

Association between Child Tax Credit advance payments and food insufficiency in households experiencing economic shocks

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Abstract

The COVID-19 pandemic brought increases in economic shocks due to poor health and lost employment, which reduced economic well-being, especially in households with children. The American Rescue Plan Act of 2021 expanded Child Tax Credit (CTC) payments to include eligibility for the lowest income households, boosted benefit levels, and provided monthly advance payments to households with children. Using Census Household Pulse Survey respondent data from January 2021 to July 2022, we evaluated the association between these advance CTC monthly payments and food insufficiency among households with children experiencing health- or employment-related economic shocks (defined as missed work due to COVID-19/other illness or COVID-19-related employer closure/layoff/furlough). Using a triple difference design, we found that the advance CTC was associated with greater reductions in food insufficiency among households with children experiencing economic shocks both compared with households without children and with households with children not experiencing economic shocks. Permanently expanding the advance CTC could create resilience to economic shocks during disease outbreaks, climate disasters, and recessions.

Key words: advance child tax credit; insecurity; food; policies; social; family health.

Introduction

Many families in the United States live paycheck to paycheck, making them vulnerable to unexpected economic shocks, such as illness, hospitalization, and job loss.¹⁻³ Such shocks can lead to hardships, including deepened poverty and food insufficiency.¹⁻⁴ This is of concern for families with children, as even brief periods of food insufficiency can be detrimental to child health, development, and education.⁵⁻¹⁰ Families with children are more likely to experience poverty and economic shocks, and Black and Hispanic families are particularly vulnerable due to discrimination and structural racism, which have driven income and wealth disparities.¹¹⁻¹⁴ Thus, policies that can address food insufficiency among populations vulnerable to economic shocks are key for achieving health equity.

The COVID-19 pandemic brought widespread economic shocks across the United States, with more than 50 million people losing employment. Additionally, missing work due to illness increased by 50% compared with the 2 years prior.^{15,16} Negative effects were disproportionately concentrated among low-income, Black, Hispanic, and/or families with children who were most likely to miss work and less likely

to receive paid sick leave.¹⁵ Further, these groups were also more likely to experience increases in food insufficiency.^{12,13}

To mitigate negative economic consequences of COVID-19, Congress passed the American Rescue Plan Act (ARPA) in March 2021. The ARPA included 3 modifications to the existing Child Tax Credit (CTC): (1) eligibility for the full CTC amount was expanded to families with low/no income; (2) the maximum credit amount increased from \$2000 to \$3000 per qualifying child for children aged 6–17 years (previously ended at 16 years) and to \$3600 for children aged 5 years or younger, with greater gains for low-income households; and (3) payments were delivered as monthly per-child advances of \$200–\$300 during the 6-month period from July 2021 through December 2021. Families received the rest of the increased CTC amount for 2021 when filing taxes in 2022. In early 2022, the CTC expansion expired and reverted to its original structure, with lower credit amounts, no monthly advance payments, and non-refundability, excluding those with the lowest incomes.

Families reported using advance CTC monthly payments for necessities such as food and clothing, and payments did not lead to decreased labor supply among recipients.^{17,18} The advance CTC was associated with decreased food insufficiency among households with children during its implementation and

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with a corresponding increase in food insufficiency after its expiration.^{19,22} However, it is still unclear if the advance CTC had differential impacts for vulnerable households, such as those experiencing economic shocks.

The objective of our study was to investigate how the ARPA expansion of the CTC, particularly the advance payments, impacted food insufficiency, including how it may have differentially protected households vulnerable to COVID-19–driven economic shocks. We aim to expand on prior literature to understand how the advance CTC may differentially affect vulnerable households and why it may have differential effects across demographic groups, including how the payments may support households to maintain food sufficiency and increase resilience to economic shocks in periods such as disease outbreaks, climate disasters, or recessions.

Data and methods

Sample and study period

We used the US Census Bureau’s nationally representative Household Pulse Survey (HPS), which contains respondent self-reported demographics, household composition, employment, and economic hardship data (including food insufficiency and participation in various assistance programs).²³ In HPS, only 1 adult responds on behalf of the household. We limited the sample to adults younger than 65 years to capture those of working age with primarily their own children in the household, and to individuals without missing data (except for income, for which a missing category was created).^{19,20} We included data from HPS waves 22–27, capturing 3 time periods: (1) before (January 6, 2021–July 5, 2021), (2) during (July 21, 2021–January 10, 2022), and (3) after (January 26, 2022–July 11, 2022) advance CTC implementation. These survey waves were selected based on the advance CTC payment dates of July 15, 2021, through December 15, 2021.

Exposure: advance CTC payments

Through the ARPA in 2021, over 90% of families with children were eligible to receive \$200–\$300 monthly per child between July and December 2021. Families who received monthly payments were eligible to claim an additional \$1500–\$1800 per child after filing their 2021 tax return in early 2022.^{19,24,25}

The advance CTC payment exposure was defined as living in a household with at least 1 child present during the survey period that covered months when the advance CTC payments were being dispersed (July 21, 2021–January 10, 2022).

Exposure: economic shocks

We defined economic shocks as a report of at least 1 health-related shock or employment-related shock. Health-related shocks were defined as a report of missing work in the past 7 days for 1 of the following reasons: “I am/was sick with coronavirus symptoms or caring for someone sick with coronavirus symptoms” or “I am/was sick (not coronavirus-related) or disabled.” Employment-related shocks were defined as a report of missing work in the past 7 days for 1 of the following reasons: “I am/was laid off or furloughed due to the coronavirus pandemic,” or “my employer closed temporarily due to the coronavirus pandemic,” or “my employer went out of business due to the coronavirus pandemic.”

Outcome

The outcome was household food insufficiency, defined as a binary measure. Following US Department of Agriculture (USDA) standard methods for coding survey responses,²⁶ food insufficiency was defined as a report of “sometimes not enough to eat” or “often not enough to eat” in response to the following question: “In the last seven days, which of these statements best describes the food eaten in your household?” Respondents were not considered to have food insufficiency if they reported “enough of the kinds of food I/we wanted to eat” or “enough, but not always the kinds of food (I/we) wanted to eat” in response to this question.^{23,26}

The HPS food-insufficiency measure of not having enough food to eat in the past 7 days is related to food insecurity, which is more expansive and based on a scale developed by the USDA. Food insufficiency is a narrower definition that focuses on food-intake quantity.²⁶ Researchers used HPS data on food insufficiency to provide real-time information throughout the pandemic; several studies have used the HPS measure to gain insight into food access during the COVID-19 pandemic.^{12,19,20,27,28}

Covariates

Other relevant policy changes during the study period included the third and final Economic Impact Payment (EIP) in March 2021, the cessation of unemployment insurance expansions in June–September 2021, and the expiration of the federal eviction moratorium in August 2021. We adjusted for self-reported individual receipt of the EIP and/or unemployment insurance and eviction risk (somewhat/very likely) to account for these changes. We included covariates for participation in other public assistance benefits, including the Supplemental Nutrition Assistance Program (SNAP) and other food aid based on yes/no questions, as well as respondent health insurance coverage. We further adjusted for demographic characteristics, including sex assigned at birth, age group, educational level, prior-year household income, marital status, number of adults in the household, and number of children in the household. We also included survey wave and state fixed effects, which capture national trends that affected both households with children and households without children during each time period (eg, inflation) as well as time-invariant state characteristics not captured by other covariates.

Analyses

We reported the unadjusted prevalence of any economic shocks, health-related shocks, and employment-related shocks prior to advance CTC implementation for all households, households with and without children, and stratified by subgroup (by race/ethnicity and for low-income households [earning <\$35 000 in the prior year^{20,21}]).

We also reported the unadjusted prevalence of household food insufficiency before, during, and after advance CTC implementation for (1) all households, (2) households without children not experiencing economic shocks, (3) households with children not experiencing economic shocks, (4) households without children experiencing economic shocks, and (5) households with children experiencing economic shocks, and by racial/ethnic and income subgroup.

We conducted linear regressions to evaluate the association between experiencing any economic shocks, health-related shocks, and employment-related shocks and household food insufficiency in the period prior to advance CTC implementation

for all households, households with and without children, and by racial/ethnic and income subgroup. We adjusted for wave and state fixed effects, time-varying covariates including receipt of EIP, SNAP, and demographic characteristics (detailed above).

In our primary model, we conducted a difference-in-difference-in-differences (“triple difference”) analysis of household food insufficiency. We compared changes in household food insufficiency in the period during advance CTC implementation in households with children experiencing economic shocks relative to households without children and to households not experiencing economic shocks. The main exposure was a binary indicator for being in a household with children, interacted with a binary indicator for the period during advance CTC implementation, and with a binary indicator for households experiencing economic shocks. The resulting estimates speak to the association between the advance CTC and food insufficiency in households with children compared with those without children, and if this association varied depending on whether households were experiencing economic shocks. We used linear models and adjusted for state and wave fixed effects, demographics, and time-varying covariates described above ([Appendix Methods](#)). Triple difference relies on the parallel trends assumption, which assumes that underlying trends between households with and without children would be parallel in the absence of the advance CTC. To test this assumption, we evaluated whether differences in food-insufficiency trends varied over time between households with and without children in the period prior to advance CTC implementation. We tested this association using both a triple difference estimate (ie, interacting an indicator for the presence of children with an indicator for the presence of economic shocks with a continuous time indicator) and difference-in-difference estimates separately among households (1) experiencing and (2) not experiencing economic shocks (ie, interacting an indicator for the presence of children with a continuous time indicator in both models). We found that, before advance CTC implementation, there were no significant differences in food-insufficiency trends over time in naive and adjusted versions of all 3 models ([Table S1](#)).

To test the robustness of our findings, we clustered standard errors by state and varied inclusion of fixed effects. We also conducted 2 additional difference-in-difference analyses. We evaluated the interaction between advance CTC implementation and children in the household by estimating stratified models separately among households experiencing and not experiencing shocks. Additionally, some respondents may have received lump-sum tax refunds during the period after the advance CTC monthly payment expiration, depending on when they filed their tax return. Therefore, we conducted a sensitivity analysis in which we excluded dates after the tax filing deadline in April 2022 based on evidence that most Americans file their taxes close to the deadline.²⁹ Last, we conducted the triple differences analysis limited to the low-income subgroup only, because this group was most likely to receive the greatest benefit from changes to the CTC made in the ARPA.^{21,22}

This study was exempt from Institutional Review Board (IRB) approval and informed consent and meets Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) reporting guidelines for cross-sectional studies.³⁰ In all models, we used US Census–provided weights divided by the number of survey waves. We used 2-sided *t* tests or chi-square tests to test for significant differences between groups; $P < .05$ was considered

significant. Analyses were conducted April through October 2023 using Stata/MP version 17.0 (StataCorp, College Station, TX).

Results

Sample characteristics

Our sample comprised 1 125 299 respondents, representing a weighted population of 122 800 808 individuals. Respondents were majority female ($n = 691\,775$ [51.3%]) and non-Hispanic White ($n = 808\,207$ [62.2%]), with a plurality ($n = 463\,735$ [48.4%]) aged 25–44 years. Weighted individual demographics and household socioeconomic characteristics are shown in [Table 1](#) for the full sample and stratified by household presence of children and experience of economic shocks.

Unadjusted household prevalence of economic shocks

The prevalence of households experiencing economic shocks in the period before advance CTC implementation was 10.9% (95% CI: 10.7%–11.0%), with 4.5% (95% CI: 4.4%–4.6%) reporting health-related shocks and 6.4% (95% CI: 6.2%–6.5%) reporting employment-related shocks ([Table S2](#)). Among all households, non-Hispanic Black, Hispanic, and low-income households were most impacted by economic shocks, with 15.5% (95% CI: 14.8%–16.1%), 14.3% (95% CI: 13.8%–14.9%), and 20.6% (95% CI: 20.1%–21.1%) experiencing economic shocks, respectively, compared with 9.2% (95% CI: 9.0%–9.3%) of White households and 8.2% (95% CI: 8.0%–8.4%) of higher-income households ([Table S2](#), [Figure S1](#)).

Unadjusted household food insufficiency prevalence before, during, and after advance CTC implementation

As depicted in [Figure 1](#), unadjusted household food-insufficiency prevalence was elevated among households experiencing economic shocks (solid lines) relative to households not experiencing economic shocks (dashed lines). In both circumstances, food insufficiency was higher in households with children (green lines) relative to households without children (gray lines). While food insufficiency increased over the study period, there was a temporary dip in food insufficiency in households with children during the period of advance CTC implementation. Overall, Hispanic, non-Hispanic Black, and low-income subgroups had the highest unadjusted household food insufficiency. Household food-insufficiency prevalence by race/ethnicity and low-income subgroups is shown in [Figure 2](#) and [Table S3](#). Except for Asian and “another racial category” respondents, the presence of children in the household was associated with similar or higher rebound rates of food insufficiency post-advance CTC expiration.

Association between economic shocks and household food insufficiency

In regression analysis, after adjusting for fixed effects and all covariates, economic shocks were associated with a 7.7 percentage point (95% CI: 6.7–8.6; $P < .001$) higher probability of food insufficiency compared with households without shocks before implementation of the advance CTC—an 80% increase. This difference was 6.7 percentage points

Table 1. Sample characteristics, overall and for households experiencing or not experiencing economic shocks, and with or without children.

| Characteristic | Households not experiencing shocks (<i>n</i> = 1 041 692) | | | Households experiencing shocks (<i>n</i> = 84 607) | | | <i>P</i> ^a | <i>P</i> ^b |
|--|---|---|--|--|---|---------------|-----------------------|-----------------------|
| | Overall (<i>n</i> = 1 126 299) | Households without children (<i>n</i> = 602 659) | Households with children (<i>n</i> = 439 033) | Households without children (<i>n</i> = 52 924) | Households with children (<i>n</i> = 31 683) | | | |
| Sex at birth | | | | | | | | |
| Female | 691 775 (51.3) | 357 798 (48.1) | 279 009 (55.2) | <.001 | 32 016 (49.2) | 22 060 (58.7) | <.001 | <.001 |
| Male | 434 524 (48.7) | 244 961 (51.9) | 160 024 (44.8) | | 20 016 (50.8) | 9623 (41.3) | | |
| Age group, y | | | | | | | | |
| 18–24 | 37 113 (7.4) | 24 835 (8.8) | 9831 (5.8) | <.001 | 1611 (6.3) | 836 (5.3) | <.001 | <.001 |
| 25–44 | 463 735 (48.4) | 190 920 (39.5) | 244 429 (61.7) | | 12 774 (32.2) | 15 612 (58.0) | | |
| 45–64 | 625 451 (44.2) | 386 904 (51.7) | 184 773 (32.5) | | 38 539 (61.6) | 15 235 (36.8) | | |
| Race and ethnicity | | | | | | | | |
| Hispanic | 119 439 (16.2) | 53 462 (13.0) | 53 344 (19.1) | <.001 | 6310 (17.4) | 6323 (27.4) | <.001 | <.001 |
| Non-Hispanic | | | | | | | | |
| Asian | 64 661 (5.3) | 32 230 (5.2) | 29 001 (6.0) | <.001 | 1939 (3.4) | 1491 (3.7) | .101 | <.001 |
| Black | 87 960 (12.3) | 41 753 (10.5) | 35 867 (13.3) | <.001 | 5401 (15.2) | 4939 (22.1) | <.001 | <.001 |
| White | 808 207 (62.2) | 452 921 (67.7) | 301 990 (57.6) | <.001 | 36 324 (59.1) | 16 962 (42.2) | <.001 | <.001 |
| Another race or ethnicity | 46 032 (3.9) | 22 283 (3.6) | 18 831 (4.0) | <.001 | 2950 (5.0) | 1968 (4.6) | .075 | <.001 |
| Education | | | | | | | | |
| Less than high school | 23 189 (6.8) | 8069 (4.6) | 10 658 (8.2) | <.001 | 2157 (10.8) | 2305(17.1) | <.001 | <.001 |
| High school/ equivalent | 121 961 (27.4) | 61 511 (26.2) | 43 930 (26.3) | | 9861 (38.3) | 6659(39.1) | | |
| Some college/2-y degree | 350 892 (30.8) | 185 664 (30.8) | 128 416 (30.2) | | 23 162 (33.7) | 13 650 (31.1) | | |
| 4-y degree or higher | 630 257 (35.0) | 347 415 (38.5) | 256 029 (35.3) | | 17 744 (17.3) | 9069 (12.7) | | |
| Marital status | | | | | | | | |
| Married | 651 530 (50.5) | 295 135 (41.9) | 320 199 (64.8) | <.001 | 19 856 (32.7) | 16 340 (46.7) | <.001 | <.001 |
| Not married | 474 769 (49.5) | 307 524 (58.1) | 118 834 (35.2) | | 33 068 (67.3) | 15 343 (53.3) | | |
| Health insurance coverage | | | | | | | | |
| Uninsured | 143 494 (18.0) | 71 214 (16.3) | 54 558 (18.0) | <.001 | 10 647 (25.3) | 7075 (29.0) | <.001 | <.001 |
| Public | 105 078 (11.9) | 41 206 (8.2) | 36 715 (11.8) | | 17 762 (32.6) | 9928 (31.2) | | |
| Private | 877 727 (70.1) | 49 183 (75.6) | 347 760 (70.2) | | 24 515 (42.1) | 14 680 (39.7) | | |
| Respondent employed in last 7 d | 832 317 (69.5) | 478 257 (77.6) | 354 060 (76.2) | <.001 | – (0) | – (0) | NA | <.001 |
| Report of UI benefits as spending source in last 7 d | 82 160 (8.6) | 33 336 (6.3) | 25 898 (7.2) | <.001 | 14 036 (25.6) | 8890 (27.3) | .003 | <.001 |
| Current participation in SNAP in last 7 d by anyone in household | 97 801 (13.1) | 29 175 (6.9) | 45 220 (16.5) | <.001 | 12 773 (27.2) | 10 633 (38.7) | <.001 | <.001 |
| Receipt of food aid in last 7 d by anyone in household | 59 485 (6.9) | 18 499 (4.1) | 30 507 (8.9) | <.001 | 5260 (11.0) | 5219 (18.3) | <.001 | <.001 |
| Report of EIP as spending source in last 7 d | 181 970 (18.8) | 81 513 (15.7) | 77 740 (20.8) | <.001 | 13 396 (25.6) | 9321 (29.6) | <.001 | <.001 |
| Report of risk for eviction in next 2 mo | 15 400 (2.3) | 4846 (1.3) | 6020 (2.4) | <.001 | 2370 (6.1) | 2164 (8.9) | <.001 | <.001 |
| No. of adults in household | | | | | | | | |
| 1 | 229 091 (21.2) | 149 631 (25.2) | 57 154 (14.4) | <.001 | 15 796 (30.3) | 6510 (21.5) | <.001 | <.001 |
| 2 | 618 640 (52.0) | 306 611 (48.4) | 274 048 (58.9) | | 23 199 (41.7) | 14 782 (45.1) | | |
| 3+ | 278 568 (26.9) | 146 417 (26.4) | 107 831 (26.6) | | 13 929 (28.0) | 10 391 (33.4) | | |
| No. of children in household | | | | | | | | |
| 0 | 655 583 (57.1) | 602 659 (100) | 0 (0) | <.001 | 52 924 (100) | 0 (0) | <.001 | <.001 |
| 1 | 204 083 (18.6) | 0 (0) | 188 793 (43.2) | | 0 (0) | 15 290 (45.2) | | |
| 2 | 172 977 (15.1) | 0 (0) | 163 109 (35.6) | | 0 (0) | 9868 (31.1) | | |
| 3+ | 93 656 (9.2) | 0 (0) | 87 131 (21.2) | | 0 (0) | 6525 (23.7) | | |
| Annual household income | | | | | | | | |
| <\$25 000 | 103 151 (13.5) | 52 070 (12.3) | 27 468 (10.5) | <.001 | 16 093 (34.7) | 7520 (28.7) | <.001 | <.001 |
| \$25 000–\$34 000 | 76 070 (9.2) | 41 346 (9.1) | 24 359 (8.2) | | 6355 (13.0) | 4010 (13.8) | | |

(continued)

Table 1. Continued

| Characteristic | Households not experiencing shocks (<i>n</i> = 1 041 692) | | | Households experiencing shocks (<i>n</i> = 84 607) | | | <i>P</i> ^a | <i>P</i> ^b |
|--------------------|---|---|--|--|---|--|-----------------------|-----------------------|
| | Overall (<i>n</i> = 1 126 299) | Households without children (<i>n</i> = 602 659) | Households with children (<i>n</i> = 439 033) | Households without children (<i>n</i> = 52 924) | Households with children (<i>n</i> = 31 683) | | | |
| \$35 000–\$49 999 | 94 885 (10.0) | 54 385 (10.6) | 31 274 (9.0) | 5768 (10.9) | 3458 (10.5) | | | |
| \$50 000–\$74 000 | 156 514 (14.1) | 91 894 (15.5) | 53 751 (13.1) | 6912 (11.4) | 3957 (10.6) | | | |
| \$75 000–\$149 000 | 322 917 (23.6) | 177 793 (25.1) | 131 815 (24.7) | 8352 (12.0) | 4957 (10.9) | | | |
| \$150 000+ | 218 736 (12.9) | 112 136 (13.0) | 101 773 (15.3) | 2934 (3.3) | 1893 (3.3) | | | |
| Missing | 154 026 (16.7) | 73 035 (14.5) | 68 593 (19.3) | 6510 (14.7) | 5888 (22.2) | | | |

Abbreviations: EIP, Economic Impact Payment; SNAP, Supplemental Nutrition Assistance Program; UI, unemployment insurance; NA, not applicable. *n* = 1 126 999. Data are presented as *n* (weighted %). Values may not add up to 100% due to rounding. Source: Authors' analysis of Household Pulse Survey data from the Census Bureau, January 2021 to July 2022.

^a*P* values within the “households not experiencing shocks” and “households experiencing shocks” columns represent the difference between households without and with children within each category, respectively.

^b*P* values on the far-right column represent the difference between households experiencing and not experiencing shocks.

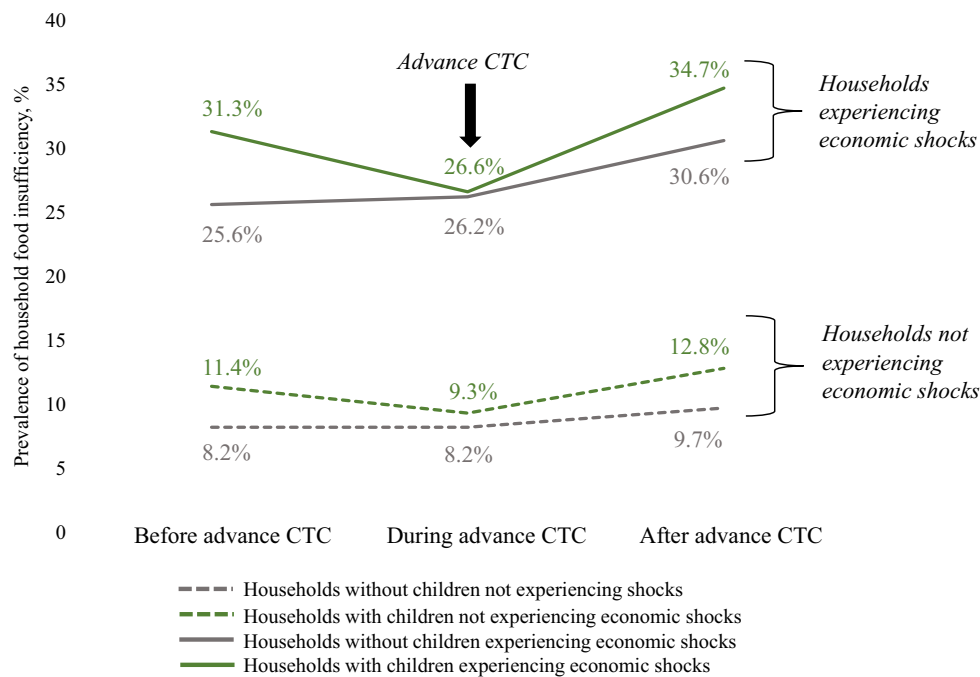


Figure 1. Unadjusted prevalence of household food insufficiency among households with and without children experiencing and not experiencing economic shocks before, during, and after advance Child Tax Credit (CTC) implementation. The figure shows the unadjusted prevalence of household food insufficiency in the periods before advance CTC implementation (January 6, 2021, through July 5, 2021), during advance CTC implementation (July 21, 2021, through January 10, 2022), and after advance CTC implementation (January 26, 2022, through July 11, 2022). The solid green line represents households with children experiencing economic shocks (health-related or employment-related shocks). The solid gray line represents households without children experiencing economic shocks. The green and gray dotted lines represent households with and without children, respectively, not experiencing economic shocks. Prevalence values are shown above or below each line. The dip in food insufficiency during the period of advance CTC implementation seen among households with children experiencing economic shocks is indicated with an arrow. Source: Authors' analysis of Household Pulse Survey data from the US Census Bureau, January 2021 to July 2022.

(95% CI: 5.6–7.8; *P* < .001) among households without children and 8.5 percentage points (95% CI: 7.0–10.0; *P* < .001) among households with children (Table S4).

Difference-in-difference analyses: estimated association between advance CTC implementation and food insufficiency among households with children experiencing economic shocks

Our triple difference model estimated a 3.5 percentage point decrease (95% CI: 6.1–0.90 percentage points; *P* = .008) in the

proportion of respondents who reported experiencing food insufficiency among households with children experiencing economic shocks compared with households without children and with those not experiencing shocks during the period of advance CTC implementation (Table 2, Table S5). This represents an 11% decrease compared with the period before advance CTC implementation. Results were robust to clustered standard errors and varied inclusion of fixed effects (Table S6).

Additionally, difference-in-difference models conducted separately among households experiencing and not experiencing

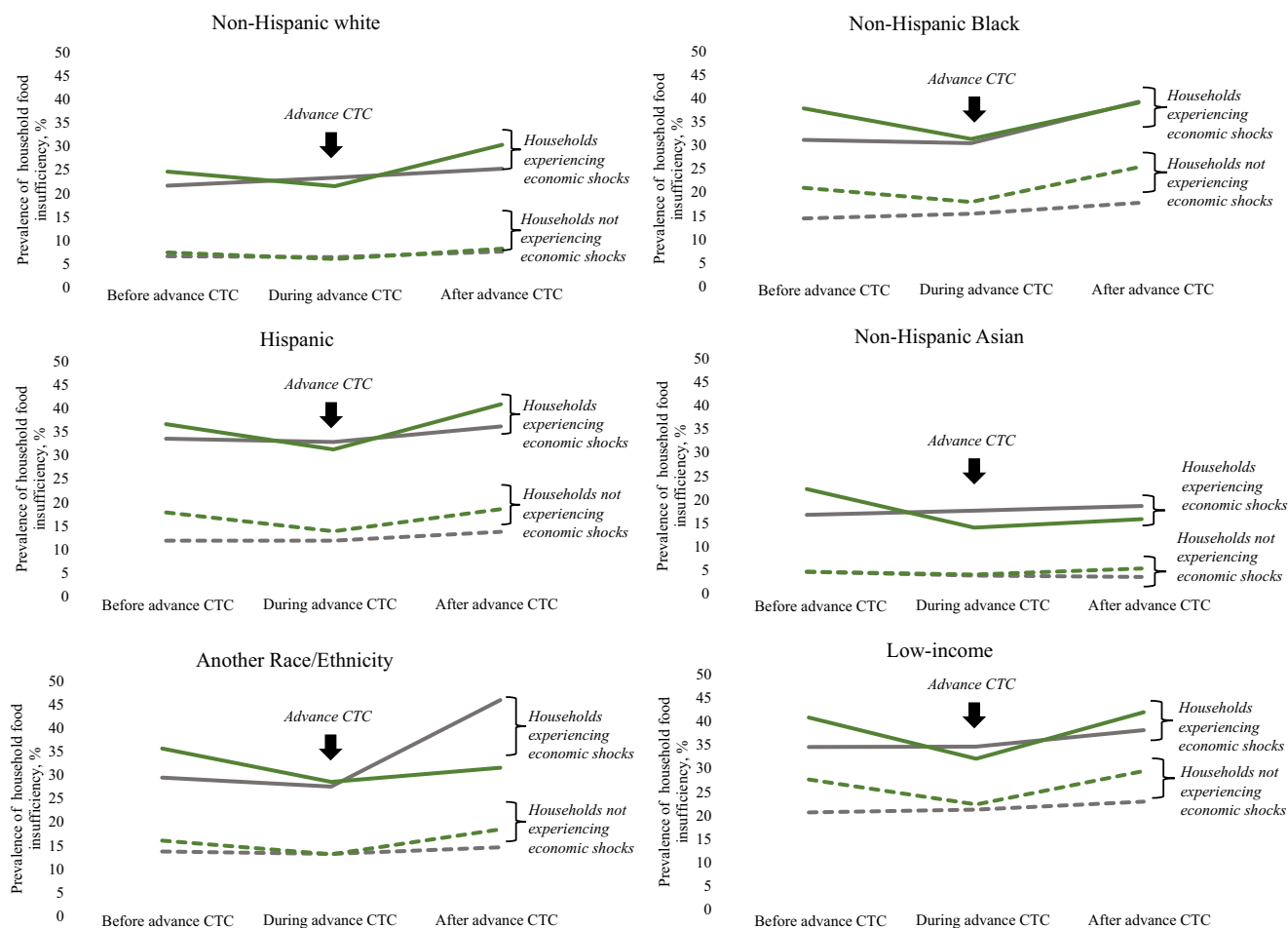


Figure 2. Unadjusted prevalence of household food insufficiency among households with and without children experiencing and not experiencing economic shocks before, during, and after advance Child Tax Credit (CTC) implementation: stratified by race, ethnicity, and low-income subgroups. The figure shows the unadjusted prevalence of food insufficiency in the periods before advance CTC implementation (January 6, 2021, through July 5, 2021), during advance CTC implementation (July 21, 2021, through January 10, 2022), and after advance CTC implementation (January 26, 2022, through July 11, 2022), stratified by race, ethnicity, and low-income subgroups. The solid green lines represent households with children experiencing economic shocks (health-related or employment-related shocks). The solid gray lines represent households without children experiencing economic shocks. The green and gray dotted lines represent households with and without children, respectively, not experiencing economic shocks. Dips in food insufficiency during the period of advance CTC implementation seen among households with children experiencing economic shocks are indicated with an arrow. A full table of unadjusted household food-insufficiency prevalence values is available in [Table S3](#). Source: Authors' analysis of Household Pulse Survey data from the Census Bureau, January 2021 to July 2022.

economic shocks were consistent with triple difference results. In both groups, the advance CTC was associated with decreased household food insufficiency, but the decrease was larger for households experiencing economic shocks compared with households not experiencing shocks (5.2 and 1.6 percentage point decrease, respectively) ([Table S7](#)).

Our results held when we excluded the period after the 2022 tax filing deadline from the triple difference model, although the effect was slightly greater. When this period was excluded, there was a 3.9 percentage point decrease in the proportion of respondents reporting food insufficiency among households with children experiencing economic shocks compared with households without children and those not experiencing economic shocks (compared with a 3.5 percentage point decrease in the main analysis) ([Table S8](#)). When the triple difference analysis was limited to the low-income subgroup, the magnitude of the effect remained the same (a 3.5 percentage point decrease), but the effect was no longer significant, likely due to a large

reduction (84% decrease) in sample size and resulting lack of precision ([Table S9](#)).

Discussion

We found that the advance CTC was associated with a 3.5 percentage point and 11% differential decrease in the probability of experiencing food insufficiency for households with children experiencing economic shocks compared with households without children and households not experiencing economic shocks. This finding is consistent with prior work documenting a decrease in food insufficiency during advance CTC implementation and an increase after advance CTC expiration among all households with children.¹⁹⁻²¹ We additionally found that the advance CTC was associated with a greater reduction in food insufficiency among households with children experiencing economic shocks (ie, missing work due to sickness with COVID-19/other illness or employer closures/layoffs/furloughs) than among those not experiencing economic

Table 2. Change in household food insufficiency during implementation of advance CTC in households with and without children experiencing and not experiencing economic shocks.

| | Household food insufficiency in households without children (<i>n</i> = 655 583), % (95% CI) | | | Household food insufficiency in households with children (<i>n</i> = 470 671), % (95% CI) | | | Triple difference estimate ^a | |
|---|--|--------------------|-------------------|---|--------------------|-------------------|--|----------|
| | Before advance CTC | During advance CTC | After advance CTC | Before advance CTC | During advance CTC | After advance CTC | Change in household food insufficiency, percentage points (95% CI) | <i>P</i> |
| Households not experiencing shocks (<i>n</i> = 1 041 692) | 8.2 (8.0, 8.5) | 8.2 (8.0, 8.5) | 9.7 (9.3, 10.0) | 11.4 (11.1, 11.7) | 9.3 (9.0, 9.7) | 12.8 (12.4, 13.3) | — | |
| Households experiencing shocks (<i>n</i> = 84 562) | 25.6 (24.6, 26.6) | 26.2 (24.7, 27.6) | 30.6 (28.6, 32.5) | 31.3 (30.0, 32.7) | 26.6 (24.9, 28.4) | 34.7 (32.4, 37.1) | −3.5 (−6.1, −0.90) | .008 |

Abbreviation: CTC, Child Tax Credit.

Source: Authors' analysis of Household Pulse Survey data from the Census Bureau, January 2021 to July 2022.

^aIn triple difference analysis, comparison is between households with children and without children and between households experiencing shocks and not experiencing shocks.

shocks. These results help to understand the mechanisms through which the advance CTC can protect against food insufficiency, through differentially impacting demographic groups most structurally vulnerable to economic shocks, including low-income, Hispanic, and Black populations. Such findings are relevant for federal and state policymakers, as Congress could consider restoration of the advance CTC and as state lawmakers consider similar models.^{31,32} These findings may also be relevant to broadly reducing vulnerability to food insufficiency in households with children, especially in preparation for events such as disease outbreaks, climate disasters, or recessions, which could produce economic shocks.

Our results parallel prior observational and quasi-experimental studies that have found that, both before and during the COVID-19 pandemic, unexpected events impacting employment contribute to economic hardship.¹ For example, 1 study found a positive association between parental decline in employment and household food insecurity.² Additional state and national survey data indicate that people who lost or missed work due to COVID-19 were most likely to report worse food access or greater food insufficiency.^{3,33,34} However, to our knowledge, our study is the first to evaluate how the relationship between the advance CTC and household food insufficiency varied by contemporaneous economic shocks experienced by household members.

Even before the COVID-19 pandemic, the United States had a higher rate of children living in poverty than most other Organization for Economic Cooperation and Development (OECD) countries, with disparities by race and ethnicity.^{11,35} These disparities are shaped by structural racism, including historical policies, such as slavery and redlining, and modern-day policies, such as low federal minimum wage, which have created inequities in education, income, and wealth.³⁶⁻³⁸ People with low income and wealth are vulnerable to food insufficiency if they face sudden health or employment shocks.³⁹ This vulnerability had a particularly negative impact during the COVID-19 pandemic, when absences from work due to illness, child care, or other personal obligations increased by 50% compared with the 2 years prior, and low-income, non-Hispanic Black, and Hispanic employees were least likely to have paid sick leave.¹⁵

Consistent with prior findings, we observed similar socioeconomic and racial/ethnic disparities: during the COVID-19 pandemic, low-income, Black, and Hispanic populations disproportionately experienced economic shocks. In the period before advance CTC implementation, low-income, non-Hispanic Black, and Hispanic households were 151%, 68%, and 55% more likely to experience economic shocks compared with higher-income and White households, respectively. Similarly, we found that the prevalence of household food insufficiency was higher among low-income, non-Hispanic Black, and Hispanic households compared with higher-income White households over the study period. Our results suggest that these findings are related; experiencing economic shocks was associated with an 80% increase in household food insufficiency. In combination, our findings show that the advance CTC was associated with an especially protective impact on households experiencing economic shocks, which were disproportionately non-Hispanic Black, Hispanic, and low-income, suggesting that the advance CTC may be impactful in these racial, ethnic, and income groups. While prior work has described differential impacts of the advance CTC on food insufficiency across demographic groups,²⁰⁻²² our findings provide insight into how differential effects may arise: through protecting structurally vulnerable households (including those most likely to have low wealth/income and unpaid sick leave) in times of missed work due to sickness or job loss.

Our study has limitations. First, the HPS relies on self-reported, repeated cross-sectional data, with low overall response rates. Because the data are repeated cross-sectional surveys rather than longitudinal, we could only evaluate contemporaneous associations between economic shocks and food insufficiency. Second, we defined economic shocks based on available survey response options and could not capture individuals who experienced economic shocks for other reasons. Third, respondents may have received lump-sum tax refunds during the period after the advance CTC monthly payment expiration. In fact, we found that, when we excluded dates after the tax filing deadline from analysis, the effect size was slightly greater, suggesting that we may be underestimating the impact of the monthly payments on food insufficiency in the absence of lump-sum returns. However, the difference was not large,

which may be consistent with prior evidence that lump-sum and monthly payments may be used for different purposes (lump-sum payments more often used for arrears and monthly payments for ongoing costs).⁴⁰ Fourth, we estimated the effect of the advance CTC on households eligible for the advance CTC (ie, households with children), rather than households that received the advance CTC. We used this “intent-to-treat” approach to avoid selection bias, as households that filed taxes during the advance CTC may differ from those that do not. This is a conservative approach that may bias results towards the null; the effect size may be greater only among households that received the advance CTC. Another limitation is that there may have been time-varying differences between households with and without children, such as school closures, which could have impacted food insufficiency. Finally, our triple difference analysis was underpowered when restricted to low-income households only (a subgroup highly impacted by the ARPA changes to the CTC); however, while we did not observe significant effects in this subgroup, the magnitude of the effect size was the same as in our main analysis, despite the loss of precision. Because of the proxy identification of benefits from the advance CTC (households with children), we used non-causal language to be conservative, despite the use of a causally interpretable triple difference design.

These limitations are counterbalanced by several strengths. First, we utilized data from a nationally representative, high-frequency survey, capturing variation and granularity in individuals' and households' circumstances. Second, we used a quasi-experimental triple difference approach, allowing us to build upon our and others' earlier work by exploring variation by contemporaneous economic shocks in addition to the presence of children in the household.

Conclusion

In conclusion, our study aligns with prior work demonstrating anti-poverty benefits of the ARPA's advance CTC, which simultaneously expanded eligibility to families with no or very low income, increased maximum benefit amounts, and provided monthly in addition to annual payments. We add to this body of evidence by showing that health- and employment-related economic shocks are associated with increased household food insufficiency and that the advance CTC was associated with decreased food insufficiency, particularly among households experiencing economic shocks. Because we found a higher prevalence of both economic shocks and food insufficiency among low-income, non-Hispanic Black, and Hispanic households, permanently reinstating the advance CTC could progress equity for households that are structurally vulnerable to economic shocks by reducing household food insufficiency and related negative long-term health and education consequences for children. Members of Congress may consider the protective effect that reinstating the advance CTC could have for US households in both the short- and long-term. Legislators may also consider that reintroducing the advance CTC could increase population resilience and better protect households with children from hardship caused by health, environmental, or economic circumstances.

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Supplementary material

Supplementary material is available at *Health Affairs Scholar* online.

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Conflicts of interest

Please see ICMJE form(s) for author conflicts of interest. These have been provided as supplementary materials.

Notes

1. Dobkin C, Finkelstein A, Kluender R, Notowidigdo MJ. The economic consequences of hospital admissions. *Am Econ Rev*. 2018;108(2):308-352. <https://doi.org/10.1257/aer.20161038>
2. Wolf S, Morrissey TW. Economic instability, food insecurity, and child health in the wake of the great recession. *Soc Serv Rev*. 2017;91(3):534-570. <https://doi.org/10.1086/694111>
3. Clay LA, Rogus S. Impact of employment, essential work, and risk factors on food access during the COVID-19 pandemic in New York state. *Int J Environ Res Public Health*. 2021;18(4):1451. <https://doi.org/10.3390/ijerph18041451>
4. Leete L, Bania N. The effect of income shocks on food insufficiency. *Rev Econ Househ*. 2010;8(4):505-526. <https://doi.org/10.1007/s11150-009-9075-4>
5. Wolfson JA, Leung CW. Food insecurity during COVID-19: an acute crisis with long-term health implications. *Am J Public Health*. 2020;110(12):1763-1765. <https://doi.org/10.2105/AJPH.2020.305953>
6. Black MM, Walker SP, Fernald LCH, et al. Early childhood development coming of age: science through the life course. *Lancet*. 2017;389(10064):77-90. [https://doi.org/10.1016/S0140-6736\(16\)31389-7](https://doi.org/10.1016/S0140-6736(16)31389-7)
7. Gundersen C, Ziliak JP. Food insecurity and health outcomes. *Health Aff*. 2015;34(11):1830-1839. <https://doi.org/10.1377/hlthaff.2015.0645>
8. Kimbro RT, Denney JT. Transitions into food insecurity associated with behavioral problems and worse overall health among children. *Health Aff*. 2015;34(11):1949-1955. <https://doi.org/10.1377/hlthaff.2015.0626>
9. Hartline-Grafton H. The impact of poverty, food insecurity, and poor nutrition on health and well-being. Food Research & Action Center. Published 2017. Accessed March 17, 2023. <https://frac.org/wp-content/uploads/hunger-health-impact-poverty-food-insecurity-health-well-being.pdf>
10. Howard LL. Does food insecurity at home affect non-cognitive performance at school? A longitudinal analysis of elementary student classroom behavior. *Econ Educ Rev*. 2011;30(1):157-176. <https://doi.org/10.1016/j.econedurev.2010.08.003>
11. Organization for Economic Cooperation and Development. Child Poverty. Organization for Economic Cooperation and Development family database. Published 2021. Accessed March 17, 2023. https://www.oecd.org/els/CO_2_2_Child_Poverty.pdf
12. Center on Budget and Policy Priorities. Tracking the COVID-19 economy's effects on food, housing, and employment hardships. Accessed August 4, 2022. <https://www.cbpp.org/research/poverty-and-inequality/tracking-the-covid-19-economy-effects-on-food-housing-and>
13. Bovell-Ammon A, Ettinger de Cuba S, Lê-Scherban F, et al. Changes in economic hardships arising during the COVID-19 pandemic:

- differences by nativity and race. *J Immigr Minor Health*. 2023;25(2):483-488. <https://doi.org/10.1007/s10903-022-01410-z>
14. Hardy B, Logan TD. *Racial Economic Inequality Amid the COVID-19 Crisis*. The Brookings Institute; 2020. Accessed October 3, 2023. https://www.brookings.edu/wp-content/uploads/2020/08/EA_HardyLogan_LO_8.12.pdf
 15. Boyens C, Raifman J, Werner K. Out sick without pay. Urban Institute. Published 2022. Accessed March 17, 2023. <https://www.urban.org/research/publication/out-sick-without-pay>
 16. For 19th straight week, unemployment filings top 1 million. MSNBC. Published 2020. Accessed March 17, 2023. <https://www.msnbc.com/rachel-maddow-show/19th-straight-week-unemployment-filings-top-1-million-n1235299>
 17. Zippel C. 9 In 10 families with low incomes are using Child Tax Credits to pay for necessities, education. Center on Budget and Policy Priorities. Published October 2021. Accessed August 4, 2022. <https://www.cbpp.org/blog/9-in-10-families-with-low-incomes-are-using-child-tax-credits-to-pay-for-necessities-education>
 18. Enriquez B, Jones D, Tedeschi E. The short-term labor supply response to the expanded Child Tax Credit. UChicago.edu. Published April 10, 2023. April 27, 2023. <https://bfi.uchicago.edu/insight/research-summary/the-short-term-labor-supply-response-to-the-expanded-child-tax-credit/>
 19. Shafer PR, Gutiérrez KM, Ettinger de Cuba S, Bovell-Ammon A, Raifman J. Association of the implementation of Child Tax Credit advance payments with food insufficiency in US households. *JAMA Netw Open*. 2022;5(1):e2143296. <https://doi.org/10.1001/jamanetworkopen.2021.43296>
 20. Bovell-Ammon A, McCann NC, Mulugeta M, Ettinger de Cuba S, Raifman J, Shafer P. Association of the expiration of Child Tax Credit advance payments with food insufficiency in US households. *JAMA Netw Open*. 2022;5(10):e2234438.
 21. Parolin Z, Ananat E, Collyer SM, Curran M, Wimer C. The initial effects of the expanded Child Tax Credit on material hardship. Published September 2021. Accessed July 30, 2022. <https://www.nber.org/papers/w29285>
 22. Pilkauskas N, Micheltore K, Kovski N, Shaefer L. The effects of income on the economic wellbeing of families with low incomes: evidence from the 2021 expanded Child Tax Credit. National Bureau of Economic Research. Published October 2022. Accessed October 3, 2023. <https://www.nber.org/papers/w30533>
 23. US Census Bureau. Measuring household experiences during the coronavirus pandemic. Published June 2022. Accessed July 28, 2022. <https://www.census.gov/data/experimental-data-products/household-pulse-survey.html>
 24. Tax Policy Center Briefing Book. What is the child tax credit? Accessed May 3, 2022. <https://www.taxpolicycenter.org/sites/default/files/briefing-book/what-is-the-child-tax-credit.pdf>
 25. Parolin Z, Collyer S, Curran M. Monthly poverty remains elevated in February. Center on Poverty & Social Policy. Published March 23, 2022. Accessed April 9, 2022. <https://www.povertycenter.columbia.edu/publication/monthly-poverty-february-2022>
 26. US Department of Agriculture: Economic Research Service. What is “Food Insufficiency”? Accessed March 4, 2022. <https://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-us/measurement/#insufficiency>
 27. Berkowitz SA, Basu S. Unemployment insurance, health-related social needs, health care access, and mental health during the COVID-19 pandemic. *JAMA Intern Med*. 2021;181(5):699-702. <https://doi.org/10.1001/jamainternmed.2020.7048>
 28. Schanzenbach D, Pitts A. “How Much Has Food Insecurity Risen? Evidence from the Census Household Pulse Survey. 2020. Accessed March 4, 2022. <https://www.ipr.northwestern.edu/documents/reports/ipr-rapid-research-reports-pulse-hh-data-10-june-2020.pdf>
 29. US Department of the Treasury. Interim results of the 2022 filing season. Published May 2, 2022. Accessed August 4, 2022. <https://www.treasury.gov/tigta/auditreports/2022reports/202240035fr.pdf>
 30. STROBE statement—Checklist of items that should be included in reports of cross-sectional studies. Accessed July 29, 2022. https://www.equator-network.org/wp-content/uploads/2015/10/STROBE_checklist_v4_cross-sectional.pdf
 31. The White House, Washington. Budget of the U.S. government: fiscal year 2024. Office of Management and Budget. Accessed March 28, 2023. https://www.whitehouse.gov/wp-content/uploads/2023/03/budget_fy2024.pdf
 32. Governor Healey Signs First Tax Cuts in More Than 20 Years. *Mass.gov*. Published October 4, 2023. Accessed October 5, 2023. <https://www.mass.gov/news/governor-healey-signs-first-tax-cuts-in-more-than-20-years>
 33. Raifman J, Bor J, Venkataramani A. Association between receipt of unemployment insurance and food insecurity among people who lost employment during the COVID-19 pandemic in the United States. *JAMA Netw Open*. 2021;4(1):e2035884. <https://doi.org/10.1001/jamanetworkopen.2020.35884>
 34. Raifman JR, Raderman W, Skinner A, Hamad R. Paid Leave Policies Can Help Keep Businesses Open And Food On Workers’ Tables. *Health Affairs Forefront*. Published October 25, 2021. Accessed March 17, 2023. <http://www.healthaffairs.org/doi/10.1377/forefront.20211021.197121/full/>
 35. National Center for Education Statistics. Children living in poverty for racial/ethnic subgroups. Published 2019. Accessed May 27, 2023. [https://nces.ed.gov/programs/raceindicators/indicator_rads.asp#:~:text=The%20percentages%20of%20children%20living,and%20Asian%20children%20\(11%20percent](https://nces.ed.gov/programs/raceindicators/indicator_rads.asp#:~:text=The%20percentages%20of%20children%20living,and%20Asian%20children%20(11%20percent)
 36. Hamilton D, Darity W. Can “Baby Bonds” eliminate the racial wealth gap in putative post-racial America? *Rev Black Polit Econ*. 2010;37(3-4):207-216. <https://doi.org/10.1007/s12114-010-9063-1>
 37. Bhutta N, Chang AC, Dettling LJ, Hsu JW. Disparities in wealth by race and ethnicity in the 2019 survey of consumer finances. *Federalreserve.gov*. Published 2020. Accessed March 17, 2023. <https://www.federalreserve.gov/econres/notes/feds-notes/disparities-in-wealth-by-race-and-ethnicity-in-the-2019-survey-of-consumer-finances-20200928.html>
 38. Braga B, McKernan SM, Ratcliffe C, Baum S. Wealth inequality is a barrier to education and social mobility. Urban Institute. Published 2017. Accessed February 17, 2023. https://www.urban.org/sites/default/files/publication/89976/wealth_and_education_3.pdf
 39. Midões C, Seré M. Living with reduced income: an analysis of household financial vulnerability under COVID-19. *Soc Indic Res*. 2022;161(1):125-149. <https://doi.org/10.1007/s11205-021-02811-7>
 40. Parolin Z, Ananat E, Collyer S, Curran M, Wimer C. The effects of the monthly and lump-sum Child Tax Credit payments on food and housing hardship. *AEA Pap Proc*. 2023;113:406-412. <https://doi.org/10.1257/pandp.20231088>