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Perceived Barriers and Facilitators of Farm-to-Consumer Retail Outlet Use Among Participants of the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) in Alabama

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Abstract

This research aimed to identify perceived barriers and facilitators of farm-to-consumer (FTC) retail outlet (eg, farmers' markets, farm/roadside stands) usage among Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) participants residing in Birmingham, Alabama. Additionally, associations between barriers and facilitators reported and daily fruit and vegetable (F&V) intake were examined. A sample of 312 lower income women (mean age = 27.6; 67.0% non-Hispanic black; 45.3% obese) who participate in the Birmingham WIC program were surveyed between October 2014 and January 2015. Fischer's exact test was used to assess associations between barriers (eg, outlet location, price, transportation), facilitators (eg, produce quality, produce variety), and high F&V intake (ie, consuming ≥ 5 servings per day). Approximately 81 (26.1%) participants reported using an FTC outlet to purchase produce in 2014. Lack of awareness (39.3%), outlet location (32.8%), and lack of interest (28.4%) were the barriers most often reported. Produce quality (69.1%), produce variety (49.4%), and price (39.5%) were the facilitators most often reported. Barriers and facilitators mentioned were not associated with high F&V intake. Lack of awareness and lack of interest are key barriers to FTC outlet usage among Birmingham WIC recipients. Interventions aiming to promote use of FTC outlets should consider the perceived barriers and facilitators to usage.

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Keywords

Farm-to-consumer; barrier; facilitator; produce shopping; behavior; diet; WIC; Alabama

Introduction

Over the past decade, disparities in access to food outlets that retail fresh, affordable, and healthy foods have been observed in lower income and predominately minority communities.[1–10] Geographic disparities in healthy food access have been found to be associated with poor fruit and vegetable intake and, in some cases, obesity.[11–16] Strategies to alleviate disparities in healthy food access have been the subject of much scientific research in recent years.[17–19] Researchers, policy makers, and health agencies such as the Centers for Disease Control and Prevention have proposed increasing the availability of retail outlets that support direct farm-to-consumer (FTC) sales (ie, farmers' markets, farm/roadside stands, community gardens, and community-supported agriculture [CSA] programs) as a strategy to reduce disparities in healthy food access.[20,21] Subsequently, food assistance programs were developed to promote use of FTC retail outlets among lower income individuals and families. Examples of these programs include the Farmers Market Nutrition Program, sponsored by the Special Supplemental Nutrition Program for Women, Infants and Children (WIC), and the Supplemental Nutrition Assistance Program (SNAP) Double Up Food Bucks.[22–24] These incentive programs have created opportunities to evaluate how FTC retail outlet availability influences diet, produce shopping behaviors, and produce shopping attitudes.

Much is known about the factors that promote and inhibit lower income individuals from consuming fresh fruits and vegetables (eg, availability, price, location).[25–27] A smaller body of scientific literature exists on perceived barriers and facilitators to purchasing fresh produce from an FTC retail outlets among lower income individuals and families.[28–33] The research aims to contribute to scientific literature on the behavioral implications of FTC retail outlet usage by identifying perceived barriers and facilitators to FTC retail outlet use among women who participate in the Birmingham, Alabama, WIC program. Additionally, associations between barriers and facilitators reported and fruit and vegetable (F&V) intake will be examined. Federal programs that allow redemption of WIC benefits at FTC retail outlets were not available to Birmingham WIC program participants at the time of the current study. This permitted investigation of produce shopping behaviors and attitudes among women who choose to patronize these outlets despite receiving no supplemental food assistance specifically for this purpose. Results from the current study will provide researchers, policy makers, and community stakeholders additional information on the factors that encourage and impede usage of FTC retail outlets as well as insight to how these barriers and facilitators may relate to individual F&V consumption.

Methods

Study design and participants

To evaluate perceived barriers and facilitators to FTC retail outlet usage among WIC recipients, a cross-sectional study was conducted between October 2014 and January 2015. Potential study participants were recruited from the Birmingham, Alabama, WIC program office located in the Central Health Center location of Jefferson County Department of Health. Upon check-in, WIC recipients were approached by study staff about participating in the study. Women who were interested in participating were screened by study staff prior to the start of their WIC appointment. Eligibility criteria for participation included the following: ≥19 years old, an Alabama resident, and currently receiving WIC program vouchers (ie, pregnant) or had at least one child receiving WIC vouchers. WIC program participants are issued food vouchers every 3 months; therefore, women who did not received WIC vouchers during the 3 months prior to their visit to the WIC office were ineligible for participation. Women who were visiting the WIC office to join the program, restart the program, or transfer their service were also considered ineligible. If eligible, women were surveyed at the end of their appointment. Informed consent was obtained from each study participant from trained study staff prior to completing the surveys. A total of 389 women were screened for eligibility, 354 were considered eligible for participation, and 312 gave informed consent and were successfully enrolled in the study. Approval for this research was obtained from the Institutional Review Board at the University of Alabama at Birmingham.

Data collection and measures

Upon completing their WIC appointment, study participants completed the Block Fruit–Vegetable–Fiber Screener and the Survey of Farm-to-Consumer Outlet Use & Produce Shopping Behaviors in Birmingham, Alabama. The Block Fruit–Vegetable–Fiber Screener is a validated dietary assessment tool designed to measure daily fruit, vegetable and fiber intake.[34] The screener requires individuals to consider their eating habits (eg, breakfast, lunch, dinner, and snacking) in the past year and record the frequency of eating the following 10 food items: fruit juice, fresh fruit (not including juice), vegetable juice, green salad, potatoes (including french fries), vegetable soup or stew, other vegetables, fiber cereal, beans, and whole wheat bread. Prediction equations are applied to the frequency of food item consumption recorded by the participant in order to calculate total servings of fruits and vegetables consumed per day.[34] The Survey of Farm-to-Consumer Outlet Use & Produce Shopping Behaviors in Birmingham, Alabama, is a self-administered questionnaire that has 32 items organized into 3 sections and collects information on participant demographics, health behaviors, produce shopping behaviors, produce shopping attitudes, and perceptions of FTC retail outlet usage. Additionally, participants recorded their current height and weight on the questionnaire.

Several demographic and health behavior questions were adopted from the Centers for Disease Control and Prevention's Behavioral Risk Factor Surveillance System.[35] Age was recorded in years. Race/ethnicity was classified as non-Hispanic white, non-Hispanic black, Hispanic or Latino, Asian or Pacific Islander, and other. Highest education level was

categorized as less than a high school diploma, high school diploma, some college, and college degree or higer. Marital status was grouped as married or not married. Smoking status was grouped as current smoker or nonsmoker. Body mass index (BMI) was calculated from each participant's self-reported height and weight (kg/m^2) and classified as the following: underweight (≤18.5), normal weight (18.5–25), overweight (25–30), obese (≥30).

Frequency of using a farmers' market, farm/roadside stand, community garden, and CSA program were assessed separately and categorized as once or twice a year, once or twice a month, once a week, and more than once a week. Participants who indicated that they purchased fresh fruits and vegetables from any FTC retail outlet during the most recent Birmingham market season (March–October 2014) were categorized as FTC retail outlet users. All other participants were considered nonusers. All study participants were asked to select their barriers and facilitators to using FTC retail outlets for the procurement of fresh fruits and vegetables. The following facilitators were listed on the questionnaire: outlet location, produce quality, produce variety, outlet hours of operation, customer service, prices/promotions, personal health, small business/farm support, and personal interest in the retail outlet. The following barriers were listed on the questionnaire: lack of awareness, outlet location, produce quality, produce variety, lack of transportation to outlet, outlet hours of operation, customer service, prices or promotions, and lack of interest. Lack of awareness of FTC outlets was defined as not being knowledgeable of any outlet locations. Lack of interest was defined as not having concern for using these outlets to purchase fruits and vegetables. Furthermore, all participants were allowed to record additional barriers and facilitators to FTC outlet use not listed in the questionnaire. Analyses performed revealed that most FTC outlet users (about 70%) did not record any barriers to usage, and almost all nonusers did not record any facilitators to usage. Therefore, in the current study, facilitators to usage were only examined among FTC retail outlet users and barriers to usage were only examined among nonusers.

Additional produce shopping behaviors assessed included frequency of grocery shopping, frequency of WIC cash value voucher (CVV) redemption, chain grocery store use (survey example: Piggly Wiggly), supercenter use (survey example: Super Wal-Mart), convenience store/gas station use and organic supermarket use (survey example: Whole Foods Market). Frequency of grocery shopping was categorized as once a month, twice a month, once a week, or more than once a week. Participants recorded yes or no if they redeemed the WIC CVV to purchase fresh fruits and vegetables during each of the previous 3 months. Participants recorded yes or no if they usually purchased fresh produce from a chain grocery store, supercenter, convenience store, or organic supermarket.

Statistical analysis

Due to missing entries on the Block screener, data collected from 2 study participants were not included in final analyses. The sample size analyzed included 310 WIC program participants. Descriptive statistics (ie, means and frequencies) were tabulated for variables of interest among all study participants and stratified by FTC retail outlet user status. Chi-square and *t* tests were used to assess differences in means and frequencies between FTC outlet users and nonusers. The frequency of each barrier and facilitator reported by study

participants was calculated. Additionally, frequency of barriers and facilitators were calculated by high fruit and vegetable intake status (ie, consuming ≥ 5 servings per day). Fisher's exact test was used to assess associations between barriers and facilitators to FTC outlet use and high fruit and vegetable intake. *P* values less than .05 were considered statistically significant and all data analyses were performed with SAS Version 9.3 (SAS Institute, Cary, NC).

Results

Demographic, health, and produce shopping characteristics of Birmingham, Alabama, WIC program participants are recorded in Table 1. Eighty-one (26.1%) participants reported purchasing produce from an FTC retail outlet in the previous year and 229 (73.9%) participants who did not. Of the 81 participants who reported using FTC outlets, 71 (87.7%) used farmers' markets, 35 (43.2%) used a farm/roadside stand, and 6 (7.4%) used a community garden. No participants reported using a CSA program during the previous year. Mean age was calculated to be 27.6 (±6.1) years old. Two hundred and five (67.0%) participants self-reported their race/ethnicity as non-Hispanic black, 59 (19.3%) as non-Hispanic white, 16 (5.2%) as Hispanic or Latino, and 25 (8.2%) as other. Most women were not married (76.8%) and reported their education level as some college (36.1%). About 45.3% of study participants were classified as obese (BMI ≥ 30) and 35.8% consumed 5 or more servings of fruits and vegetables per day. FTC outlet users and nonusers were similar in terms of age, education level, smoking status, and BMI classification. Compared to nonusers, there was a higher proportion of non-black (41.3% vs. 30.1%) and married (30.9% vs. 20.5%) WIC participants among the FTC outlet users; however, the differences in frequencies were not statistically significant. A significant association between FTC retail outlet usage and F&V intake was observed. The proportion of FTC outlet users who consume 5 or more servings of fruits and vegetables per day was significantly greater that the proportion of nonusers (49.4% vs. 31.0%; $P = .003$).

Most participants reported that they shopped for groceries once a week (36.3%) and 63.5% self-reported they received and redeemed the WIC CVV to purchase fresh fruits and vegetables during each of the 3 previous months. Twelve (3.9%) participants indicated that they used convenience stores to purchase fruits and vegetables, 23 (7.4%) used organic markets, and 8 (2.6%) grew their own produce in a home garden. Compared to nonusers, a greater proportion of FTC outlet users patronized organic markets (16.1% vs. 4.4%; $P = .001$) and had a home garden (6.2% vs. 1.3%; $P = .03$).

Perceived barriers and facilitators to FTC retail outlet usage among all study participants, stratified by high F&V consumption, are displayed in Tables 2 and 3, respectively. The barriers of usage mentioned most often by nonusers were lack of awareness (39.3%), outlet location (32.8%), and lack of interest (28.4%). Twelve (5.2%) nonusers recorded that a key reason for not patronizing FTC outlets was because they could not redeem the WIC CVV or SNAP benefits at these types of outlets. Among FTC retail outlet users, the facilitators of usage most often reported were produce quality (69.1%), produce variety (49.4%), price (39.5%), and outlet location (32.1%). There were no significant associations found between

reported perceived barriers and facilitators and intake of 5 or more servings of fruits and vegetables per day among study participants.

Discussion

This study aimed to identify perceived barriers and facilitators of FTC retail outlet usage and examine their associated with daily F&V intake. Though no significant associations were observed between barriers and facilitators reported and high F&V intake, valuable information about perceived barriers and facilitators to FTC retail outlet use was collected and reported. To our knowledge, this study is the first to assess perceived barriers and facilitators to FTC outlet use among lower income individuals in Alabama. Less than 30% of the women participating in the Birmingham WIC program used an FTC retail outlet to purchase produce in the previous year. Of the women who used FTC outlets, only half reported going at least once a month, suggesting that many women visit these outlets infrequently during the market season. The prevalence of use in the current study is similar to other studies of FTC outlet use among WIC program participants.[28,36–38] In a study on usage patterns of a newly established farmers' market located adjacent to a clinic in Miami, Florida, Grin et al[37] found that only 35% of lower income women receiving services at the clinic reported visiting the market in the past year. Jilcott-Pitts et al[36] observed that about 25% of lower income women in North Carolina used local farmers' markets. These findings suggest that barriers to using FTC retail outlets exist among lower income families and individuals. Despite the limited number of studies that have examined barriers and facilitators of using FTC retail outlets, findings have been consistent.[28–33]

Is appears that awareness and interest may be key factors that inhibit use of FTC retail outlets among lower income individuals. In the current study, 39% of the study participants who did not use FTC retail outlets during the 2014 market season reported lack of awareness as a barrier to usage and 28% reported lack of interest. With approximately 50% of their study participants reporting being unaware of market hours of operation and location, lack of awareness was the most pertinent barrier to usage in the study conducted by Project for Public Spaces (PPS).[29] Likewise, Racine et al[28] observed that 7% of their study participants did not know where a farmers' market was located in their communities and 2% reported not knowing the definition of a farmers' market. In a qualitative study conducted by McGuirt et al,[32] awareness of market locations emerged as a reason women did not procure food from local markets in North Carolina. Furthermore, a recent study by Wetherill et al[31] mentioned that personal interest in patronizing farmers' markets among SNAP recipients in Oklahoma was affected by awareness.

Results from the current study suggest that price of fresh produce at FTC retail outlets may not be a significant barrier to usage among WIC participants residing in Birmingham. This correlates to what Racine et al[28] and PPS[29] observed in their respective studies examining farmers' markets usage among lower income families. Racine and colleagues[28] reported that only 2.2% of African American women who participant in WIC program in Charlotte, North Carolina, and Washington, D.C., believed that produce sold at local farmers markets was too expensive. After surveying users of 8 farmers' markets located in various U.S. cities, PPS researchers reported that several farmers' market shoppers believed that prices of produce at

the farmers' market were lower than the grocery store during market season.[29] Additionally, only 17% of farmers' market users in that study mentioned price as a barrier to shopping at their local farmers market.[29] Studies comparing the seasonal price of produce sold at farmers' markets to chain supermarkets offer valuable insight to the issue of price as a barrier to FTC retail outlet usage.[39–42] Valpiani and colleagues reported that with sufficient availability, some fresh produce varieties are cheaper at direct-to-consumer outlets depending on the season.[39] McGuirt and colleagues observed that farmers markets do offer significant price savings on certain items compared to supermarkets.[41] Considering that the target populations in many studies of FTC retail outlet usage are lower income, it may be more useful to focus on market acceptance of SNAP and/or WIC benefits rather than produce price. About 5% of the nonusers in the current study reported that the nonacceptance of SNAP and WIC benefits at markets in Birmingham was a barrier to usage. McGuirt and colleagues' qualitative study found that that store acceptance of SNAP/WIC benefits was a barrier to local food procurement among the women in their study.[32] Furthermore, Wetherill and colleagues' study observed that farmers' markets were perceived to be not as accommodating to the produce shopping needs of SNAP recipients.[31]

Over 30% of FTC retail outlet users in the current study mentioned outlet location as a facilitator to usage, and a similar proportion of nonusers listed outlet location as a barrier. This suggests that location may significantly influence an individual's decision to use or not use an FTC retail outlet. Misyak et al[30] and Jilcott Pitts et al[33] assessed factors that inhibit use of farmers' markets among SNAP recipients in Virginia and North Carolina, respectively. Both studies found that outlet location and lack of transportation are 2 important barriers to farmers' market use among SNAP recipients.[30,33] Additionally, 17% of women in the study conducted by Racine and colleagues mentioned that there were not any farmers' markets located close to their residences.[28]

A common finding among studies that examined facilitators of F&V purchasing and consumption among lower income populations is that produce quality and variety are highly valued among lower income individuals.[25–27] Qualitative studies conducted by Zenk et al[25] and Haynes-Maslow et al[26] reported that produce quality was a significant factor in healthy food procurement among African American women living in lower income neighborhoods. The current study observed that produce quality and variety are also key facilitators of FTC retail outlet usage among WIC recipients in Birmingham. The studies conducted by Misyak et al[30] and colleagues and PPS[29] reported that high-quality produce was important to lower income farmers' market users in the United States.

The strengths and limitations to this research should be considered when interpreting results. The study population was a strength because it featured a diverse sample of women with respect to race/ethnicity and education level. The questionnaire was a strength because it featured validated demographic and health questions adopted from other validated survey instruments.[35] Though the Block Fruit–Vegetable–Fiber screener has been found to be a valid method of measuring daily F&V consumption, the screener and prediction equations have not been validated in a population that consist of mostly African Americans.[34] Furthermore, because the screener requires individuals to recall their food intake during the previous month, recall bias may affect the daily fruit and vegetable intake measure. Other

limitations to this study include the small sample size, the cross-sectional study design, the missing barrier and facilitator information, and the WIC CVV redemption measurement. A mixed methods study that incorporates some form of qualitative data collection would have permitted a more thorough assessment of perception and attitudes toward FTC retail outlet usage among study participants. Considering many of FTC outlet users did not list any barriers and almost all of the nonusers did not list any facilitators, we were unable to holistically examine the factors the influence usage of FTC retail outlets among women who participate in the Birmingham WIC program. The questionnaire used in the current study did not account for the fact that WIC participants who are not breastfeeding do not qualify to receive the WIC CVV from the time their child is 6 months to a year old. Therefore, the frequency of women who voluntarily did not redeem the voucher and the frequency of women who were not qualified to receive the voucher cannot be delineated. Considering that all data were self-reported, reporting errors may have occurred. Categorizing daily servings of F&Vs may have affected our ability to observe a significant association between perceived barriers and facilitators and F&V intake; however, additional analyses conducted where F&V intake was modeled as continuous variable produced similar findings. Additionally, this study consisted solely of lower income women who participant in the WIC program in Birmingham, Alabama. Findings from this research may not be generalizable to other populations.

In conclusion, this research study identified several perceived barriers (ie, awareness, interest, and location) and facilitators (ie, produce variety, quality, and price) of FTC retail outlet usage among WIC program participants in Birmingham, Alabama. These findings contribute to knowledge of FTC retail outlet usage among lower income populations and contribute further insight to the key factors that promote and impede usage of these outlets. Addressing the perceived barriers to using FTC retail outlets has significant implications for those invested in using these outlets to increase access to healthy food in underresourced communities. Overall, this area of research is in the early stages and further work is needed to better examine the public health implications of FTC retail outlets. Future programs or interventions that involve FTC retail outlets should consider the key barriers and facilitators to usage among members of the surrounding community or target population. Additionally, community-level strategies that involve FTC retail outlets, community residents, and other stakeholders should be developed to address the barriers to FTC retail outlet usage.

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References

1. Sharkey J, Horel S. Neighborhood socioeconomic deprivation and minority composition are associated with better potential spatial access to the ground-truthed food environment in a large rural area. J Nutr. 2008; 138:620–627. [PubMed: 18287376]
2. Franco M, Diez Roux A, Glass T, Caballero B, Brancati F. Neighborhood characteristics and availability of healthy foods in Baltimore. Am J Prev Med. 2008; 36:561–567.
3. Galvez M, Morland K, Raines C, et al. Race and food store availability in an inner-city neighborhood. Public Health Nutr. 2007; 11:624–631. [PubMed: 17935646]
4. Morland K, Filomena S. Disparities in the availability of fruits and vegetables between racially segregated urban neighborhoods. Public Health Nutr. 2007; 10:1481–1489. [PubMed: 17582241]
5. Singleton CR, Sen B, Affuso O. Disparities in the availability of farmers markets in the U.S. Environ Justice. 2015; 8(4):135–143. [PubMed: 27746854]
6. Morland K, Wing S, Diez Roux A, Poole C. Neighborhood characteristics associated with the location of food stores and food service places. Am J Prev Med. 2002; 22:23–29. [PubMed: 11777675]
7. Neckerman K, Bader M, Richards C, et al. Disparities in the food environments of New York City public schools. Am J Prev Med. 2010; 39(3):195–202. [PubMed: 20709250]
8. Powell L, Slater S, Mirtcheva D, Bao Y, Chaloupka F. Food store availability and neighborhood characteristics in the United States. Prev Med. 2006; 44(2007):189–195. [PubMed: 16997358]
9. Baker E, Schootman M, Barnidge E, Kelly C. The role of race and poverty in access to food that enable individuals to adhere to dietary guidelines. Prev Chronic Dis. 2006; 3(3):A76. [PubMed: 16776877]
10. Richardson A, Boone-Heinonen J, Popkin B, Gorden-Larsen P. Are neighbourhood food resources distributed inequitably by income and race in the USA? Epidemiological findings across the urban spectrum. BMJ Open. 2012; 2(2):e000698.
11. Michimi A, Wimberly MC. Associations of supermarket accessibility with obesity and fruit and vegetable consumption in the conterminous United States. Int J Health Geogr. 20101; 8:49.
12. Zick CD, Smith KR, Fan JX, Brown BB, Yamada I, Kowaleski-Jones L. Running to the store? The relationship between neighborhood environments and the risk of obesity. Soc Sci Med. 2009; 69:1493–1500. [PubMed: 19766372]
13. Drewnowski A, Aggarwal A, Hurvitz P, Monsivais, Moudon A. Obesity and supermarket access: proximity or price? Am J Public Health. 2012; 102(8):e74–e80. [PubMed: 22698052]
14. Aggarwal A, Cook AJ, Jiao J, et al. Access to supermarkets and fruit and vegetable consumption. Am J Public Health. 2014; 104:917–923. [PubMed: 24625173]
15. Zenk SN, Lanchance LL, Schultz AJ, Mentz G, Kannan S, Ridella W. Neighborhood retail food environment and fruit and vegetable intake in a multiethnic urban population. Am J Health Promot. 2009; 23:255–264. [PubMed: 19288847]
16. Singleton CR, Affuso O, Sen B. Decomposing racial disparities in obesity prevalence: variations in retail food environment. Am J Prev Med. 2016; 50(3):365–372. [PubMed: 26507301]
17. Robinson PL, Dominguez F, Teklehaimanot S, Lee M, Brown A, Goodchild M. Does distance decay modelling of supermarket accessibility predict fruit and vegetable intake by individuals in a large metropolitan area? J Health Care Poor Underserved. 2013; 24(Suppl):172–185. [PubMed: 23395954]
18. Glanz K, Hoelscher D. Increasing fruit and vegetable intake by changing environments, policy and pricing: restaurant-based research, strategies, and recommendations. Prev Med. 2004; 39(Suppl 2):S88–S93. [PubMed: 15313077]
19. Story M, Kaphingst K, Robinson-O'Brien R, Glanz K. Creating healthy food and eating environments: policy and environmental approaches. Annu Rev Public Health. 2008; 29:253–272. [PubMed: 18031223]
20. Kahn L, Sobush K, Keener D, et al. Recommended community strategies and measurements to prevent obesity in the United States. MMWR Morb Mortal Wkly Rep. 2009; 58:RR–7.

21. Hood C, Martinez-Donate A, Meinen A. Promoting healthy food consumption: a review of state-level policies to improve access to fruits and vegetables. WMJ. 2012; 111(6):283–288. [PubMed: 23362705]
22. U.S. Department of Agriculture, Food and Nutrition Service. [Accessed August 15, 2014] WIC nutrition program facts. Available at: http://www.fns.usda.gov/sites/default/files/WIC-Fact-Sheet.pdf
23. U.S. Department of Agriculture, Food and Nutrition Service. [Accessed August 15, 2014] WIC Farmers Market Nutrition Program (FMNP). Available at: http://www.fns.usda.gov/fmnp/wic-farmers-market-nutrition-program-fmnp
24. Fair Food Network. [Accessed August 15, 2014] Double Up Food Bucks. Available at: http://doubleupfoodbucks.org/about
25. Zenk SN, Odoms-Young A, Dallas C, et al. "You have to hunt for the fruits, the vegetables": environmental barriers and adaptive strategies to acquire food in a low-income African-American neighborhood. Health Educ Behav. 2011; 38:282–292. [PubMed: 21511955]
26. Haynes-Maslow, L., Parsons, SE., Wheeler, SB., Leone, LA. A qualitative study of perceived barriers to fruit and vegetable consumption among low-income populations, North Carolina, 2011. Prev Chronic Dis. https://www.ncbi.nlm.nih.gov/pubmed/23489639
27. Havas S, Treman K, Langenberg P. Factors associated with fruit and vegetable consumption among women participating in WIC. J Am Diet Assoc. 1998; 98:1141–1148. [PubMed: 9787720]
28. Racine EF, Smith Vaughn A, Laditka SB. Farmers' market use among African-American women participating in the Special Supplemental Nutrition Program for Women, Infants, and Children. J Am Diet Assoc. 2010; 110:441–446. [PubMed: 20184995]
29. Project for Public Spaces. [Accessed October 4, 2014] Farmers markets as a strategy to improve access to healthy food for low-income families and communities. Available at: http://www.pps.org/wp-content/uploads/2013/02/RWJF-Report.pdf
30. Misyak S, Ledlie Johnson M, McFerren M, Serrano E. Family nutrition program assistant's perception of farmers' markets, alternative agricultural practices, and diet quality. J Nutr Educ Behav. 2014; 46:434–439. [PubMed: 24751655]
31. Wetherill MS, Gray KA. Farmer's markets and the local food environment: identifying perceived accessibility for SNAP consumers receiving Temporary Assistance for Needy Families (TANF) in an urban Oklahoma community. J Nutr Educ Behav. 2015; 47(2):127–133. [PubMed: 25754298]
32. McGuirt JT, Ward R, Elliot NM, Bullock SL, Jilcott Pitts SB. Factors influencing local food procurement among women of reproductive age in rural eastern and western North Carolina, USA. J Agr Food Syst Community Dev. 2014; 4(4):143–154. [PubMed: 25664198]
33. Jilcott Pitts SB, Demarest CL, Dixon CE, et al. Farmers' market shopping and dietary behaviors among Supplemental Nutrition Assistance Program participants. Public Health Nutr. 2015; 18(13): 2407–2414. [PubMed: 25895894]
34. Block G, Gillespie C, Rosenbaum EH, Jenson C. A rapid food screener to assess fat and fruit and vegetable intake. Am J Prev Med. 2000; 18(4):284–288. [PubMed: 10788730]
35. Centers for Disease Control and Prevention. [Accessed January 21, 2015] Behavioral Risk Factor Surveillance System (BRFSS). Available at: http://www.cdc.gov/brfss/
36. Jilcott Pitts SB, Wu Q, McGuirt JT, Crawford TW, Keyserling TC, Ammerman AS. Associations between access to farmers' markets and supermarkets, shopping patterns, fruit and vegetable consumption and health indicators among women of reproductive age in eastern North Carolina, USA. Public Health Nutr. 2013; 16:1944–1952. [PubMed: 23701901]
37. Grin BM, Gayle TL, Saravia DC, Sanders LM. Use of farmers markets by mothers of WIC recipients, Miami–Dade County, Florida, 2011. Prev Chronic Dis. 2013; 10:E95. [PubMed: 23764344]
38. Kropf ML, Holden DH, Holcomb JP, Anderson H. Food security status and produce intake and behaviors of Special Supplemental Nutrition Program for Women, Infants, and Children and Farmers' Market Nutrition Program participants. J Am Diet Assoc. 2007; 107:1903–1908. [PubMed: 17964309]

39. Valpiani N, Wilde P, Rodgers B, Stewart H. Patterns of fruit and vegetable availability and price competitiveness across four seasons are different in local food outlets and supermarkets. Public Health Nutr. 2015; 18(15):2846–2854. [PubMed: 25895583]

40. Millichamp A, Gallegos D. Comparing the availability, price, variety and quality of fruits and vegetables across retail outlets and by area-level socio-economic position. Public Health Nutr. 2013; 16:171–178. [PubMed: 22433912]

41. McGuirt JT, Jilcott SB, Liu H, Ammerman A. Produce price savings for consumers at farmers' markets compared to supermarkets in North Carolina. J Hunger Environ Nutr. 2011; 6:86–98.

42. Lucan SC, Maroko AR, Sanon O, Frias R, Schechter CB. Urban farmers' markets: accessibility, offerings, and produce variety, quality, and price compared to nearby stores. Appetite. 2015; 90:23–30. [PubMed: 25733377]

Table 1

Descriptive characteristics of Birmingham WIC program participants by FTC retail outlet user status (n = 310).[a]

Variable	All participants N = 310	FTC users[b] 81 (26.13)	Nonusers 229 (73.87)	P value
Demographics				
Age (years)	27.62 (±6.06)[c]	28.27 (±6.86)	27.39 (±5.74)	.26
Race/ethnicity				.07
Non-Hispanic black	205 (66.99)	47 (58.75)	158 (67.33)	
Non-black[d]	101 (33.01)	33 (41.25)	68 (30.09)	
Highest education level				.84
≤High school	26 (8.84)	8 (10.26)	18 (8.33)	
High school	89 (30.27)	21 (26.92)	68 (31.48)	
Some college	106 (36.05)	28 (35.90)	78 (36.11)	
College degree	73 (24.83)	21 (26.92)	52 (24.07)	
Marital status				.06
Married	72 (23.23)	25 (30.86)	47 (20.52)	
Not married	238 (76.77)	56 (69.14)	182 (79.48)	
Health:				
Smoking status				.46
Current smoker	41 (13.40)	13 (16.05)	28 (12.44)	
Nonsmoker	265 (86.60)	68 (83.95)	197 (87.56)	
Daily F&V consumption				.003
≥5 servings	111 (35.81)	40 (49.38)	71 (31.00)	
<5 servings	199 (64.19)	41 (50.62)	158 (69.00)	
BMI classification				.19
Underweight	7 (2.28)	3 (3.70)	4 (1.77)	
Normal weight	73 (23.78)	19 (23.46)	54 (23.89)	
Overweight	88 (28.66)	28 (34.57)	60 (26.55)	
Obese	139 (45.28)	31 (38.27)	108 (47.79)	
Grocery shopping				
Frequency of grocery shopping				.78
Twice a month	111 (35.60)	26 (32.10)	84 (36.84)	
Once a month	25 (8.09)	6 (7.41)	19 (8.33)	
Once a week	112 (36.25)	33 (40.74)	79 (34.65)	
More than once a week	62 (20.06)	16 (19.75)	46 (20.18)	
WIC CVV redemption				.24
Yes	198 (63.46)	47 (58.02)	151 (65.37)	
No	114 (36.54)	34 (41.98)		
80 (34.63)				
Chain grocery store use	274 (88.39)	76 (93.83)	198 (86.46)	.08
Convenience store use	12 (3.87)	4 (4.94)	8 (3.49)	.52

Variable	All participants *N* = 310	FTC users[b] 81 (26.13)	Nonusers 229 (73.87)	*P* value
Organic market use	23 (7.42)	13 (16.05)	10 (4.37)	.001
Home garden	8 (2.58)	5 (6.17)	3 (1.31)	.03

[a] WIC indicates Special Supplemental Nutrition Program for Women, Infants, and Children; FTC, farm-to-consumer retail outlet; F&V, fruit and vegetable; BMI, body mass index; CVV, cash value voucher. *N* (%); frequencies may total to the sample size due to missing data.

[b] FTC users: 71 (87.7%) used a farmers' market, 35 (43.2%) used a farm/roadside stand, 6 (7.4%) used a community garden, 0 used a community-supported agriculture program.

[c] Mean (±SD) for continuous variables.

[d] Non-black: non-Hispanic white = 59 (19.3%), Hispanic = 16 (5.2%), other = 25 (8.2%).

Table 2

Perceived barriers of FTC retail outlet usage among Birmingham, Alabama, WIC program participants, *n* (%).[a]

	Nonusers			
	All	≥5 Servings	<5 Servings	
Reasons for not shopping at FTC outlets	**229 (73.87)**	**71 (31.00)**	**158 (69.00)**	***P* value**
Lack of awareness	90 (39.30)	29 (40.85)	61 (38.61)	.75
Outlet location	75 (32.75)	21 (29.58)	54 (34.18)	.49
Produce quality	17 (7.42)	3 (4.23)	14 (8.86)	.28
Produce variety	12 (5.24)	6 (8.45)	6 (3.80)	.20
Lack of transportation	23 (10.04)	6 (8.45)	17 (10.76)	.59
Outlet hours of operation	20 (8.73)	8 (11.27)	12 (7.59)	.36
Prices and promotions	23 (10.04)	6 (8.45)	17 (10.76)	.59
Lack of interest	65 (28.38)	21 (29.58)	44 (27.85)	.79
Other responses recorded				
“Don’t Accept WIC (or SNAP)”	12 (5.19)			
“Home garden”	2 (0.01)			

[a]FTC indicates farm-to-consumer; WIC, Special Supplemental Nutrition Program for Women, Infants, and Children; SNAP, Supplemental Nutrition Assistance Program.

Table 3

Perceived facilitators to FTC retail outlet usage among Birmingham, Alabama, WIC program participants, n (%).[a]

	FTC users			
	All	≥5 Servings	<5 Servings	
Reasons for shopping at FTC outlets	**81 (26.13)**	**40 (49.38)**	**41 (50.62)**	***P* value**
Outlet location	26 (32.10)	14 (35.00)	12 (29.27)	0.58
Produce quality	56 (69.14)	27 (67.5)	29 (70.73)	0.75
Produce variety	40 (49.38)	21 (52.50)	19 (46.34)	0.58
Outlet Hours of operation	10 (12.35)	5 (12.50)	5 (12.20)	0.99
Customer service	13 (16.05)	7 (17.50)	6 (14.63)	0.73
Prices and promotions	32 (39.51)	14 (35.00)	18 (43.90)	0.41
Personal health	18 (22.22)	12 (30.00)	6 (14.63)	0.10
Small business/farm support	15 (18.52)	9 (22.5)	6 (14.63)	0.36
Personal interest in outlet	7 (8.64)	5 (12.50)	2 (4.88)	0.26

[a]FTC indicates farm-to-consumer; WIC, Special Supplemental Nutrition Program for Women, Infants, and Children.