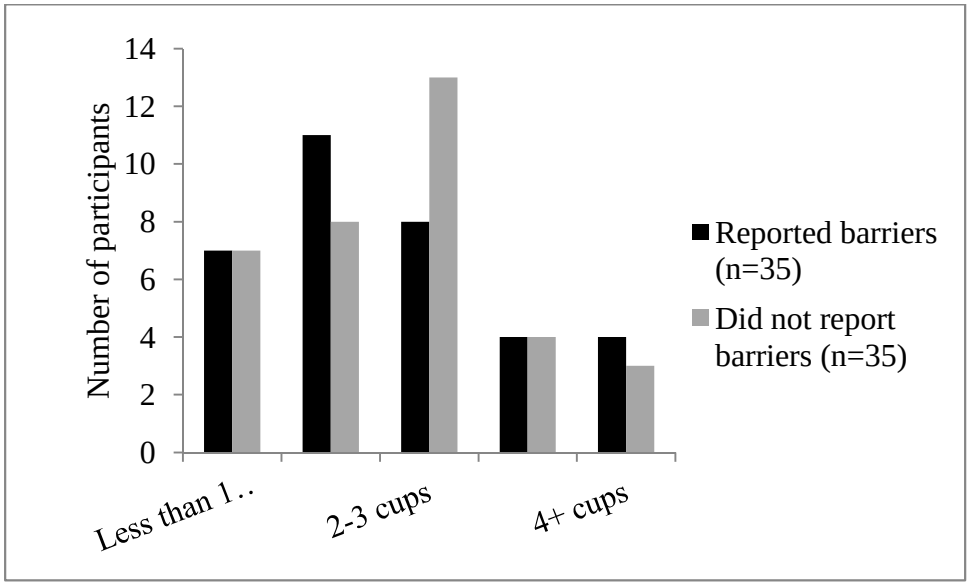


Figure 2 - Reported daily fruit consumption among 70 Fresh Bucks participants in cups per day

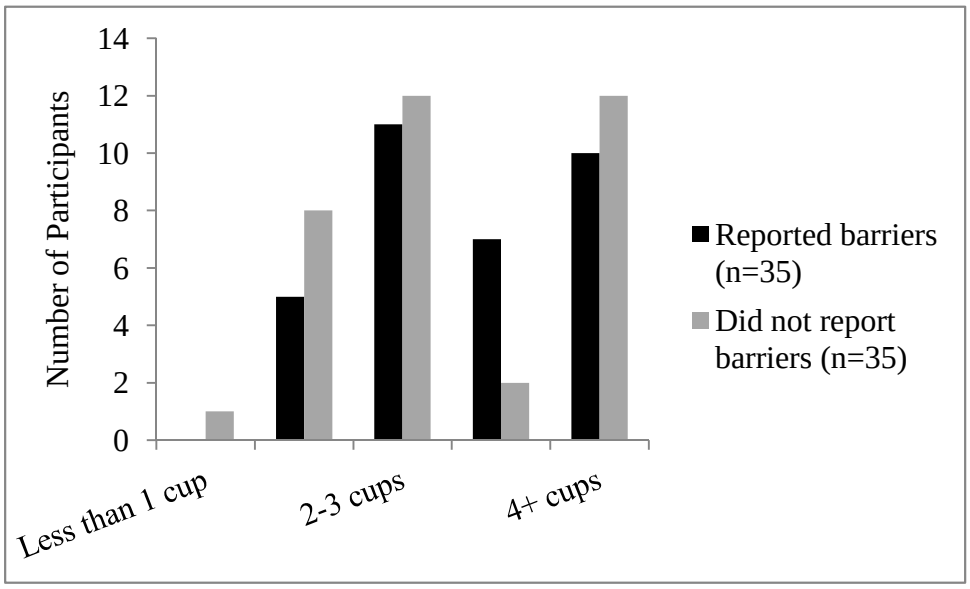


Figure 3 - Reported daily vegetable consumption among 70 Fresh Bucks participants in cups per day

Table 3 lists the categories of barriers and solutions gathered from open-ended questions on the follow-up phone survey. The two barrier categories reported most were 1) participants

purchased too much produce and could not use it all before it spoiled (eight participants), and 2) that the produce wilted or spoiled very quickly (seven participants). Six participants specifically noted that lettuce and other greens were difficult to use for these reasons. It is not possible to discern from participant responses whether the problem lies in purchasing too much produce, or whether farmer's market produce tends to spoil more quickly, so these two groups were not combined. However, due to the similarities between these two questions the groups reporting one or both barriers were not separated for analysis.

Table 3 – Barriers and solutions reported in response to open-ended questions related to difficulty preparing and consuming or storing produce prior to spoiling.

Barrier Categories[a]	Number reported	Solution Categories[b]	Number reported
Purchased too much	8	Looked up recipes to use produce	8
Produce wilted/spoiled quickly	7	Only purchased what I knew how to prepare	4
Produce was damaged/bruised	3	Experimented without a recipe	4
Poor cooking skill or knowledge[c]	1	Asked farmers market staff how to prepare items	3
		Excellent cooking skill or knowledge	3
		Froze or dried produce to preserve	3

[a] Barriers reported by participants were grouped into categories. Some participants reported more than one barrier.
[b] Solutions reported by participants were gathered from open-ended responses to questions in the follow-up phone call survey.
[c] This count does not include participants who reported they only purchased items they knew how to prepare.

Open-ended follow-up questions prompted participants who reported barriers to describe how they overcame barriers to preparing or consuming produce. Some individuals reported more than one of these solutions. The solution reported most frequently in both groups was to look for new recipes, online or otherwise. Participants also reported asking market staff how to prepare unfamiliar produce, preserving produce by freezing or drying it, and experimenting with new recipes.

Discussion

The primary purpose of this analysis was to advance understanding of the impact of post-purchase barriers to consumption of produce obtained through an incentive program for SNAP recipients. Our findings support current literature, which reports that spoilage [34, 30] and difficulty preparing and storing food [11, 28, 29, 30, 35] are barriers for low-income shoppers. Results indicate that participants purchased more produce with the financial incentive as compared to a typical shopping trip regardless of whether they reported barriers. Evaluations of other incentive programs at farmers markets and grocery stores also found that participants purchased a greater volume and variety of produce with the incentive [21, 22, 23, 24, 25, 26, 17]. Unfortunately, these studies did not report about wasted or uneaten produce so it is unclear whether the problem is purchasing too much produce and not consuming it fast enough, or that fresh local farmers market produce spoils faster than it can be consumed. It does not appear that the amount of the financial incentive is associated with spoiling produce. Participants were informed before shopping that Fresh Bucks could be saved and brought back on any market day. Therefore, there was no need for participants to use all of their incentive in one day. In addition, participants chose how many Fresh Bucks they received based on how much of their own EBT money they spent that day.

The literature cites poor cooking skill and lack of food-related knowledge as barriers to fruit and vegetable consumption among low-income populations [36, 34]. In this small sample of Fresh Bucks participants, lack of cooking knowledge or skill did not appear to be a barrier that impacted fruit and vegetable consumption. If cooking skills and knowledge were a barrier, we would expect participants who reported barriers (specifically those who reported trouble preparing certain items) to report lower fruit and vegetable consumption. However, there was no difference in full produce consumption between the two groups. The participants in this analysis

also appear more adaptable in their cooking than typical SNAP recipients. Several participants reported only purchasing familiar produce that they knew how to prepare. Though this adaptation may limit variety in their diets, it prevents inadequate cooking skill from inhibiting the consumption of purchased produce. Previous research also indicates that low-income individuals tend to avoid trying new recipes or purchasing fresh, unfamiliar produce for fear that the recipe will fail or the produce will spoil [37]. However, the most frequently reported solutions by participants in this analysis were to seek new recipes online, in cookbooks, or from market staff. Four more participants also reported experimenting with foods they did not know how to prepare. This population's willingness to seek out and experiment with new recipes might partially explain the high proportion of fruits and vegetables consumed [38] compared to typical SNAP participants. It appears that either these participants did not have the poor cooking skills typically associated with low-income individuals, or they effectively overcame poor knowledge or skills by employing solutions atypical of low-income populations. We can conclude that the population of SNAP participants surveyed in this analysis is quite different from typical low-income shoppers in their ability to overcome barriers to preparing produce at home.

Evaluations of other SNAP incentive programs report that low-income shoppers increased their consumption of fruits and vegetables after participating in these program [17, 25, 26]. Unfortunately, such pre-post comparisons were not possible in this analysis. Both the pre- and post-shopping Fresh Bucks surveys did ask about typical fruit and vegetable intake. However, when data collection started in September 2013, the Fresh Bucks Program had already been available at markets for three months, and many of the participants we surveyed had already taken advantage of the incentive. An adequate pre-post assessment of fruit and vegetable

intake before and after participating in a financial incentive program is needed to measure longitudinal information not captured by this analysis.

SNAP recipients in this analysis reported higher typical fruit and vegetable intake than the national average for SNAP participants as well as the average Washington state adult. Although exact comparisons are not possible, NHANES data show that typical SNAP participants consume 0.7 cups of fruit and 0.9 cups of vegetables daily [13], and the median number of times Washington state adults eat vegetables daily is 1.7 times per day, and fruit 1.1 times per day [39]. Among participants who reported barriers, most reported that they consumed 1-2 cups per day, compared to 2-3 cups per day among those who did not report barriers. Most participants in both groups consumed 2-3 or greater cups of vegetables daily.

We can conclude that a large portion of Fresh Bucks participants do meet national guidelines for fruit and vegetable consumption [33]. Nevertheless, we cannot conclude that the Fresh Bucks incentive is the sole cause of the higher fruit and vegetable consumption. The Fresh Bucks study found that 56 percent of participants received Fresh Bucks only once during the season, and an additional 35 percent received Fresh Bucks between two and five times [31]. The average shopper may not have accessed Fresh Bucks enough times for the program to have a significant impact on overall fruit and vegetable consumption. This again suggests that this is an atypical population of SNAP recipients, and there are other characteristics that account for the relatively high fruit and vegetable consumption observed in Fresh Bucks participants.

Limitations

The tool we used to assess the amount of fruits and vegetables consumed is subject to self-report and social-desirability bias, so these measures may be artificially inflated [40, 41]. The lack of language interpreters likely excluded SNAP participants who do not speak English.

Furthermore, the portion of SNAP participants who chose to shop at a farmers market, answer survey questions, and respond to follow-up phone calls is probably very different from the SNAP participants who do not participate in Fresh Bucks or failed to complete all three surveys. Only 34 percent of participants who completed the pre-shopping survey completed all three surveys, and it is possible that some shoppers were less likely to complete all three surveys and are underrepresented. For example, most of the surveys were conducted on weekdays during typical work hours. As a result, the survey may have been biased toward unemployed persons who were home during work hours and able to travel to farmers markets during the day.

Washington state and National SNAP beneficiaries represented in NHANES data are approximately 70 percent female and have an average household size of 3.6 [13]. Evaluations of fruit and vegetable incentives programs for SNAP participants in other states also found higher female participation rates (76-82 percent) [22, 42]. This analysis found a higher proportion of female participants and a smaller household size of 2.8 or 2.9 members. This is a limitation because our findings may not be true for the general population of SNAP recipients.

Far fewer participants in this analysis reported children in their household compared to the Washington state SNAP average (64 percent of households) [43]. King County has a lower percentage of households with children that receive SNAP compared to surrounding counties. Less than 12.1% of households with children in King County receive SNAP, compared to 12.1-17% in Snohomish County and 17-26% in Pierce County [44]. Low participation in the survey by families with children may be due to overall lower purchases of fruit and vegetables by low-income families with children [45]. It may also be related to parents being unwilling to stay and complete the survey if they had children to watch [31].

Recent national SNAP data indicate that recipients are 49 percent non-Hispanic whites, 20.6 percent identify as Hispanic, and more than one-quarter identify as African American [13]. Other fruit and vegetable incentive programs at farmers markets reported participants were predominantly African American (50-56 percent), followed by white (28-38 percent) and Hispanic/Latino/Spanish (5-11 percent) [22, 42]. The population surveyed in this analysis was 83 percent non-Hispanic white, and of 70 participants, three identified as African American and three more as Hispanic.

Finally, this analysis followed a population of individuals who likely met dietary guidelines for fruit and vegetable intake without a financial incentive, and are unlike typical SNAP participants. If we are to achieve the greatest benefit per public health dollar, future programs will need to serve more representative SNAP and other low-income populations where they typically shop, which does not appear to be at farmers markets.

Future Research

Factors that the Fresh Bucks study was unable to measure may moderate barriers to fruit and vegetable consumption. For example, social resources or circumstances (i.e., employment, presence of a spouse or partner, or health conditions), age [34], time available for cooking, and food management skills (i.e., ability to plan-ahead, keep food costs down, and prepare healthful meals) all influence food choices [46]. This analysis only provided a snapshot of fruit and vegetable consumption, and assessing the impact of barriers on fruit and vegetable intake over time may require approaches that are more rigorous. Future studies should conduct focus groups and in-depth interviews to assess the impact of barriers to consumption over time in the context of financial incentive programs. These may include 24-hour recalls, food diaries, shopping receipt collection, or home visits to assess shopping, food preparation and eating habits. A larger

sample size and a factor analysis approach could be useful because it would take the many interacting relationships between the variables into account and deepen our understanding about the characteristics of SNAP recipients who use Fresh Bucks. These kinds of analyses may identify barriers or solutions not measured in the Fresh Bucks study, help us understand how they interact or compound to impact fruit and vegetable consumption, and inform the design of targeted interventions.

Several store-based incentives programs were recently evaluated by the US Department of Agriculture (USDA) [16]. These programs utilized front of package labeling to communicate health benefits of certain foods, EBT rebates, 2-for-1 price promotions, other financial incentives, and principles of behavioral economics to incentivize SNAP recipients to purchase more fruits and vegetables. Each of these options may reduce barriers to purchasing produce, but there is no guarantee that this will translate into increased consumption at home. Nonetheless, the conclusions drawn from evaluating these measures may prove useful for future store- and farmers market-based incentive programs. First, one universal incentive system for SNAP participants is likely to be more effective than several disjointed systems [16]. Second, effective incentives programs and policies will be flexible enough to change as stores or markets add new products or are bought-out by other stores [16]. Such a universal system would likely reduce the impact of the three most common barriers identified in the Healthy Incentives Pilot: confusion related to accessing the incentive, the variability of eligible products, and program obscurity [17].

Both in-store and farmers market programs could address post-purchase barriers to consumption of fruits and vegetables by emulating some of the solutions reported by participants. For instance, the info booth at markets could distribute language-appropriate recipes

incorporating unfamiliar foods. On-site cooking demonstrations could teach problem-solving skills for participants, including appropriate volumes of produce to purchase, and reduce the impact of barriers related to unfamiliarity with produce and fear of food waste. *Food: Too Good to Waste* [47] is a country-wide campaign recently adopted by the King County Solid Waste Division to reduce food waste, and is already addressing some of these topics in King County. In grocery stores and at markets, financial incentives could extend to commonly purchased, cosmetically imperfect, frozen, canned, or dried items. Cosmetically imperfect or frozen produce may be more budget-friendly for participants, and preserved produce will not spoil as quickly, reducing waste at home [48]. In addition, a policy within the Fresh Bucks Program to remind participants that they do not need to spend all of their incentive on that day may also reduce the number of participants who purchase too much produce in one day. There is likely a role for SNAP-Ed interventions [49] and other education programs targeted at low-income populations to provide cooking skill and other education to increase familiarity with various types of produce.

Conclusion

Currently, fruit and vegetable incentive programs focus mostly on financial barriers to fruit and vegetable consumption, but these programs are not designed to alleviate barriers at home. In this analysis of SNAP recipients who participated in a financial incentive program at Seattle farmers markets, half of the participants reported at least one post-purchase barrier. However, participants also reported a number of solutions, and overall these barriers did not appear to affect consumption at home. Participants who did not report any barriers were significantly more likely to know how to prepare all items they purchased. In addition, the majority of all the Fresh Bucks participants reported that they purchased more produce than normal due to the Fresh Bucks incentive.

The unique demographics of the participants in the Fresh Bucks study preclude the results of this analysis from being generalizable to typical low-income populations. To reap the full benefit of fruit and vegetable incentive programs, the long-term impact of these programs on fruit and vegetable consumption should be assessed in samples that are more representative. Public health initiatives could address barriers to consumption in locations where typical SNAP participants already shop. Future research will need to employ more rigorous methods of examining shopping and cooking behaviors in order to understand the magnitude of problems mentioned in our analysis: fast spoilage of fresh fruits and vegetables and purchasing more produce than can be eaten before it spoils.

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Appendix A: Fresh Bucks Customer Surveys

PRE-SHOPPING w/optional 5Qs POST

(Upon sign-in) Hi, my name is _____. I'm working with a team that is helping the City of Seattle learn what people think about the Fresh Bucks program. We would like to ask you a few questions before you head out to shop. It should take five to ten minutes. Are you willing?

Before we get started, I want to make sure you know:

- The survey is voluntary, so you don't have to answer all the questions, and can stop at any time.
- If you decide not to participate, that will not put your benefits at risk in any way.
- There are no costs to you for participating.

Do you have any questions for me before we start?

I. (POTENTIAL PRE SHOPPING):

1. **Last four digits of EBT #?** [see card]	Open:
2. **How often do you shop at a farmers market when they are in season?** (NOTE: "In season" will be all year for some markets, partial year for some markets) (open-ended, select one)	☐ First time ☐ Once a week or more ☐ Once or twice a month ☐ Less than once a month ☐ Not sure/refused
3. **Of all the times you have shopped at farmers markets, during how many have you used EBT?** [select one]	☐ Never before today ☐ Less than half the time ☐ About half the time ☐ More than half the time ☐ Every time
4. **What are your main reasons for shopping at this farmers market today?** (open-ended, check-off top 3)	☐ Supporting local farmers ☐ Convenience – location ☐ Convenience – time ☐ Affordability ☐ Accepts SNAP/FMNP ☐ Accepts Fresh Bucks ☐ Quality/freshness of produce ☐ Variety of produce ☐ Fun outing/atmosphere ☐ Other : _____ ☐ Don't know/refused
5. **How many times have you ever used <u>Fresh Bucks</u> before?** (open-ended, select one)	☐ First time ☐ 2-5 times ☐ 6-10 times ☐ More than 10 times ☐ Not sure/refused
6. [Only if they have used Fresh Bucks before.] **Have you purchased more fruits and vegetables as a result of the Fresh Bucks program?**	☐ N/A ☐ More ☐ Same ☐ Less ☐ Don't know/refused
7. [Only if they have used Fresh Bucks before.] **Has the produce you've bought with Fresh Bucks made a difference in your family's diet?**	☐ N/A ☐ Big difference ☐ Some difference ☐ No difference ☐ Don't know/refused
8. a) **How likely are you to use EBT at a farmers market without Fresh Bucks?** (read responses, select one)	☐ Very likely ☐ A little likely ☐ Unlikely ☐ Very unlikely ☐ Maybe / not sure / don't know ☐ Refused
b) **Why or why not?** *<u>Prompts:</u> What does/would make you come back? What don't you like? What is frustrating or confusing?*	Open:

9. **About how many cups of fruit (including 100% pure fruit juice) do you eat or drink each day? Think about what you ate for each meal, plus snacks.** [show picture card if helpful]	☐ None ☐ 1⁄2 cup or less ☐ 1⁄2 to 1 cup ☐ 1 to 2 cups ☐ 2 to 3 cups ☐ 3 to 4 cups ☐ 4 cups ☐ Don't know/refused
10. **About how many cups of vegetables (including 100% vegetable juice) do you eat or drink each day? Think about what you ate for each meal, plus snacks.** [show picture card if helpful]	☐ None ☐ 1⁄2 cup or less ☐ 1⁄2 to 1 cup ☐ 1 to 2 cups ☐ 2 to 3 cups ☐ 3 to 4 cups ☐ 4 cups ☐ Don't know/refused
11. a) **How many people live in your household including you?**	Open:
b) **How many of these are under the age of 18?**	Open:
12. **In what food assistance programs do you or someone in your household regularly participate?** select all that apply; show picture card if helpful]	☐ EBT (SNAP, food stamps) ☐ WIC Checks ☐ Farmers Market Nutrition Program ☐ Senior FMNP ☐ Don't know/refused ☐ Other: _____ ☐ Don't know/refused
13. a) **What is your race? Would you say:**	☐ White ☐ Black or African American ☐ Asian ☐ Native Hawaiian or Pacific Islander ☐ American Indian or Alaska Native ☐ Other ☐ Don't know/not sure
b) **Are you Hispanic or Latino?**	☐ Yes ☐ No
c) **Do you belong to an ethnic or cultural heritage that is important to you? If so, what is it?**	☐ No ☐ Vietnamese ☐ Chinese ☐ Ethiopian/Eritrean ☐ Somali ☐ Other: ☐ Indian ☐ Burmese ☐ Nepali ☐ Ukrainian ☐ Filipino
14. **What language do you speak at home?**	☐ English ☐ Spanish ☐ Other _____ ☐ I don't know/refused
15. **Do you identify as male or female?** [by observation; ask if needed]	☐ Male ☐ Female ☐ Neither of the above ☐ Not sure/refused
16. **Would you be willing to share more with us via a short phone call later in the year? The questions would be similar. We would offer a gift card for your time.**	☐ No ☐ Yes → Name: _____ Phone #: _____
Finally, we are offering a [voucher] if you come back to answer 5 additional questions about your experience here today once you're done shopping. Would you be willing?	☐ No ☐ Yes

II. POST SHOPPING (stand alone, or insert after Q10 for all post-shopping)

Last four digits of EBT #? [see card]	Open:
17. **What did you buy at the farmers market today?** [Ask open-ended and check-off all that apply]	☐ Fruit, **What type(s)?** ☐ Vegetables, **What type(s)?** ☐ Jams/Juices ☐ Bread ☐ Cheese ☐ Meats/Fish ☐ Baked Goods ☐ Other ☐ Not sure/refused
18. **Think about just the fruits and vegetables you purchased today. Is this <u>more</u>, <u>less</u>, or <u>the same</u> amount that you buy in a typical shopping trip at the farmers market when you don't use Fresh Bucks?**	☐ More ☐ Same ☐ Less ☐ I don't know/hard to say ☐ Don't usually shop at farmers market ☐ Not applicable
19. a) **Did you buy any fruits or vegetables today that you don't usually purchase?**	☐ No ☐ Yes
b) IF YES: ***What made you purchase those new fruits and vegetables today?*** *[ask open-ended and check all that apply]*	☐ *They looked interesting* ☐ *I tasted a sample and liked them* ☐ *They were a good deal* ☐ *I had more money to spend* ☐ *Specific reference to Fresh Bucks* ☐ *Other:* ☐ *I don't know/refused*
20. a) **How did you pay for your items at the market today? I assume you used Fresh Bucks and EBT. Did you pay for fruits and vegetables in any other ways today?** [Show illustration card; check all that apply]	☐ EBT ☐ Fresh Bucks ☐ Cash ☐ Debit or Credit Card (MasterCard, Visa) ☐ WIC Fruit and Vegetable Checks ☐ Farmers Market Nutrition Program or Senior Farmers' Market Nutrition Program (FMNP) Coupons ☐ Other: _____ ☐ Not sure/refused
b) **Did you have any EBT currency or Fresh Bucks left over after shopping?**	☐ Yes ☐ No
21. a) **How likely are you to use Fresh Bucks again after today?** [read responses, select one]	☐ Very likely ☐ A little likely ☐ Unlikely ☐ Very unlikely ☐ Maybe / not sure / don't know ☐ Refused

b) **Why is that?** *<u>Prompts:</u> What does/would make you come back? What don't you like? What is frustrating or confusing?*	Open:
22. **Any additional comments (from this point in survey or previously)**	Open:

III. PHONE CALLS:

INTRODUCTORY SCRIPT:

Hi, I am calling for _____. My name is _____. I'm working with a team that is helping the City of Seattle learn what people think about the Fresh Bucks program at Seattle farmers markets. Someone from my team talked to you several weeks back at a farmers market. We're calling to ask you a few follow-up questions. It should take about five minutes. We can send you a $5 gift card to Target for your time. Are you willing to talk for a few minutes now?

YES → *[Proceed with script]*

NO → Is there another time that would be better for me to call you?

YES → [*Note time.]* Okay, thank you. We'll call you back then.

NO → Okay, thank you for your time. *[End call]*

Before we get started, I want to make sure you know:

- You don't have to answer all the questions, and you can stop at any time.
- If you decide not to participate, that will not put your benefits at risk in any way.
- There are no costs to you for participating.

Do you have any questions for me before we start?

ADDITIONAL NOTES ON CALLING PROTOCOL:

1) **Try to reach the person at least <u>4 times</u> (on separate days). Leave a message each time if you can, and record the date and time of the attempt.**

2) **If you get voice mail on your first try, leave the following message:**

"Hi, I am calling for _____. My name is _____. I'm working with a team contracted by City of Seattle to learn what people think about the Fresh Bucks program at Seattle farmers markets. Someone from my team talked to you this summer at a farmers market. We're calling to ask you a few follow-up questions. It should take about five minutes and we can offer you a $5 Target gift card. I will try to call you back [DAY] between [TIME and TIME]. If you would like to be removed from this list, or to set up a specific time to talk, you can call the project manager at 206-616-7362. Thank you."

3) **On your <u>last</u> attempt, leave the following message:**

"Hi, I am calling for _____. My name is _____. I'm working with a team contracted by the City of Seattle learn what people think about the Fresh Bucks program at Seattle farmers markets. Someone from my team talked to you several weeks back at a farmers market. We're calling to ask you a few follow-up questions. It should take about five minutes and we can offer a $5 Target gift card for your time. I have tried several times without reaching you. We don't

want to bother you if you're not interested. However, if you would like to participate by answering these questions, please call the project manager at 206-616-7362. Thank you."

[Reference the contact sheet to fill in the blanks:] **On the day in** *[MONTH]* **_____that someone from my team spoke with you, you were shopping at the** *[MARKET]* **_____.** **You told us you purchased** *[PRODUCE TYPES]* **_____** **You also told us that you** *DID / did NOT [underline as appropriate]* **have leftover Fresh Bucks or EBT tokens when you were done shopping.**	
1. **A)** *[Start here if they <u>DID</u> have currency left over]* **Did you ever go back to a farmers market to spend your remaining Fresh Bucks or EBT tokens?**	☐ Yes *[Go to Q3]* ☐ No *[Go to Q4]* ☐ Not sure ☐ Skipped this question
B) *[Start here if they did <u>NOT</u> have currency left over, of if we don't know]* **Do you think you have shopped at a farmers market and used Fresh Bucks at any time since then?**	☐ Yes *[Go to Q3]* ☐ No *[Go to Q4]* ☐ Not sure/don't remember ☐ Skipped this question
2. *[If <u>"YES"</u> to Q1A or Q1B]* **Did you go back to the same market?**	☐ Yes ☐ No ☐ Not sure ☐ Skipped this question
3. *[If "NO" in Q1A or Q1B]* **Why not?**	Open
4. **In general, how many of the fruits and vegetables that you bought with Fresh Bucks did you know how to prepare when you bought them? Would you say…** *PROMPT: Think about all of the fruits and vegetables you purchased with Fresh Bucks this season if you can't remember that shopping trip specifically.*	☐ All of them ☐ More than half ☐ About half ☐ Less than half ☐ None of them ☐ Not sure/don't remember
5. **Can you remember any specific fruits and vegetables that you bought with Fresh Bucks that were difficult to prepare?** *PROMPT: Think about all of the fruits and vegetables you purchased with Fresh Bucks this season if you can't remember that shopping trip specifically.*	☐ Yes ☐ No ☐ Not sure
a. *[If YES]* **What were they?**	Open:
b. *[If YES]* **What did you do in this situation?** *Prompts: throw them out, ask someone for help, experiment, look up a recipe*	Open:

6. Do you remember any specific fruits and vegetables that you bought with Fresh Bucks and then prepared in a new way that you really liked? *PROMPT: Think about all of the fruits and vegetables you purchased with Fresh Bucks this season if you can't remember that shopping trip specifically.*	☐ Yes ☐ No ☐ Not sure
a. *[If YES]* **What were they?**	Open:
7. In general, how many of the fruits and vegetables that you bought with Fresh Bucks were you able to finish before they went bad? Would you say… *PROMPT: Think about all of the fruits and vegetables you purchased with Fresh Bucks this season if you can't remember that shopping trip specifically.*	☐ All of them ☐ More than half ☐ About half ☐ Less than half ☐ None of them ☐ Not sure/don't remember
8. Do you remember any specific fruits and vegetables you bought that you had trouble finishing or storing before they went bad?	☐ Yes ☐ No ☐ Not sure
a. *[If YES]* **What were they?**	Open:
9. When you purchase fruits and vegetables at other places, like the grocery store, what <u>4</u> fruits and vegetables do you typically purchase?	1. 2. 3. 4. Notes:
10. Do the fruits and vegetables you buy depend on the season?	☐ Yes ☐ No ☐ Not sure
11. Other than a $10 incentive at farmers markets like Fresh Bucks, what else would help you and those you shop for to buy and eat fruits and vegetables? *[PROMPT: greater financial incentive, education/classes, retail sources that are more convenient, retail sources that have higher quality F&V]*	Open:
12. Other than a $10 incentive like Fresh Bucks, what, if anything else would make farmers markets a place that you would want to continue shopping? *[PROMPT: hours, locations, transportation, languages, specific food types/product, prices]*	Open:
13. The Fresh Bucks program has been extended until the end of December at markets that are still open - Ballard, Broadway, West Seattle, and University District. How likely is it that you will use Fresh Bucks at one of these markets <u>between now and the end of December</u>?	☐ Very likely ☐ A little likely ☐ Unlikely ☐ Very unlikely ☐ Not sure

	☐ Refused
14. Why is that?	Open:
15. And, how likely is it that you will shop at one of the 3 year-long farmers markets <u>after the Fresh Bucks program has ended</u> for the season? *PROMPT: The markets that stay open all year are Ballard, West Seattle, and University District.*	☐ Very likely ☐ A little likely ☐ Unlikely ☐ Very unlikely ☐ Not sure ☐ Refused
16. Why is that? *PROMPT: What about the farmers market makes you want to shop there instead of wherever you typically get food.*	Open:
My last few questions are about the fruits and vegetables you typically eat.	
17. Do you feel that you and those you shop for typically eat enough fruit?	☐ Yes ☐ Some of us do, and some of us don't ☐ No ☐ Not sure ☐ Refused
18. Do you feel that you and those you shop for typically eat enough vegetables?	☐ Yes ☐ Some of us do, and some of us don't ☐ No ☐ Not sure ☐ Refused
19. On a scale of 1 through 5, how important do you believe it is for you and those you shop for to eat <u>more</u> fruits and vegetables?	☐ 1: Very important ☐ 2: Important ☐ 3: Neutral ☐ 4: A little important ☐ 5: Not important ☐ Refused
20. About how many cups of <u>fruit</u> (including 100% pure fruit juice) do you eat or drink each day? Think about what you ate for each meal, plus snacks.	☐ None ☐ 1⁄2 cup or less ☐ 1⁄2 to 1 cup ☐ 1 to 2 cups ☐ 2 to 3 cups ☐ 3 to 4 cups ☐ 4 cups ☐ Don't know/refused
21. About how many cups of <u>vegetables</u> (including 100% vegetable juice) do you eat or drink each day? Think about what you ate for each meal, plus snacks.	☐ None ☐ 1⁄2 cup or less ☐ 1⁄2 to 1 cup ☐ 1 to 2 cups ☐ 2 to 3 cups ☐ 3 to 4 cups ☐ 4 cups ☐ Don't know/refused

22. Those are all the questions I have for you. Do you have any additional comments for us about the Fresh Bucks program?	Open:

SEE REVERSE FOR QUESTIONS ABOUT CLAIMING TARGET GIFT CARDS →

Thank you for your time. We can offer you a $5 gift certificate to Target for answering these questions.

[Use the following script to ask questions about gift certificate redemption, but complete the information on the Excel spreadsheet.]

1) **Would you like this gift certificate?**
2) **You have two options, which would you prefer:**
    a. **Us to <u>e-mail</u> you the gift card for you to use on Target.com** (You'll get this a little faster, but you must have an email address and be willing to use it to shop online.)
        i. If you chose the email option, what is your email?
    b. Us to <u>mail</u> you a gift card to use at Target

I need to ask a couple more questions. University of Washington policy requires that we collect and maintain a record of the recipient's name and address and value of each gift card provided to study participants. This information will be stored in a secure file and will not be shared with anyone except in the case of an audit.

3) **We need your correct and full name for our records. Is it** [confirm name and spelling].
4) **We also need your home address.** (This is needed regardless of whether they chose the emailed or mailed options. We may not be able to mail to a PO Box address.)

Thank you again for your time.