Impacts of SNAP Benefit Increases on US Child Food Insufficiency During the COVID-19 Pandemic

Jiaxing Bao, MPA[1]; Daniel Kim, M.D., Dr.P.H.[1,2]
Author Affiliations:
[1]School of Community Health and Behavioral Sciences, Bouvé College of Health Sciences, Northeastern University, Boston
[2]School of Public Policy and Urban Affairs, Northeastern University, Boston

Word count: 1,712

Corresponding author: Jiaxing Bao, MPA, Department of Public Health and Health Sciences, School of Community Health and Behavioral Sciences, Bouvé College of Health Sciences, Northeastern University, 360 Huntington Ave, Boston, MA 02115 (bao.jiax@northeastern.edu).

Abstract

Background The COVID-19 pandemic reversed a decade of progress in reducing child food insufficiency in the United States. Congress implemented a universal 15% increase in Supplemental Nutrition Assistance Program (SNAP) benefits from January 2021 through September 2021 to address rising child food hardship.

Method We conducted a difference-in-differences analysis using U.S. Census Bureau data to evaluate the impact of this temporary expansion on child food insufficiency. We compared 9,776 SNAP-participating households with 18,961 eligible non-participating households, examining changes before and during the benefit expansion period while accounting for demographic and economic characteristics.

Results The expansion was associated with a 20% reduction in the odds of child food insufficiency among SNAP participants compared to eligible non-participants (OR = 0.80; 95% CI, 0.66-0.97). Hispanic-American households experienced a 39% reduction (OR = 0.61; 95% CI, 0.47-0.80), and households with six or more members showed a 33% reduction (OR = 0.67; 95% CI, 0.45-1.02).

Conclusions The 15% SNAP benefit expansion in 2021 effectively reduced child food insufficiency during the pandemic, with particularly strong protective effects among Hispanic-American and large households. These findings support a universal food benefit expansion improving child health needs during a national health and economic crisis.

Introduction

The Supplemental Nutrition Assistance Program (SNAP) is the nation's largest food assistance program and the United States Department of Agriculture's (USDA) largest spending program.[1] SNAP provides food benefits to low-income households via an Electronic Benefits Transfer (EBT) card, which functions like a debit card to purchase eligible food at authorized stores.[2] We use food insufficiency as the primary outcome, as it is the measure of food hardship available in our database and methodologically ideal for our research question. Defined by the USDA as a situation in which households sometimes or often did not have enough to eat, food insufficiency measures household food adequacy within the past seven days.[3] This short timeframe makes it a more sensitive indicator than a twelve months food insecurity measure for detecting immediate impacts of the SNAP benefit increase during the pandemic. Food hardship among children is linked to adverse health, social, and educational outcomes.[4] Prior to the coronavirus (COVID-19) pandemic, American households achieved substantial reductions in food insufficiency. Prevalence rates among households with children declined from a post-Great Recession peak of 14.9% in 2011 to 11.1% by 2018, returning to pre-recession levels.[5]

The COVID-19 pandemic sharply reversed this progress. The public health measures implemented in March 2020, including business closures and stay-at-home orders, led to severe economic impacts: the unemployment rate surged to 14.8% by April 2020, its highest rate since 1948.[6] Moreover, school closures eliminated access to the National School Lunch Program, a vital source of free lunches for nearly 30 million children.[7] These combined disruptions led national food insufficiency rates to rise to 14.8% in 2020, erasing a decade of progress.[8]

In response, the U.S. Congress implemented distinct phases of SNAP expansion. The initial response, the Families First Coronavirus Response Act in March 2020, introduced Emergency Allotments (EAs).[9] EAs were supplemental monthly payments raising a household's total SNAP benefit to the maximum amount allowed for their household size. This maximum benefit is the highest possible monthly allotment for a household of a specific size, and is adjusted annually by the federal government based on the cost of living.[10] EAs provided a "top-up" payment only to households whose regular benefit was below this maximum level. Consequently, while about 60% of SNAP participants received EAs payments, the remaining participants received little or no additional support because they were the lowest-income households already at or near the maximum allotment.[9] Considering this coverage gap, Congress passed a more comprehensive intervention through the American Rescue Plan Act of 2021: a universal 15% increase in maximum SNAP benefits for all participating households, regardless of their existing benefit level, initially effective from January 1, 2021 through June 30, 2021, and later extended to September 30, 2021.[11,12] This policy shift was meaningful as it ensured support reached all SNAP households, including the 40% who had gained little from EAs.

While research shows EAs reduced food hardship among households with children, and one study documented the effect of the 15% expansion on adult food insufficiency through March 2021, the impact on child food insufficiency throughout its entire duration remains unexamined.[13,14] Our study addresses this crucial gap by evaluating whether the universal 15% expansion in maximal SNAP benefits effectively decreased child food insufficiency across the nine-month expansion period. This is particularly timely given the 2025 Reconciliation Bill enacted by the U.S. Congress in July 2025, with 9-10% projected benefit reductions ($15/household/month) for typical families by 2034.[15]

Methods

This study used data from the U.S. Census Bureau's Household Pulse Survey (HPS), a weekly recurring, nationally-representative, cross-sectional online survey. We defined a pre-expansion period (September 30, 2020, to December 21, 2020; Weeks 16-21), and an expansion period (April 14, 2021, to September 27, 2021, Weeks 28-38), excluding January 6, 2021, to March 29, 2021 (Weeks 22-27) for policy implementation.

Our sample was comprised of adults aged 18-65 in households with at least one child under 18 meeting the USDA's state and household size-specific SNAP income eligibility limits.

The primary exposure was self-reported SNAP receipt. The control group was comprised of income-eligible households with children whose gross income was below 130% of the federal poverty level but which did not report SNAP receipt. The main outcome was child food insufficiency, a binary variable derived from a survey question asked only to households with children. Respondents were asked to rate whether "The children were not eating enough because we just couldn't afford enough food" over the previous 7 days—"Often true"/ "Sometimes true"/ "Never true". We coded "Often true" or "Sometimes true" as experiencing child food insufficiency, and "Never true" as not experiencing it. For households with children that had missing responses to this question, we imputed based on their response to the general household food sufficiency question, assuming that within food-sufficient households, children were also food-sufficient. Specifically, we assumed no child food insufficiency if the household reported having "Enough of the kinds of food (I/we) wanted to eat". Households with missing data on both the child-specific and the household-level questions were excluded.

Based on prior literature, we adjusted for a range of variables that could confound the relationship between SNAP participation and our outcome of interest.[16] Covariates consisted of age, gender, race and ethnicity, household income, marital status, household size, number of children, educational attainment, employment status, expense difficulty, stimulus payment use, and free food receipt. We also conducted a sensitivity analysis excluding free food receipt as it could be on the causal pathway.

We implemented multiple imputation using chained equations (MICE) for missing data on household income (26.9%) and other covariates (marital status, employment status, expense difficulty, and free food receipt; all <0.5% missing).[17] We specified imputation methods appropriate to each variable type: proportional odds logistic regression for ordered categorical variables (household income and expense difficulty), polytomous logistic regression for unordered categorical variables (marital status), and logistic regression for binary variables (employment status and free food receipt).

We employed a difference-in-differences (DiD) analytic approach with survey-weighted logistic regression comparing changes in child food insufficiency from the pre- to post-expansion period between SNAP recipients (treatment) and eligible non-recipients (control). Our analysis relies on the key assumption that outcome trends were similar for groups pre-expansion i.e., parallel trends assumption. While the counterfactual assumption that pre-post differences would have been similar between the groups in the absence of the expansion cannot be directly tested, assessing the assumption is crucial for establishing that the non-recipients represent a comparable control group. To assess the robustness of our findings to covariate adjustment, we estimated an unadjusted DiD model that included only the treatment, time, and the interaction term. We also conducted several subgroup analyses by household size, family type, and

race/ethnicity. These subgroups were selected *a priori*, aligning our analysis with the framework used in the USDA Annual Food Security report, which identifies these characteristics as key dimensions for monitoring food hardship and equity.[18]

Statistical significance was evaluated at the 5% level. R Studio (Version 2023.12.1+402) was used for all analyses.

Results

The parallel trends assumption was supported by both a visual inspection (Online Supplemental Figure) and a formal statistical test (P = 0.64). Our sample included 28,737 households, of which 9,776 (34.0%) participated in SNAP. SNAP-participating households showed higher levels of child food insufficiency (31.2% vs 29.3%), higher rates of household incomes below $25,000 (74.3% vs 60.3%) and of extreme expense difficulty (47.5% vs 30.5%), three or more children (40.0% vs 30.0%), and lower employment (37.2% vs 52.3%) (Table).

In our primary analysis, the temporary 15% SNAP expansion was associated with a 20% reduction in the odds of child food insufficiency among participating households compared to eligible but non-participating households (OR = 0.80; 95% CI, 0.66-0.97, P=0.04) (Figure). The unadjusted model yielded a consistent but marginally non-significant reduction in child food insufficiency (OR = 0.82; 95% CI, 0.66-1.02, P = 0.08). In a sensitivity analysis that excluded free food receipt from the model, our main findings were highly robust (OR = 0.800, P = 0.04 with adjustment for free food vs OR = 0.802, P = 0.04 without adjustment). In subgroup analyses, Hispanic-American households experienced a 39% reduction (OR = 0.61; 95% CI, 0.47-0.80, P=0.002). Households with six or more members experienced a 33% reduction (OR =

0.67; 95% CI, 0.45-1.02, P=0.07). The results from the primary and subgroup analyses are presented in Supplemental Table A1.

Discussion

This study demonstrates meaningful reductions in child food insufficiency among SNAP-participating households following the 2021 temporary 15% benefit expansion. While this overall effect aligns with the SNAP's fundamental purpose, the heterogeneous treatment effects across demographic subgroups represent our substantive contribution. Specifically, we observed stronger treatment effects among Hispanic-American households, but no significant effects among other racial/ethnic subgroups.

Our findings offer an important insight into how public policy designs can address vulnerability of large households to food hardship. Curran and Hartley (2021) establish that larger families face a persistent risk of child food insufficiency under standard SNAP structures.[19] Our study observed a significant greater improvement in child food insufficiency for larger households compared with their smaller counterparts. This differential impact suggests that the universal expansion of SNAP in 2021 was particularly effective at overcoming the unique financial pressures large families face, thereby mitigating the food hardship that standard SNAP may not fully resolve.

The observed racial/ethnic heterogeneity may be explained by the Reserve Capacity Model, which suggests that cultural characteristics like strong familial networks and community cohesion in Hispanic communities may serve as resilience resources amplifying the positive

impacts of SNAP expansion through enhanced resource sharing and collective coping strategies.[20] Our findings also align with previous evidence that SNAP enhances low-income Hispanic-Americans' ability to afford sufficient diets.[21]

Limitations of our study include its reliance on self-reported food insufficiency data that may have introduced information bias, particularly as child food insufficiency was reported by parents rather directly answered by children; a cross-sectional design that prevented the tracking of individuals over time; and low survey response rates (<10%) raising concerns about sample representativeness and potential selection bias. Although the U.S. Census Bureau's sampling weights were designed to account for non-response and there is evidence that these weighting adjustments mitigated the issue, some residual bias could have remained.[22]

Overall, despite these limitations, our analysis provides robust evidence that supports the protective role of the 2021 universal 15% SNAP benefit expansion against child food insufficiency during a national health and economic crisis.

Ethics Statement

Given these data were publicly available and de-identified, the study was deemed exempt by the Northeastern University Institutional Review Board.

Competing Interest Statement

The authors declare that they have no competing interests.

Funding Statement

The are no funders to report for this submission.

References

1. Jones, J. W. & Toossi, S. The Food and Nutrition Assistance Landscape: Fiscal Year 2023 Annual Report.
2. U.S. Department of Agriculture, Food and Nutrition Service. SNAP EBT. *U.S. Department of Agriculture* https://www.fns.usda.gov/snap/ebt (2025).
3. U.S. Department of Agriculture, Economic Research Service. Food Security in the U.S. - Measurement. *Economic Research Service U.S. DEPARTMENT OF AGRICULTURE* https://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-us/measurement.
4. Ralston, K., Treen, K., Coleman-Jensen, A. & Guthrie, J. Children's Food Security and USDA Child Nutrition Programs.
5. Coleman-Jensen, A. Food Insecurity in U.S. Households in 2018 is Down from 2017, Continuing Trend and Returning to Pre-Recession (2007) Level. *U.S. Department of Agriculture* https://www.usda.gov/about-usda/news/blog/food-insecurity-us-households-2018-down-2017-continuing-trend-and-returning-pre-recession-2007-level (2025).
6. Falk, G., Nicchitta, I. A., Nyhof, E. C. & Romero, P. D. *Unemployment Rates During the COVID-19 Pandemic*. https://www.congress.gov/crs-product/R46554 (2021).
7. Pandemic Oversight. Find out how children received lunch when schools closed during the pandemic. https://pandemicoversight.gov/data-interactive-tools/data-stories/find-out-how-children-received-lunch-when-schools-closed-during (2023).
8. Coleman-Jensen, A. Household Food Security in the United States in 2020. (2020).
9. Toossi, S., W. Jones, J. & Hodges, L. The Food and Nutrition Assistance Landscape: Fiscal Year 2020 Annual Report.

10. U.S. Department of Agriculture, Food and Nutrition Service. SNAP Eligibility. *U.S. Department of Agriculture* https://www.fns.usda.gov/snap/recipient/eligibility (2025).
11. Dasgupta, K. & Plum, A. Termination of SNAP Emergency Allotments, Food Sufficiency, and Economic Hardships. *FEDS* 1–19 (2023) doi:10.17016/feds.2023.046.
12. U.S. Department of Agriculture, Food and Nutrition Service. SNAP – Extension of Temporary Increase in Maximum Allotments due to COVID-19. *U.S. Department of Agriculture* https://www.fns.usda.gov/snap/Extension-of-Temporary-Increase-in-Maximum-Allotments (2021).
13. Austin, A. E. & Sokol, R. L. Emergency Allotments in SNAP and Food Hardship Among Households With Children. *JAMA Netw Open* **7**, e2428680 (2024).
14. Jackson, K. E., Chiang, A. Y. & Hamad, R. The association of increased SNAP benefits during COVID-19 with food insufficiency and anxiety among US adults: a quasi-experimental study. *Public Health Nutr.* **27**, e186 (2024).
15. Hecht, L. & Chatfield, K. What the 2025 Reconciliation Bill's SNAP Overhauls Could Mean for Children, Families, and States – NCCP. *National Center for Children in Poverty* https://www.nccp.org/publication/impacts-of-proposed-snap-overhaul-on-children-families-and-states/ (2025).
16. Leung, C. W. & Wolfson, J. A. The impact of the 2021 Thrifty Food Plan benefit re-evaluation on SNAP participants' short-term food security and health outcomes. *Front. Public Health* **11**, 1142577 (2023).
17. Buuren, S. V. & Groothuis-Oudshoorn, K. **mice** : Multivariate Imputation by Chained Equations in *R*. *J. Stat. Soft.* **45**, (2011).

18. U.S. Department of Agriculture, Economic Research Service. Food Security in the U.S. - Key Statistics & Graphics. *Economic Research Service U.S. DEPARTMENT OF AGRICULTURE* https://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-us/key-statistics-graphics.
19. Curran, M. A. & Hartley, R. P. Food Security and Policy Effects by Family Size.
20. Gallo, L. C., Penedo, F. J., Espinosa De Los Monteros, K. & Arguelles, W. Resiliency in the Face of Disadvantage: Do Hispanic Cultural Characteristics Protect Health Outcomes? *Journal of Personality* **77**, 1707–1746 (2009).
21. Center on Budget and Policy Priorities. *SNAP Helps Millions of Latinos*. (2018).
22. Peterson, S., Toribio, N., Farber, J. & Hornick, D. Nonresponse Bias Report for the 2020 Household Pulse Survey. (2020).

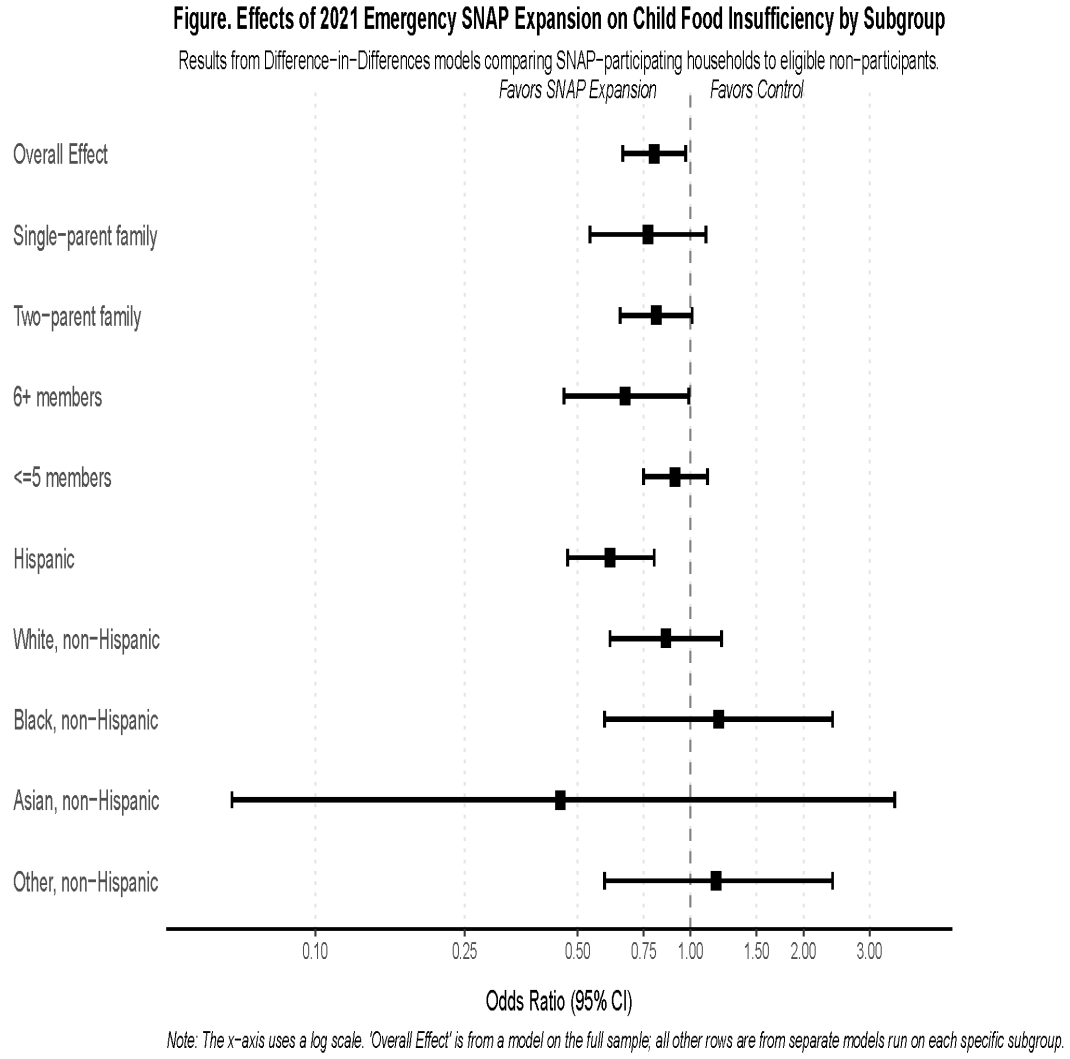

Figure Legend

Forest plot showing odds ratios (ORs) and 95% confidence intervals (CIs) for the associations between SNAP expansion and child food insufficiency across different demographic subgroups. Each horizontal line represents the 95% CI for each subgroup, with the square marker indicating the point estimate. The vertical dashed line at OR=1.0 represents the null effect. ORs less than 1.0 (to the left of the dashed line) indicate that SNAP expansion is associated with reduced child food insufficiency (favors SNAP expansion). Subgroups are stratified by family structure (single-parent vs. two-parent families), household size (6+ members vs. ≤5 members), and

race/ethnicity (Hispanic, White non-Hispanic, Black non-Hispanic, Asian non-Hispanic, and Other non-Hispanic). Note: Log scale used for x-axis.

Table. Characteristics of Income-Eligible Households with Children Under 18 Years by SNAP Participation, 2020-2021 Household Pulse Survey, Weeks 16-21 and 28-38 (N = 28,737)				
Characteristic	**SNAP-participating households (n = 9,776)**		**Non-SNAP-participating households (n = 18,961)**	
	No.	**% (95% CI)**	**No.**	**% (95% CI)**
Child food insufficiency in past 7 days				
Yes	3,061	31.2 (29.1-33.3)	5,220	29.3 (27.7-31.0)
No	6,715	68.8 (66.7-70.9)	13,741	70.7 (69.0-72.3)
Age, mean (SD)		38.9 (10.5)		38.4 (12.6)
Gender				
Female	8,536	79.0 (77.4-80.5)	13,586	58.1 (56.8-59.3)
Male	1,240	21.0 (19.5-22.6)	5,375	41.9 (40.7-43.2)
Race/ Ethnicity				
White, non-Hispanic	4,896	39.5 (32.5-46.5)	9,879	36.4 (26.9-45.9)
Black, non-Hispanic	2,006	25.3 (20.6-30.0)	2,514	15.9 (10.7-21.1)
Hispanic	1,986	26.7 (17.6-35.8)	4,584	37.2 (24.2-50.3)
Asian, non-Hispanic	155	1.9 (1.0-2.7)	918	5.3 (3.6-6.9)
Other, non-Hispanic	733	6.6 (4.9-8.3)	1,066	5.2 (4.0-6.4)
Education				
Less than/some high school	1,007	20.0 (16.2-23.9)	1,699	20.7 (15.3-26.1)
High school graduate or equivalent	2,799	44.7 (41.3-48.1)	4,709	41.9 (37.7-46.1)
Some college/Associate's degree	4,752	30.3 (28.6-32.0)	8,029	27.9 (26.7-29.0)
Bachelor's/Graduate degree	1,218	5.0 (4.6-5.4)	4,524	9.5 (8.5-10.4)
Household size, mean (SD)		5.3 (1.9)		5.4 (1.9)
Children <18 in household				
1	3,402	32.2 (30.6-33.9)	8,185	42.5 (41.5-43.6)
2	2,728	27.7 (26.4-29.0)	5,198	27.5 (26.7-28.4)
3	1,919	20.6 (19.6-21.7)	3,283	17.1 (16.1-18.1)
4	1,039	10.5 (9.4-11.6)	1,274	6.6 (5.9-7.3)
5	688	8.9 (7.9-9.8)	1,021	6.3 (5.7-7.0)
Marital status				
Now married	2,722	33.4 (30.7-36.2)	7,932	40.8 (39.6-42.1)
Now not-married	7,054	66.6 (63.8-69.3)	11,029	59.2 (57.9-60.4)
Household income				
< $25,000	7,887	74.3 (71.8-76.9)	12,893	60.3 (58.4-62.3)
$25,000-$34,999	1,581	21.0 (18.8-23.1)	4,847	30.4 (29.2-31.5)
$35,000-$49,999	308	4.7 (3.8-5.6)	1,221	9.3 (8.1-10.6)
Currently employed	3,667	37.2 (35.4-39.1)	10,460	52.3 (50.5-54.1)
Received free food	2,954	28.9 (26.6-31.2)	3,358	19.4 (16.1-22.7)

Expense difficulty				
Not difficult	631	6.7 (5.8-7.7)	3,508	16.7 (15.6-17.8)
Somewhat difficult	1,602	17.5 (16.2-18.8)	4,491	25.3 (23.9-26.6)
Very difficult	2,685	28.3 (26.2-30.3)	5,052	27.6 (26.4-28.8)
Extremely difficult	4,858	47.5 (45.6-49.3)	5,910	30.5 (28.7-32.2)
Used stimulus payment	4,163	42.5 (40.4-44.6)	5,165	28.9(26.1-31.7)