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DOES FOOD ASSISTANCE DRIVE SPENDING ON SUGARY FOODS? EVIDENCE FROM THE PANDEMIC ELECTRONIC BENEFIT TRANSFER PROGRAM

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ABSTRACT

We provide evidence on the extent to which food assistance affects spending on sugary items by studying the Pandemic Electronic Benefit Transfer (P-EBT) program, which provided funds to families of children who lost access to free and reduced-price school meals due to COVID-19 pandemic school closures. Leveraging state-level variation in the timing of P-EBT disbursements using a stacked difference-in-differences identification strategy with NielsenIQ Consumer Panel data, we find that P-EBT disbursement was associated with a 16-percent increase in weekly spending on sugary items among SNAP-eligible households with school-aged children. Notably, this increase exceeded the percentage increase in overall food spending for this group, suggesting that SNAP-eligible households with school-aged children allocated a disproportionately large share of their P-EBT-driven purchases toward sugary items relative to their pre-period baseline. We do not detect changes among households unlikely to have received P-EBT benefits or in placebo disbursement years.

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1. Introduction

Poor diet quality is a leading contributor to preventable disease and premature death in the United States (U.S. Burden of Disease Collaborators 2018), and diets high in sugar, sodium, and refined carbohydrates are a key driver of the obesity epidemic (Mozaffarian et al. 2011). Recognizing this, policymakers and public health officials have long sought to limit individuals' consumption of processed foods rich in these ingredients (Bollinger et al. 2011; Carpenter and Tello-Trillo 2015; Cawley and Frisvold 2017). Yet processed foods are typically cheaper than equal-calorie nutrient-dense alternatives (Drewnowski and Specter 2004; Wendt and Todd 2011; Rao et al. 2013; Cawley 2015), making it difficult for lower-income households to maintain high-quality diets. As a result, diet quality is strongly stratified by income, with lower-income households consuming less-healthy diets than their higher-income counterparts (Dubois et al. 2014; Allcott et al. 2019a; Hut and Oster 2022).

In addition to consuming less-healthy diets, lower-income households are more likely to experience food insecurity (Rabbitt et al. 2025), which is also associated with worse health outcomes (Gunderson and Ziliak 2015; Thomas et al. 2019). To ensure that all individuals, regardless of income, have access to a nutritionally adequate diet, the U.S. government spends over $101.7 billion – or 1.4 percent of the federal budget – providing food assistance through the Supplemental Nutrition Assistance Program (SNAP) each year (U.S. Department of Agriculture 2025a). Despite this sizable investment, the relationship between food assistance and diet quality is theoretically ambiguous. Though food assistance may enable recipients to purchase nutritious foods that were previously avoided due to cost, households may instead use these funds to purchase high-calorie items of limited nutritional value, such as candy and sugar-sweetened beverages. Indeed, policymakers have become increasingly concerned about this possibility,

prompting efforts to restrict SNAP-eligible purchases (U.S. Department of Agriculture 2025b).

Until recently, SNAP benefits could be used on "any food or food product" that is prepared at home (7 U.S.C. § 2012(k)). However, during the second Trump administration, 22 states have been granted waivers to limit the types of foods that can be purchased with SNAP benefits (U.S. Department of Agriculture 2025b). Yet SNAP restrictions on the purchase of certain food items may not improve diet quality. For one, there is surprisingly little causal evidence to the extent to which SNAP recipients use their benefits to purchase these items (Cuffey et al. 2016; Alba et al. 2024). Moreover, when food assistance transfers substitute for spending that households would have otherwise undertaken, recipients can treat them as unrestricted cash and allocate the funds according to their underlying preferences, including toward unhealthy items and non-food purchases (Southworth 1945; Hoynes and Schanzenbach 2009; Hoynes and Schanzenbach 2015; Smith et al. 2016; Beatty and Tuttle 2015).

In this paper, we provide novel evidence on how food assistance affects household purchases of sugary food items by leveraging state-level variation in the timing of the Pandemic Electronic Benefit Transfer (P-EBT) program. When the COVID-19 pandemic resulted in widespread school closures, approximately 30 million children lost access to free and reduced-price meals (U.S. Department of Agriculture 2020). Free and reduced-price school meals provide a substantial share of daily calories for low-income students (Kuhn 2018; Laurito and Schwartz 2019) and implicit budget relief to low-income households (Long 1991; Marcus and Yewell 2022). To compensate families for this lost support, Congress authorized the P-EBT program to provide transfers to households based on the federal reimbursement value of missed school breakfasts and lunches. Most households received a single lump-sum payment of approximately $300 per child to cover

missed meals from March through June (Bauer et al. 2020; Bauer et al. 2024).[1] However, due to variation in pre-existing administrative capabilities, including whether states could already match student-level meal data with SNAP administrative records, states differed substantially in how quickly they were able to implement the program. Figure 1 shows that some states began issuing benefits as early as mid-April, while others did not do so until August.

Using NielsenIQ Consumer Panel data and a stacked difference-in-differences identification strategy that accounts for variation in treatment timing (Cengiz et al. 2019), we study how P-EBT disbursement affected the purchasing behaviors of SNAP-eligible households with school-aged children. Although P-EBT funds were designed to substitute for school meals, which are subject to federal nutrition standards, we find that P-EBT was associated with a 16-percent ($1.43) increase in weekly spending on sugary items, including sugar-sweetened beverages and candy and sweets. Event-study estimates confirm that these increases were limited to the post-period. Next, we show that these increases only occurred among SNAP-eligible households with school-aged children; we do not detect any changes among households that were unlikely to receive P-EBT payments, including higher-income households with children, higher-income households without children, and SNAP-eligible households without children. Nor do we detect changes among SNAP-eligible households with school-aged children in non-P-EBT disbursement years.

Our results speak to two ongoing policy discussions. First, we provide evidence that additional food assistance increases household spending on sugary items, informing ongoing debates about whether to restrict SNAP-eligible

[1] As we discuss later, for households already participating in SNAP, P-EBT benefits were typically loaded automatically onto existing EBT cards with no application required. In contrast, eligible households that were not enrolled often required new EBT card issuance, additional verification, and proactive applications (Bauer et al. 2024).

purchases. Providing a complementary perspective from the restriction side of this policy debate, early evidence on the effects of these waivers indicates that they have reduced spending on soda by 11–19 percent (Allcott et al. 2026; Cooper et al. 2026; Frisvold and Lozano Rojas 2026). Second, although the P-EBT program ended in September 2023, the Consolidated Appropriations Act of 2023 authorized a permanent Summer EBT program, known as SUN Bucks, which launched in summer 2024 to assist families with grocery purchases during the summer months (U.S. Department of Agriculture 2024). Our results suggest that programs like SUN Bucks may generate similar increases in purchases of sugary items among recipient households, and policymakers may wish to consider whether nutritional guardrails could improve dietary outcomes among recipients.

The rest of the paper proceeds as follows: In Section 2, we describe the P-EBT program and existing evidence on the effects of food assistance on health-related behaviors and outcomes. In Section 3, we describe the NielsenIQ Consumer Panel data that we use to measure household purchases and our difference-in-differences strategy comparing changes in purchases among SNAP-eligible households residing in states that have implemented P-EBT to the changes among SNAP-eligible households in states that had not yet implemented P-EBT. In Section 4, we report our results showing that P-EBT payments increased spending on sugary items among SNAP-eligible households with school-aged children. Finally, in Section 5, we discuss the implications of our findings, the limitations of our study, and areas for future research.

2. Policy Background and Existing Literature

2.1 Policy Background

Every day, more than 29 million U.S. children participate in the National School Lunch Program and more than 15 million participate in the School Breakfast

Program (U.S. Department of Agriculture 2026). These programs provide nutritious meals to support children's dietary intake and academic performance (Anderson et al. 2018; Schwartz and Rothbart 2020; Bond et al. 2022), and free and reduced-price meals function as an in-kind transfer to lower-income households by reducing the need for at-home food purchases (Kuhn 2018; Laurito and Schwartz 2019). As a result, when the COVID-19 pandemic resulted in widespread school closures, millions of children lost access to the meals they relied on through these programs. In response, Congress created the Pandemic Electronic Benefit Transfer (P-EBT) program, which provided families of children eligible for free or reduced-price school meals with benefits to offset the cost of meals missed due to pandemic-related school closures (Families First Coronavirus Response Act 2020).

The P-EBT program was designed to function like the Supplemental Nutrition Assistance Program (SNAP). Households with children who were eligible for free or reduced-price meals were issued benefits on Electronic Benefit Transfer cards that could be used to purchase SNAP-eligible foods at authorized grocery retailers.[2] The benefit amounts were based on the federal reimbursement value of the meals not provided due to pandemic-related school closures. Because states largely closed schools in mid-March 2020 and schools remained closed through the end of the academic year, most households received a single lump-sum payment covering the value of meals from March through June. The average payment was approximately $300 per child (Bauer et al. 2024; Bauer et al. 2020).

Although the P-EBT program was federally funded, implementation was left to the states, which were required to submit administrative plans to the U.S. Department of Agriculture describing how they would identify eligible children,

[2] The P-EBT program applied to both low-income students and those who received free or reduced-price meals through the Community Eligibility Provision. Under this provision, schools and school districts in high-poverty areas are permitted to serve free breakfast and lunch to all enrolled students without collecting household applications, regardless of household income (Marcus and Yewell 2022).

match educational and SNAP records, and distribute benefits. Although participation was optional, all states eventually submitted plans and received approval. However, states varied in how quickly they were able to implement the program, largely due to differences in pre-existing administrative capacity. In addition to integrating student-level school meal data with their SNAP administrative systems, some states also had to create new application systems for non-SNAP households (Koné Consulting 2020). For households already participating in SNAP, P-EBT benefits were typically loaded automatically onto existing EBT cards. In contrast, eligible households that were not already enrolled in SNAP often required new EBT card issuance, additional verification, or proactive applications, depending on the state. As a result, SNAP households generally received benefits earlier and with substantially less administrative burden, while non-SNAP households often experienced delays of several weeks or received retroactive payments later in the summer (Bauer et al. 2024).

2.2 Literature on Diet Quality & Effects of Food Assistance

We build on a broad literature that explores the effects of food assistance on household purchases. Although SNAP has been shown to reduce food insecurity (Ratcliffe et al. 2011; Mabli et al. 2013; Gregory and Smith 2019), there is mixed evidence on whether it affects the healthfulness of food purchases.[3] Several cross-sectional comparisons have shown that SNAP recipients generally purchase less-healthy foods than non-participants (Andreyeva et al. 2015; Franckle et al. 2017; Grummon and Taillie 2017). For example, a USDA report found that sugar-sweetened beverages were the second most-purchased item among SNAP

[3] Another strand of literature has explored the degree to which SNAP recipients view their benefits as equivalent to cash (Hoynes and Schanzenbach 2009; Beatty and Tuttle 2015; Hastings and Shapiro 2018).

households (Garasky et al. 2016).[4] Yet individuals who select into SNAP participation likely differ from income-eligible non-participants, potentially biasing cross-sectional comparisons. Indeed, studies using quasi-experimental methods to address selection have generally found that SNAP has a negligible effect on diet quality (Chen and Wang 2021; Hastings et al. 2021; Feng et al. 2024). In contrast, LaGuardia et al. (2025) found that lump-sum Earned Income Tax Credit payments were associated with increased spending on healthy foods without any change in spending on soft drinks. Our results showing that P-EBT disbursement was associated with increased spending on sugary items suggest that the diet-quality effects of financial assistance may depend on the form of the benefits, rather than solely on income.

We also add to a body of research exploring the economic and policy determinants of diet quality (Hut and Oster 2022). One common hypothesis is that lower-income households have worse diet quality because they have fewer options to access nutritious foods. Yet there is mixed evidence on the importance of food availability for shaping dietary choices. Proximity to fast-food restaurants is associated with higher caloric intake and obesity rates (Davis and Carpenter 2009; Currie et al. 2010), though Anderson and Matsa (2011) found no meaningful relationship between fast-food restaurants and obesity when using proximity to the interstate highway system as an instrument for restaurant access. Likewise, Allcott et al. (2019a) leveraged the entry of new supermarkets into an area to conclude that food access explains approximately 10 percent of nutritional inequality between income groups, and Hut (2020) similarly showed that dietary habits were persistent following residential moves.

[4] Sugar-sweetened beverages were the second most-purchased category among SNAP households, accounting for 9.3 percent of expenditures compared to 7.1 percent among non-SNAP households (Garasky et al. 2016).

Some policymakers have sought to discourage consumption of discretionary foods through targeted taxes. For example, several U.S. localities have levied taxes on sugar-sweetened beverages, which have increased prices (Cawley and Frisvold 2017; Cawley et al. 2020a,b). Although higher soft drink prices are associated with a reduced likelihood that children are classified as overweight in within-child fixed-effects estimates (Morrissey et al. 2014), consumer responses, such as purchasing items in untaxed jurisdictions (Cawley et al. 2019; Seiler et al. 2021) and substituting toward other high-calorie untaxed drinks (Fletcher et al. 2010a) and sugary items (Lozano-Rojas and Carlin 2022), have limited the effectiveness of sugar-sweetened beverage taxes at reducing consumption and improving public health (Fletcher et al. 2010b; Cawley et al. 2022). Other policies have shifted responsibility to consumers, either by requiring restaurants to disclose nutritional information (Bollinger et al. 2011; Courtemanche et al. 2025) or by limiting fast-food companies' liability for weight-related harms, thereby reducing consumers' ability to externalize the costs of their choices (Carpenter and Tello-Trillo 2015).

We also add to growing evidence on the effects of pandemic-era policies intended to promote food access and reduce food insecurity. Several papers have leveraged state-level variation in the timing of the expiration of SNAP emergency allotments. This work has documented reductions in grocery spending (Martinchek et al. 2025) and increases in food insufficiency (Bitler and Schanzenbach 2025; Jones and Hashad 2025). Relatedly, during the pandemic the federal government subsidized universal free school meals. After this program expired, states that continued providing these meals had lower rates of food insufficiency (Toossi 2024). Specifically studying the P-EBT program, Bauer et al. (2024) estimated that the P-EBT program reduced household food insufficiency and children's food insecurity fell by 27–49 percent. Most closely related to our study, Bonomo et al. (2026) used the NielsenIQ Consumer Panel data to compare grocery spending

responses across four pandemic-era programs. They showed that households spent more following monthly payments than following one-time payments and that in-kind transfers for grocery purchases generated larger food store spending than equivalent cash transfers.

We build on this work by identifying food assistance as an important determinant of diet quality. Though prior work has generally found that SNAP has a negligible effect on aggregate diet quality, our results indicate that P-EBT benefits increased spending on sugary items. Interestingly, we uncover a larger percentage increase in spending on sugary items than in overall weekly food spending, suggesting that households allocated their P-EBT-driven purchases more heavily toward sugary items than their pre-period baseline would have predicted. These findings provide evidence to ongoing policy debates over whether to restrict SNAP-eligible purchases of sugary items and have implications for the design of SUN Bucks, the permanent summer food assistance program launched by the U.S. Department of Agriculture in 2024.

3. Data and Methods

3.1 Data: NielsenIQ Consumer Panel

We examine the relationship between P-EBT and food purchases using household-level retail scanner data from the NielsenIQ Consumer Panel. Participating households use scanning devices to record all purchases made during shopping trips to grocery stores, mass retailers, club stores, convenience stores, and pharmacies. For each transaction, the NielsenIQ Consumer Panel captures the Universal Product Code (UPC), quantities purchased, total price paid, and purchase date. We examine household purchases occurring between March and December 2020 and we aggregate transaction-level purchases to the household-week level, defining weeks from Monday to Sunday. These data are commonly used to study consumer

demand, food purchasing behavior, and the nutritional consequences of food policy (Dubois et al. 2014; Hastings and Shapiro 2018; Allcott et al. 2019a; Hut and Oster 2022).

The P-EBT program targeted children enrolled in the National School Lunch Program. However, we do not directly observe P-EBT receipt or free or reduced-price meal participation in the NielsenIQ Consumer Panel. Instead, our main sample consists of households (i) with at least one child aged 6–18 and (ii) whose income falls below the state and household-size-specific SNAP gross income eligibility threshold. We impose these restrictions because SNAP-eligible households with school-aged children were most likely to be eligible for the P-EBT program, and this income bracket likely contains a high share of existing SNAP participants who faced lower administrative barriers to collecting their benefits. Because all states eventually issued P-EBT payments, our identifying variation comes from the cross-state variation in the timing of disbursement, with households in later-treated states serving as the comparison group for those in earlier-treated states. As a falsification test, we also examine spending changes among three groups unlikely to have been eligible for P-EBT: higher-income households with school-aged children, higher-income households without children, and SNAP-eligible households without children.

We use the NielsenIQ Consumer Panel data to examine how the P-EBT program affected household purchases of sugary items, including (i) sugar-sweetened beverages and (ii) sweets and candy. These items are consistently associated with lower dietary quality and adverse long-run health outcomes (Malik et al. 2010; Hu 2013; Allcott et al. 2019b; Wilk et al. 2026), and there are ongoing efforts to restrict SNAP recipients' ability to use food assistance benefits to purchase these items. We report summary statistics for our main dependent

variables in Table 1.[5] Column 1 reports results for SNAP-eligible households with school-aged children, column 2 for SNAP-eligible households without children, column 3 for higher-income households with school-aged children, and column 4 for higher-income households without children.

Table 1 shows that, even prior to P-EBT disbursement, SNAP-eligible households spent more than their higher-income counterparts on sugary items. During the pre-period, SNAP-eligible households with school-aged children spent an average of $8.94 on sugary items per week compared to $6.00 for higher-income households with school-aged children. Though both groups spent similar amounts on candy and sweets ($2.87 vs. $2.49), SNAP-eligible households spent nearly 70 percent more on sugar-sweetened beverages ($6.06 vs. $3.50). Among households without school-aged children, those that were SNAP eligible also spent more on sugary items, though the difference was less pronounced ($5.47 vs. $4.79). Again, this difference was driven by greater spending on sugar-sweetened beverages ($3.13 vs. $2.45) while spending on candy and sweets was identical. These patterns are consistent evidence documenting large disparities in diet quality across the income distribution (Allcott et al. 2019a; Hut and Oster 2022).

3.2 Methods: Difference-in-Differences

To test the relationship between the P-EBT program and household food purchases, we use a difference-in-differences identification strategy that leverages cross-state variation in the timing of the first P-EBT disbursements. Because states implemented the P-EBT program at different points in time, a conventional two-way fixed effects estimator may produce biased estimates due to the inclusion of already-treated states in the comparison group for later-treated states (Goodman-

[5] We report the items comprising our categories in Appendix Table 1. Appendix Table 2 reports the summary statistics for our demographic characteristics and state-level time-varying covariates.

Bacon 2021). To avoid this issue, we adopt a stacked difference-in-differences specification that limits comparisons to newly treated states and not-yet-treated states (Cengiz et al. 2019). We define treatment cohorts, *c*, as groups of states that issued their first P-EBT disbursements in the same calendar week. We examine household spending changes from five weeks before to five weeks following the cohort's P-EBT disbursement by constructing separate datasets consisting of the states in cohort *c* and not-yet-treated states that did not issue P-EBT within this window.[6] These stack-specific datasets are then appended together.

As part of this process, some observations from the not-yet-treated states are duplicated and used as the control group in multiple stacks. To assure that the comparisons are between households in newly treated states and households in the not-yet-treated states within each respective stack-specific dataset, we estimate the following specification:

$$Y_{hstc} = \alpha + \beta \cdot \text{P-EBT}_{st} + \mathbf{X}'_{hc}\boldsymbol{\gamma} + \mathbf{B}'_{stc}\boldsymbol{\lambda} + \boldsymbol{\theta}_{sc} + \boldsymbol{\tau}_{tc} + \varepsilon_{hstc} \quad (1)$$

where the dependent variable, Y_{hstc}, is the spending outcome for household *h*, located in state *s*, in week *t*, and cohort *c*. The independent variable of interest, P-EBT_{st}, is an indicator variable taking on the value of one for treated states in their post-disbursement period and is zero otherwise.

We include the vector $\mathbf{X}_{hc}$ to account for household-level demographic characteristics that may affect household food purchases, including indicators for household size, the age of the household head, race/ethnicity (non-Hispanic Black, Hispanic, non-Hispanic white, and other race/ethnicity), educational attainment of the household head (at most a high school degree, some college, and college degree or more), and marital status (married and not married). We also include the vector

[6] We limit the window to five weeks before the disbursement date, the disbursement week, and four weeks after disbursement to ensure that there are a reasonable number of states available to serve in each cohort-specific comparison group.

$\mathbf{B}_{stc}$ to control for other economic and pandemic-era policy conditions, including the unemployment rate, the number of unemployment insurance claims processed during that week, whether the state had an active mask mandate or stay-at-home order, and whether the state had issued emergency SNAP allotments (Raifman et al. 2022). Finally, we account for time-invariant differences across states with state-cohort fixed effects, θ_{sc}, and common time shocks through week-cohort fixed effects, τ_{tc}. Standard errors are clustered at the state level (Bertrand et al. 2004).

In the presence of the covariates and fixed effects, our identifying assumption is that, in the absence of the P-EBT program, the spending patterns of SNAP-eligible households with school-aged children during the five weeks following when their states began P-EBT disbursements would have evolved similarly to comparable households in states that would not disburse P-EBT payments until more than five weeks later. We assess the plausibility of this assumption with the following event-study specification:

$$Y_{hstc} = \alpha + \sum_{j=-5,\, j\neq -1}^{4} \beta^{j} \cdot I^{j}_{st} + \mathbf{X}'_{hc}\boldsymbol{\gamma} + \mathbf{B}'_{stc}\boldsymbol{\lambda} + \boldsymbol{\theta}_{sc} + \boldsymbol{\tau}_{tc} + \varepsilon_{hstc} \qquad (2)$$

where I^{j}_{st} is an indicator variable equal to one for treated households if the observation fell within j weeks of the cohort-specific disbursement date. In this setup, the coefficients of interest, β^{j}, measure how the outcomes evolved in treated and not-yet-treated states around the disbursement window.

4. Results

4.1 Changes in Spending on Sugary Foods

In Table 2, we begin exploring whether the P-EBT program affected household purchase decisions. The dependent variable in column 1 is total weekly household spending on sugary items. Meanwhile, the next two columns separate out specific sugary categories; the dependent variable in column 2 is weekly spending on sugar-

sweetened beverages, and the dependent variable in column 3 is weekly spending on candy and sweets. The estimates are obtained using the stacked difference-in-differences specification from equation (1), comparing spending changes among SNAP-eligible households with school-aged children residing in states that began disbursing P-EBT payments to concurrent changes among similar households in states that had not yet begun disbursing.

We find that P-EBT disbursement was associated with a $1.43 increase in weekly spending on sugary items among SNAP-eligible households with school-aged children – an approximate 16-percent increase relative to their pre-period mean. The increase reflects higher purchases of both sugary beverages and foods: P-EBT disbursement was associated with an approximate $0.65 (11-percent) increase in weekly spending on sugar-sweetened beverages and a $0.78 (27-percent) increase in weekly spending on candy and sweets. Table 2 provides the first evidence that the P-EBT program, despite being designed to replace foregone school meals subject to federal nutrition standards, increased spending on sugary items that would not be served as part of a school meal. These findings have implications for the growing number of states seeking federal waivers to restrict SNAP purchases of sugar-sweetened beverages and candy, suggesting that food assistance disbursements meaningfully shape demand for precisely the categories targeted by such restrictions. Indeed, our estimates are consistent with early evidence that waivers restricting purchases of sugary beverages with SNAP funds have reduced soda purchases by 11–19 percent (Allcott et al. 2026; Cooper et al. 2026; Frisvold and Lozano Rojas 2026).

In the presence of our covariates and fixed effects, our identification assumption is that spending among SNAP-eligible households with school-aged children in states that began disbursing P-EBT payments would have evolved similarly to spending among comparable households in states that had not yet begun disbursing. In Figure 2, we assess the plausibility of this assumption by plotting the

event-study estimates from equation (2) for total weekly spending on sugary items (Panel A) and when looking separately by item category (Panel B).[7] The pre-period estimates are small in magnitude and statistically indistinguishable from zero. Following P-EBT disbursement, however, we find that SNAP-eligible households with school-aged children spent approximately $1.50 (17 percent) more each week on sugary items.[8] Likewise, we show a similar dynamic pattern for spending on sugar-sweetened beverages (light grey squares) and spending on candy and sweets (dark grey triangles).

Our estimates indicate that SNAP-eligible households with school-aged children increased spending on sugary items in the weeks following P-EBT disbursement. Of course, not every eligible household opted to participate in the P-EBT program, so our estimates should be interpreted as intent-to-treat effects. However, we can leverage prior evidence on take-up rates, which varied from 78 (Cunnyngham 2023) to 89 percent (Kenney et al. 2022), to rescale our estimates to the implied treatment-on-the-treated effects. These corresponding estimates indicate that P-EBT disbursement was associated with a $1.60 (17.9-percent) to $1.83 (20.5-percent) increase in spending on sugary items, due to a $0.72–$0.83 (12–13.6-percent) increase in spending on sugar-sweetened beverages and a $0.88–$1.00 (30.5–34.8-percent) increase in spending on candy and sweets.

Prior to P-EBT disbursement, SNAP-eligible households with school-aged children devoted approximately 9 percent of their weekly food spending to sugary items ($8.94/$100.79 = 0.089). To assess whether P-EBT disbursement influenced how households allocated their food spending, in Table 3 we examine how P-EBT disbursement affected weekly household spending on food (column 1) and non-

[7] The estimates are reported in Appendix Table 3.
[8] We show in Appendix Figure 1 that the results are robust to not using the sample weights. Indeed, if anything, not using the sample weights results in flatter and more precise pre-period estimates, consistent with Solon et al. (2015).

food items (column 2). We find that P-EBT disbursement was associated with a $7.95 (8-percent) increase in weekly food spending without any detected change in non-food spending. Because the increase in spending on sugary items (16 percent) exceeded the increase in overall food spending (8 percent), our results imply that SNAP-eligible households with school-aged children allocated a disproportionately larger share of their P-EBT-driven food purchases to sugary items. Had spending on sugary items increased in line with households' pre-period allocation, we would have expected a $0.71 increase versus the $1.43 increase we found in Table 2.

4.2 Robustness Tests

In the prior section, we showed that SNAP-eligible households with school-aged children increased their weekly spending on sugary items after their state began disbursing P-EBT payments. To increase confidence that this purchasing change reflects a causal effect of the P-EBT program, rather than broader trends in local purchasing behaviors, in Table 4 we examine the relationship between P-EBT disbursement and spending patterns of three groups unlikely to receive P-EBT funds: SNAP-eligible households without children (Panel A), higher-income households with school-aged children (Panel B), and higher-income households without children (Panel C).[9] Reassuringly, there is no evidence that P-EBT disbursement was associated with spending changes for any of our falsification groups. The point estimates are 49- to 96-percent smaller in magnitude, inconsistently signed, and not statistically distinguishable from zero.

In Table 5, we explore whether the estimated relationship between the P-EBT program and increased spending on sugary items among SNAP-eligible households with school-aged children was driven by seasonal patterns correlated

[9] Some higher-income households with school-aged children may have been eligible for P-EBT payments due to the Community Eligibility Provision.

with state-specific disbursement dates. The dependent variables in Panels A, B, and C are total weekly spending on sugary items, weekly spending on sugar-sweetened beverages, and weekly spending on candy and sweets, respectively. The columns report estimates obtained when constructing placebo treatment indicators by matching states' P-EBT disbursement weeks to data from the three years before and after the introduction of the P-EBT program.[10] We do not detect any evidence that these placebo disbursement dates were associated with changes in weekly spending on sugary items among SNAP-eligible households with school-aged children, indicating that location-specific seasonal spending patterns do not explain our findings, and supporting a causal interpretation of our main results.

Although pandemic-related lockdown policies varied considerably across states, generally speaking households in the earlier-treated states faced more severe restrictions than those in later-treated states. As a result, it is theoretically possible that our results showing increased spending on sugary items are driven, at least in part, by households purchasing more items from convenience stores due to difficulties accessing their usual grocery stores. Although we have included controls for stay-at-home orders and other pandemic-related policies, we now take several additional steps to assess the extent to which lockdown policies may be confounding our results. In Figure 3, we show that the relationship between P-EBT disbursement and weekly spending on sugary items is robust to iteratively excluding each treatment cohort, indicating that our results are not being driven by the earlier-treated cohorts that faced the most severe restrictions.[11] Meanwhile, in

[10] Using the 2021-2023 as placebo years assumes that the within-year timing of later rounds of P-EBT disbursement was not correlated with the timing of the initial disbursement in 2020. Because the timing of the initial disbursement was dependent on idiosyncratic variation in the ease with which states could link information on free- and reduced-price meals to their existing EBT systems, it is unlikely that the timing of later disbursements would be correlated with the initial dates. However, the 2017-2019 placebo years do not require this assumption.

[11] Appendix Figure 2 shows similar patterns for spending on sugar-sweetened beverages (Panel A) and candy and sweets (Panel B).

Appendix Table 4, we show that most spending on sugary items occurred at grocery stores (40.5 percent), with the next most common locations being discount (33.9 percent) and dollar stores (10.9 percent); convenience stores were the seventh most common location (2.2 percent). We then show in Appendix Table 5 that the estimated increase in spending on sugary items following P-EBT disbursement was driven by purchases at grocery stores, suggesting that our results are not due to households substituting towards more accessible retail channels due to pandemic-related restrictions.

In a repeated cross-sectional setting, our results could be driven by changes in which households are observed to make purchases in a given week. For example, if P-EBT disbursement affected the frequency of shopping trips, or otherwise changed which households shopped in a given week, our estimates could capture a compositional shift in the set of households observed in the post-period. However, in Appendix Table 6, we show that the patterns are robust to augmenting equation (1) with time-invariant household fixed effects; we continue to find a statistically significant $1.33 (15-percent) increase in spending on sugary items following P-EBT disbursement. Likewise, in Appendix Table 7, we account for changes in the frequency of shopping trips by aggregating each household's pre-period and post-period spending. Regardless of whether we include household fixed effects, we find that P-EBT disbursement was associated with a $7.09–$7.42 (21-percent) increase in spending on sugary items. Finally, in Appendix Table 8, we replace our dependent variables with indicators capturing whether the household made any sugary purchases, which allows us to measure extensive-margin changes in purchasing behavior. We find that P-EBT disbursement was associated with a 2.2–2.8-percentage-point (3.5–4.5-percent) increase in the likelihood that households purchased sugary items, indicating that at least some of the increase was driven by

households making purchases in week they otherwise would not have, rather than solely by households spending more money during their usual trips.[12]

4.3 Heterogeneity by Household Characteristics

Thus far, we have shown that P-EBT disbursement was associated with increased spending on sugary items among SNAP-eligible households with school-aged children, that this relationship was unique to the group likely to receive P-EBT benefits and the year in which benefits were disbursed. In this section, we examine how the relationship varied based on the pre-period consumption patterns and household demographic characteristics. Prior work has shown that teenagers have stronger and more well-defined dietary preferences than younger children (Wang et al. 2008; Serrano-Gonzalez et al. 2021) and are better able to advocate for their preferences during grocery shopping (National Academies of Sciences 2006). As a result, households with teenagers may have been more likely to allocate their additional funds towards sugar-sweetened beverages than those with younger children. In Table 6, we examine the relationship between P-EBT disbursement and weekly spending on sugary items for SNAP-eligible households with younger school-aged children (Panel A) and those with teenagers (Panel B). Although we find a similar increase in total spending on sugary items across both groups, the point estimates suggest that SNAP-eligible households with teenagers purchased more sugar-sweetened beverages. In contrast, the point estimates suggest that P-EBT disbursement was associated with a larger increase in spending on candy and sweets among SNAP-eligible households with younger school-aged children. However, when we examine all SNAP-eligible households with school-aged

[12] As an additional robustness test, in Appendix Table 9, we show that the patterns are robust to using an alternative weighting scheme for the stacked difference-in-differences estimator (Wing et al. 2024). We continue to find that P-EBT disbursement was associated with a $1.54–$1.76 (17.2–19.7-percent) increase in spending on sugary items.

children and interact the entire right-hand side of equation (1) with an indicator for the presence of a teenager, the estimated difference is not statistically significant (Panel C).

Next, we test whether the marginal propensity to allocate food assistance toward sugary items varied by economic constraints. Prior evidence on SNAP has shown that food assistance functions like cash at the margin, implying that additional transfers may be allocated based on household preferences, rather than nutritional targeting (Hoynes and Schanzenbach 2009). In Table 7, we examine how P-EBT disbursement affected spending on sugary items based on underlying economic circumstances by comparing households with school-aged children with incomes below 100 percent of the Federal Poverty Line (Panel A) to those above the poverty line but still below the SNAP eligibility threshold (Panel B). The point estimates suggest that P-EBT disbursement was associated with a larger increase in spending on sugary items among higher-income SNAP-eligible households with school-aged children. However, our triple-difference estimates indicate that this difference was not statistically significant (Panel C).[13]

5. Discussion

Lower-income households are more likely to receive food assistance and consume diets rich in added sugars. Although the relationship between food assistance and diet quality is not fully understood, policymakers are actively seeking to restrict recipients from spending their benefits on sugary items. In this paper, we provide timely evidence on this topic by studying how the Pandemic Electronic Benefit Transfer (P-EBT) program affected household spending. Leveraging state-level

[13] We also examined differences by race/ethnicity of the household head. The point estimates were larger for non-Hispanic white households when stratifying the sample, and there was no statistical difference in our triple-difference framework. The results are included as Appendix Table 10 for completeness.

variation in the timing of P-EBT disbursements and NielsenIQ Consumer Panel data, we find that P-EBT disbursement was associated with a $1.43 (16-percent) increase in weekly spending on sugary items among SNAP-eligible households with school-aged children. Because this percentage increase exceeded the increase in overall food spending, this estimate implies that households allocated a disproportionately larger share of their P-EBT-driven purchases toward sugary items relative to their pre-period baseline. Event-study estimates confirm that these increases were limited to the post-period, and we do not detect changes among households unlikely to have received P-EBT benefits or in placebo disbursement years.

There are several possible explanations for why we find that SNAP-eligible households allocated a larger share of their P-EBT-induced food spending toward sugary items relative to their pre-disbursement patterns. For one, it is possible that these households were meeting their basic food needs during this period, allowing them to allocate the additional funds toward discretionary items. However, there is evidence that food insecurity was increasing during the period in which P-EBT payments were disbursed (Bitler et al. 2020; Ziliak 2021), suggesting that this is unlikely to have been the case. Another possibility is that these funds may have enabled households to engage in social activities that were associated with higher spending on sugary items. Finally, households may have used sugary items to reward children for their resilience during the pandemic. Our data do not allow us to distinguish between these possibilities.

This paper is subject to several limitations. First, because we do not directly observe P-EBT receipt in the NielsenIQ Consumer Panel, our sample of SNAP-eligible households with school-aged children may include those that opted not to participate in the program. Given this potential misclassification, our estimates are likely to understate the effect of P-EBT receipt on household purchases. Second, our data capture food purchases but not food consumption. As a result, our

estimates should be interpreted as measuring how food assistance affects the nutritional quality of items available to households, which is likely correlated with eventual consumption. Finally, because we examine changes arising within a short window after what was expected to be a single lump-sum food assistance payment received during the public health crisis, our results may not generalize easily to programs administered monthly. Yet even short-run increases may have long-term consequences, given evidence that sugary consumption can become habitual (Zhen et al. 2011) and that early-life sugar exposure can have lasting health effects (Gracner et al. 2026).

Despite these limitations, our results have implications for several ongoing debates about food assistance. A growing number of states are seeking federal waivers to restrict SNAP-eligible purchases of sugary items, and our results speak to whether such restrictions would meaningfully reduce spending on these items. Much of the existing evidence on this question comes from analyzing spending patterns of a small number of lower-income households that were not already enrolled in SNAP and volunteered for randomized benefits in Minneapolis. For example, French et al. (2017) found that the 60 restricted households spent $5 (51 percent) less per week on sugary items than the 63 control households. Likewise, studying a later trial, Harnack et al. (2024) found that the 65 restricted households spent $4.34 (41 percent) less on sugary items than the 71 households in the control group.[14] Although these trials imply larger reductions than the increases we document, it is worth noting that our estimates still imply a sizable increase in spending on sugary items following P-EBT disbursement. Moreover, because our

[14] In the first trial, at follow-up the control households spent $4.50 on sugar-sweetened beverages, $3.3 on sweets, and $2.10 on candy. Meanwhile, restricted households spent $2.30 on sugar-sweetened beverages, $1.60 on sweets, and $1.00 on candy. In the second trial, control households spent $4.44 on sugar-sweetened beverages, $4.16 on sweets, and $1.88 on candy. Meanwhile, restricted households spent $2.66 on sugar-sweetened beverages, $2.53 on sweets, and $0.95 on candy.

estimates are identified from comparing spending changes among SNAP-eligible households with school-aged children across the country, our estimates offer a complementary perspective on the importance of food assistance in driving spending on sugary items and the potential effects of a broader set of restrictions. Consistent with the relative size of our findings, recent evidence indicates that federal waivers allowing states to restrict purchases of sugary beverages with SNAP funds reduced spending on soda by 11–19 percent (Allcott et al. 2026; Cooper et al. 2026; Frisvold and Lozano Rojas 2026).

Our results also have implications for the permanent summer food program launched by the U.S. Department of Agriculture in 2024, known as SUN Bucks. This program provides benefits in a manner similar to P-EBT and does not include a restriction on the specific foods that can be purchased. As of summer 2026, SUN Bucks operated in 37 states, the District of Columbia, all five U.S. territories, and a number of participating Tribal nations, while 12 states declined to participate (U.S. Department of Agriculture 2026). Our results suggest that SUN Bucks disbursements may generate similar increases in spending on sugary items among recipient households in the absence of nutritional guardrails. Future work should examine how these policy changes have affected diet quality among recipient households.

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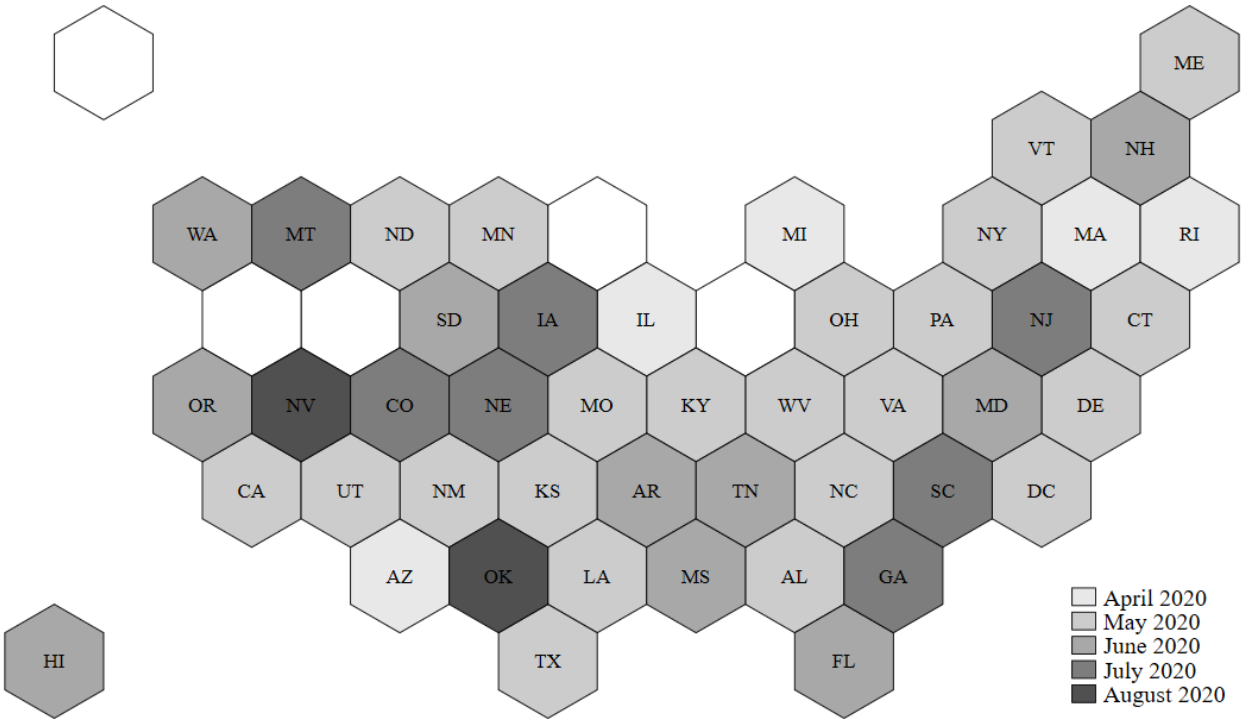
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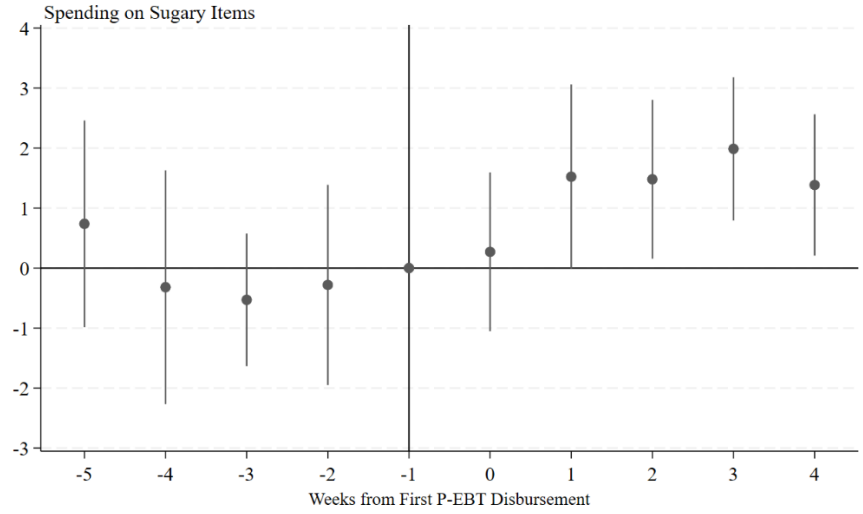
7. Figures

Figure 1: Timing of First P-EBT Disbursement

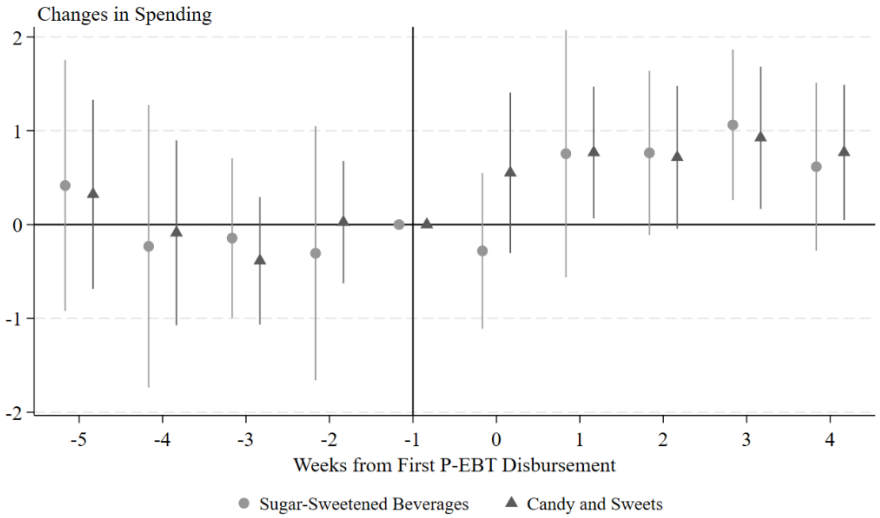


Source: Bauer et al. (2020)
Note: The figure shows the cross-state variation in when states first began P-EBT disbursements. Due to conflicting information on disbursement dates, Alaska, Idaho, Indiana, Wisconsin, and Wyoming are excluded from the analysis.

Figure 2: Event-Study Estimates Showing Post-Period Increases in Spending on Sugary Items



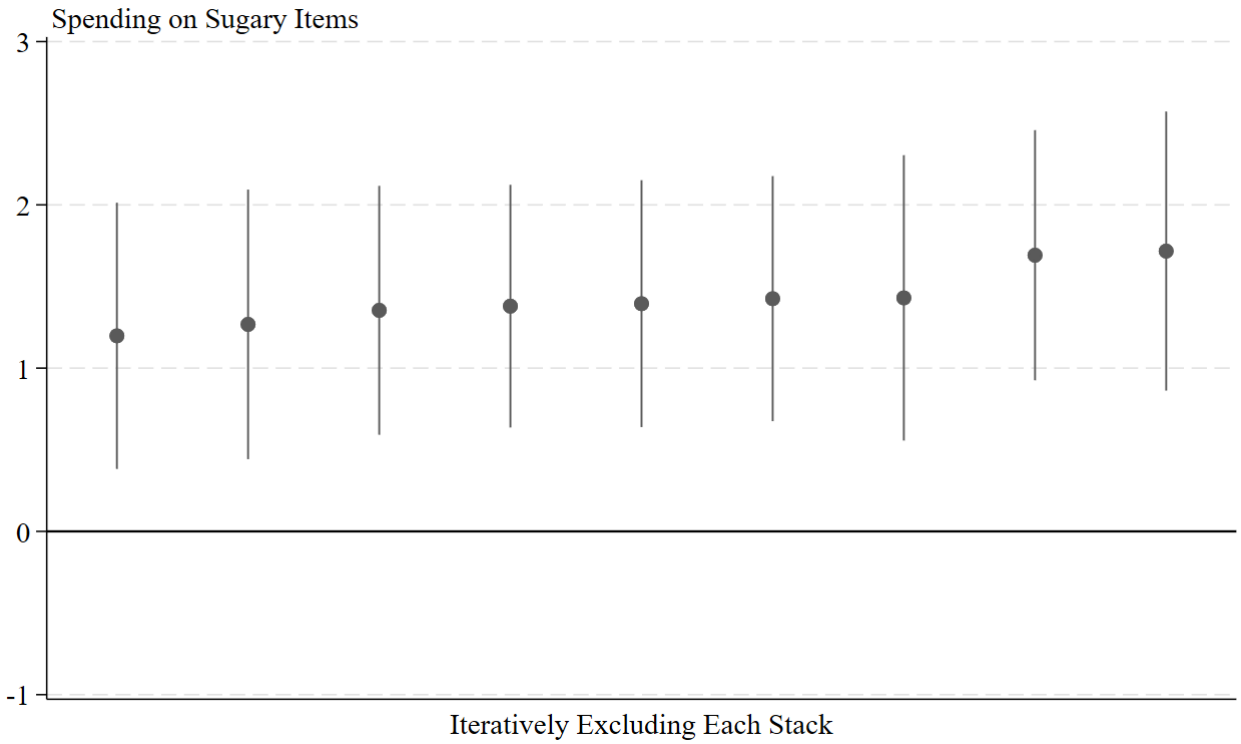
(A)



(B)

Source: NielsenIQ Consumer Panel, 2020.
Note: Panel A reports results from one regression where the dependent variable is weekly spending on sugary items. Panel B reports results from two regressions where the dependent variable is weekly spending on sugar-sweetened beverages (light grey squares) and weekly spending on candy and sweets (dark grey triangles), respectively. The sample includes SNAP-eligible households with school-aged children. The markers denote the point estimates and the vertical lines the corresponding 95 percent confidence intervals. The estimates are obtained using the stacked event-study specification from equation (2). The regression includes state fixed effects, week fixed effects, household-level demographic controls, and state-level economic and policy controls. The right-hand side variables are all interacted with the data stack indicator to limit comparisons to newly treated states and not-yet-treated states. The estimates utilize the sample weights. The estimates are also reported in Appendix Table 4.

Figure 3: The Results are Robust to Iteratively Dropping Each Data Stack



Source: NielsenIQ Consumer Panel, 2020.
Note: The dependent variable is weekly household spending on sugary items among SNAP-eligible households with school-aged children. Each point estimate is obtained by re-estimating equation (1) while iteratively excluding one treatment cohort from the estimation sample. The regression includes state fixed effects, week fixed effects, household-level demographic controls, and state-level economic and policy controls. The right-hand side variables are all interacted with the data stack indicator to limit comparisons to newly treated states and not-yet-treated states. The estimates utilize the sample weights. Markers denote point estimates and vertical lines denote 95 percent confidence intervals. Standard errors are clustered at the state level.

8. Tables

Table 1: Summary Statistics Prior to the Launch of the P-EBT Program

	(1)	(2)	(3)	(4)
Sample →	SNAP-Eligible + School-Aged Children	SNAP-Eligible + No Children	Higher-Income + School-Aged Children	Higher-Income + No Children
Sugary Items	8.94	5.47	6.00	4.79
	(16.32)	(10.62)	(11.74)	(9.75)
SSB	6.06	3.13	3.50	2.45
	(13.63)	(7.61)	(8.91)	(6.37)
Candy and Sweets	2.87	2.33	2.49	2.33
	(6.67)	(6.61)	(6.37)	(6.79)
Observations	7,642	20,678	10,025	27,971

Source: NielsenIQ Consumer Panel, 2020.
Note: The table reports the sample means and standard deviations (in parentheses). The summary statistics utilize the sample weights.

Table 2: P-EBT Disbursement Increased Spending on Sugary Items Among SNAP-Eligible Households with School-Aged Children

	(1)	(2)	(3)
Spending on →	Sugary Items	Sugar-Sweetened Beverages	Sweets and Candy
P-EBT	1.426***	0.645*	0.780***
	(0.369)	(0.357)	(0.208)
Mean	8.94	6.06	2.87
Observations	143,585	143,585	143,585

Source: NielsenIQ Consumer Panel, 2020.

Note: The sample includes SNAP-eligible households with school-aged children. The dependent variable in column 1 is weekly spending on sugary items, in column 2 weekly spending on sugar-sweetened beverages, and in column 3 weekly spending on sweets and candy. The estimates are obtained using the stacked difference-in-differences specification shown in equation (1). The regression includes state fixed effects, week fixed effects, household-level demographic controls, and state-level economic and policy controls. The non-treatment right-hand side variables are all interacted with the data stack indicator to limit comparisons to newly treated states and not-yet-treated states. The estimates utilize the sample weights. Standard errors, shown in parentheses, are clustered at the state level.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

Table 3: P-EBT Disbursement Increased Spending on Food Items

	(1)	(2)
Spending on →	Food Items	Non-Food Items
P-EBT	7.954**	-1.803
	(2.999)	(1.849)
Mean	100.79	47.04
Observations	143,585	143,585

Source: NielsenIQ Consumer Panel, 2020.

Note: The sample includes SNAP-eligible households with school-aged children. The dependent variable in column 1 is weekly spending on food items and in column 2 weekly spending on non-food items. The estimates are obtained using the stacked difference-in-differences specification shown in equation (1). The regression includes state fixed effects, week fixed effects, household-level demographic controls, and state-level economic and policy controls. The non-treatment right-hand side variables are all interacted with the data stack indicator to limit comparisons to newly treated states and not-yet-treated states. The estimates utilize the sample weights. Standard errors, shown in parentheses, are clustered at the state level.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

Table 4: P-EBT Disbursement Was Unrelated to Changes in Spending on Sugary Items Among Likely Ineligible Households

	(1)	(2)	(3)
Spending on →	Sugary Items	Sugar-Sweetened Beverages	Sweets and Candy
Panel A: SNAP-Eligible Households Without School-Aged Children			
P-EBT	-0.088	-0.038	-0.050
	(0.180)	(0.134)	(0.114)
Mean	5.47	3.13	2.33
Observations	396,308	396,308	396,308
Panel B: Higher-Income Households with School-Aged Children			
P-EBT	0.732	0.331	0.401
	(0.551)	(0.349)	(0.282)
Mean	6.00	3.50	2.49
Observations	188,846	188,846	188,846
Panel C: Higher-Income Households Without School-Aged Children			
P-EBT	-0.197	0.026	-0.223
	(0.157)	(0.073)	(0.232)
Mean	4.79	2.45	2.33
Observations	512,884	512,884	512,884

Source: NielsenIQ Consumer Panel, 2020.

Note: The sample in Panel A includes SNAP-eligible households without school-aged children, in Panel B higher-income households with school-aged children, and in Panel C higher-income households without school-aged children. The dependent variable in column 1 is weekly spending on sugary items, in column 2 weekly spending on sugar-sweetened beverages, and in column 3 weekly spending on sweets and candy. The estimates are obtained using the stacked difference-in-differences specification shown in equation (1). The regression includes state fixed effects, week fixed effects, household-level demographic controls, and state-level economic and policy controls. The non-treatment right-hand side variables are all interacted with the data stack indicator to limit comparisons to newly treated states and not-yet-treated states. The estimates utilize the sample weights. Standard errors, shown in parentheses, are clustered at the state level.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

Table 5: P-EBT Disbursement Was Unrelated to Changes in Spending on Sugary Items Among SNAP-Eligible Households with School-Aged Children During Placebo Years

	(1)	(2)	(3)	(4)	(5)	(6)
Placebo Year →	2017	2018	2019	2021	2022	2023
Panel A: Outcome is Spending on Sugary Items						
P-EBT	-0.218	0.530	0.161	-0.664	0.223	-0.951
	(0.412)	(0.512)	(0.424)	(0.479)	(0.717)	(0.805)
Mean	6.51	6.50	7.26	8.64	10.03	10.48
Observations	132,307	116,723	132,331	110,863	107,218	108,178
Panel B: Outcome is Spending on Sugar-Sweetened Beverages						
P-EBT	0.091	0.266	0.360	-0.491	0.580	-0.986
	(0.328)	(0.481)	(0.298)	(0.311)	(0.378)	(0.655)
Mean	4.25	4.37	4.54	5.79	6.75	7.32
Observations	132,307	116,723	132,331	110,863	107,218	108,178
Panel C: Outcome is Spending on Sweets and Candy						
P-EBT	-0.309	0.264	-0.199	-0.173	-0.357	0.036
	(0.209)	(0.192)	(0.200)	(0.200)	(0.445)	(0.388)
Mean	2.26	2.12	2.71	2.84	3.27	3.16
Observations	132,307	116,723	132,331	110,863	107,218	108,178

Source: NielsenIQ Consumer Panel, 2017–2023.

Note: The sample includes SNAP-eligible households with school-aged children. Column 1 limits the sample to observations from 2017, column 2 from 2018, column 3 from 2019, column 4 from 2021, column 5 from 2022, and column 6 from 2023. The dependent variable in Panel A is weekly spending on sugary items, in Panel B weekly spending on sugar-sweetened beverages, and in Panel C weekly spending on sweets and candy. The estimates are obtained using the stacked difference-in-differences specification shown in equation (1). The regression includes state fixed effects, week fixed effects, household-level demographic controls, and state-level economic and policy controls. The non-treatment right-hand side variables are all interacted with the data stack indicator to limit comparisons to newly treated states and not-yet-treated states. The estimates utilize the sample weights. Standard errors, shown in parentheses, are clustered at the state level.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

Table 6: P-EBT Disbursement and Spending on Sugary Items, by Age of the Child

	(1)	(2)	(3)
Spending on →	Sugary Items	Sugar-Sweetened Beverages	Sweets and Candy
Panel A: Sample Includes SNAP-Eligible Households with Younger Children			
P-EBT	1.343**	0.460	0.883**
	(0.548)	(0.586)	(0.338)
Mean	8.58	5.98	2.59
Observations	71,612	71,612	71,612
Panel B: Sample Includes SNAP-Eligible Households with Teenage Children			
P-EBT	1.387***	0.720	0.667**
	(0.474)	(0.450)	(0.253)
Mean	9.32	6.15	3.16
Observations	71,973	71,973	71,973
Panel C: Baseline Sample			
P-EBT	1.343**	0.460	0.883**
	(0.548)	(0.585)	(0.338)
P-EBT × Teen HH	0.044	0.259	-0.216
	(0.746)	(0.782)	(0.452)
Mean	8.94	6.06	2.87
Observations	143,585	143,585	143,585

Source: NielsenIQ Consumer Panel, 2020.

Note: The sample in Panel A includes SNAP-eligible households whose school-aged children are all ages 6–11, and in Panel B SNAP-eligible households with at least one teenage child, ages 12–18. Panel C reports estimates obtained from the full sample of SNAP-eligible households with school-aged children and a modified version of equation (1) that fully interacts the right-hand side variables with an indicator for the presence of a teenager in the household. The dependent variable in column 1 is weekly spending on sugary items, in column 2 weekly spending on sugar-sweetened beverages, and in column 3 weekly spending on sweets and candy. The estimates in Panels A and B are obtained using the stacked difference-in-differences specification shown in equation (1); Panel C additionally includes the triple interactions. The regression includes state fixed effects, week fixed effects, household-level demographic controls, and state-level economic and policy controls. The non-treatment right-hand side variables are all interacted with the data stack indicator to limit comparisons to newly treated states and not-yet-treated states. The estimates utilize the sample weights. Standard errors, shown in parentheses, are clustered at the state level.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

Table 7: P-EBT Disbursement and Spending on Sugary Items, by Household Income

	(1)	(2)	(3)
Spending on →	Sugary Items	Sugar-Sweetened Beverages	Sweets and Candy
Panel A: Sample Includes Households with Income < 100% FPL			
P-EBT	0.915*	0.264	0.652*
	(0.465)	(0.362)	(0.334)
Mean	9.91	6.98	2.93
Observations	46,655	46,655	46,655
Panel B: Sample Includes Households with Income ≥ 100% FPL			
P-EBT	1.779***	0.939*	0.840***
	(0.528)	(0.508)	(0.244)
Mean	8.19	5.36	2.82
Observations	96,930	96,930	96,930
Panel C: Baseline Sample			
P-EBT	0.915*	0.264	0.652*
	(0.464)	(0.361)	(0.334)
P-EBT × HH Income ≥ 100% FPL	0.864	0.676	0.188
	(0.691)	(0.586)	(0.391)
Mean	8.94	6.06	2.87
Observations	143,585	143,585	143,585

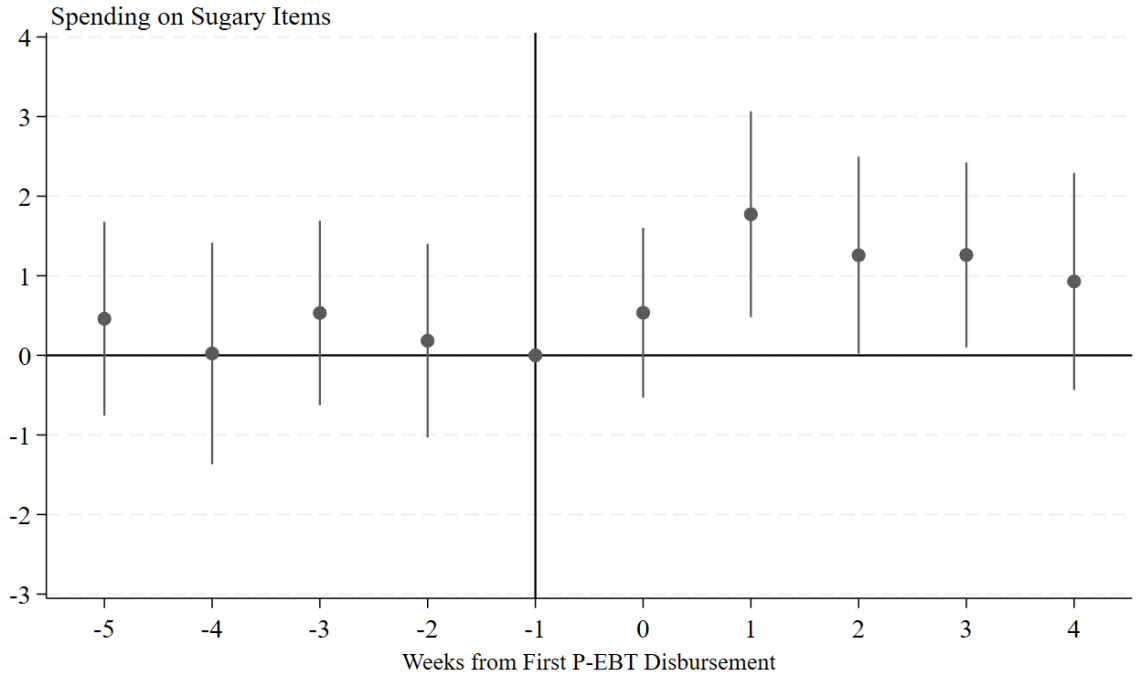
Source: NielsenIQ Consumer Panel, 2020.

Note: The sample in Panel A includes SNAP-eligible households with school-aged children and income below 100 percent of the Federal Poverty Line, and in Panel B SNAP-eligible households with school-aged children and income at or above 100 percent of the Federal Poverty Line but below the state and household-size-specific SNAP gross income eligibility threshold. Panel C reports estimates obtained from the full sample of SNAP-eligible households with school-aged children and a modified version of equation (1) that fully interacts the right-hand side variables with an indicator for having a household income at or above 100 percent of the Federal Poverty Line. The dependent variable in column 1 is weekly spending on sugary items, in column 2 weekly spending on sugar-sweetened beverages, and in column 3 weekly spending on sweets and candy. The estimates in Panels A and B are obtained using the stacked difference-in-differences specification shown in equation (1); Panel C additionally includes the triple interactions. The regression includes state fixed effects, week fixed effects, household-level demographic controls, and state-level economic and policy controls. The non-treatment right-hand side variables are all interacted with the data stack indicator to limit comparisons to newly treated states and not-yet-treated states. The estimates utilize the sample weights. Standard errors, shown in parentheses, are clustered at the state level.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

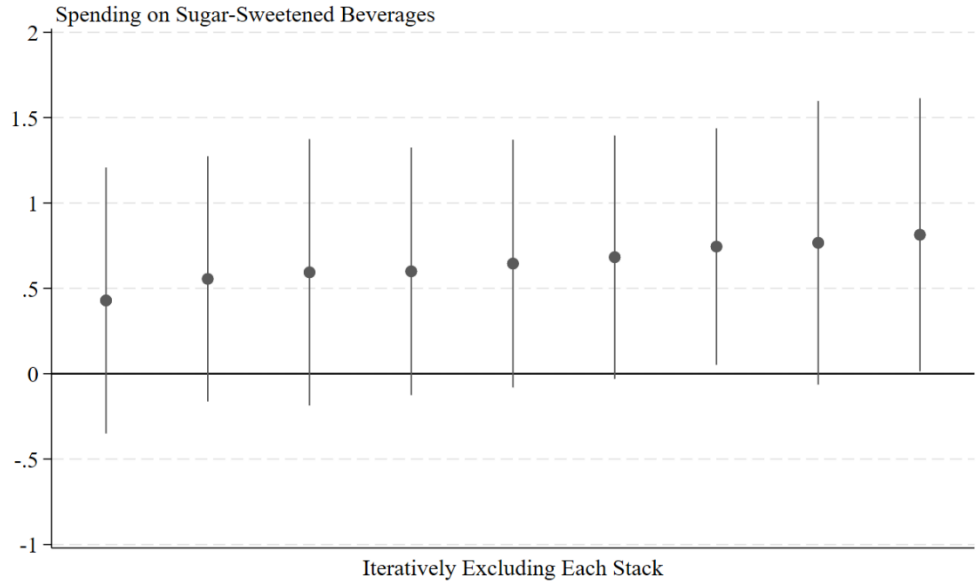
9. Appendix Figures

Appendix Figure 1: Unweighted Event-Study Estimates Showing Post-Period Increases in Spending on Sugary Items

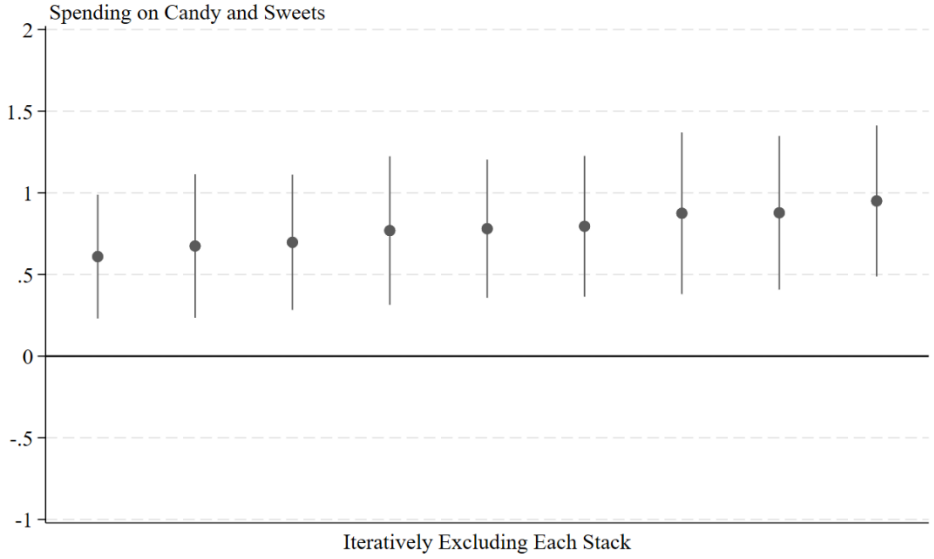


Source: NielsenIQ Consumer Panel, 2020.
Note: The figure plots event-study estimates for weekly household spending on sugary items among SNAP-eligible households with school-aged children, estimated without sample weights. The markers denote the point estimates and the vertical lines the corresponding 95 percent confidence intervals. The estimates are obtained using the stacked event-study specification from equation (2). The regression includes state fixed effects, week fixed effects, household-level demographic controls, and state-level economic and policy controls. The non-treatment right-hand side variables are all interacted with the data stack indicator to limit comparisons to newly treated states and not-yet-treated states. Standard errors are clustered at the state level.

Appendix Figure 2: The Increases in Spending on Sugar-Sweetened Beverages and Candy and Sweets Are Robust to Iteratively Dropping Each Treatment Cohort



(A)



(B)

Source: NielsenIQ Consumer Panel, 2020.

Note: Panel A examines weekly spending on sugar-sweetened beverages, and Panel B examines weekly spending on candy and sweets. The sample includes SNAP-eligible households with school-aged children. Estimates are obtained by re-estimating equation (1) while iteratively excluding each treatment cohort. The regression includes state fixed effects, week fixed effects, household-level demographic controls, and state-level economic and policy controls. The non-treatment right-hand side variables are all interacted with the data stack indicator to limit comparisons to newly treated states and not-yet-treated states. Markers denote point estimates and vertical lines denote 95 percent confidence intervals; standard errors are clustered at the state level. The estimates utilize the sample weights.

10. Appendix Tables

Appendix Table 1: Classification of Items

Category	Sub-Category	Food Groups
Sugary Items	Sugary Sweetened Beverages	Regular carbonated soft drinks
		Fruit drinks
		Sweetened teas
		Sports drinks
		Energy drinks
		Other sweetened drink mixes
	Candy and Sweets	Candy
		Marshmallow
		Chocolate items
		Cookies
		Other jams

Source: NielsenIQ Consumer Panel, 2020.

Note: The table reports the NielsenIQ product categories comprising each of the sugary item subcategories. Sugar-sweetened beverages include regular (non-diet) carbonated soft drinks, fruit drinks, sweetened teas, sports drinks, energy drinks, and other sweetened drink mixes; diet sweetened beverages are excluded. Candy and sweets include candy, marshmallows, chocolate items, cookies, and other jams and spreads. The sugary items category, our primary outcome of interest, is defined as the sum of spending on sugar-sweetened beverages and candy and sweets.

Appendix Table 2: Additional Summary Statistics

	(1)	(2)	(3)	(4)
SNAP Eligible?	Yes	Yes	No	No
School-Aged Children?	Yes	No	Yes	No
Age	42.53	55.79	46.29	54.07
	(10.78)	(11.27)	(8.25)	(10.99)
Employed	0.73	0.35	0.97	0.81
	(0.44)	(0.47)	(0.16)	(0.38)
At Most a HS Degree	0.34	0.44	0.08	0.12
	(0.47)	(0.49)	(0.27)	(0.33)
Some College	0.41	0.37	0.19	0.26
	(0.49)	(0.48)	(0.39)	(0.44)
College Graduate	0.23	0.18	0.71	0.60
	(0.42)	(0.38)	(0.44)	(0.48)
Married	0.52	0.24	0.90	0.70
	(0.49)	(0.42)	(0.29)	(0.45)
White	0.54	0.73	0.62	0.71
	(0.49)	(0.44)	(0.48)	(0.44)
Black	0.12	0.09	0.07	0.08
	(0.33)	(0.29)	(0.27)	(0.27)
Other Race	0.05	0.06	0.12	0.10
	(0.23)	(0.24)	(0.38)	(0.30)
Hispanic	0.28	0.10	0.17	0.09
	(0.44)	(0.30)	(0.38)	(0.29)
Unemployment Rate	0.08	0.08	0.07	0.08
	(0.03)	(0.03)	(0.02)	(0.03)
UI Claims per 1K	9.24	9.50	9.13	9.41
	(10.41)	(11.15)	(10.58)	(10.91)
Stay-at-Home Order	0.19	0.20	0.21	0.21
	(0.39)	(0.40)	(0.40)	(0.40)
Mask Mandate	0.47	0.48	0.51	0.51
	(0.49)	(0.49)	(0.49)	(0.49)
SNAP EA	0.77	0.78	0.77	0.77
	(0.41)	(0.41)	(0.41)	(0.41)
Observations	143,585	396,308	188,846	512,884

Source: NielsenIQ Consumer Panel, 2020.

Note: The table reports the sample means and standard deviations (in parentheses). The summary statistics utilize the sample weights. The demographic characteristics are based on the household head. The COVID-19 policies report the share of household-week observations for which the household's state had each policy actively in effect.

Appendix Table 3: Event-Study Estimates

		(1)	(2)	(3)
Spending on →		Sugary Items	Sugar-Sweetened Beverages	Sweets and Candy
Pre-Period				
	-5	0.738	0.416	0.322
		(0.848)	(0.658)	(0.496)
	-4	-0.319	-0.232	-0.087
		(0.959)	(0.741)	(0.485)
	-3	-0.529	-0.144	-0.386
		(0.544)	(0.419)	(0.334)
	-2	-0.281	-0.306	0.025
		(0.821)	(0.666)	(0.321)
Post-Period				
	0	0.271	-0.281	0.552
		(0.651)	(0.408)	(0.421)
	1	1.523*	0.756	0.768**
		(0.757)	(0.648)	(0.345)
	2	1.481**	0.764*	0.716*
		(0.652)	(0.431)	(0.375)
	3	1.988***	1.062**	0.926**
		(0.587)	(0.395)	(0.373)
	4	1.386**	0.617	0.769**
		(0.580)	(0.441)	(0.355)
Mean		8.94	6.06	2.87
Observations		143,585	143,585	143,585

Source: NielsenIQ Consumer Panel, 2020.

Note: The sample includes SNAP-eligible households with school-aged children. The dependent variable in column 1 is weekly spending on sugary items, in column 2 weekly spending on sugar-sweetened beverages, and in column 3 weekly spending on sweets and candy. The estimates are obtained using the stacked event-study specification from equation (2). The regression includes state fixed effects, week fixed effects, household-level demographic controls, and state-level economic and policy controls. The non-treatment right-hand side variables are all interacted with the data stack indicator to limit comparisons to newly treated states and not-yet-treated states. The estimates utilize the sample weights.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

Appendix Table 4: Location of Spending on Sugary Items

	(1)	(2)	(3)
Sample →	Full Sample	Treated Households	Control Households
Grocery	40.5%	43.2%	40.1%
Discount	33.9%	29.6%	34.5%
Dollar	10.9%	12.1%	10.7%
Drug	4.4%	3.5%	4.6%
Other	3.6%	4.7%	3.4%
Warehouse	3.0%	3.3%	3.0%
Convenience	2.2%	1.5%	2.2%
Online	1.5%	2.1%	1.5%
Restaurant	0%	0.1%	0.0%
Observations	143,585	15,285	128,300

Source: NielsenIQ Consumer Panel, 2020.
Note: The table shows the share of purchases of sugar items that occurred at each location. The estimates utilize the sample weights.

Appendix Table 5: P-EBT Disbursement Was Associated with Increased Spending on Sugary Items at Grocery Stores

	(1)	(2)	(3)	(4)
Type of Store →	Grocery Stores	Discount Stores	Dollar Stores	Other Stores
Panel A: Spending on Sugary Items				
P-EBT	0.913***	0.075	0.202	0.235
	(0.218)	(0.228)	(0.167)	(0.189)
Mean	3.58	2.43	1.01	1.90
Observations	143,585	143,585	143,585	143,585
Panel B: Spending on Sugary-Sweetened Beverages				
P-EBT	0.498**	-0.058	0.141	0.064
	(0.211)	(0.142)	(0.113)	(0.129)
Mean	2.72	1.44	0.61	1.28
Observations	143,585	143,585	143,585	143,585
Panel C: Spending on Sweets and Candy				
P-EBT	0.416***	0.133	0.061	0.171
	(0.099)	(0.122)	(0.101)	(0.130)
Mean	0.86	0.98	0.39	0.62
Observations	143,585	143,585	143,585	143,585

Source: NielsenIQ Consumer Panel, 2020.

Note: The sample includes SNAP-eligible households with school-aged children. The dependent variable in Panl A is weekly spending on sugary items, in Panel B weekly spending on sugar-sweetened beverages, and in Panel C weekly spending on sweets and candy. Column 1 examines purchases at grocery stores, column 2 at discount stores, column 3 at dollar stores, and column 4 at all other stores. The estimates are obtained using the stacked difference-in-differences specification shown in equation (1). The regression includes state fixed effects, week fixed effects, household-level demographic controls, and state-level economic and policy controls. The non-treatment right-hand side variables are all interacted with the data stack indicator to limit comparisons to newly treated states and not-yet-treated states. The estimates utilize the sample weights. Standard errors, shown in parentheses, are clustered at the state level.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

Appendix Table 6: The Relationship Between P-EBT Disbursement and Spending on Sugary Items Among SNAP-Eligible Households with School-Aged Children After Including Household Fixed Effects

	(1)	(2)	(3)
Spending on →	Sugary Items	Sugar-Sweetened Beverages	Sweets and Candy
P-EBT	1.326***	0.611	0.715***
	(0.412)	(0.401)	(0.188)
Mean	8.94	6.06	2.87
Observations	143,585	143,585	143,585

Source: NielsenIQ Consumer Panel, 2020.

Note: The sample includes SNAP-eligible households with school-aged children. The dependent variable in column 1 is weekly spending on sugary items, in column 2 weekly spending on sugar-sweetened beverages, and in column 3 weekly spending on sweets and candy. The estimates are obtained using the stacked difference-in-differences specification shown in equation (1). The regression includes state fixed effects, week fixed effects, household fixed effects, and state-level economic and policy controls. The non-treatment right-hand side variables are all interacted with the data stack indicator to limit comparisons to newly treated states and not-yet-treated states. The estimates utilize the sample weights. Standard errors, shown in parentheses, are clustered at the state level.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

Appendix Table 7: P-EBT Disbursement and Spending on Sugary Items Among SNAP-Eligible Households with School-Aged Children After Aggregating the Pre- and Post-Periods

	(1)	(2)	(3)
Spending on →	Sugary Items	Sugar-Sweetened Beverages	Sweets and Candy
Panel A: Baseline Specification			
P-EBT	7.417***	3.606*	3.809***
	(2.077)	(1.960)	(0.933)
Mean	35.13	24.27	10.86
Observations	28,717	28,717	28,717
Panel B: Baseline Specification + Household Fixed Effects			
P-EBT	7.088***	3.082	4.007***
	(2.142)	(2.074)	(0.892)
Mean	35.13	24.27	10.86
Observations	28,717	28,717	28,717

Source: NielsenIQ Consumer Panel, 2020.

Note: The sample includes SNAP-eligible households with school-aged children. The dependent variable in column 1 is spending on sugary items, in column 2 spending on sugar-sweetened beverages, and in column 3 spending on sweets and candy. The dependent variables measure total household spending on the items during the pre-period and the post-period, rather than being measured at the week level. The estimates in Panel A are obtained using the stacked difference-in-differences specification shown in equation (1). The regression includes state fixed effects, week fixed effects, household-level demographic controls, and state-level economic and policy controls. The estimates in Panel B are obtained after augmenting the specification with time-invariant household fixed effect. The non-treatment right-hand side variables are all interacted with the data stack indicator to limit comparisons to newly treated states and not-yet-treated states. The estimates utilize the sample weights. Standard errors, shown in parentheses, are clustered at the state level.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

Appendix Table 8: Extensive-Margin Relationship Between P-EBT Disbursement and Spending on Sugary Items Among SNAP-Eligible Households with School-Aged Children

	(1)	(2)	(3)
Spending on →	Sugary Items	Sugar-Sweetened Beverages	Sweets and Candy
Panel A: Baseline Specification			
P-EBT	0.028**	0.019*	0.024**
	(0.013)	(0.010)	(0.012)
Mean	0.62	0.49	0.36
Observations	143,585	143,585	143,585
Panel B: Baseline Specification + Household Fixed Effects			
P-EBT	0.022**	0.016*	0.020**
	(0.011)	(0.010)	(0.010)
Mean	0.62	0.49	0.36
Observations	143,585	143,585	143,585

Source: NielsenIQ Consumer Panel, 2020.

Note: The sample includes SNAP-eligible households with school-aged children. The dependent variable in column 1 is an indicator for spending money on sugary items, in column 2 weekly for spending money on sugar-sweetened beverages, and in column 3 for spending money on sweets and candy. The estimates in Panel A obtained using the stacked difference-in-differences specification shown in equation (1). The regression includes state fixed effects, week fixed effects, household-level demographic controls, and state-level economic and policy controls. The estimates in Panel B are obtained after augmenting the specification with time-invariant household fixed effect. The non-treatment right-hand side variables are all interacted with the data stack indicator to limit comparisons to newly treated states and not-yet-treated states. The estimates utilize the sample weights. Standard errors, shown in parentheses, are clustered at the state level.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

Appendix Table 9: P-EBT Disbursement and Spending on Sugary Items Among SNAP-Eligible Households with School-Aged Children Using an Alternative Stacked Difference-in-Differences Weighting Scheme

	(1)	(2)	(3)
Spending on →	Sugary Items	Sugar-Sweetened Beverages	Sweets and Candy
Panel A: Baseline Specification			
P-EBT	1.540***	0.758*	0.781***
	(0.343)	(0.375)	(0.212)
Mean	8.73	5.98	2.76
Observations	37,556	37,556	37,556
Panel B: Baseline Specification + Household Fixed Effects			
P-EBT	1.763***	1.008**	0.755***
	(0.491)	(0.496)	(0.232)
Mean	8.73	5.98	2.76
Observations	37,556	37,556	37,556

Source: NielsenIQ Consumer Panel, 2020.

Note: The sample includes SNAP-eligible households with school-aged children. The dependent variable in column 1 is weekly spending on sugary items, in column 2 weekly spending on sugar-sweetened beverages, and in column 3 weekly spending on sweets and candy. The estimates in Panel A are obtained using the stacked difference-in-differences specification shown in equation (1) estimated using the weighting scheme proposed in Wing et al. (2024). The regression includes state fixed effects, week fixed effects, household-level demographic controls, and state-level economic and policy controls. The estimates in Panel B are obtained after augmenting the specification with time-invariant household fixed effect. The non-treatment right-hand side variables are all interacted with the data stack indicator to limit comparisons to newly treated states and not-yet-treated states. The estimates utilize the sample weights. Standard errors, shown in parentheses, are clustered at the state level.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

Appendix Table 10: P-EBT Disbursement and Spending on Sugary Items, by Race/Ethnicity

	(1)	(2)	(3)
Spending on →	Sugary Items	Sugar-Sweetened Beverages	Sweets and Candy
Panel A: Sample Includes Non-Hispanic White Households			
P-EBT	1.946***	1.069**	0.878**
	(0.631)	(0.402)	(0.359)
Mean	9.89	6.73	3.15
Observations	87,925	87,925	87,925
Panel B: Sample Includes Non-Hispanic Black, Hispanic, and Other Race Households			
P-EBT	1.057	0.284	0.773*
	(0.723)	(0.619)	(0.430)
Mean	7.94	5.36	2.57
Observations	55,660	55,660	55,660
Panel C: Baseline Sample			
P-EBT	1.946***	1.069**	0.878**
	(0.631)	(0.402)	(0.360)
P-EBT × Non-White HH	-0.889	-0.785	-0.105
	(1.054)	(0.667)	(0.636)
Mean	8.94	6.06	2.87
Observations	143,585	143,585	143,585

Source: NielsenIQ Consumer Panel, 2020.

Note: The sample in Panel A includes SNAP-eligible households with school-aged children whose household head is non-Hispanic white individual, and in Panel B SNAP-eligible households with school-aged children whose household head is a non-Hispanic Black, Hispanic, or another race/ethnicity individual. Panel C reports estimates obtained from the full sample of SNAP-eligible households with school-aged children and a modified version of equation (1) that fully interacts the right-hand side variables with an indicator for the household head being a race/ethnicity other than non-Hispanic white (Non-White HH). The dependent variable in column 1 is weekly spending on sugary items, in column 2 weekly spending on sugar-sweetened beverages, and in column 3 weekly spending on sweets and candy. The estimates in Panels A and B are obtained using the stacked difference-in-differences specification shown in equation (1); Panel C additionally includes the triple interactions. The regression includes state fixed effects, week fixed effects, household-level demographic controls, and state-level economic and policy controls. The non-treatment right-hand side variables are all interacted with the data stack indicator to limit comparisons to newly treated states and not-yet-treated states. The estimates utilize the sample weights. Standard errors, shown in parentheses, are clustered at the state level.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$