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The American Rescue Plan Act Is a Great Start but More Increases in Supplemental Nutrition Assistance Program (SNAP) Benefits Are Likely Needed Due to Implicit Hidden Reductions

George C Davis

Department of Agricultural & Applied Economics, Department of Human Nutrition, Foods, and Exercise, Virginia Tech University, Blacksburg, VA, USA

ABSTRACT

The Supplemental Nutrition Assistance Program (SNAP) is intended to help low-income individuals reach the cost of a nutritious diet. In response to the Coronavirus disease 2019 (COVID-19) pandemic, SNAP benefits have been increased by 20.3% since October 2020. Given the intended goal of the program, is the 20.3% increase enough? Even prior to COVID-19, the literature had identified 3 separate shortcomings in the current formula that had not been addressed. Here, these shortcomings are integrated into a unifying framework that allows for a comparison between an adjusted formula, that accounts for all these shortcomings, and the current unadjusted formula, that does not account for these shortcomings. Using some average data from the literature, the current unadjusted formula gives the misleading impression that the government will provide 71% of the cost of a nutritious diet with households responsible for 29%. However, working with the adjusted formula, that takes into account the shortcomings, reveals the government actually only provides 41% of the adjusted cost of a nutritious diet and households are responsible for 59%. Some actual and recommended adjustments are shown to fall far short of the full adjustment required to reach a nutritious diet, on average. In particular, the 20.3% increase is less than half of the amount needed to fully correct for these omissions. J Nutr 2021;151:2099–2104.

Keywords: American Rescue Plan, Supplemental Nutrition Assistance Program, SNAP, SNAP benefits, Thrifty Food Plan

Introduction

The purpose of the Supplemental Nutrition Assistance Program (SNAP) is to provide low-income eligible households enough money to reach the cost of a nutritious diet (1). In response to the Coronavirus disease 2019 (COVID-19) pandemic the Families First Coronavirus Response Act effectively eliminated all the standard deductions, that typically reduce the benefit levels, such that all participants can now get the maximum SNAP benefits (2). In addition, there was an inflation adjustment increase of 5.3% to the maximum SNAP benefit in October 2020, which was more than double the 20-y average inflation adjustment (3). Furthermore, in December 2020, the Consolidated Appropriations Act 2021 boosted monthly benefits by an additional 15% initially through to June 2021 (4) and President Biden signed the American Rescue Plan on 11 March, 2021 extending that increase through to September 2021 (5). Given the stated goal of the program, is this total 20.3% increase enough?

Even prior to COVID-19, a 2013 comprehensive Institute of Medicine (IOM) report (6) identified 3 major shortcomings in the current SNAP benefit formula: 1) the outdated food expenditure share of income, 2) the ignoring of geographic food price differences, and 3) the ignoring of labor (time) costs. Although this research has grown, the focus has been on these shortcomings in isolation (7–14). No unified framework has been developed for analyzing and comparing all 3 limitations simultaneously. Consequently, there are 3 outstanding questions of particular interest: 1) which of these shortcomings is relatively speaking most important to address? 2) How much will the benefits need to change to address all 3 shortcomings in sum? 3) Does the 20.3% increase cover these shortcomings?

This article presents a simple unifying framework that will answer these questions and:
(1) demonstrate and quantify how these shortcomings can be considered implicit hidden benefit reductions in a more accurate adjusted formula,

(2) quantify ideological positions on a continuum from “no adjustment” to “full adjustment” that provides a singular useful focal point for policy discussions and negotiations.

These questions and objectives are addressed by distinguishing between a corrected or adjusted SNAP benefit formula that accounts for all 3 shortcomings and the current unadjusted formula that does not. The adjusted and unadjusted formulas are connected with some simple algebra. The intuition is analogous to that of purchasing power in economics: there is a difference in purchasing power between a real (adjusted) amount and a nominal (unadjusted) amount. The adjustment to the maximum SNAP benefit can be decomposed into a food expenditure share adjustment, a geographic price difference adjustment, and a labor cost adjustment. This unifying framework allows us to compare the relative magnitudes of these adjustments, determine the full adjustment amount, and compare the recent 20.3% adjustment, along with some other previous and proposed adjustments, to the fully adjusted benefits.

The 3 Areas of Concern and Related Literature

For clarity, it is important to distinguish between the SNAP benefit formula and its values. Although the basic formula is the same across households, the SNAP benefit values will vary by the levels of several household-related variables (e.g. earned income, household composition, child care and dependent care status). The focus of this analysis is on inaccuracies and omissions in the formula across all households. I will discuss later how the values of these inaccuracies and omissions could vary by households. Inaccuracies and omissions are both forms of information omission, so for simplicity the term “omission” is used to cover both.

The stylized SNAP benefit formula for an individual household in the 2013 IOM report (p. 33) (6) is sufficient for illuminating the 3 omissions: \( S = M_T - b(Y_G - D) \). In this formula:

- \( S \) is the SNAP benefit amount, \( M_T \) is the minimum dollar threshold estimate for a nutritious diet, \( Y_G \) is the household’s gross income, \( D \) is a list of allowable deductions (e.g. standard deduction, child support, dependent care). The difference \( Y_G - D \) is referred to as “net income.” The \( b \) is known as the benefit reduction rate and is the assumed food expenditure share of net income the household spends on food. If net income is zero, the household gets the maximum SNAP benefit, which in this context is synonymous with the cost of a nutritious diet \( M_T \). Concerns about the appropriate food expenditure share relate to the value of \( b \), and geographical price differences and labor cost adjustments relate to more accurately estimating the cost of a nutritious diet \( M_T \).

The benefit reduction rate

The current SNAP benefit reduction rate is 30% or \( b = 0.30 \), which is the food expenditure share of income from a 1955 USDA food consumption survey (6). The more recent food expenditure share is much lower. From 2012 to 2019, the average food expenditure share has been stable at 13%, with some minor differences across income quintiles (lowest 20 = 16%, second 20 = 14%, third 20 = 13%, fourth 20 = 13%, highest 20 = 11%). There is also very little variability across household sizes or regions (15). So, the current SNAP benefit reduction rate implicitly expects participating households to spend about twice as much of their own “net income” on food as the average household.

Geographical price differences

The maximum SNAP benefit \( M_T \) is equivalent to the Thrifty Food Plan (TFP), which comes from a math programming model designed to estimate the minimum cost of a nutritious diet. The TFP is based on national average food prices from a 2001–2002 Nielsen Homescan dataset that is updated for inflation by the national consumer price index for food (6). However, food prices differ by geographic location. In areas where local prices are higher (lower) than the national average, SNAP benefits will be too low (or too high) (7–10, 16, 17). In 2012–2013, the USDA Food Acquisition and Purchase Survey (FoodAPS) project used data collected by Information Resource, Inc. to estimate TFP baskets that are more geographically sensitive (18). Clearly with a decade time difference, the different geographical focus, and being collected by different firms, not to mention the significant change in the food retailing environment over this time, it is not surprising that even the average TFP estimates differ. For example, comparing census region TFP estimates from the FoodAPS data to the national TFP estimates for the same set of SNAP recipients Davis, You, and Yang (7) found for every census region, the geographical (and temporally) adjusted TFP estimates are higher. The geographically sensitive and more recent average TFP (maximum benefit) is $111.95 per week; the national and older TFP currently in use is $100.35 per week (see their Table 2). This is a difference of about $50.00 per month. This is similar to the $45 estimate given by Christensen and Bronchetti (Table 5) (8) based on FoodAPS and census regions as well.

Labor cost omission

A nutritious diet requires both money and labor (time) inputs. Ingredients cannot be converted into nutrition without some time in planning, shopping, preparation, and cooking. Time is important in several nutrition-related decisions and outcomes (11–14, 19–25). The TFP only includes the cost of ingredients (groceries) but ignores the labor (time) input cost. Basic cost accounting and math implies ignoring the cost of an important input leads to an underestimation of the cost of production. Consequently, the cost of a nutritious diet, the maximum SNAP benefit, is underestimated.

Using Becker’s (1965) household production “full cost” framework (26), Davis and You (13, 14) demonstrate that the cost of a nutritious diet that would include time is:

\[
M = M_T^G + p^G T_T - p^G T_T
\]

Notationally, \( M_T^G \) is the geographically sensitive money input threshold (i.e. groceries) and \( T_T \) is time input threshold required to reach a nutritious diet, respectively. Time is valued at the geographically sensitive labor market price \( p^G \), which, as proven by Shreyer and Dewert (27), is appropriate when the goal is to estimate the labor input cost. The household is contributing \( T_T \) to nutrition production. The intuition of (1) is straightforward. The first 2 terms \((M_T^G + p^G T_T)\) give the sum of the estimated grocery and time input cost required to reach a nutritious diet. The subtraction of the last term \(p^G T_T\) takes into account the contribution being made by the household. This is conceptually identical to what the benefit formula does in the money input dimension where it deducts an assumed amount the household will contribute to the cost of a nutritious diet (i.e. the benefit.
The best estimates of the required time $T_r$ and actual time $T_a$ indicate it is very unlikely households are spending near the required time to reach a nutritious diet, especially for single-headed households. The current best estimate of the required time $T_r$ consistent with the TFP has a 95% percentile range of 8.59 to 17.44 h a week, with a mean of 13.10 h per week (13). In terms of actual time $T_a$ the distribution for single-headed households depends on what data and time period is used, but the results are rather consistent. Across several studies the average amount of time per week in food production is about 4.60 h and the widest 95% percentile range is 1.45 to 9.21 h per week (12–14, 24). For dual-headed households, the mean is 10.97 h per week with a 95% percentile range of 6.17 to 17.33 h per week (12). So, on average, single- and dual-headed households fall short of the time required for producing a nutritious diet by about 9 and 2 h per week, respectively.

### Methods and Results

These 3 cost omissions imply that the “real” benefits may be lower than suggested by the current benefit formula. This section presents a unifying framework for simultaneously addressing all 3 omissions, determining their relative magnitudes, and determining to what extent some actual and proposed scaling adjustments offset the omissions.

#### The real benefit reduction rate

The “real” or hidden benefit reduction rate can be determined by answering the question: in the adjusted formula, what benefit reduction rate would be required in order to reduce the adjusted benefit level to the unadjusted benefit level? Starting with the adjusted cost of a nutritious diet given to equation (1) and letting $b_r$ represent the real benefit reduction rate, the more accurate or adjusted benefit formula is then:

$$ S_a = M^C_g + p^G(T_r - T_a) - b_r NI $$

Alternatively, the current unadjusted benefit formula that uses national average food prices for the money cost threshold of a nutritious diet $M^N_g$, ignores the labor cost, and has the current benefit reduction rate $b_c$, can be written as:

$$ S_a = M^N_g - b_c NI $$

The real benefit reduction rate is then determined by setting (2) equal to (3) and solving for $b_r$:

$$ b_r = b_c + \frac{(M^C_g - M^N_g)}{NI} + \frac{p^G(T_r - T_a)}{NI} $$

Substituting (4) into (2) would give the current unadjusted formula (3). Equation (4) demonstrates that, in addition to the current benefit reduction rate $b_c$, the household may have to also make up a geographical price difference component (second term) and a labor cost component (third term), so the real benefit reduction rate $b_r$ differs from the current rate $b_c$. If the geographically adjusted maximum SNAP benefit $M^C_g$ is greater (less) than the national-based maximum SNAP benefit amount $M^N_g$, then the real benefit reduction rate $b_r$ would be greater (smaller) than the current benefit reduction rate $b_c$. The same logic applies to the labor cost difference captured by the last term. The “real” purchasing power of the current SNAP benefits may be quite different from the “nominal” purchasing power.

As indicated, the actual values of these adjustments will differ by individual household-level variables, geographic locations, and time periods. A comprehensive quantitative analysis of these individual adjustments is beyond the purpose or scope of this article. However, some idea of the total and relative magnitudes can be gleaned by using averages found in government data and the cited literature. Table 1 reports all the numbers cited above and a few others, along with their sources and time frames. Substituting these numbers into equation (4) yields an average estimate of the real benefit reduction rate $b_r$ from the geographical and labor-cost-adjusted maximum SNAP benefit of $1.07 = 0.30 + 0.12 + 0.65$. The current maximum SNAP benefits, that do not take into account geographical price differences and labor cost, are equivalent to subtracting $1.07 \times NI$ from the geographical and labor-cost-adjusted maximum SNAP benefits, not the $0.30 \times NI$ as shown in the current formula.

A more direct and enlightening way to express this discrepancy is to determine the real per cent contribution the current SNAP benefits make to the adjusted cost of a nutritious diet. Using these numbers, the current unadjusted monthly cost of a nutritious diet estimate is $401.80 and the average current SNAP benefit would be $S_a = 401.80 - 0.3 \times 383 = $286.50. However, the average geographical and labor-adjusted (real) monthly cost estimate is $S_a = 447.80 - 248.38 = 199.42$. The current maximum SNAP benefits, which do not take into account geographical price differences and labor cost, are equivalent to subtracting $1.07 \times NI$ from the cost of a nutritious diet. If a household wants to reach the real nutritional diet cost target, it must provide 59% not 29% of the real cost. Simply stated, households on average are being asked to not only account for the current food expenditure share differences, but also to account for the geographical price difference and labor cost omission.

Equation (4) is also very useful for analyzing the sufficiency of setting the current benefit reduction rate to zero ($b_r = 0$), which is equivalent to giving everyone the maximum SNAP benefit, as was effectively done during the COVID-19 pandemic in October 2020 by the emergency allotment supplement (4). However, note equation (4) reveals that even if everyone gets the maximum SNAP benefit ($b_r = 0$), there are still hidden reductions related to geographical price differences and labor costs, i.e. $M^C_g - M^N_g$, $p^G(T_r - T_a)$ equal to $294.38 + $46 + $248.38 on average. Simply stated, the current benefit reduction rate cannot be set low enough to correct for geographical

### Table 1: Average monthly values from government data and literature

| Variable | Value |
|----------|-------|
| Expenditure share. Net income | 0.30 |
| Actual $b_c$, decimal | 0.13 |
| Net income ($NI$, $) | $383.00 |
| TFP (maximum SNAP) | $447.80 |
| Regional price based $M^C_g$, $ | $401.40 |
| Labor cost | $11.65 |
| Hourly home cook, p,$ | 52.40 |
| Required hours $T_r$, h | 31.08 |

Notes/Source: Based on monthly data from the government and cited literature. $b_r$, actual benefit reduction rate; $b_c$, current benefit reduction rate; $M^C_g$, geographically adjusted maximum SNAP benefit; $M^N_g$, national based maximum SNAP benefit; SNAP Supplemental Nutrition Assistance Program; $T_r$, time actual; $T_a$, time required.

1. Substituting (4) into (2) would give the current unadjusted formula (3).
2. $b_c$ current formula share (6), $b_r$ actual average food expenditure share from 2005 to 2012 (15), NI 2012 (28).
3. $a_n$ and $M^g$ 4/2012 – 1/2013 (7).
4. p national average hourly wage rate cooks in the home 2004–2012 (29), $T_r$ required hours 2011–12, $T_a$ actual hours (2015). Average over single- and dual-headed households (12, 13, 24).
price and labor cost omissions. So, what can be done to correct for these omissions?

A scaling adjustment approach with policy weighting parameters

To increase benefits, the recent approach used by the USDA, and frequently recommended by researchers, is to simply multiply the maximum benefit level by a scaling factor. What should this scaling factor be to correct for the 3 omissions? Write the scaled current maximum benefit level by a scaling factor. What should this scaling factor be? To correct for the 3 omissions? Write the scaled current maximum benefit level by a scaling factor. What should this scaling factor be?

The results in Table 2 are consistent with the literature: the current maximum SNAP benefit underestimates the true cost of a nutritious diet and not by a minor amount (6–14). However, none of the cited literature can answer the question: which of the 3 adjustments is relatively speaking most important? Based on the average numbers used here, the contribution to the total adjustment for the food expenditure share is 16%, the geographical price is 14%, and labor cost is 70%. The labor cost adjustment is much more important than the food share and geographical price differences, even if the last 2 are combined.

Not surprisingly, the overall scaling factor consists of individual scaling factors for each omission. However, the political reality is that there are many reasons why a full adjustment may not be desirable or feasible (e.g. ideological, financial constraints). Consequently, policy weighting parameters $\lambda_G, \lambda_T, \lambda_S$ are introduced to reflect the percentage of adjustment for each correction. The policy weights are conceptually appealing because they help separate the science of diet cost estimation from the politics of welfare ideology. Discussions and debates can then focus singularly on negotiations about the desired percentage of the adjustment. For example, if I group feels labor should not be covered, that does not mean labor is not part of the cost of a nutritious diet; it always is. Rather, they are implicitly saying the policy weight on the labor adjustment should be zero ($\lambda_T = 0$). Note more generally the fully adjusted formula (2) and the unadjusted current formula (3) are both embedded in (5) and will result if all 3 policy weighting parameters are set equal to 1.00 or 0.00, respectively.

Using the numbers from Table 1, Table 2 gives the estimates of the scaling adjustments needed to correct for the cost omissions corresponding to different policy parameter weightings. For simplicity we choose the same weight $\lambda$ for all 3 (i.e. $\lambda_G = \lambda_T = \lambda_S$). With no adjustment ($\lambda = 0$) the maximum SNAP benefit is as before $M_N^T = $401.40 per month. With a half-way compromise scaling adjustment ($\lambda = 0.5$), the individual scaling adjustments are food expenditure share (0.07), geographical prices (0.06), and labor cost (0.31). Consequently, the total adjustment scale is 1.44 so the maximum SNAP benefits would be 44% higher or $578.02 (= $401.40 \times 1.44)$ per month. With full adjustment scaling ($\lambda = 1$) the numbers are twice the half-way amounts, so the general relative pattern remains, but with higher absolute numbers. With the full adjustment scaling, the maximum SNAP benefit is $401.40 \times 1.89 = $758.65 per month.

### TABLE 2 Scaling adjustments based on government data and literature averages

| Scaling type                          | No adjustment ($\lambda = 0$) | Half-way adjustment ($\lambda = 0.5$) | Full adjustment ($\lambda = 1$) |
|---------------------------------------|-------------------------------|-------------------------------------|---------------------------------|
| Food expenditure share                | 0.00                          | 0.07                                | 0.15                            |
| Geographical prices                   | 0.00                          | 0.08                                | 0.12                            |
| Labor cost                            | 0.00                          | 0.31                                | 0.62                            |
| Total adjustment                      | 1.00                          | 1.44                                | 1.89                            |
| Adjusted maximum SNAP benefit per month, $ |
| Current maximum benefit $401.40       | $578.02                       | $758.65                            |

1Using numbers from Table 1 and equations (6) – (9). SNAP: Supplemental Nutrition Assistance Program.

### Discussion

The discussion is consistent with the literature: the current maximum SNAP benefit underestimates the true cost of a nutritious diet and not by a minor amount (6–14). However, none of the cited literature can answer the question: which of the 3 adjustments is relatively speaking most important? Based on the average numbers used here, the contribution to the total adjustment for the food expenditure share is 16%, the geographical price is 14%, and labor cost is 70%. The labor cost adjustment is much more important than the food share and geographical price differences, even if the last 2 are combined.

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### Table 3

| Type                  | Equivalent adjustment factor ($\alpha$) | Implied policy scale value ($\lambda$) |
|-----------------------|----------------------------------------|--------------------------------------|
| Full adjustment       | 0.89                                   | 1.00                                 |
| Recommended           | Ziliak (11)                            | 0.20                                 | 0.22                                 |
|                       | You and Davis (12)                     | 1.26                                 | 1.42                                 |
| Actual                | ARRA                                   | 0.136                                | 0.15                                 |
|                       | COVID-19                               | 0.203                                | 0.23                                 |
| Alternative plans     | Low-cost food plan                     | 0.30                                 | 0.34                                 |
|                       | Moderate-cost food plan                | 0.61                                 | 0.69                                 |
|                       | Liberal food plan                      | 0.97                                 | 1.09                                 |

1ARRA, American Recovery and Reinvestment Act; COVID-19, Coronavirus disease 2019.
Conclusions

A substantial amount of research has demonstrated that SNAP benefits are inadequate for their intended goal of providing enough money for a nutritious diet and 3 major shortcomings have been separately identified: 1) the food expenditure share of income is outdated, 2) geographic food price differences are not considered, and 3) labor costs are ignored. This article provides a unifying framework for accounting for all these shortcomings simultaneously and reveals how these shortcomings are implicit hidden reductions in the current formula. The article also develops scaling adjustments to the current formula and ranks these adjustments. The scaling adjustments are attractive because they allow for a continuum of adjustments along a scale from zero to full adjustments, which is attractive as it essentially allows for negotiations simply in terms of percentages. The location of some actual and proposed adjustments on the scale are quantified.

Using average numbers found in the literature, labor is the far more important omission or adjustment (70%) than the other 2 components (food expenditure share 16% and geographical prices 14%). The current benefit reduction rate is 30%, whereas the real benefit reduction rate from the full adjusted diet cost estimate is 107%. The current benefit reduction rate implies that the government provides 71% of the cost of a nutritious diet and individuals 29%, but once the real cost is considered the government only provides 41% and individuals are responsible for 59%. Furthermore, the analysis reveals some recent and recommended scaling adjustments have been very conservative, being all <25% of a full adjustment, with one exception. The simplest approach to address the inadequacy problem, that is close to the half-way point on the adjustment scale, would be to use something between the low- and moderate-cost plans already provided by the USDA.

As with all research, there are limitations and areas in need of future work. Because the purpose of this work is more conceptual than empirical, the most obvious limitation is the use of averages to demonstrate the quantified values. As with all averages, for some households these numbers will be too low and for others too high. Much more refined diet cost estimates and comprehensive analyses could be achieved by breaking down these adjustments along many different dimensions (e.g. household composition, employment status, geographic region, time period). Such refined granularity essentially requires more specific data associated with households. As indicated, given the food share of income is rather stable across households at about 13%, data on geographically sensitive prices and time on food production is more pressing. However, there is already a precedent for geographical price adjustments as this is one of the reasons the benefits for Alaska, Hawaii, Guam, and the Virgin Islands are already higher, so it can be done. The least data-intensive method for making some geographical price adjustment would be to use readily available geographically sensitive cost of living adjustments, as has been recommended by several authors (6–8, 10). The data needed for the more important time component may seem more challenging, but it need not be. Just as the current benefit reduction rate is based on the average food expenditure share across all households, so too could some average be used for time across households, which could even be different by household compositions using the American Time Use Survey. Of course, neither of these types of broad adjustments would be as accurate as collecting individual household-specific information, but there are many pragmatic reasons in government policies for not collecting data at this level of detail but instead using constants or some central tendency (e.g. confidentiality, equity perceptions, data limitations, monitoring feasibility, political constraints). The main point is that some adjustment is better than none. “The perfect should not be the enemy of the good” and this is especially true with respect to the labor cost adjustment for the following reason.

To simplify the presentation, the term “omissions” was used to represent information omission and therefore to cover both inaccuracies (current benefit reduction rate and geographic price differences) and the actual labor cost omission. An inaccuracy by definition could be positive for some households and negative for others. However, technically an input cost omission is a 1-sided inaccuracy and in this sense is fundamentally different than a 2-sided inaccuracy. Basic math and cost accounting reveals that completely omitting an important input in calculating the cost of producing something will always underestimate the cost of production. In this context, regardless of the household, as long as there is need to spend labor in food production, the cost of the diet will be underestimated and SNAP benefit adequacy over estimated.

Finally, this analysis focused on the main component of the SNAP; the SNAP benefit formula. However, during COVID-19 other elements have been attached to the SNAP (2), such as...
as the Pandemic Electronic Benefit Transfers (P-EBT) payments designed to cover missing school lunches. When taken into account these would further mitigate the omissions covered here. However, these are not part of the standard program and, as stated in the Food and Nutrition Act of 2008 (1), it is the goal of the SNAP benefit formula in isolation to help low-income households reach the cost of a nutritious diet. Given this stated goal and the analysis presented here, although the recent 20.3% increase in maximum SNAP benefits is a great start, more is likely needed to make the benefits adequate and much more work is needed on estimating the full cost of a nutritious diet.

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References
1. United States Food and Nutrition Act 2008. US Code 2011. Title 7, Chapter 51. Declaration of Policy. [Internet]. Available from: https://uscode.house.gov/browse/prelim/chapter51&edition=prelim.
2. USDA increases monthly SNAP benefits by 40%. United States Department of Agriculture Press Release. 22 April, 2020. [Internet]. Available from: https://www.usda.gov/media/press-releases/2020/04/22/usda-increases-monthly-snap-benefits-40.
3. SNAP benefit increase takes effect. United States Department of Agriculture Press Release. 2020. [Internet]. Available from: https://www.fns.usda.gov/news-item/fns-001420.
4. Consolidated Appropriations Act. 2021. [Internet]. Available from: https://www.congress.gov/116/bills/hr133/BILLS-116hr133enr.pdf.
5. American Rescue Plan Act. 2021. [Internet]. Available from: https://www.congress.gov/bill/117th-congress/house-bill/1319/text.
6. Caswell J, Yaktine A . eds. Supplemental Nutrition Assistance Program: Examining the Evidence to Define Benefit Adequacy. Washington DC: National Academies Press; 2013.
7. Davis GC, You W, Yang Y. Are SNAP benefits adequate? A geographical and food expenditure decomposition. Food Policy 2020;95:101917.
8. Christensen G, Bronchetti ET. Local food prices and the purchasing power of SNAP benefits. Food Policy 2020;95: 101937.
9. Ismail M, Ver Ploeg M, Chomitz V, Wilde P. Differences in food-at-home spending for SNAP and non-SNAP households given geographic price variation. J Acad Nutr Dietetics 2020;120(7):1142–1150.e12.
10. Gundersen C, Waxman E, Crambaugh A. An examination of the adequacy of Supplemental Nutrition Assistance Program (SNAP) benefit levels: impacts on food insecurity. Agri Res Econ Rev 2019;48(3):433–47.
11. Ziliak J. Modernizing SNAP benefits. Policy Proposal 6. The Hamilton Project. 2016. [Internet]. Available from: https://www.hamiltonproject.org/assets/files/ziliak_modernizing_snap_benefits.pdf.
12. You W, Davis GC. Estimating dual headed time in food production with implications for SNAP benefit adequacy. Rev Econ Household 2019;17(1):249–66.
13. Davis GC, You W. Not enough money or not enough time to satisfy the thrifty food plan? A cost difference approach for estimating a money–time threshold. Food Policy 2011;36:101–7.
14. Davis GC, You W. The Thrifty Food Plan is not thrifty when labor cost is considered. J Nutr 2010;140(4):854–7.
15. Bureau of Labor Statistics. Consumer Expenditure Surveys. 2012–2019. Average Expenditure, Share, Standard Error Tables. BLS. CES. Washington DC. [Internet]. Available from: https://www.bls.gov/cex/tables.htm#aggexp.
16. Todd J, Leibtag E, Penberthy E. Geographic Differences in the Relative Price of Healthy Foods. Econ Info Bull 78. US Department of Agriculture, Washington, DC; 2011.
17. Leibtag E. Stretching the Food Stamp Dollar: Regional Food Prices Affect Affordability of Food. Econ Info Bull 29-2. US Department of Agriculture, Washington, DC; 2007.
18. USDA. FoodAPS-GC. 2018. FoodAPS National Food Acquisition and Purchase Survey Geography Component. [Internet]. Available from: https://www.ers.usda.gov/data-products/foodaps-nationalhousehold-food-acquisition-and-purchase-survey-geography-component/.
19. Jabs J, Devine C. Time scarcity and food choices: an overview. Appetite 2006;47(2):196–204.
20. Monsivais P, Aggarwal A, Drewnowski A. Time spent on home food preparation and indicators of healthy eating. Am J Prev Med 2014;47(6):796–802.
21. Fiese BH, Gundersen C, Koester B, Jones B. Family chaos and lack of mealtime planning is associated with food insecurity in low income households. Econ Human Biol 2016;21: 147–55.
22. Marshall G, Pires T. Measuring the impact of travel costs on grocery shopping. The Econ J 2018;128(614):2538–57.
23. Mills S, White M, Brown H, Wrieden W, Kwasnicka D, Halligan J, Robalino J, Adams J. Health and social determinants and outcomes of home cooking: a systematic review of observational studies. Appetite 2011;11:116–34.
24. Yang Y, Davis GC, You W. Measuring food expenditure poverty in SNAP populations: some extensions with an application to the American recovery and reinvestment act. Appl Econ Persp and Policy 2019;41(1):133–52.
25. Davis GC, Serrano EL. Food and Nutrition Economics: Fundamentals for Health Sciences. Oxford University Press; 2016.
26. Becker GS. A theory of the allocation of time. The Economic Journal 1965;75(299):493–517.
27. Schreyer P, Diewert EW. Household Production, Leisure, and Living Standards. In Measuring Economic Sustainability and Progress, eds. Dale W, Jorgenson, Steven Landefeld J, Schreyer P. Chicago: University of Chicago Press; 2014, 89–114.
28. Cronquist C. Characteristics of Supplemental Nutrition Assistance Program Households: Fiscal Year 2018. Washington DC: United States Department of Agriculture Food and Nutrition Service; 2019. [Internet]. Available from: https://www.fns.usda.gov/snap/characteristics-supplemental-nutrition-assistance-program-households-fiscal-year-2018.
29. United States Bureau of Labor Statistics. Occupational Employment Statistics Data. 2004–2012. [Internet]. Available from: https://www.bls.gov/oes/current/oes_nat.htm.
30. Agricultural Improvement Act of 2018. Public Law No: 115–334. [Internet]. Available from: https://www.congress.gov/116/bills/hr133/BILLS-116hr133enr.pdf.
31. Executive Order on Economic Relief Related to the COVID-19 Pandemic, White House Press Release. 2021 [Internet]. Available from: https://www.whitehouse.gov/briefing-room/presidential-actions/2021/01/22/executive-order-economic-relief-related-to-the-covid-19-pandemic/.
32. Children's Health Watch. Research Brief. SNAP: from the Thrifty Food Plan (TFP) to the Low Cost Food Plan (LCFP). [Internet]. Available from: https://childrenshealthwatch.org/wp-content/uploads/SNAP_2017_Ana_logo.pdf.
33. United States Department of Agriculture. Food Plans: Cost of Food Reports. Washington, DC. [Internet]. Available from: https://www.fns.usda.gov/cnpp/usda-food-plans-cost-food-reports-monthly-reports.