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RESEARCH ARTICLE

Increases in Sugary Drink Marketing During Supplemental Nutrition Assistance Program Benefit Issuance in New York

Alyssa J. Moran, MPH, RD,[1] Aviva Musicus, BA,[1] Mary T. Gorski Findling, MS,[2] Ian F. Brissette, PhD,[3] Ann A. Lowenfels, MPH,[3] S.V. Subramanian, PhD,[4] Christina A. Roberto, PhD[5]

Introduction: The Supplemental Nutrition Assistance Program (SNAP) is the largest federal food assistance program, providing $67 billion in benefits to 44 million Americans. Some states distribute SNAP benefits over one or a few days each month, which may create an incentive for retailers to heavily promote top-selling products, like sugar-sweetened beverages, when benefits are disbursed.

Methods: A beverage environment scan assessing presence of displays, advertisements, and price promotions for sugar-sweetened, low-calorie, and unsweetened beverages was administered in a census of SNAP-authorized beverage retailers (n=630) in three cities in New York from September to November 2011. Multilevel regression models controlling for store type; county; and percentage SNAP enrollment, poverty, and non-Hispanic white population in the store's census tract were used to estimate the odds of in-store beverage marketing during the SNAP benefit issuance period compared to other days of the month. Data were analyzed in 2016.

Results: There were higher odds of in-store sugar-sweetened beverage marketing during SNAP benefit issuance days (first to ninth days of the month) compared with other days of the month, particularly for sugar-sweetened beverage advertisements (OR=1.66, 95% CI=1.01, 2.72) and displays (OR=1.88, 95% CI=1.16, 3.03). In census tracts with high SNAP enrollment (>28%), the odds of a retailer having sugar-sweetened beverage displays were 4.35 times higher (95% CI=1.93, 9.98) during issuance compared with non-issuance days. There were no differences in marketing for low-calorie or unsweetened beverages.

Conclusions: Increases in sugar-sweetened beverage marketing during issuance may exacerbate disparities in diet quality of households participating in SNAP. Policy changes, like extending SNAP benefit issuance, may mitigate these effects.

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INTRODUCTION

The Supplemental Nutrition Assistance Program (SNAP) is the largest nutrition safety net program in the U.S., providing $67 billion in food benefits to 44 million low-income Americans each year.[1] Benefits are provided once per month on an electronic benefit transfer card, which can be used to purchase most foods and beverages from authorized retailers. Although SNAP reduces poverty and improves food security,[2] the program was not designed to promote diet quality,[3] and there is evidence of disparities in household food

From the [1]Department of Nutrition, Harvard T.H. Chan School of Public Health, Boston, Massachusetts; [2]Interfaculty Initiative in Health Policy, Graduate School of Arts and Sciences, Harvard University, Cambridge, Massachusetts; [3]New York State Department of Health, Albany, New York; [4]Department of Social and Behavioral Sciences, Harvard T.H. Chan School of Public Health, Boston, Massachusetts; and [5]Department of Medical Ethics and Health Policy, University of Pennsylvania Perelman School of Medicine, Philadelphia, Pennsylvania

Address correspondence to: Alyssa J. Moran, MPH, RD, Department of Nutrition, Harvard T.H. Chan School of Public Health, 655 Huntington Avenue, Boston MA 02115. E-mail: ajm978@mail.harvard.edu.

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purchases, consumption, and weight status between participants and nonparticipants.[4–11] Studies show that grocery transactions paid for with SNAP contain more sugar-sweetened beverages (SSBs); more red and processed meats; and fewer fruits, vegetables, and legumes than transactions paid for with other means.[5–7] A recent systematic review concluded that SSB consumption among people participating in SNAP is similar to income eligible nonparticipants, but greater than higher-income nonparticipants.[4] Some studies have found higher prevalence of overweight and obesity among SNAP participants compared with nonparticipants,[8–11] though other studies have found no difference or associations in the opposite direction.[12–15]

Unhealthful food marketing targeted at SNAP participants at times of high susceptibility might partially explain these differences. Because of the way SNAP is administered, SNAP-authorized retailers may be incentivized to increase unhealthful food and beverage marketing when SNAP households receive their benefits. In some states, SNAP benefits are automatically made available to all households on the same day each month (single-day benefit issuance). In others, benefits are distributed across one or several weeks, depending on the household's case number or last name (short or extended benefit issuance). Because most SNAP benefits are spent within the first week of receipt,[16–19] retailers may respond by changing marketing to meet anticipated demand. In states with single-day or short benefit issuance periods, there is a strong financial incentive for retailers to increase marketing of popular items, like SSBs, to attract SNAP shoppers when benefits are disbursed. Many studies have documented a disproportionate burden of unhealthful food marketing in low- versus high-income neighborhoods,[20–24] and such exposure has been linked to differences in food preferences and consumption.[25] For example, ecologic studies find that advertising of nutrient-poor foods and beverages is associated with greater consumption of advertised foods and higher BMIs.[26,27] Experimental studies show that increasing the number of times an item is displayed within a retail setting increases purchases of advertised items.[28,29] However, no research has assessed fluctuations in product marketing in response to the SNAP issuance cycle. This study tests whether retailer beverage marketing increases during days when SNAP benefits are distributed compared to other days of the month, and if this increase is higher in neighborhoods with high, compared to low, SNAP enrollment.

METHODS

Study Sample and Measures

Data were initially collected as part of a descriptive study of beverage marketing in stores (the original study was not specifically designed to examine this research question). A census of beverage retailers operating in the largest cities in northeastern (Albany), central (Syracuse), and western (Buffalo) New York (NY) was provided by the NY State Department of Agriculture and Markets (N=1,108). Research assistants were trained to administer a beverage environment scan, which was based on the Nutrition Environment Measures Survey in Stores and Retail Assessment of Tobacco Stores.[30,31] The assessment form included four sections: (1) store information, (2) beverage availability, (3) beverage cost, and (4) beverage marketing (Appendix, available online). Research assistants were instructed to complete the first section of the form before arriving at the store and completed sections two to four based on observations in the store. Only questions about store information and beverage marketing were used for this study. These questions asked about the presence or absence of displays (end of aisle displays, barrels, or free-standing floor displays), advertisements (interior or exterior signs, posters, banners, or decals), and price promotions (special price advertised or promoted in the store). Research assistants coded beverages into three mutually exclusive categories by reading the Nutrition Facts panel on each beverage: (1) SSBs (non-alcoholic beverages containing added caloric sweeteners and >25 calories per 8 ounces), (2) low-calorie beverages (drinks with reduced or zero calories and ≤ 25 calories per 8 ounces), and (3) water (no added flavoring, sweetener, carbonation, or vitamins). Caloric cut offs were consistent with the New York City Food Standards, which apply to beverages procured in NY State.[32] Regular and low-calorie versions of soda, sport drinks, energy drinks, iced teas, and fruit drinks were assessed; milk, ready-to-drink coffee, and 100% juice were not included. Training was conducted by an outside firm and included one 4-hour session on how to identify different types of beverages and eight mock retail assessments (percentage agreement with a gold standard ranged from 80% to 100% in mock assessments). A follow-up 2-hour training was conducted, focusing on measures with $<90\%$ agreement with the gold standard. Each store was assessed once in September–November 2011. Because this study was not initially designed to answer the current research question, stores were not sampled on random days. Research assistants were neither aware that the study was about SNAP benefit issuance, nor were they told of the dates of issuance in NY.

Retailers were divided into mutually exclusive outlet types: (1) convenience store, (2) convenience/gas, (3) pharmacy, (4) large grocery, (5) small grocery, (6) mass merchandiser, or (7) other retailer (Appendix Table 2, available online). Outlet types were assigned by using keywords, descriptions on company websites, or Dunn & Bradstreet classifications. SNAP-authorized retailers were identified by matching store names and addresses to a list obtained from the U.S. Department of Agriculture. Store locations were geocoded and joined to their corresponding census tracts in ArcMap. Census tract-level data from the 2011 American Community Survey were matched to each store and included the percentage of households living below the poverty line, the percentage of households receiving SNAP, and racial/ethnic composition (% non-Hispanic white) of the census tract ("neighborhood") surrounding each retailer.

Of the census of 1,108 stores, 123 retailers did not sell beverages (confirmed through onsite visits) and 13 were duplicate addresses. Of the remaining 972 stores, 126 were excluded because either: (1) the store had closed ($n=53$), (2) the store refused or the research assistant encountered an unsafe situation during the onsite visit

Table 1. Characteristics of Beverage Retailers in New York, by SNAP Benefit Issuance

Variable	SNAP issuance (1st–9th of month)	Not SNAP issuance (10th–31st of month)	*p*-value
Total *n*	179	451	
Retailer type, *n* (%)			
Convenience[a]	40 (22)	126 (28)	0.15
Pharmacy	19 (11)	58 (13)	0.44
Large grocer	19 (11)	28 (6)	0.06
Small grocer	72 (40)	159 (35)	0.24
Other[b]	29 (16)	80 (18)	0.65
Chain retailer, *n* (%)	72 (40.2)	192 (42.6)	0.59
City, *n* (%)			**<0.001**
Albany	46 (25.7)	75 (16.6)	
Buffalo	52 (29.1)	260 (57.7)	
Syracuse	81 (45.3)	116 (25.7)	
Census tract characteristics, M (SD)			
Households participating in SNAP, %	24.3 (16.0)	28.6 (15.8)	**<0.01**
Poverty, %	25.3 (14.0)	29.2 (14.2)	**<0.01**
Non-Hispanic white race, %	56.4 (29.2)	55.3 (30.4)	0.67

Note: Boldface indicates statistical significance ($p<0.05$).
[a]Convenience includes gas station.
[b]Other includes mass merchandisers.
SNAP, Supplemental Nutrition Assistance Program.

(n=44), or (3) the store could not be found at the listed address (n=29). After exclusions, there were 846 retailers, which were then matched to a list of SNAP-authorized retailers from the U.S. Department of Agriculture. The final sample included all 630 stores authorized to accept SNAP.

Statistical Analysis

Statistical analyses were conducted in MLwiN through Stata, version 14 in 2016. *T*-tests compared differences in store and census tract characteristics by date of assessment (the SNAP issuance period versus other days of the month). To test the hypothesis that beverage marketing increases during SNAP issuance periods compared with non-issuance periods, multilevel regression models were used to estimate the association between: (1) SNAP benefit issuance and odds of beverage displays, advertisements, and price promotions (each are binary measures reflecting presence or absence of such marketing); and (2) SNAP benefit issuance and number of different types of beverages marketed (soda, fruit drink, sport drink, energy drink, sweetened tea). A single measure of overall marketing was not examined as an outcome because the majority of retailers had some type of beverage marketing regardless of issuance period, leading to low variation in this outcome. The primary independent variables were an indicator for whether or not a store was assessed during SNAP benefit issuance, which occurs during the first 9 days of the month in NY, and percentage SNAP use within the store's census tract, which was entered into models as a binary variable based on whether the tract fell above or below the sample median (28%). Sensitivity analyses compared the odds of each type of beverage marketing during issuance to the middle (10th–18th) and end (19th–31st) of the month. In the first model, the outcomes were the odds of displays, advertisements, or price promotions for SSBs, low-calorie beverages, or water. In the second model, the outcomes were continuous variables for the number of types of SSB displays, advertisements, and price promotions ranging from zero to five, based on the beverage categories described here.

Cities were entered into models as fixed effects, and models included random intercepts for census tracts. Regressions controlled for outlet type, whether the retailer was a chain or not, percent poverty, and percent non-Hispanic white within the store's census tract. Continuous variables were mean centered. A second set of regressions included a time X place interaction term to assess whether the association between issuance and SSB marketing was larger in neighborhoods with a higher percentage of SNAP enrollment.

RESULTS

More stores assessed during SNAP issuance were located in Syracuse, and more stores assessed on non-issuance days were located in Buffalo (Table 1). Across both groups, most stores identified as large or small grocers (44%) and were independent stores (58%). The mean percentage of households participating in SNAP was 24% (SD=16%) in stores assessed during SNAP issuance compared with 29% (SD=16%) in stores assessed on other days ($p<0.01$). Mean percentage poverty and percentage non-Hispanic white, respectively, were 25% (SD=14%) and 56% (SD=29%) in stores assessed during SNAP issuance and 29% (SD=14%) and 55% (SD=30%) in stores assessed on other days of the month ($p<0.01$, p=0.67).

Table 2. Difference in the Number of SSB Categories Marketed in 630 SNAP-Authorized Stores in New York

	Advertisements		Displays		Price promotions	
Variable	**b (95% CI)**	***p*-value**	**b (95% CI)**	***p*-value**	**b (95% CI)**	***p*-value**
By neighborhood SNAP enrollment						
Low enrollment	ref	—	ref	—	ref	—
High enrollment	0.06 (−0.21, 0.33)	0.67	0.07 (−0.22, 0.36)	0.64	0.08 (−0.21, 0.38)	0.59
By SNAP issuance day						
Not SNAP issuance day	ref	—	ref	—	ref	—
SNAP issuance day	0.06 (−0.15, 0.28)	0.56	0.40 (0.18, 0.61)	<**0.001**	−0.12 (−0.34, 0.10)	0.29
Stores in neighborhoods with low SNAP enrollment						
Not SNAP issuance day	ref	—	ref	—	ref	—
SNAP issuance day	0.05 (−0.26, 0.37)	0.74	0.19 (−0.07, 0.46)	0.16	0.04 (−0.28, 0.35)	0.82
Stores in neighborhoods with high SNAP enrollment						
Not SNAP issuance day	ref	—	ref	—	ref	—
SNAP issuance day	0.11 (−0.17, 0.40)	0.44	0.63 (0.29, 0.97)	<**0.001**	−0.29 (−0.58, 0.01)	0.06

Note: Boldface indicates statistical significance ($p < 0.05$). Number of SSB categories marketed ranges from 0 to 5 (soda, fruit drinks, sport drinks, energy drinks, and iced tea). Multiple regressions controlled for county, mean-centered racial/ethnic composition (% non-Hispanic white) and poverty (% poverty) in the store's census tract, whether the store is a chain retailer or not, and retailer type (convenience store, grocery store, pharmacy, or other). Models included random intercepts for census tract to account for tract-level variation in beverage marketing. High SNAP enrollment is defined as greater than the median (28%).
SNAP, Supplemental Nutrition Assistance Program; SSB, sugar-sweetened beverage.

The first analysis examining the presence of SSB displays revealed that there were 0.40 more varieties of SSBs on display during SNAP issuance compared with all other days of the month (b=0.40, 95% CI=0.18, 0.61; Table 2). The odds of a retailer having any SSB displays were 1.88 times higher during benefit issuance compared with other days of the month (95% CI=1.16, 3.03; Table 3). In sensitivity analyses, the odds of a retailer having SSB displays were 2.75 times higher during issuance compared with the middle of the month (95% CI=1.60, 4.71), but no different compared to the end of the month (Appendix Table 1, available online). Further, there was a significant interaction between SNAP issuance and neighborhood SNAP enrollment. Retailers in neighborhoods with high SNAP enrollment had a greater variety of SSBs during issuance compared with all other days of the month (b=0.63, 95% CI=0.29, 0.97; Table 2) and 4.35 times higher odds of SSB displays (95% CI=1.93, 9.98) during issuance compared with other days of the month (Table 4).

The analyses of SSB advertisements found that the odds of a retailer having SSB advertisements were 1.66 times higher during SNAP benefit issuance compared with other days of the month (95% CI=1.01, 2.72; Table 3). The odds of a retailer having SSB advertisements were 1.80 times higher during the issuance period compared with the middle of the month (95% CI=1.03, 3.13) but no different compared to the end of the month (Appendix Table 1, available online). In subgroup analyses, retailers in neighborhoods with high SNAP enrollment had 2.39 times higher odds of SSB advertisements during issuance compared with other days of the month.

The third analysis of price promotions found no differences in the variety of beverages promoted or the odds of a retailer having price promotions for SSBs based on SNAP issuance period. There were also no differences in any type of marketing for low-calorie beverages or water by SNAP issuance and no differences in any type of marketing for any beverage by retailer neighborhood SNAP enrollment. Finally, there were no differences in any type of SSB marketing by issuance period among stores located in neighborhoods with low SNAP enrollment.

DISCUSSION

In this study, retailers were more likely to promote SSBs during SNAP benefit issuance compared with other days of the month through the use of displays and advertisements. This provides support for the hypothesis that retailers are targeting SNAP customers at the beginning of the month with increased SSB marketing. This was further supported because SSB marketing was only more prevalent during benefit issuance in neighborhoods with high SNAP enrollment. This statistically significant interaction was present even after controlling for neighborhood poverty, suggesting retailers are responding to the SNAP issuance cycle, rather than secular trends in marketing over the course of the month. For example, all stores may alter promotions in the first week of the month when paychecks are received. If receipt of

Table 3. Odds of In-Store Beverage Marketing in 630 SNAP-Authorized Retailers in New York

	Advertisements		Displays		Price promotions	
Variable	**OR (95% CI)**	***p*-value**	**OR (95% CI)**	***p*-value**	**OR (95% CI)**	***p*-value**
SSBs						
Neighborhood SNAP enrollment						
Low-enrollment census tract	1.00	—	1.00	—	1.00	—
High-enrollment census tract	1.13 (0.60, 2.10)	0.71	1.15 (0.63, 2.07)	0.65	1.12 (0.61, 2.06)	0.71
SNAP benefit issuance day						
Not SNAP issuance day	1.00	—	1.00	—	1.00	—
SNAP issuance day	1.66 (1.01, 2.72)	**0.046**	1.88 (1.16, 3.03)	**0.01**	0.92 (0.58, 1.45)	0.71
Low-calorie beverages						
Neighborhood SNAP enrollment						
Low-enrollment census tract	1.00	—	1.00	—	1.00	—
High-enrollment census tract	0.93 (0.53, 1.62)	0.79	1.34 (0.72, 2.50)	0.35	1.36 (0.78, 2.39)	0.28
SNAP benefit issuance day						
Not SNAP issuance day	1.00	—	1.00	—	1.00	—
SNAP issuance day	0.78 (0.50, 1.21)	0.26	1.01 (0.64, 1.60)	0.96	1.30 (0.85, 1.98)	0.22
Water						
Neighborhood SNAP enrollment						
Low-enrollment census tract	1.00	—	1.00	—	1.00	—
High-enrollment census tract	1.17 (0.45, 3.05)	0.74	1.10 (0.60, 2.05)	0.75	1.23 (0.61, 2.46)	0.56
SNAP benefit issuance day						
Not SNAP issuance day	1.00	—	1.00	—	1.00	—
SNAP issuance day	0.62 (0.29, 1.33)	0.22	0.86 (0.52, 1.43)	0.56	0.94 (0.56, 1.59)	0.82

Note: Boldface indicates statistical significance ($p<0.05$). Multiple logistic regressions controlled for county, mean-centered racial/ethnic composition (% non-Hispanic white) and poverty (% poverty) in the store's census tract, whether the store is a chain retailer or not, and retailer type (convenience store, grocery store, pharmacy, or other). Models included random intercepts for census tract to account for tract-level variation in beverage marketing.
SNAP, Supplemental Nutrition Assistance Program; SSB, sugar-sweetened beverage.

paychecks is driving the association between SNAP benefit issuance and beverage marketing, it is unlikely that there would be differences by neighborhood SNAP enrollment because the likelihood of receiving a paycheck on the first of the month is unrelated to SNAP benefit receipt.

The current study builds on existing literature by assessing the effect of time, and the interaction between time (benefit issuance) and place (neighborhoods with high SNAP enrollment), on the concentration of unhealthful food marketing targeted towards low-income SNAP households. Findings suggest retailers are

Table 4. Odds of In-Store SSB Marketing in 630 SNAP-Authorized Retailers in New York

	Advertisements		Displays		Price promotions	
Variable	**OR (95% CI)**	***p*-value**	**OR (95% CI)**	***p*-value**	**OR (95% CI)**	***p*-value**
Stores in neighborhoods with low SNAP enrollment						
Not SNAP issuance day	1.00	—	1.00	—	1.00	—
SNAP issuance day	1.21 (0.60, 2.44)	0.60	1.00 (0.53, 1.89)	0.99	1.11 (0.59, 2.09)	0.74
Stores in neighborhoods with high SNAP enrollment						
Not SNAP issuance day	1.00	—	1.00	—	1.00	—
SNAP issuance day	2.39 (1.15, 5.00)	**0.02**	4.35 (1.93, 9.98)	**<0.001**	0.73 (0.37, 1.45)	0.37

Note: Boldface indicates statistical significance ($p<0.05$). Multiple logistic regressions controlled for county, racial/ethnic composition (% non-Hispanic white) and poverty (% poverty) of the store's census tract, whether the store is a chain retailer or not, and retailer type (convenience store, grocery store, pharmacy, or other). Models included random intercepts for census tract to account for tract-level variation in beverage marketing. High SNAP enrollment is defined as greater than the median (28%).
SNAP, Supplemental Nutrition Assistance Program; SSB, sugar-sweetened beverage.

increasing the prevalence of displays and advertisements for SSBs without altering price promotions, and are consistent with prior research on pricing and anecdotal retailer reports. One study using 2 years of sales data from three supermarkets found that SNAP recipients paid more for similar items at the beginning versus the end of the benefit month, suggesting that retailers do not differentially offer price promotions during benefit issuance, but rather increase prices at this time in response to increased consumer demand.[29] Anecdotally, retailers report differentially advertising large-volume, top-selling items (e.g., 2-liter bottles of Coca-Cola) during benefit issuance in response to consumer demand, but this is the first study to the authors' knowledge to systematically evaluate whether this is happening.[33] This targeted marketing likely increases purchases of SSBs and may at least partially explain disparities in purchasing, consumption, and health outcomes by SNAP participation.

There are a range of policy options for addressing unintended consequences of SNAP benefit issuance. States could extend the issuance period to cover more days of the month so that retailers cannot target SNAP recipients with increased marketing when benefits are received. For example, the state of Alabama distributes benefits from the 4th to the 23rd of each month.[34] Although changes to state schedules may be administratively difficult, there is precedent for states extending benefit issuance. In 2016, Florida shifted from a 15-day distribution to a 28-day distribution so that retailers could better spread food inventory over the course of the month.[35,36]

As an alternative, states could consider regulating point-of-sale marketing of SSBs, similar to restrictions that have been considered for tobacco. For example, states could set limits on the amount of advertising for any product on store exteriors, the amount of display space dedicated to SSBs, or the number of SSB facings per brand.[37] States could also ban point-of-sale displays of SSBs altogether.[37] Many countries have successfully implemented restrictions on tobacco displays and seen reductions in youth smoking initiation and experimentation; however, proposals for such changes in the U.S. may be thwarted by free speech protections under the first amendment to the Constitution.[38–40] Alternatively, states may consider policies that dampen the effects of marketing by highlighting health risks at point of sale. Several states and cities have introduced bills requiring text warning labels on SSB packaging, including NY.[41] In experimental studies, warning labels have been shown to increase risk perceptions and reduce intent to purchase SSBs.[42–44]

At the federal level, the U.S. Department of Agriculture could consider strengthening requirements for SNAP-authorized retailers. In a recent commentary, Thorndike and Sunstein[45] introduced the idea of a SNAP choice architecture policy, which would prohibit SNAP-authorized retailers from placing nutritionally poor items, like SSBs, in highly visible locations, like end-of-aisle, free-standing, and checkout counter displays. This policy would allow stores to continue to sell SSBs, but would reduce the likelihood of impulse purchases by reducing exposure to SSBs in the store.[45,46]

Limitations

These results should be interpreted with attention to several methodologic limitations. First, retailers were assessed only once and coded based on whether the assessment occurred during SNAP issuance or not. Thus, this study does not compare one group of retailers assessed during SNAP issuance to the same group assessed on a non-issuance day. As displayed in Table 1, stores assessed during issuance and on other days of the month were similar with regard to retailer and neighborhood characteristics. However, stores assessed during issuance were located in neighborhoods with lower poverty and lower SNAP enrollment, which may bias effect estimates towards the null if there is generally higher prevalence of SSB marketing in lower-income neighborhoods. Additionally, there may be other unobserved characteristics, such as the size of the store, which could affect the probability of marketing at a given time. Second, although the number of different types of beverages marketed were included to capture some information about quantity of beverages advertised, the beverage environment assessment included only a binary measure of whether beverage marketing was present or not. It did not capture detailed information about the marketing, such as the number of advertisements or size of displays. Third, purchases and consumption were not measured, so it is unclear how observed differences in marketing influence health. Fourth, census tracts were used to estimate the demographics of the population served by each store. It is likely that people travel across tracts to shop, and certain types of stores may attract different types of customers within a census tract. If higher-income shoppers are traveling to neighborhoods with high SNAP enrollment to shop, these stores may not be as responsive to the SNAP benefit issuance cycle and less likely to alter their marketing. If lower-income shoppers are traveling to neighborhoods with low SNAP enrollment to shop, stores may be more responsive to the issuance cycle and more likely to alter marketing. Lastly, these results represent findings from three urban areas in a Northeastern state. Beverage retail environments may differ in rural areas or other regions of the country, and

may be influenced by state or municipal policies, like beverage taxes.

CONCLUSIONS

In states with single-day or short SNAP benefit issuance, food retailers have an incentive to heavily promote top-selling products, such as SSBs, when SNAP benefits are disbursed. The retailer response to issuance may exacerbate disparities in purchasing patterns and diet quality of households participating in SNAP. Several policy alternatives could mitigate this problem: restrictions on placement or marketing, extended issuance, or point-of-sale messaging to counteract advertisements for unhealthful products. Future work should investigate whether these marketing practices occur nationwide, and further research is needed to examine the direct impact of issuance-related changes to food marketing on food purchases made by SNAP households.

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SUPPLEMENTAL MATERIAL

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