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Farm-to-Consumer Retail Outlet Use, Fruit and Vegetable Intake, and Obesity Status among WIC Program Participants in Alabama

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Abstract

Objectives—We studied whether use of farm-to-consumer (FTC) retail outlets (eg, farmers market, farm/roadside stand) was associated with daily fruit and vegetable (F&V) intake or obesity status among women who participate in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) in Birmingham, AL.

Methods—We used a cross-sectional study design and recruited a convenience sample of 312 women (mean age = 27.6; 67.0% non-Hispanic black; 45.6% obese) participating in Birmingham's WIC Program. Participants were recruited between October 2014 and January 2015. Participants who self-reported purchasing produce from a FTC outlet during the 2014

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Human Subjects Statement

This study was conducted according to the guidelines laid down in the Declaration of Helsinki and the Alabama Department of Public Health and the Institutional Review Board at the University of Alabama at Birmingham approved all procedures involving human subjects. Written informed consent was obtained from all study subjects.

Conflict of Interest Statement

All authors of this article declare they have no conflicts of interest.

farmers' market season were classified as FTC outlet users. Multivariable-adjusted regression models were used to examine associations between FTC outlet use, daily F&V intake, and obesity status (ie, body mass index ≥ 30).

Results—Approximately 26.1% of participants were classified as FTC outlet users. After adjusting for socio-demographic factors and WIC Cash Value Voucher redemption, FTC outlet use was associated with increased odds of consuming ≥ 5 servings of F&Vs per day (OR: 2.01; 95% CI: 1.15 – 3.50), but not obesity status (OR: 0.68; 95% CI: 0.39 – 1.20).

Conclusions—FTC retail outlet use was associated with F&V intake among program participants but not obesity status.

Keywords

farm-to-consumer; fruit and vegetable consumption; obesity; cash value voucher program; WIC program

Obesity persists as a major public health burden in the United States (US) that disproportionately affects minorities and individuals of a lower socioeconomic status.^{1–3} Data from the National Health and Nutrition Examination Survey indicate that 56% of non-Hispanic black women and 42% of women living below the federal poverty line are classified as obese, ie, a body mass index (BMI) ≥ 30 .^{4,5} Obese individuals are at increased risk for chronic diseases such as cardiovascular disease, hypertension, Type II diabetes, and certain types of cancer.^{6,7} Like obesity, fruit and vegetable (F&V) consumption also has been linked to chronic disease risk.^{8,9} Studies show that disparities in F&V intake and availability exist in the US.^{10,11} The Centers for Disease Control and Prevention (CDC) reports that the proportion of low-income adults who consume the recommended number of F&V servings per day is significantly lower than that of higher income adults.¹² The United States Department of Agriculture (USDA) reports that more than 50% of families residing in communities with low access to food retailers that offer fresh, affordable, and healthy food are low-income.¹³ Growing interest in obesity disparities and poor F&V consumption have resulted in more research being conducted on strategies to address these public health issues.^{14–16}

Food retail outlets that support direct farm-to-consumer (FTC) sales, such as farmers' markets, farm/roadside stands, community gardens, and community supported agriculture (CSA) programs, have been proposed by researchers, policymakers, and health agencies such as the CDC as a strategy to prevent obesity in lower income communities by improving access to healthy foods.^{14–17} More scientific literature on the behavioral and nutritional implications of FTC retail outlet use is becoming available.^{18–36} The development of USDA-sponsored food assistance programs that incentivize use of FTC retail outlets (eg, the WIC Farmers' Market Nutrition Program) has permitted researchers to examine the diet and health outcomes associated with FTC retail outlet usage among low-income individuals and families.^{19,20,25–27} Many of these studies have reported that use of outlets such as farmers' markets is associated with higher intake of F&Vs among low-income adults.^{19,20,25}

The WIC Cash Value Voucher (CVV) is another federal program that aims to increase fruit and vegetable consumption among low-income individuals and families.^{37–40} This program

was developed as part of the WIC food package revisions implemented in 2009.^{39,40} The CVV permits eligible WIC participants to purchase up to \$10 worth of fresh fruits and vegetables each month at food retailers authorized to accept WIC benefits.⁴⁰ To date, little research has been conducted on the CVV or its impact on diet, diet-related behaviors, and health.^{37,38} Regular redemption of the WIC CVV may significantly affect the behaviors of low-income individuals by positively influencing their food venue selection and preference for fresh produce. Redeemers of the voucher may start to seek food retail outlets that offer better quality foods including fresh fruits and vegetables.

The purpose of this research was to determine if FTC retail outlet use was associated with daily F&V intake or obesity status among women who participate in the WIC Program in Birmingham, a large urban center in Central Alabama. Furthermore, this study aimed to examine WIC CVV redemption among study participants, and explore how regular redemption of the CVV affects association between FTC retail outlet use and study outcomes. At the time of the current study, the WIC program in Birmingham did not have any national programs implemented to incentivize use of FTC retail outlets among WIC participants. Therefore, WIC participants were unable to redeem the CVV at FTC retail outlets. This provided the opportunity to compare the characteristics of non-users to users that patronize FTC retail outlets despite being unable to redeem any food assistance benefits at these outlets. We hypothesized that WIC program participants who purchased produce from FTC retail outlets during the most recent Alabama market season would have a significantly higher F&V intake per day compared to those who did not use these outlets.

METHODS

Study Recruitment and Participants

To assess associations among FTC retail outlet use, daily F&V intake, and obesity status, we conducted a cross-sectional study. Study participants were recruited between October 2014 and January 2015 from the Birmingham WIC Program office in the Central Health Center location of Jefferson County Department of Health. Trained staff members screened women for eligibility when the women visited the WIC office for their regular appointments. To be eligible for participation, women had to meet the following criteria at the time of study screening: be an Alabama resident; be 19 years old; and be a current WIC program participant. To be a WIC program participant, an individual must be pregnant, postpartum, or have a least one child age 5 or under. All eligible individuals have an annual household income that is below the federal poverty line. WIC program participants are issued food vouchers every 3 months; therefore, women who did not receive WIC vouchers during the 3 months prior to being screened for study eligibility were considered ineligible for participation. Additionally, women visiting the WIC office to transfer their services, restart their WIC services, or join the program were ineligible for study participation. If eligible, women were surveyed at the end of their WIC appointment. Informed consent was obtained from each study participant by study staff prior to survey completion. A total of 389 women were screened for eligibility, 354 were found to be eligible, and 312 successfully completed all survey material. The most common reason for ineligibility was not receiving WIC program vouchers during the 3 months prior to study screening. Data on 2 study participants

were not analyzed due to their having an incomplete fruit and vegetable screener instrument. Final analyses included 310 women.

Data Collection Instruments

All study participants were asked to complete the Block Fruit-Vegetable-Fiber Screener and the Survey of Farm-to-Consumer Outlet Use & Produce Shopping Behaviors in Birmingham, AL, a self-administered survey developed by study staff members for this research project.⁴³ Together, the survey and the Block screener took about 15 to 25 minutes to complete. Several questions featured in the survey were adopted from validated survey instruments such as the CDC Behavioral Risk Factor Surveillance System and the National Cancer Institute's Food Attitudes and Behaviors Survey.^{41,42} The survey included 32 items designed to collect information on demographics, FTC retail outlet usage, produce shopping behaviors, current health status, and health behaviors. Demographic information collected included age, race/ethnicity, education level, marital status, number of household members, and number of children under the age of 18. Participants were asked to self-report their frequency (ie, never, once or twice a year, once or twice a month, once or twice a week) of using the following farm-to-consumer retail outlets in 2014: farmers' market, farm/roadside stand, community garden, and CSA program. Participants self-reported either "yes" or "no" regarding their redemption of a WIC CVV at a food retail store during each of the previous 3 months. Current height and weight information was collected from participants on the survey.

The Block Fruit-Vegetable-Fiber Screener is a validated survey instrument designed to measure fruit, vegetable, and fiber intake.⁴³ Detailed information about the Block Fruit-Vegetable-Fiber Screener was published by Block et al in 2000.⁴³ In brief, the screener asks individuals to consider their regular eating habits throughout the past year and record their frequency of consuming fruit juice, fresh fruit (not including juice), vegetable juice, green salad, potatoes (including French fries), vegetable soup, vegetables, fiber cereal, beans, and whole wheat bread.⁴³ Response options for frequency of consumption included less than once a week, once a week, 2–3 times a week, 4–6 times a week, once a day, 2 or more times a day.⁴³ The Block screener applies prediction equations to the frequency of food item consumption recorded by the participant to calculate total servings of fruits and vegetables consumed per day.⁴³

Variable Definitions

Self-identified race/ethnicity was classified as non-Hispanic white, non-Hispanic black, Hispanic, Asian/Pacific Islander, and other. Educational level was categorized as less than a high school diploma, high school diploma, some college, and a college degree. Marital status was grouped as married or not married. Non-married participants included those women who were single, divorced, or widowed. The primary outcome variables were daily F&V intake and obesity status. Daily F&V consumption was reported as total servings per day as calculated by the Block Fruit-Vegetable-Fiber Screener. BMI was calculated from each participant's self-reported height and weight (kg/meters²) and classified according to the definitions established by the World Health Organization: underweight (< 18.50), normal weight (18.50 – 24.99), overweight (25.00 – 30.00), obese (≥ 30.00).⁴⁴ Participants who

indicated they purchased fresh fruits and vegetables from any form of FTC retail outlet during the most recent Birmingham market season (March 2014 – October 2014) were categorized as FTC retail outlet users. Participants who recorded “never” as their frequency of using all 4 types of FTC retail outlets were considered non-users. All those who redeemed the WIC CVV in each of the 3 previous months prior to study enrollment were classified as regular redeemers. Those who redeemed the CVV in 1 or 2 of the previous 3 months were labeled irregular redeemers, and those who did not redeem the CVV at all were considered non-redeemers.

Statistical Analysis

Descriptive statistics (ie, means and frequencies) were calculated for variables of interest among all study participants and stratified by FTC retail outlet user status. To assess differences in means and frequencies, t tests and χ^2 tests were used respectively. For analytical purposes, all other race/ethnicities beside non-Hispanic black were grouped together due small sample sizes. Crude and multivariable adjusted linear regression models were used to assess the association between FTC retail outlet use in 2014 and daily servings of F&Vs. Crude and multivariable adjusted logistic regression models were used to assess the associations among FTC retail outlet use, consumption of 5 servings of F&Vs per day, and obesity status (ie, BMI ≥ 30). Multivariable models were adjusted for age, race/ethnicity, education level, marital status, and WIC CVV redemption. Stratified analyses were performed to see if the association between FTC retail outlet use and outcome variables differed between regular WIC CVV redeemers and other study participants (ie, non-redeemers and irregular redeemers). Probability values less than .05 were considered statistically significant and all data analyses were performed with SAS version 9.4 for Windows (SAS Institute - Cary, NC).

RESULTS

Table 1 reports the descriptive characteristics of the 310 study participants stratified by FTC retail outlet user status. Mean age was 27.6 (± 6.1) years. There were 205 (67.0%) non-Hispanic Blacks, 59 (19.3%) non-Hispanic Whites, 16 (5.2%) Hispanics, and 25 (8.2%) participants of other race/ethnicity backgrounds. Most study participants reported their education level as some college (36.1%) and their marital status as not married (76.8%). Mean household size was 3.7 (± 2.1) and mean number of children was 2.0 (± 1.2). Approximately 63.5% of participants reported they redeemed the WIC CVV in each of the previous 3 months, and 45.6% of participants were classified as obese according to their BMI. We calculated the mean daily servings of F&Vs among study participants to be 4.5 (± 2.0).

There were 81 (26.1%) participants classified as FTC retail outlet users and 229 (73.9%) as non-users. Of the 81 participants that reported using FTC retail outlets to purchase fresh produce during the 2014 Alabama market season, 71 (87.7%) used a farmers' market, 35 (43.2%) used a farm/roadside stand, and 6 (7.4%) used a community garden. No study participants reported using a CSA program. Of the 81 FTC retail outlet users, 53 (65.4%) reported shopping at least once a month. FTC retail outlet users and non-users were similar

with respect to age, education level, number of children, number of household members, WIC CVV redemption, and BMI classification. Mean number of F&V servings consumed by FTC retail outlet users was significantly higher than non-users (4.79 servings vs 4.28 servings; $p = .03$). Compared to non-users, there was a slightly higher proportion of non-black (41.3% vs 30.1%) and married (30.9% vs 20.5%) women among the FTC retail outlet users; however, the differences in frequencies were not statistically significant.

Tables 2 and 3 show results from linear and logistic regression models that examined the association between FTC retail outlet use and daily servings of F&Vs consumed. The crude linear regression model suggested that participants who patronized FTC retail outlets, on average, consumed 0.5 more servings of F&Vs per day than non-users ($p = .03$). After adjusting for age, non-Hispanic black race, highest education level, marital status, and WIC CVV redemption, the association maintained statistical significance ($p = .04$). Stratified linear regression models indicated that the association between FTC retail outlet use and daily servings of F&Vs varies by WIC CVV redemption status. FTC retail outlet use was associated with daily servings of F&Vs among regular WIC CVV redeemers ($\beta = 0.74$; $SE = 0.32$; $p = .02$), but not for irregular and non-redeemers ($\beta = 0.30$; $SE = 0.35$; $p = .41$). Whereas FTC retail outlet users comprised 26.1% of the total study sample, they comprised 36.0% of participants who consumed ≥ 5 servings of F&Vs per day. The crude logistic regression models indicated that FTC retail outlet use was significantly associated with increased odds of consuming ≥ 5 servings of F&Vs per day (OR: 2.17; 95% CI: 1.29 – 3.64). After adjusting for age, non-Hispanic black race, education level, marital status, and WIC CVV redemption, the association maintained its statistical significance (OR: 2.01; 95% CI: 1.15 – 3.50). FTC retail outlet use was associated with increased odds of consuming ≥ 5 servings of F&Vs among WIC CVV redeemers (OR: 2.54; 95% CI: 1.30 – 4.97), but not for irregular and non-redeemers (OR: 1.96; 95% CI: 0.83 – 4.63).

Table 4 reports the results from logistic regression models that examined associations between FTC retail outlet use and obesity status. Approximately 30.1% of non-obese study participants used FTC retail outlets during the 2014 Alabama market season compared to 22.3% of obese study participants. FTC retail outlet use was not associated with odds of obesity status in the crude (OR: 0.67; 95%: 0.40 – 1.12) or the multivariable adjusted logistic regression model (OR: 0.68; 95%: 0.39 – 1.20). Statistically significant associations were not observed for regular WIC CVV redeemers or irregular and non-redeemers.

DISCUSSION

We assessed associations among FTC retail outlet use, daily F&V intake, and obesity status in a population of low-income women residing in Birmingham, AL. Furthermore, we explored how WIC CVV redemption influences the association between FTC retail outlet use and the outcome variables. This is the first examination of outcomes associated with FTC retail outlet use conducted in Alabama – a state where the average number of F&V servings consumed per day by adults is below the national average and the age-adjusted adult obesity prevalence is higher than the national average.^{12,45} Several regions of the US, including Alabama, experienced an increase in total number of FTC retail outlets in the past decade.⁴⁶ According to the USDA Economic Research Service, USDA-registered farmers'

markets increased by 100% between 2009 and 2012 in Alabama.⁴⁶ Findings from the current study indicate that the prevalence of FTC retail outlet use among WIC program participants (26.1%) was similar to other research studies that examined farmers' market use among low-income women.^{20,21,33,34} Furthermore, we found that FTC retail outlet use was positively associated with F&V intake, but not obesity status, among Birmingham WIC program participants.

Overall, our results appear to be in line with other studies that examined associations between farmers' market use and F&V consumption.^{21–23,25–31} Studies conducted by Grin et al,³⁴ Wheeler et al,²⁷ and Jilcott-Pitts et al²¹ all observed that farmers' market use was associated with increased F&V intake among low-income women. In an intervention study conducted by Herman et al,²⁵ WIC clients offered a subsidy to purchase F&Vs from a local farmers' market significantly increased their intake at the end of the study period compared to participants who did not receive the subsidy. The few studies that examined the benefits of using other forms of FTC retail outlets also have produced positive results.^{28–33} Farm stands introduced to 2 low-income communities of Austin, TX significantly increased the F&V consumption of community members in a research study by Evans et al.²⁸ Quandt et al³⁰ introduced nutrition education and a CSA program to women participating in a small feasibility study and observed that participants randomized to the intervention group increased their F&V intake over time. Furthermore, Carney et al³¹ examined the impact of a community-based participatory research project that involved developing a community gardening project with low-income families. Frequency of vegetable consumption increased significantly for parents and children. This information as well as our findings provide further support to the hypothesis that use of FTC retail outlets may positively influence the diet and dietary behaviors of low-income individuals and families.

About 63% of participants in our study redeemed the WIC CVV in each of the 3 months prior to study enrollment. National data collected in 2011 showed that about 77% of eligible WIC participants used their CVV; however, only 45% used the entire dollar amount of the voucher.³⁹ It is probable that barriers exist which affect regular redemption of the voucher.^{37,38} A qualitative study by Bertmann et al³⁸ found that the decision to use the WIC CVV was affected by factors such as negative interactions in stores with store personnel. Little information exists in the literature on how redemption of the WIC CVV is related to dietary intake. Our study observed that WIC CVV was associated with a significant increase in the total number of F&V servings consumed per day among WIC program participants ($\beta = 0.66$; SE = 0.22; $p = .003$). We hypothesized that regular redemption of the WIC CVV may affect individual food preferences, produce shopping behaviors, and dietary intake.^{37,38} Therefore, we were interested in exploring whether regular WIC CVV redemption modified associations between FTC retail outlet use, daily F&V intake, and obesity status. A statistically significant association was found between FTC retail outlet use and F&V intake among WIC CVV redeemers. FTC retail outlet use appeared to be positively associated with F&V intake among irregular and non-redeemers; however, the point estimates failed to reach statistical significance. This could be due to the small sample size of irregular and non-redeemers ($N = 114$). On the other hand, it could indicate that the association between FTC retail outlet use and F&V intake varies by WIC CVV redemption. Additional research is

needed to improve understanding of how WIC CVV redemption affects WIC program participants' dietary intake and food shopping behaviors.

We found no statistically significant associations between FTC retail outlet use and obesity status. Previous research on the relationship between the 2 has resulted in mixed findings.^{21,47-49} Ecological studies by Jilcott et al⁴⁷ and Ahern et al⁴⁸ reported that neither farmers' market availability nor direct farm sales were related to age-adjusted adult obesity prevalence at the county-level.^{47,48} Weinstein et al⁴⁹ conducted an intervention aimed to alter purchasing behaviors, and F&V consumption, in individuals with Type II diabetes by providing vouchers to be used at local farmers markets. Those persons who received the intervention significantly increased their use of farmers' markets and fruit intake, but did not differ from the control group with respect to reductions in BMI after the 12-week intervention concluded.⁴⁹ In general, there is limited evidence in the literature linking F&V consumption to reductions in obesity.⁵⁰⁻⁵² We suspect that the insignificant relationship observed between FTC retail outlet usage and obesity status in our study, and in previous research, may be attributed to the weak association between F&V intake and obesity. FTC retail outlets may be better positioned as a potential strategy to improve diet quality in low-income communities rather than as a strategy to reduce obesity.

The strengths and limitations of this research should be noted. The study population was a strength because it featured a diverse sample of low-income women with respect to age, race/ethnicity, and education level. Because all of the study participants were women who participate in the Birmingham WIC program, study findings may not be generalizable to other populations. Other limitations include the cross-sectional study design and the small sample size, which may have affected our ability to observe a significant association between FTC retail outlet usage and obesity status. The cross-sectional study design does not permit the examination of temporal relationships. Therefore, it could be accurate that low-income individuals who value purchasing and consuming F&Vs may have a stronger desire to patronize FTC retail outlets, thereby explaining the significant association found between FTC retail outlet usage and daily F&V intake.

Both the survey and Block diet screener required study participants to recall their produce shopping behaviors and dietary intake. The information they provided may have been affected by recall and reporting errors. Whereas the survey developed for this study included questions adopted from other validated surveys, it was not tested for validity prior to conducting this research. Although the Block Fruit-Vegetable-Fiber Screener was validated previously, the sample of non-Hispanic black participants in the validation study was small (7%).⁴³ Also, the screener did not allow us to assess daily fruit intake independent of daily vegetable intake. Studies have observed that the association between FTC retail outlet use and fruit intake in low-income individuals differs from the association between FTC retail outlet use and vegetable intake.^{19,33}

The WIC CVV redemption measure was self-reported rather than objectively measured by reviewing official redemption records. Therefore, we were unable to analyze participants' individual WIC CVV eligibility status or their total dollar amount redeemed. Those participants labeled regular redeemers may have used only a small fraction of the total dollar

amount they received to purchase fresh fruits and vegetables. Furthermore, because we did not examine the reasons study participants did not report to the WIC office to receive their vouchers, we were unable to distinguish between study participants who did not pick up their CVV and participants who willingly did not use the voucher at a food store.

In conclusion, our findings suggest that FTC retail outlet usage is associated with F&V intake, but not obesity status. Although WIC CVV redemption was not associated with FTC retail outlet use, it was significantly associated with F&V intake among study participants. The association between FTC retail outlet use and F&V intake differed between regular WIC CVV redeemers and other study participants. Future research should consider the impact of WIC CVV redemption and explore how FTC retail outlet use influences overall diet quality. Further work is needed to delineate the significance of FTC retail outlets in improving dietary intake in low-income communities. Addressing these research questions may be important to those public health practitioners, community stakeholders, and policymakers invested in the use of FTC retail outlets to address disparities in retail food environment and health in the US.

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Table 1

Descriptive Characteristics of Birmingham WIC Program Participants Stratified by FTC Retail Outlet Use (N = 310)

Variable	All Participants N = 310	FTC Users ^a 81 (26.13)	Non-Users 229 (73.87)	p value
Age, years	27.62 (± 6.06) ^b	28.27 (± 6.86)	27.39 (± 5.74)	.26
Race/Ethnicity				
Non-Hispanic black	205 (66.99)	47 (58.75)	158 (67.33)	.07
Non-black ^c	101 (33.01)	33 (41.25)	68 (30.09)	
Education Level				
High school	26 (8.84)	8 (10.26)	18 (8.33)	
High school	89 (30.27)	21 (26.92)	68 (31.48)	.84
Some college	106 (36.05)	28 (35.90)	78 (36.11)	
College degree	73 (24.83)	21 (26.92)	52 (24.07)	
Marital Status				
Married	72 (23.23)	25 (30.86)	47 (20.52)	.06
Not married	238 (76.77)	56 (69.14)	182 (79.48)	
Number of Children 18	1.95 (± 1.22)	1.89 (± 1.28)	1.97 (± 1.20)	.61
Number of Household Members				
Regular	198 (63.46)	47 (58.02)	151 (65.37)	.24
Irregular and non-redeemers	114 (36.54)	34 (41.98)	80 (34.63)	
Daily Servings of F&Vs	4.47 (1.97)	4.79 (1.64)	4.28 (1.94)	.03
BMI Classification				
Underweight	7 (2.30)	3 (3.70)	4 (1.79)	
Normal weight	72 (23.61)	19 (23.46)	53 (23.66)	.30
Overweight	87 (28.52)	28 (34.57)	59 (26.34)	
Obese	139 (45.57)	31 (38.27)	108 (48.21)	

Note.

N (%)

FTC: Farm-to-Consumer Retail Outlet; BMI: Body Mass Index

Student's t test and chi-square test of association used to calculate p-values reported.

Counts may total to the sample size due to missing data for variable.

^aFTC outlet users: 71 (87.65%) used farmers' markets, 35 (43.21%) used farm/roadside stands, 6 (7.41%) used community gardens, and 0 used CSA programs

^bMean (\pm standard deviation) for continuous variables

^cNon-black: Non-Hispanic white = 59, Hispanic = 16, Asian = 1, Other = 25

Table 2

Associations between FTC Retail Outlet Use and Daily Servings of F&Vs

Variable	Regular CVV Redeemers			Irregular & Non-redeemers		
	Crude β (SE)	p-value	Adjusted β (SE) ^a	p-value	Adjusted β (SE) ^b	p-value
FTC Outlet Use						
Yes	0.51 (0.24)	.03	0.51 (0.25)	.04	0.74 (0.32)	.02
No	REF		REF		REF	
					0.30 (0.35)	.41
					REF	

Note.

CVV: Cash Value Voucher; FTC, Farm-to-Consumer; F&V, Fruit and Vegetable; β , regression coefficient; SE, Standard Error

^aLinear regression model adjusted for age, Non-Hispanic Black race, education level, marital status, and WIC CVV redemption

^bStratified linear regression model adjusted for age, Non-Hispanic black race, education level, and marital status

Table 3 Association between FTC Retail Outlet Use and Odds of Consuming 5 Servings of F&Vs per day, N (%)

Variable	5 Servings 111 (35.81)	< 5 Servings 199 (64.19)	Crude OR (95% CI)	Regular WIC CVV Redeemers			Irregular & Non-redeemers		
				Adjusted OR (95% CI) ^a	Adjusted OR (95% CI) ^b	Adjusted OR (95% CI) ^b			
FTC Outlet Use									
Yes	41 (20.60)	41 (20.60)	2.17 (1.29 – 3.64)	2.01 (1.15 – 3.50)	2.54 (1.30 – 4.97)	1.96 (0.83 – 4.63)			
No	71 (63.96)	158 (79.40)	REF	REF	REF				

Note.

CVV: Cash Value Voucher; FTC: Farm-to-Consumer; F&V: Fruit and Vegetable; OR: Odds Ratio; CI: Confidence Interval; WIC: Special Supplemental Nutrition Program for Women, Infants, and Children.

^aLogistic regression model adjusted for age, Non-Hispanic black race, education level, marital status, and WIC CVV redemption

^bStratified logistic regression model adjusted for age, Non-Hispanic black race, education level, and marital status

Table 4

Association between FTC Retail Outlet Use and Odds of Obesity Status, N (%)

Variable	Obese 139 (45.57)	Non-obese 166 (54.43)	Crude OR (95% CI)	Regular WIC CVV Redeemers		Irregular & Non-redeemers	
				Adjusted OR (95% CI) ^a	Adjusted OR (95% CI) ^b	Adjusted OR (95% CI) ^b	Adjusted OR (95% CI) ^b
FTC Outlet Use							
Yes	31 (22.30)	50 (30.12)	0.67 (0.40 – 1.12)	0.68 (0.39 – 1.20)	0.73 (0.39 – 1.48)	REF	0.61 (0.24 – 1.56)
No	108 (77.70)	116 (69.88)	REF	REF	REF	REF	REF

Note.

CVV: Cash Value Voucher; FTC: Farm-to-Consumer; OR: Odds Ratio; CI: Confidence Interval; WIC: Special Supplemental Nutrition Program for Women, Infants, and Children.

Obese defined as having a body mass index ≥ 30

^aLogistic regression model adjusted for age, Non-Hispanic black race, education level, marital status, and WIC CVV redemption

^bStratified logistic regression model adjusted for age, Non-Hispanic black race, education level, and marital status