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The Effect of the 2023 SNAP Benefits Reduction on Food Insufficiency

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ABSTRACT

This analysis estimates the effects of reduced Supplemental Nutrition Assistance Program (SNAP) benefits on food insufficiency from January to July 2023, when emergency allotments (EAs) were eliminated. Using Household Pulse Survey data, the results show that the 2023 SNAP benefits reduction increased overall food insufficiency by 7.57 percentage points (pp) after three months, 7.48 pp after four months, and 8.62 pp after five months, each compared to before the end of EAs. Increases in food insufficiency were driven by higher income SNAP participants, who experienced higher reductions in SNAP benefits than lower income SNAP participants. The increase in food insufficiency is more prominent among female, Black, less educated, and metropolitan respondents.

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Chapter 1

Introduction

The Supplemental Nutrition Assistance Program (SNAP) is the largest food assistance program in the United States, aiming to alleviate food insufficiency by providing low-income households with monthly financial assistance to supplement their food budget. SNAP serves about 40 million people per month at a cost of approximately $79 billion in fiscal year 2020 (U.S. Department of Agriculture [USDA], 2022). At the beginning of each month, SNAP is dispensed to an individual's electronic benefit transfer (EBT) card, which can be used at SNAP-authorized retailers. During the COVID-19 pandemic, states issued emergency allotments (EAs) of SNAP benefits. 18 states gradually ended EAs from March 2021 to January 2023. 21 states and the District of Columbia (DC) stopped EAs after February 2023, and 11 states halted EAs after March 2023.

The declaration of a public health emergency for COVID-19 in early 2020 enabled the government to expand access to federal safety net programs like SNAP during a time of need. In March 2020, as part of the COVID-19 relief efforts, the federal government increased all SNAP benefits by 15% to provide additional support to households struggling with food insufficiency through the Families First Coronavirus Response Act (U.S. Department of Agriculture, 2023g). This primarily included EAs, which ensured that all SNAP beneficiaries received at least the maximum SNAP benefit, regardless of household income. EAs allowed all SNAP households to receive the greater of: an extra $95 or an additional benefit valued up to the maximum for their household size (USDA, 2023e). This $95 minimum was implemented in April 2021 (USDA,

2023f). The increase in SNAP benefits is associated with a large jump in SNAP participants: from February to July 2020, the number of SNAP participants grew by more than 6 to 7 million (Rosenbaum, 2020).

SNAP is a powerful tool to reduce the prevalence of food insufficiency and food insecurity during economic downturns.[1] First, the literature confirms a causal effect of SNAP on food insufficiency and food insecurity utilizing evidence from the COVID-19 pandemic and the Great Recession. For example, Nord and Prell (2011) found that, following the 2009 Recovery Act and stimulus package, the prevalence of food insecurity decreased by 2.2 percentage points (pp) from 2008 to 2009 among all low-income households. This improvement was largely attributed to the increase in SNAP benefits after the Recovery Act. Additionally, SNAP participants, compared to income-eligible SNAP nonparticipants, were 37% less likely to experience food insecurity over August-December 2020 after EAs were introduced (Restrepo, 2023). Second, research also shows SNAP is one of the most effective mechanisms for economic stimulus to reach low-income households to provide counter-cyclical help during recessions (Blinder & Zandi, 2015; Congressional Budget Office, 2015). This is because states can issue additional SNAP benefits within days or weeks. In addition, SNAP benefits will be virtually entirely used each month (around 97%) (Rosenbaum et. al., 2020). This will free up household income to offset other costs or save.

The SNAP benefit increase was initially set to expire at the end of September 2021 but was extended until the end of December 2021. On December 29, 2022, President Biden signed into law the 2023 Consolidated Appropriations Act, which terminated EAs after the issuance of

[1] Food insufficiency is defined as sometimes or often not having enough to eat, while food insecurity is defined as reduced quality and variety in a diet. Food insecurity is usually based on USDA 6-item, 10-item, or 18-item survey modules (U.S. Department of Agriculture, 2023d).

February 2023 benefits. This means that households in the 32 states and DC, which had not yet ended EAs, lost these extra SNAP benefits as a result of the change, following February 2023 issuances (USDA, 2023a). States that issued February 2023 EAs in March 2023 were allowed to do so. Compared to 2019 levels, the average person in 2023 lost about $90 a month in SNAP benefits (Rosenbaum et. al., 2023). Additionally, around 32 million people received fewer SNAP benefits after the end of EAs (Brown et. al., 2023). Separately in October 2021, the USDA revised the Thrifty Food Plan, which raised SNAP benefit levels permanently by 21% (Center on Budget and Policy Priorities, 2023). However, this timeline does not interfere or overlap with this paper's analyses of January to July 2023.

Given SNAP benefits make up over 60% of the average food-at-home expenditures of SNAP households (Tiehen et. al., 2017), it is important to analyze the impact of the largest and most recent reduction of SNAP benefits. Using the US Census Bureau's Household Pulse Survey, we conduct a national analysis using data from January to July 2023. The analysis finds that reducing SNAP benefits increases food insufficiency among SNAP participants, especially in the third, fourth, and fifth months with reduced SNAP benefits. Increases in food insufficiency were mainly driven by higher income SNAP participants, who experienced higher reductions in SNAP benefits than lower income SNAP participants (who were already receiving maximum benefits). Female, Black, and less educated respondents were also especially impacted, in addition to adults (aged 25 to 64) and those living in cities or northeastern US. This could be attributed to several possible reasons, such as associations with lower financial literacy (Carman & Zamarro, 2016), lower community support (Doustmohammadian et. al., 2022), and food access anxiety (Clay & Rogus, 2021). In addition, we do not find evidence that changes in participation in other government social safety net programs (i.e., unemployment insurance,

rental assistance, school EBT, and Women, Infants, and Children (WIC)) confounded the effect of the SNAP benefits reduction on food insufficiency. All things considered, this paper confirms the positive effect that higher SNAP benefits have on food sufficiency and implies the insufficiency of current levels of SNAP disbursed.

This paper is also consistent with relevant studies on the estimated effects of decreasing SNAP benefits on food insufficiency. For instance, two other studies revealed that estimates of food insufficiency increased by 3.18 pp (Sanjeevi & Monsivais, 2023) to 5 pp (Richterman et. al., 2023) when looking at the states that discontinued SNAP EAs before March 2023. The first and only other SNAP benefit cut occurred in 2013, and after this cut, food insecurity similarly significantly rose in SNAP households by 3.7 pp (Katare & Kim, 2017). These studies together suggest the causal, negative effects SNAP benefit cuts have on food sufficiency. This paper contributes to the literature by examining the dynamic impact of ending extra SNAP benefits on food insufficiency, while identifying demographics that were most impacted by the SNAP benefits reduction. To the best of our knowledge, we are also the first to identify the impacts of the 2023 national SNAP benefit cut on food insufficiency.

Chapter 2

Data

The US Census Bureau's Household Pulse Survey (HPS) collects national household data to assess the emergent social and economic impacts of the COVID-19 pandemic. Since April 2020, the HPS has collected household information on a variety of topics, including food insufficiency, education, and vaccinations. One adult aged 18 years or older from each household is randomly selected to complete the survey, which is open for two weeks within each four-week cycle. Appendix A lists the specific survey collection weeks used in this study.

In all, 44,293 surveys from January 2023 to July 2023 were used for this analysis. We classified respondents by week and by state. The sample dataset is restricted to SNAP participants (the household received SNAP in the past 7 days) and income-eligible SNAP nonparticipants (did not receive SNAP in the past 7 days and the ratio of household income to the poverty threshold was 200% or less). Next, the sample dataset is further restricted to the 32 states and DC impacted by the end of EAs. In order to produce nationally representative results, all regressions include survey weights.

Collected from the HPS, household income is reported in brackets of $10,000 to $50,000 increments, ranging from less than $25,000 to $200,000 and above. Following past studies (e.g., Restrepo, 2023), the ratio of household income to the poverty threshold is determined by dividing the highest income in a respondent's reported income bracket by the federal poverty line for the household size.[2] Other household characteristics collected from the HPS are age, marital status, number of household members 18 and older, number of household members under 18,

[2] A household income of $200,000 or above is coded as $200,000.

educational attainment, census region, status of living in a metropolitan area, race, sex, and Hispanic/non-Hispanic status.

The main, binary outcome analyzed in this study is reported household food insufficiency in the last seven days. Food insufficiency is defined by respondents confirming "sometimes not enough to eat" or "often not enough to eat" in the last seven days. Food sufficiency consists of the responses "enough, but not always the kinds of food I/we wanted to eat" or "enough of the kind of food I/we wanted to eat" in the last seven days. A more severe outcome analyzed was the binary measure of frequent food insufficiency, as reported by the selection of "often not enough to eat."[3]

To control for changes in food prices and unemployment, this analysis uses monthly data on regional unemployment rates and the Consumer Price Index (CPI) for Food at Home (FAH) and Food Away from Home (FAFH), as has been similarly done in another study (Restrepo, 2023). The data were collected from the *Bureau of Labor Statistics*.

[3] For reference, 25.02% and 7.73% of HPS respondents reported food insufficiency and severe food insufficiency in July 2023 in our sample, respectively.

Chapter 3

Methods

This analysis estimates the effects of reduced SNAP benefits on food insufficiency from January to July 2023. We analyze these estimated effects by the months after the last benefit month with EAs, each compared to before the end of EAs. See Appendix B1 for the last benefit month with EAs of each state.[4] The treatment group is households that participate in SNAP, while the control group is households that do not but are income eligible. Using the Household Pulse Survey, we set up a difference in difference (DID) framework and use ordinary least squares to estimate a linear probability model:

$$F_{it} = \alpha_0 + \alpha_1 SNAP_{it} + \sum_{m=1}^{5} \delta_m SNAP_i \times Drop_m + \alpha_2 X'_{it} + \delta_t + \varepsilon_{irt}$$

where F_{it} is a binary measure of food insufficiency in the last seven days for household *i* at time *t*; $SNAP_{it}$ is an indicator variable equal to 1 if household *i* received SNAP in the past 7 days; $Drop_m$ is a vector of indicator variables for the number of months after EAs ended[5]; X_{it} is a vector of time-varying individual, household, and regional characteristics (age and its square, marital status, educational attainment, race, Hispanic/non-Hispanic, sex, number of household members 18 and older, number of household members under 18, the ratio of family income to the poverty threshold, census region, and whether living in a metropolitan area, regional unemployment rate, regional FAH CPI, FAFH CPI); δ_t represents week fixed effects that control for seasonal variations; and ε_{irt} is a random error term. To generate nationally representative

[4] The last benefit month with SNAP EAs was February 2023 for 21 states and DC and March 2023 for 11 states.
[5] For the states that ended EAs after February 2023, there are five months after EA ends (March-July). For the states that ended EAs after March 2023, there are four months after (April-July).

estimates from HPS survey answers, all regression analyses utilize the HPS survey weights, which account for nonresponse, adults per household, and survey coverage.

The vector δ_m is the primary coefficient of interest and estimates the average change in food insufficiency due, at least partially, to decreasing SNAP benefits for individual months following the cut in EAs, when each is compared to before the reduction.[6] The coefficient α_1 estimates the average impact of SNAP participation on food insufficiency in the pre-period.

[6] For the states in which EAs were last dispensed in February 2023, before the reduction refers to January and February 2023. For the states in which EAs were last dispensed in March 2023, before the reduction refers to January, February, and March 2023.

Chapter 4

Results

Main Findings

Table 1 shows the descriptive statistics for individual, household, and regional characteristics for the overall sample. The descriptive statistics are also separated by SNAP participation status before the SNAP benefits reduction and after the SNAP benefits reduction. As indicated in the table, there are statistically significant differences by SNAP participation status in age and marital status across both time periods, for example. To account for these differences in demographics, economic conditions, and food prices, the characteristics listed in Table 1 are controlled for in all regression analyses.

Table 1. Descriptive statistics for overall sample

	Overall		Nonparticipants Before EA Ends		SNAP Participants Before EA Ends		Nonparticipants After EA Ends		SNAP Participants After EA Ends	
	Mean or % (1)	SD	Mean or % (2)	SD	Mean or % (3)	SD	Mean or % (4)	SD	Mean or % (5)	SD
Dependent variables										
Food insufficiency	0.257		**0.228**		**0.293**		**0.236**		**0.340**	
Severe food insufficiency	0.070		**0.061**		**0.073**		**0.062**		**0.102**	
Individual and household characteristics										
Age	49.45	0.156	**49.96**	**0.299**	**48.26**	**0.410**	**49.79**	**0.238**	**48.35**	**0.371**
Married	0.314		**0.340**		**0.243**		**0.345**		**0.224**	
Number of household members ≥18 yrs	2.246	0.011	**2.309**	**0.021**	**1.977**	**0.028**	**2.337**	**0.017**	**2.036**	**0.025**
Number of household members < 18 yrs	0.855	0.010	**0.758**	**0.019**	**1.119**	**0.037**	**0.773**	**0.014**	**1.093**	**0.028**
Educational attainment										
Less than high school	0.051		0.049		0.056		0.052		0.051	
Some high school	0.103		**0.111**		**0.110**		**0.092**		**0.120**	

High school or equivalent	0.414		**0.404**		**0.448**		**0.409**		**0.427**	
Some college	0.218		**0.214**		**0.220**		**0.218**		**0.224**	
Associate degree	0.087		0.084		0.083		**0.088**		**0.092**	
Bachelor's degree	0.086		**0.094**		**0.054**		**0.096**		**0.060**	
Graduate degree	0.040		**0.046**		**0.029**		**0.045**		**0.026**	
Census region										
Northeast	0.211		**0.200**		**0.286**		**0.186**		**0.258**	
South	0.318		**0.308**		**0.274**		**0.346**		**0.274**	
West	0.259		0.305		0.251		**0.238**		**0.254**	
Midwest	0.212		**0.187**		**0.189**		**0.230**		**0.214**	
Metropolitan	0.318		0.328		0.332		0.311		0.316	
Race/ethnicity										
White	0.702		**0.722**		**0.648**		**0.726**		**0.631**	
Black	0.170		**0.148**		**0.232**		**0.147**		**0.239**	
Asian	0.049		**0.064**		**0.024**		**0.052**		**0.031**	
Other	0.079		**0.066**		**0.096**		**0.075**		**0.100**	
Hispanic	0.244		0.252		0.208		0.258		0.212	
Male	0.383		**0.417**		**0.285**		**0.412**		**0.302**	
Ratio of family income to the poverty threshold	1.371	0.003	**1.408**	**0.006**	**1.283**	**0.010**	**1.405**	**0.004**	**1.267**	**0.008**
Region FAFH CPI	350.2	0.065	345.8	0.152	345.3	0.233	**352.4**	**0.068**	**353.1**	**0.110**
Region FAH CPI	301.7	0.092	300.8	0.220	299.8	0.336	**302.2**	**0.116**	**303.0**	**0.202**
Region unemployment rate	0.036	0.000	**0.037**	**0.000**	**0.037**	**0.000**	**0.035**	**0.000**	**0.035**	**0.000**
Observations	44,293		11,842		4,274		20,886		7,291	

Note: These summary statistics for individuals with responses for all listed variables are calculated using HPS survey weights. T-tests were used to find whether means of variables in columns 2 and 3 were significantly different from each other and whether means of variables in columns 4 and 5 were significantly different from each other. Means of variables are in bold if they are significantly different from each other at the 10% level or lower.

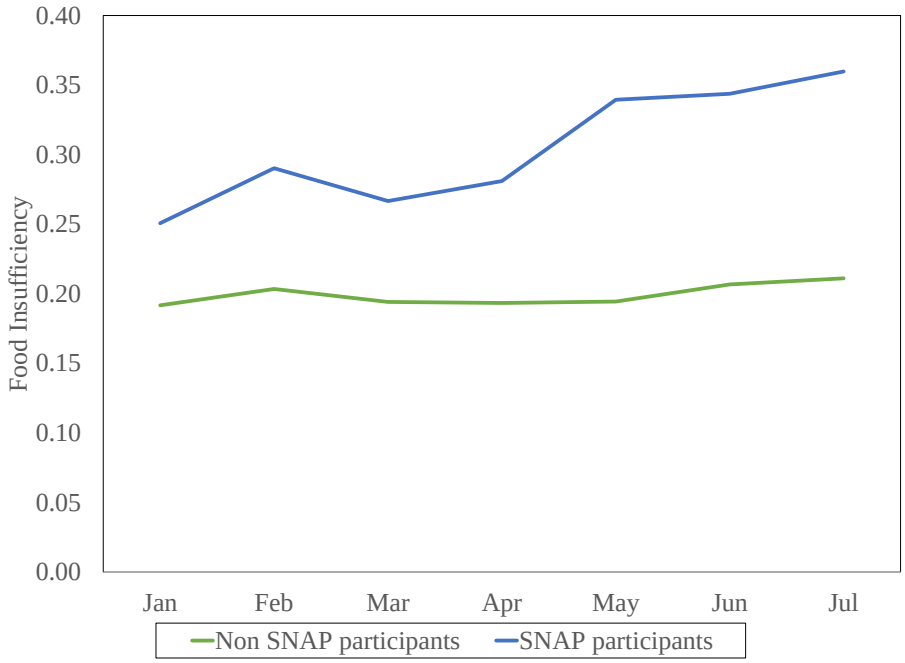

Figure 1. Average monthly food insufficiency rates from January-July 2023

Figure 1 presents the reported monthly food insufficiency for January-July 2023. While SNAP nonparticipants reported a nearly constant level of food insufficiency, SNAP participants, on average, reported higher and increasing levels of food insufficiency after EAs were eliminated. A key identifying assumption of the DID methods is that, in the absence of treatment, treated and control units would have parallel trends. Although this assumption is not directly testable, we can analyze trends in the pre-period for treated and control groups. Figure 1 visually confirms the assumption of the parallel trend of food insufficiency: prior to the 2023 SNAP benefit cut, the difference in food insufficiency between SNAP participants and nonparticipants was constant over time. We also statistically test the parallel trends assumption in Appendix B2, and the results fail to reject parallel trends in the pre-period. This supports the validity of the DID empirical approach and ensures the regression estimates for the causal treatment effects are generally unbiased.

Table 2. Estimated effects of SNAP benefits reduction on food insufficiency measures

Dep Var	Food Insufficiency	Severe Food Insufficiency
SNAP	0.0086	-0.00501
	(0.0135)	(0.0080)
SNAP × 1 Month After	-0.0183	0.0057
	(0.0248)	(0.0137)
SNAP × 2 Months After	0.0132	0.0468***
	(0.0243)	(0.0178)
SNAP × 3 Months After	0.0757***	0.0266*
	(0.0251)	(0.0159)
SNAP × 4 Months After	0.0748***	0.0222
	(0.0242)	(0.0153)
SNAP × 5 Months After	0.0862***	0.0348*
	(0.0297)	(0.0192)
Observations	44,293	44,499

Note: These regressions were estimated using HPS survey weights. Standard errors are shown in parentheses. *, **, and *** respectively mean significance at the 10%, 5%, and 1% level.

In Table 2, the regression analysis shows the estimated effects of the SNAP benefits reduction on food insufficiency, where the impact is persistent even into the fifth month after the end of EAs. The SNAP benefits reduction caused an increase in overall food insufficiency by 7.57 pp after three months, 7.48 pp after four months, and 8.62 pp after five months, each compared to the before period. The second column of Table 2 presents the same estimated effects but for severe food insufficiency, which increased one month earlier but less than overall food insufficiency estimates. Severe food insufficiency increased by 4.68 pp, 2.66 pp, and 3.48 pp two, three, and five months after the SNAP benefits reduction, respectively. One explanation for this discrepancy could be that those facing severe food insufficiency would react quicker to food budget changes, while current SNAP levels protect participants better from severe than overall food insufficiency. Appendix B3 provides a robustness check and reruns this analysis but only for the states in which EAs ended after February 2023, confirming that these results are robust.

Heterogeneity Analysis

SNAP participants with lower household incomes were likely to have already been receiving maximum SNAP benefits for their household size and would at most receive $95 in EAs. On the other hand, SNAP participants with higher household incomes were likely to have received a larger increase in SNAP benefits through EAs. Therefore, there is a heterogeneous SNAP benefit cut by household income, and Tables 3 and 4 re-estimate the regression analysis to investigate how this affects the prevalence of food insufficiency based on two subsamples:

1. Comparing all income-eligible SNAP nonparticipants with SNAP participants whose ratio of monthly household income to the poverty threshold was *above* the 50th percentile for SNAP participants [> 127%] (Table 3)
2. Comparing all income-eligible SNAP nonparticipants with SNAP participants whose ratio of monthly household income to the poverty threshold was *below* the 50th percentile for SNAP participants [<= 127%] (Table 4)

Table 3. Estimated effects of SNAP benefits reduction on food insufficiency measures (comparing income-eligible nonparticipants with higher income SNAP participants)

Dep Var	Food Insufficiency	Severe Food Insufficiency
SNAP	0.0117	-0.0016
	(0.0166)	(0.0099)
SNAP × 1 Month After	-0.0143	0.0079
	(0.0289)	(0.0181)
SNAP × 2 Months After	0.0100	0.0371*
	(0.0301)	(0.0213)
SNAP × 3 Months After	0.0806***	0.0099
	(0.0300)	(0.0174)
SNAP × 4 Months After	0.0919***	0.0333*
	(0.0302)	(0.0201)
SNAP × 5 Months After	0.0564	0.0318
	(0.0343)	(0.0230)

Observations	31,758	31,894

Note: These regressions were estimated using HPS survey weights. Standard errors are shown in parentheses. *, **, and *** respectively mean significance at the 10%, 5%, and 1% level.

Table 4. Estimated effects of SNAP benefits reduction on food insufficiency measures (comparing income-eligible nonparticipants with lower income SNAP participants)

Dep Var	Food Insufficiency	Severe Food Insufficiency
SNAP	0.0086	-0.0013
	(0.0192)	(0.0127)
SNAP × 1 Month After	-0.0224	-0.0130
	(0.0332)	(0.0176)
SNAP × 2 Months After	0.0039	0.0375
	(0.0336)	(0.0254)
SNAP × 3 Months After	0.0540	0.0250
	(0.0360)	(0.0236)
SNAP × 4 Months After	0.0391	0.0057
	(0.0333)	(0.0216)
SNAP × 5 Months After	0.1000**	0.0454
	(0.0415)	(0.0277)
Observations	19,116	19,219

Note: These regressions were estimated using HPS survey weights. Standard errors are shown in parentheses. *, **, and *** respectively mean significance at the 10%, 5%, and 1% level.

The estimates of the interactions between SNAP participation and the month dummies are generally higher in Table 4 than in Table 3. Among higher income SNAP participants, the SNAP benefits reduction increased food insufficiency by 8.06 pp after three months and 9.19 pp after four months (Table 3). These results are all significant at the 1% level. For all SNAP participants, these estimates were 7.57 pp after three months and 7.48 pp after four months (Table 2). In contrast, the estimates of the interactions between SNAP participation and the month dummies in Table 4 are generally lower and statistically insignificant. For instance, the SNAP benefits reduction only increased lower income SNAP participants' food insufficiency rates after five months. These results altogether suggest that the regression estimates in Table 2 are mainly driven by higher income SNAP participants.

Table 5. Estimated effects of SNAP benefits reduction on overall food insufficiency for selected household and individual characteristics

Subsample	Less Than Bachelor's Degree	Bachelor's Degree or Above	Northeast	South	West	Midwest	Metropolitan	Non-Metropolitan	White	Black
SNAP	0.0019	0.0584***	-0.00167	0.0127	0.0262	0.0074	0.0042	0.0110	0.0267*	-0.0606*
	(0.0148)	(0.0220)	(0.0286)	(0.0257)	(0.0250)	(0.0280)	(0.0250)	(0.0159)	(0.0158)	(0.0314)
SNAP × 1 Month After	-0.0250	0.0407	-0.0222	-0.0890**	0.0198	0.0132	0.0543	-0.0550**	-0.0196	0.0287
	(0.0267)	(0.0426)	(0.0492)	(0.0420)	(0.0471)	(0.0455)	(0.0494)	(0.0263)	(0.0274)	(0.0519)
SNAP × 2 Months After	0.0231	-0.0905***	0.0269	0.0011	-0.0053	0.0108	0.0102	0.0148	0.0028	0.0245
	(0.0267)	(0.0328)	(0.0511)	(0.0473)	(0.0436)	(0.0513)	(0.0455)	(0.0285)	(0.0280)	(0.0586)
SNAP × 3 Months After	0.0752***	0.0680	0.1010*	0.0776*	0.0412	0.0552	0.0741	0.0741**	0.0603**	0.1580***
	(0.0273)	(0.0458)	(0.0520)	(0.0443)	(0.0498)	(0.0532)	(0.0474)	(0.0296)	(0.0296)	(0.0557)
SNAP × 4 Months After	0.0767***	0.0509	0.0431	0.0917**	0.0384	0.1540***	0.0884**	0.0688**	0.0646**	0.1900***
	(0.0265)	(0.0405)	(0.0486)	(0.0446)	(0.0477)	(0.0493)	(0.0429)	(0.0292)	(0.0287)	(0.0555)
SNAP × 5 Months After	0.0962***	-0.0408	0.2090***	0.0344	0.0621	0.0486	0.1450**	0.0595*	0.0806**	0.0883
	(0.0321)	(0.0448)	(0.0684)	(0.0504)	(0.0497)	(0.0539)	(0.0569)	(0.0337)	(0.0344)	(0.0696)
Observations	32,834	11,459	8,219	13,116	14,401	8,557	12,997	31,296	33,076	6,010

Table 5. (Continued)

Subsample	Asian	Other	Hispanic	Non-Hispanic	Female	Male	Youth (>=18 and <=24)	Adults (>24 and <65)	Seniors (>=65)
SNAP	0.1090	-0.0119	-0.0062	0.0154	-0.0033	0.0406	0.0058	0.0011	0.0350
	(0.0974)	(0.0461)	(0.0334)	(0.0145)	(0.0152)	(0.0276)	(0.0579)	(0.0163)	(0.0256)
SNAP × 1 Month After	0.0843	-0.1330*	-0.0120	-0.0171	0.0065	-0.0719	-0.1110	-0.0078	-0.0207
	(0.1530)	(0.0747)	(0.0653)	(0.0240)	(0.0254)	(0.0529)	(0.0907)	(0.0275)	(0.0429)
SNAP × 2 Months After	-0.00282	0.0526	-0.0138	0.0231	0.0035	0.0239	-0.0845	0.0136	0.0306
	(0.1240)	(0.0914)	(0.0543)	(0.0265)	(0.0272)	(0.0494)	(0.0764)	(0.0286)	(0.0519)
SNAP × 3 Months After	-0.2550*	0.1320	0.0910	0.0598**	0.0967***	0.0265	0.1520	0.0812***	0.0409
	(0.1540)	(0.0835)	(0.0759)	(0.0255)	(0.0292)	(0.0485)	(0.1170)	(0.0303)	(0.0451)
SNAP × 4 Months After	-0.2430*	0.0096	0.0116	0.0886***	0.0959***	0.0219	-0.0703	0.0752***	0.0986*
	(0.1320)	(0.0809)	(0.0619)	(0.0254)	(0.0279)	(0.0471)	(0.0970)	(0.0284)	(0.0512)
SNAP × 5 Months After	0.1390	0.1150	0.1200	0.0734**	0.0770**	0.0953	-0.0061	0.1010***	0.0101
	(0.2250)	(0.0957)	(0.0754)	(0.0311)	(0.0336)	(0.0581)	(0.1200)	(0.0351)	(0.0512)
Observations	1,902	3,305	6,871	37,422	30,374	13,919	1,917	29,941	12,435

Note: These regressions were estimated using HPS survey weights. Standard errors are shown in parentheses. *, **, and *** respectively mean significance at the 10%, 5%, and 1% level.

Aside from household income, there may be a heterogeneous food insufficiency impact by educational attainment, census region, status of living in a metropolitan area, race/ethnicity, sex, and age. For example, minority groups may be disproportionately affected by socioeconomic disparities in healthcare, education, and employment, leading to food affordability challenges (Hall, 2023). In addition, financial illiteracy could exacerbate food insufficiency through poor budgeting, especially among those with less educational attainment (Carman & Zamarro, 2016). Women may also be more sensitive to food budget changes and household food needs, given their frequent role in managing household finances and food purchases (Matheson & McIntyre, 2014). Thus, certain demographics might be particularly vulnerable to reductions in SNAP benefits. Table 5 re-estimates the regression analysis on overall food insufficiency using subsamples for the given household and individual characteristics. Appendix B4 lists these subsamples and their changes in *severe* food insufficiency due to the SNAP benefits reduction.

Respondents with lower educational attainment, specifically less than a bachelor's degree, faced higher increases in food insufficiency due to the SNAP benefits reduction, compared to respondents with higher educational attainment. In fact, respondents with bachelor's and graduate degrees saw food insufficiency decreases after the end of EAs, on average. For those living in metropolitan areas, the SNAP benefits reduction caused a statistically significant increase in food insufficiency by 8.84 pp after four months and 14.5 pp after five months. Meanwhile, non-metropolitan households experienced comparatively lower increases of 7.41 pp after three months, 6.88 pp after four months, and 5.95 pp after five months. Among census regions, respondents in the northeastern US were especially negatively impacted, with food insufficiency increases of 10.1 pp after three months and 20.9 after five months. Black

respondents, compared to those of other ethnicities, including Hispanic, faced considerably high increases of 15.8 pp after three months and 19.0 pp after four months. For female respondents, the SNAP benefits reduction caused significant increases in food insufficiency of 9.67 pp after three months, 9.59 pp after four months, and 7.70 pp after five months. Notably, there were no statistically significant increases for male respondents. Lastly, adults were negatively impacted more than youth and seniors.

Possible explanations for higher food insufficiency increases among certain demographics may include associations with lower financial literacy, lower community support and safety, and/or higher food access worry. For instance, households without financial and budgeting knowledge may be less resilient to food budget changes. This may be especially evident among low income and less educated households (Carman & Zamarro, 2016). Additionally, households living in unsafe neighborhoods or lacking social support from their community may be more vulnerable to food insufficiency. Community support, such as help from family and neighbors, nutrition programs, and food vouchers, improves food access, availability, and utilization (Doustmohammadian et. al., 2022). Meanwhile, safety in a community increases the perceived ability to maintain food sufficiency (Nagao-Sato et. al., 2021). Furthermore, higher food access worry has a bidirectional relationship with food insufficiency (Nagata et. al., 2022; Clay & Rogus, 2021). Individuals who are more anxious about food access, such as female and adult (aged 25 to 64) respondents potentially, may be more inclined to report food insufficiency as a result.

Mechanisms

The HPS data also includes indicators of participation in other government programs, such as school meals, governmental rental assistance, unemployment insurance, and Women, Infants, and Children (WIC) in the last seven days. Participation in these government safety net programs may also affect the availability of food in the household for SNAP participants, and extra support could allow a household to free up more of its budget to spend on food. The end of SNAP EAs may be concurrent with phasing out other social welfare programs due to the end of the public health emergency. Therefore, a set of outcomes like unemployment insurance, WIC, school meals, and governmental rental assistance was also analyzed to estimate the effects of SNAP benefits reduction on participation in these programs.

Table 6. Estimated effects of SNAP benefits reduction on participation in governmental safety net programs

Dep Var	Unemployment insurance	Women, Infants, and Children (WIC)	School EBT	Governmental rental assistance
SNAP	0.0145**	0.0582***	0.1340***	0.1140***
	(0.0059)	(0.0077)	(0.0113)	(0.0095)
SNAP × 1 Month After	-0.0104	0.00325	0.0041	0.0023
	(0.0083)	(0.0155)	(0.0248)	(0.0182)
SNAP × 2 Months After	-0.0063	0.0367**	-0.0102	-0.0246
	(0.0100)	(0.0172)	(0.0216)	(0.0166)
SNAP × 3 Months After	0.0017	0.0156	0.0018	0.0188
	(0.0124)	(0.0146)	(0.0211)	(0.0187)
SNAP × 4 Months After	-0.0102	0.0000	-0.0031	-0.0041
	(0.0081)	(0.0137)	(0.0196)	(0.0159)
SNAP × 5 Months After	-0.0140	0.0172	-0.0174	0.0330
	(0.0105)	(0.0187)	(0.0240)	(0.0242)

Observations	44,499	44,499	44,499	44,499

Note: These regressions were estimated using HPS survey weights. Standard errors are shown in parentheses. *, **, and *** respectively mean significance at the 10%, 5%, and 1% level.

Table 6 shows that after the 2023 SNAP benefits reduction, SNAP participants were overall not more likely to receive unemployment insurance, participate in WIC, receive free or reduced-price school meals, or receive governmental assistance. The $SNAP \times Month$ interaction effects do not show significance from zero. The exception is for WIC, which shows some significance only in the second month after the end of EAs. These findings suggest that the increase in food insufficiency when SNAP benefits decreased is overall not being confounded by other government programs that offer food or cash assistance to low-income people.

Chapter 5

Discussion and Conclusions

This paper finds evidence that the reduction of SNAP benefits as a result of EA elimination increased the prevalence of food insufficiency, starting after three months. This direction is in line with SNAP's causal protective impact on food sufficiency. The 2023 SNAP benefits reduction increased the food insufficiency of SNAP participants by 7.57 pp after three months, 7.48 pp after four months, and 8.62 pp after five months, each compared to before the benefits decrease (Table 2). In particular, the main driver of these results is higher income SNAP participants, who were more likely than lower income SNAP participants to lose SNAP benefits following the reductions. This is because they were more likely to have received a higher amount of EAs, since their SNAP benefits could be much lower than maximum benefits due to their higher income bracket. Among higher income SNAP participants, food insufficiency increased by 8.06 pp after three months and 9.19 pp after four months, as a result of the SNAP benefits reduction (Table 3). Among these results, severe food insufficiency generally increased earlier but less than overall food insufficiency. This could be due to a quicker response to food budget reductions when one is facing severe food insufficiency. Also, current SNAP levels may protect against severe more than overall food insufficiency due to at least some food budget being alleviated.

Other strong drivers of this analysis are the following characteristics: female, Black, less educated, metropolitan, adult (aged 25 to 64), and in the northeastern US (Table 5). Possible reasons could be a combination of factors, such as differences in budgeting skills and financial literacy, less community support and safety, and higher food access worries. While financial illiteracy negatively impacts a household's ability to save for sufficient food budgets, less

community support and safety can exacerbate the financial and time costs of food access. Furthermore, food access anxiety influences perceptions of food access and can increase willingness to report food insufficiency. For instance, the SNAP benefits reduction, among female respondents, increased food insufficiency by 9.67 pp after three months, 9.59 pp after four months, and 7.70 pp after five months (Table 5). There were no statistically significant increases for male respondents, on the other hand. Women respondents were more sensitive to the SNAP benefits reduction than men respondents since they may be more likely to make household food decisions and therefore be more aware of food budget changes (Matheson & McIntyre, 2014). Women may also perceive less stigma in reporting food insufficiency, compared to men. Lastly, it is noteworthy that all results are generally not attributed to concurrent participation changes in other government assistance programs such as unemployment insurance, school meals, WIC, or rental assistance (Table 6).

The underreporting of SNAP due to reasons like stigma is one source of potential bias in our estimates. Self-reporting itself presents a reporting error. Future research could employ an instrumental variable strategy that could better address this measurement error.

Another consideration is heterogeneous SNAP participation changes in reaction to SNAP benefit cuts. For example, the elimination of EAs may lead to lower participation due to lower benefits received, meaning remaining SNAP participants (e.g., lower income) probably have the greatest need. Hence, our results likely provide an upper bound. A last consideration is the digitization of SNAP benefits, which may lower food insufficiency by mitigating food access barriers (Jones et. al., 2023). By April 2022, 49 states and DC, however, already allowed SNAP benefits to be used for online transactions (Moran, 2023).[7] Therefore, the impact of the

[7] In June 2023, Alaska became the last state to expand to SNAP online purchasing (USDA, 2023b).

expansion of SNAP online purchasing on our results is likely to be minimal. Similarly, the Pandemic Electronic Benefit Transfer (P-EBT) program was established during the COVID-19 pandemic, and eligible school children received SNAP benefits equal to the value of school meals missed due to school closures. Bauer et. al. (2020) found that, among school-age children, P-EBT reduced food hardship by 30% in the following week after disbursement. Still, P-EBT is unlikely to change our results, since K-12 schools reopened as early as 2020 (USDA, 2023c).

It is worthwhile to compare our results with other recent studies on the impact of SNAP benefit changes. Restrepo (2023) reported an 8.6 pp reduction in food insecurity as a result of the adoption of SNAP EAs during the COVID-19 pandemic, comparing 2019 to August-December 2020 data. He further found that these results were mainly driven by higher income SNAP participants. Using DID models to analyze HPS data, Richterman et. al. (2023) revealed that, from August 2020 to February 2023, the end of EAs was associated with increases of 5 pp overall and 6 pp child food insufficiency. From December 2021 through January 2023, Sanjeevi & Monsivais (2023) found a 3.18 pp increase as a result of the EA discontinuation in a two-way fixed effects model, but their results are not robust using an alternative Callaway-Sant'Anna approach. Lavallee et. al. (2023) focused on Nebraska and looked at the rejection of EAs for SNAP households from August to November 2020, using data from the HPS, the USDA, and the Population Estimates Program (PEP). This was associated with a 1.61 pp increase in food insecurity based on a synthetic control methods (SCM) empirical approach.

Another study looked at the effects of the first and only other SNAP benefit cut, using data from the 2012-2014 Current Population Survey – Food Security Supplement (CPS-FSS). After using DID estimation to compare December 2012 to December 2014 data, Katare and Kim (2017) found that the 2013 SNAP benefit cut caused a 3.7 pp increase in overall food insecurity

and a 3.1 pp increase in severe food insecurity. Their estimates are smaller than ours possibly due to 1) a farther-away time period (one year after the SNAP benefits reduction vs. three to five months after in our study) and 2) a smaller benefit cut. For reference, the 2013 benefit cut, in which a 16% increase in SNAP benefits expired for most SNAP participants, caused a household of four to lose $36 per month in benefits (Katare & Kim, 2017).[8] In comparison, the 2023 EA expiration generated around $90 in benefit losses on average (Rosenbaum et. al., 2023).

Compared to the literature, the main strength of this study is that it provides a dynamic look at food insufficiency changes over time. We do so by analyzing the most recent and largest reduction of EA benefits, using data from January to July 2023. Lastly, heterogeneity analyses identify demographics that are especially impacted by the SNAP benefits reduction.

Our results imply that current levels of SNAP are insufficient to counter the food insufficiency experienced in the US, warning against any future cuts. Aside from the amount dispensed, SNAP could be insufficient due to other factors like the time cost of preparing meals, which is not considered when determining how much a household receives in SNAP benefits (Davis & You, 2010; Davis, 2021). Different costs of living also do not influence the amount of SNAP disbursed (Christensen & Bronchetti, 2020; Davis et. al., 2020; Gundersen et. al., 2019). One policy consideration is researching and implementing more local food programs, such as fresh produce and nutrition education programs, which enhance community support to access and purchase food. The role of health services in food sufficiency and security through nutrition education and healthy diet prescriptions can also be strengthened.

[8] $36 in 2013 was worth $46.54 in 2023 using CPI adjustment.

Appendix A

Household Pulse Survey Collection Weeks

This study used surveys collected from the following HPS weeks in 2023:

- Jan 4 – Jan 16
- Feb 1 – Feb 13
- Mar 1 – Mar 13
- Mar 29 – Apr 10
- Apr 26 – May 8
- Jun 7 – Jun 19
- Jun 28 – Jul 10

Appendix B1

Last Benefit Month with EAs by State

Last Benefit Month with EAs	State
March 2021	ID
May 2021	ND
June 2021	AR
July 2021	MT, FL, NE, SD
August 2021	MO
December 2021	TN, MS
March 2022	IA
April 2022	WY, KY, AZ
May 2022	GA, IN
August 2022	AK
January 2023	SC
February 2023	CO, CT, DE, DC, IL, LA, ME, MD, MI, NJ, NM, NY, OH, OK, OR, RI, TX, UT, VA, WA, WV, WI
March 2023	AL, CA, HI, KS, MA, MN, NV, NH, NC, PA, VT

Note: Data are from "Recent Changes to SNAP Benefit Amounts," by the USDA, 2023 (https://www.fns.usda.gov/SNAP/2023-benefit-changes). In the public domain. This study only examines the states in which the last benefit month with EAs was February or March 2023.

Appendix B2

Parallel Trends Check

Dep Var	Food Insufficiency	Severe Food Insufficiency
Trend	0.0240	0.0188*
	(0.0177)	(0.0104)
Trend × SNAP	0.0101	-0.0035
	(0.0100)	(0.0057)
Observations	13,962	14,030

Note: These regressions were estimated using HPS survey weights. Standard errors are shown in parentheses. *, **, and *** respectively mean significance at the 10%, 5%, and 1% level.

We statistically test the parallel trends assumption used in this study's regressions. First, the dataset is restricted to the last two months before the SNAP benefits reduction.[9] Next, we conduct a DID estimation to compare food insufficiency trends of SNAP participants with income-eligible nonparticipants. The treatment group is households that participate in SNAP, while the control group is households that do not but are income-eligible. Neither $Trend \times SNAP$ estimates are significant for overall and severe food insufficiency, and these results show that, before the SNAP benefits reduction, the food insufficiency trends of SNAP participants and income-eligible nonparticipants were not significantly different. Thus, the parallel trends assumption is upheld.

[9] For the states that ended EAs after February 2023, the $Trend$ variable is defined as zero for January 2023 and one for February 2023. For the states that ended EAs after March 2023, the $Trend$ variable is defined as zero for February 2023 and one for March 2023.

Appendix B3

Estimated effects of SNAP benefits reduction on food insufficiency using states ending EA in February only

Dep Var	Food Insufficiency	Severe Food Insufficiency
SNAP	0.0129	-0.0194**
	(0.0135)	(0.0080)
SNAP × 1 Month After	-0.0183	0.0444**
	(0.0248)	(0.0137)
SNAP × 2 Months After	-0.0209	0.0537**
	(0.0243)	(0.0178)
SNAP × 3 Months After	0.1020***	0.0345*
	(0.0251)	(0.0159)
SNAP × 4 Months After	0.0856***	0.0508**
	(0.0242)	(0.0153)
SNAP × 5 Months After	0.0825**	0.0507**
	(0.0297)	(0.0192)
Observations	29,575	29,710

Note: These regressions were estimated using HPS survey weights. Standard errors are shown in parentheses. *, **, and *** respectively mean significance at the 10%, 5%, and 1% level.

This robustness check re-estimates the regression analysis used in Table 2 and reduces the sample to the states in which EAs ended in February 2023. This excludes the 11 states in which February 2023 EAs were dispensed in March 2023. For overall food insufficiency, the results show higher increases that similarly start three months after the SNAP benefits reduction, compared to Table 2. For severe food insufficiency, there are sustained 3 to 5 pp increases from immediately one month to five months after the reduction, compared to the before period. These results show that our Table 2 results are robust, in that food insufficiency significantly increased due to the SNAP benefits reduction.

Appendix B4

Estimated effects of SNAP benefits reduction on severe food insufficiency for selected household and individual characteristics

Subsample	Less Than Bachelor's Degree	Bachelor's Degree or Above	Northeast	South	West	Midwest	Metropolitan	Non-Metropolitan	White	Black
SNAP	-0.0062	0.0034	-0.0239	-0.0022	0.0094	-0.0026	-0.0133	-0.0006	0.0079	-0.0341*
	(0.0088)	(0.0107)	(0.0165)	(0.0138)	(0.0165)	(0.0155)	(0.0150)	(0.0092)	(0.0090)	(0.0206)
SNAP × 1 Month After	0.0064	-0.0041	0.0049	0.0041	-0.0077	0.0250	0.0502*	-0.0181	0.0007	0.0418
	(0.0149)	(0.0190)	(0.0339)	(0.0207)	(0.0220)	(0.0293)	(0.0301)	(0.0135)	(0.0163)	(0.0309)
SNAP × 2 Months After	0.0524***	-0.0061	0.0719*	0.0446	0.0346	0.0269	0.0687*	0.0353*	0.0427**	0.0651
	(0.0196)	(0.0174)	(0.0373)	(0.0360)	(0.0308)	(0.0367)	(0.0372)	(0.0196)	(0.0198)	(0.0476)
SNAP × 3 Months After	0.0252	0.0313	0.0145	0.0235	0.0187	0.0474	0.0117	0.0300	0.0095	0.0777*
	(0.0173)	(0.0255)	(0.0338)	(0.0283)	(0.0317)	(0.0348)	(0.0263)	(0.0194)	(0.0168)	(0.0404)
SNAP × 4 Months After	0.0221	0.0175	0.0258	0.0182	-0.0023	0.0645*	0.0395	0.0126	0.0090	0.0650*
	(0.0167)	(0.0229)	(0.0324)	(0.0287)	(0.0258)	(0.0342)	(0.0281)	(0.0181)	(0.0184)	(0.0365)
SNAP × 5 Months After	0.0383*	-0.0179	0.0392	0.0290	0.1050***	-0.0007	0.0523	0.0259	0.0212	0.0419
	(0.0209)	(0.0181)	(0.0512)	(0.0333)	(0.0389)	(0.0297)	(0.0410)	(0.0211)	(0.0199)	(0.0486)
Observations	32,989	11,510	8,258	13,180	14,469	8,592	13,086	31,413	33,206	6,052

Appendix B4

(Continued)

Subsample	Asian	Other	Hispanic	Non-Hispanic	Female	Male	Youth (>=18 and <=24)	Adults (>24 and <65)	Seniors (>=65)
SNAP	0.0094	-0.0243	-0.0122	-0.0037	-0.0008	-0.0112	-0.0036	-0.0050	-0.0072
	(0.0543)	(0.0281)	(0.0172)	(0.0090)	(0.0091)	(0.0150)	(0.0310)	(0.0101)	(0.0117)
SNAP × 1 Month After	-0.0317	-0.0259	0.0532	-0.0047	-0.0039	0.0231	-0.0470	0.0135	-0.0079
	(0.0707)	(0.0408)	(0.0411)	(0.0127)	(0.0130)	(0.0332)	(0.0403)	(0.0170)	(0.0158)
SNAP × 2 Months After	-0.0088	0.04980	0.0315	0.0511**	0.0363*	0.0664*	-0.0301	0.0435**	0.0839**
	(0.0679)	(0.0609)	(0.0364)	(0.0203)	(0.0192)	(0.0379)	(0.0354)	(0.0208)	(0.0418)
SNAP × 3 Months After	-0.1030	0.0494	-0.0346	0.0375**	0.0182	0.0427	0.1330	0.0247	0.0143
	(0.0664)	(0.0550)	(0.0340)	(0.0177)	(0.0174)	(0.0328)	(0.0834)	(0.0202)	(0.0189)
SNAP × 4 Months After	-0.0538	-0.0138	-0.0042	0.0300*	0.0170	0.0335	-0.0305	0.0160	0.0398
	(0.0594)	(0.0458)	(0.0348)	(0.0168)	(0.0168)	(0.0316)	(0.0377)	(0.0192)	(0.0249)
SNAP × 5 Months After	-0.0437	0.0885	0.0161	0.0408*	0.0268	0.0449	0.0679	0.0319	0.0221
	(0.0591)	(0.0794)	(0.0339)	(0.0225)	(0.0217)	(0.0384)	(0.0819)	(0.0239)	(0.0262)
Observations	1,918	3,323	6,918	37,581	30,512	13,987	1,924	30,059	12,516

Note: These regressions were estimated using HPS survey weights. Standard errors are shown in parentheses. *, **, and *** respectively mean significance at the 10%, 5%, and 1% level.

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