

Strategies to Counter 2021-Specific Challenges in Producing the Supplemental Poverty Measure in the American Community Survey

Brian Glassman and Danielle Wilson
Poverty Statistics Branch
Social, Economic, and Housing Statistics Division
U.S. Census Bureau¹

SEHSD Working Paper #2023-21

June 2023

Abstract

The Census Bureau releases official poverty measure estimates each year using both the Current Population Survey Annual Social and Economic Supplement (CPS ASEC) and the American Community Survey (ACS). Official poverty estimates can be created relatively easily using data from either survey. However, Supplemental Poverty Measure (SPM) estimates are not as easily calculated using the ACS. The SPM is an extension of the official poverty measure that considers non-cash benefits and necessary expenses (such as income and payroll taxes, medical and work expenses) when determining an individual's poverty status. The SPM subsequently requires additional income information that is available in the CPS ASEC but not in the ACS. To calculate SPM estimates using the ACS, missing benefit and expense information is imputed using three years of CPS ASEC data. While this normally may be a reasonable strategy, its implementation is potentially problematic for 2020 and 2021 due to the unprecedented transformation of the economy and temporary expansion of social safety net programs. Therefore, it may be best to exclude pre-pandemic data and use fewer years of the CPS ASEC for 2021 ACS SPM imputations. The first purpose of this paper is to explore the effects of using fewer (than the normal three) years of CPS ASEC data in ACS imputations. The second is to develop a solution to the possible double counting of pandemic Economic Impact Payments in the ACS.

¹ This paper is released to inform interested parties of ongoing research and to encourage discussion of work in progress. Any views expressed are those of the author and not necessarily of the U.S. Census Bureau. The Census Bureau reviewed this data product for unauthorized disclosure of confidential information and has approved the disclosure avoidance practices applied to this release. CBDRB-FY23-POP001-0096.

I. Introduction

The Supplemental Poverty Measure (SPM) is an extension of the official poverty measure that considers non-cash benefits, tax credits and necessary expenses when determining an individual's or family's poverty status. The U.S. Census Bureau annually produces SPM estimates using the Current Population Survey's Annual Social and Economic Supplement (CPS ASEC). To calculate the SPM, the value of a unit's² total noncash benefits (which includes SNAP benefits, school lunch benefits, WIC benefits, and energy, broadband, and housing subsidies) is added to their sum of cash income net expenses (which includes federal and state income and payroll (FICA) taxes, medical expenses, and work and childcare expenses).

Although the CPS ASEC collects detailed income and relationship data, it can only produce SPM estimates at the national level using 1 year of data and state level using pooled 3 years of data. Although the larger American Community Survey (ACS) can produce geographically disaggregate estimates, it does not contain the detailed resource information necessary to determine individual poverty status per the SPM. The ACS does not ask any questions about receipt of housing, energy, or broadband subsidies, school lunch, or WIC benefits. The survey only asks whether households received SNAP benefits during the past year. Unlike the CPS ASEC, the ACS also does not ask respondents about expenses incurred over the last year (such as medical expenses, work expenses, and childcare expenses).

Increased interest in poverty at geographically disaggregate levels motivated the implementation of the SPM in the ACS. In 2020, Fox et al. proposed a methodology to impute the value of missing benefits and expenses to produce SPM estimates using the ACS. The Census Bureau subsequently published a series of [ACS microdata sets](#) with imputed values for these necessary components. Data users can use the microdata sets to estimate SPM rates for states and public use microdata areas (PUMAs) within the United States using 1 year of data.

Unfortunately, the methodology proposed by Fox et al. (2020) may not be appropriate for 2020 and 2021 due to the unprecedented transformation of the economy and the expansion of temporary social safety net programs.

First, the COVID-19 pandemic caused a massive shutdown and reorganization of the economy in 2020. Consequently, using pre-pandemic data to impute components of post-pandemic economic well-being may be inappropriate.

Second, there was a large change in the administration of the SNAP and school lunch benefits at the start of the pandemic. Changes to the standard school lunch methodologies used in the 2019 CPS ASEC were implemented in 2020 and 2021 to adjust for school closings and the distribution of benefits on pandemic electronic benefit (P-EBT) cards (Shrider 2021 and 2022). Furthermore, Congress substantially expanded the SNAP program in March of 2020 in response to the pandemic. For these two programs, it subsequently seems necessary to use fewer than three years of CPS ASEC data in respective ACS imputations.

² An SPM unit differs from a traditional family as defined in the OPM. An SPM unit considers members of a household that are likely to share resources, such as cohabitating partners, foster children, and unrelated individuals 15 years or younger. Additional discussion on the differences between SPM unit and OPM families can be found in Provencher (2011).

Third, income based Economic Impact Payments (EIP) were distributed in 2020 and 2021. The value of these payments, including the overall tax responsibility of survey respondents, is simulated using the TAXSIM model designed by the National Bureau of Economic Research (NBER). However, there is evidence that households in the ACS may have included the value of EIP in their reported receipt of public assistance. Such a systematic double counting of EIP, if pervasive, could potentially bias ACS SPM estimates.

This paper has two main purposes. The first is to explore the effect of using fewer than three years of CPS ASEC data in our ACS imputations. The second is to propose a method that prevents the double counting of EIP in the ACS. The data and methodology used in this paper are discussed in Section II. In Section III, we present results using one, two and three years of pooled CPS ASEC data for ACS imputations. In Section IV, we discuss pandemic related concerns regarding reported values of public assistance and propose solutions to address them. Final SPM rates with all updates to the ACS SPM methodology are shown in Section V. Section VI concludes.

II. Data and Methods

Two datasets are used in the production of the ACS SPM. The main data come from the ACS 1-year public use estimates. The ACS is a nationwide household survey designed to provide communities with reliable and timely demographic, social, economic, and housing data for the nation, states, congressional districts, counties, places, and localities every year.³ It has an annual sample size of about 3.5 million addresses across the United States and Puerto Rico, and includes both housing units and group quarters (e.g., nursing facilities and prisons).⁴ The ACS is one of the best sources of sub-national economic, social, and employment characteristics and its large sample size allows for analyses by demographic characteristics and small area geographies.

The second source of data is from the CPS ASEC. Although the sample size of the CPS ASEC is smaller than that of the ACS, it collects significantly more detailed income information. Microdata from the CPS ASEC is consequently used to impute benefits and expenses not available in the ACS. When possible, the value of public assistance received is also compared between the two surveys to check for consistency.⁵

Table 1 lists and defines the acronyms of benefits and expenses considered by the SPM. The first nine rows in Table 1 describe variables available in the CPS ASEC but not in the ACS. The last row describes public assistance as defined by its quoted phrasing on the ACS questionnaire.⁶

³ For technical documentation for the ACS, refer to <https://www.census.gov/programs-surveys/acs/technical-documentation.html>.

⁴ While people living in group quarters are sampled in the ACS, those living in institutional group quarters (e.g., nursing homes or correctional facilities) are not included in the poverty universe. Homeless populations are not included in the sample universe unless they are living in shelters at the time of the survey.

⁵ Note that the reference periods differ between the two surveys. The CPS ASEC uses the previous calendar year while the ACS uses the previous 12 months.

⁶ For more information about the ACS SPM methodology, refer to <https://www.census.gov/library/working-papers/2020/demo/SEHSD-WP2020-09.html>.

Table 1: Variable definitions	
Benefit/expense	Definition
School lunch	Child ate a hot lunch at school (benefit due to government subsidization)
Free/reduced lunch	Child ate a free or reduced-price lunch
WIC	Special Supplemental Nutrition Program for Women, Infants, and Children benefits
Housing assistance	Rental subsidies: government help with rent or living in public housing
Energy assistance	State or local assistance with energy payments
SNAP benefits	Supplemental Nutrition Assistance Program benefits
Childcare expenses	Amount of money spent on childcare in order to work
Insurance premiums	Amount paid in health insurance premiums
Other medical expenses	Any out-of-pocket medical expenses other than insurance premiums
Public assistance	“Any public assistance or welfare payments from the state or local welfare office”

The SPM in the CPS ASEC also includes broadband internet subsidies in resources. However, we do not include these subsidies as part of the ACS SPM for two reasons. First, the broadband subsidy began [distributing benefits in May of 2021](#). The ACS has a rolling collection process which means that respondent data could come from anywhere from January 2021 through December 2021. Therefore, we could be imputing subsidies to households prior to the introduction of the program. Second, the CPS ASEC asks about whether or not someone received the subsidy and the number of months of receipt and then uses those answers to multiply by the broadband subsidy value. Questions about receipt of the subsidy and number of months receiving the subsidy were not asked in the ACS.

The details for the original imputation procedure proposed by Fox et al. (2020) for each variable using three years of CPS ASEC data are in Appendix Table 1. For example, data from the 2018, 2019, and 2020 CPS ASEC are used to impute the value of components considered by the SPM for the 2019 ACS. A logistic regression model is generally used to impute whether a benefit or expense was received. A predictive means match is used to impute the amount of each benefit or expense conditional on receipt or incurrence. Different combinations of independent variables are used in each regression, though many imputations consider the same core demographic characteristic information.

Important for this paper is the changes that occurred to the administration of the school lunch program. Due to the nearly universal shutdown of schools throughout the country, pandemic electronic benefit cards (P-EBT) were allocated to families that would have otherwise received school lunch. The methods used to calculate school lunch benefits in this paper were based on assumptions made in the SPM from the CPS ASEC (Shrider 2021 and 2022). If a family was already receiving SNAP, we assume that P-EBT values were captured within the value of reported SNAP benefits. If a family was not receiving SNAP, we added the value of P-EBT to their school lunch benefit.

In the following section we present results using different pooled samples of the CPS ASEC to impute SPM benefits and expenses for the 2021 ACS. This analysis is repeated for the 2019 ACS. We compare results using the 2021 and 2019 ACS to check for any inconsistencies when using two or three years of pooled CPS ASEC data. We do not replicate this analysis for the 2020 ACS due to data quality

concerns.⁷ In 2020, the onset of the COVID-19 pandemic disrupted data collection and resulted in lower survey response rates. Those who responded to the survey had statistically different social, economic, and housing characteristics than those who did not. This resulted in unreasonable estimates, or ones that were inconsistent with benchmarks and administrative data. These inconsistencies signaled a serious quality issue and nonresponse bias in the 2020 ACS 1-year data. Rather than release the estimates using standard methodology, the U.S. Census Bureau created experimental estimates using a new weighting methodology aimed at mitigating the nonresponse bias in the 2020 data.⁸

The result of this paper will be the release of a 2021 ACS SPM public use research file. ACS SPM public use research files for 2009 through 2019 are already available.⁹ Due to the previously discussed data quality concerns, we will not be releasing a 2020 ACS SPM public use research file. Furthermore, rather than comparing 2021 estimates to 2020 experimental estimates, comparisons in this paper use 2021 and 2019 data.

III. Imputation Results

In this section we present estimates on program participation and conditional mean values of benefits (and expenses) using various pooled CPS ASEC samples. These estimates are calculated for the 2021 and 2019 ACS sample using imputations from one, two and three years of CPS ASEC data. For the 2021 ACS SPM, one-year CPS ASEC imputations come from the 2022 CPS ASEC, two-year CPS ASEC imputations come from the 2021 and 2022 CPS ASEC and three-year CPS ASEC imputations come from the 2020, 2021 and 2022 ASEC. Differences using either one, two or three-year CPS ASEC samples are compared for 2019 and 2021. It is important to note that the 2021 ACS and the 2022 CPS ASEC have different reference periods. The reference period for the CPS ASEC is the previous calendar year, while the reference period for the ACS is the previous 12 months which can differ depending on what month during the year the respondent was interviewed.

Table 2 shows 2021 ACS estimates at the household level using the original imputation method (3 years of CPS ASEC) and alternative imputation methods using 2 years of CPS ASEC or 1 year of CPS ASEC data. Results are shown at the household level because all imputations are done at the household level. Values are then distributed among SPM units within the household. Differences in estimates of program receipt and the valuation of benefits using each imputation method are also shown for the 2019 ACS.

Program participation using 2- and 3-year CPS ASEC imputations for the 2021 ACS differs for households receiving school lunch, free lunch, WIC and rent subsidies. Using the standard imputation methodology, the receipt of school lunch, WIC, and rent subsidy was overstated compared to using 2 years of CPS ASEC data, while receipt of free or reduced-price lunch was understated. In comparison, differences between imputation methods only exist for free or reduced-price lunch in the 2019 ACS, but it is two times smaller in magnitude.

⁷ For more information on data quality concerns for the 2020 ACS, refer to <https://www.census.gov/newsroom/press-releases/2021/changes-2020-acs-1-year.html>.

⁸ For additional information on the experimental data, visit <https://www.census.gov/programs-surveys/acs/data/experimental-data.html>.

⁹ Refer to <https://www.census.gov/library/working-papers/2020/demo/SEHSD-WP2020-09.html>.

Table 2 also shows that energy assistance and SNAP were understated and childcare expenses, insurance premiums, and other medical expenses were overstated in 2021 using the original imputation method as opposed to the 2-year alternative method. In 2019, significant differences were only seen for SNAP and energy assistance, though the original methodology overstated the value of SNAP compared to the 2-year method.

Compared to the first alternative imputation method using 2 years of CPS ASEC data, the magnitude of the differences were larger when only 1 year of CPS ASEC data is used. For example, the original imputation method predicts that approximately 16.5 percent of households received school lunch in the 2021 ACS. The imputation using 2 years of CPS ASEC data predicts that approximately 16.3 percent of households received school lunch. However, the same imputation using only 1 year of CPS ASEC data instead predicts that 17.7 percent of households received school lunch. In other words, the 1-year imputation rate of school lunch participation is approximately 1.2 percentage points greater than what the original imputation predicts, and 1.5 percentage points greater than the 2-year imputation predicts.

The 1-year imputation rate of free lunch participation is approximately 2.6 percentage points greater than what the original imputation method predicts, and 2.0 percentage points greater than what the 2-year imputation predicts. Differences in the conditional valuation of benefits between imputation methods also increase in magnitude when using 1 year of CPS ASEC data. The imputed 1-year value of SNAP is approximately \$404 and \$212 greater than what the original and 2-year imputation predict, respectively.

Table 2 also presents the same analyses of benefits and expenses at the SPM unit level. Consistent with the results presented at the top of Table 2, the valuation of benefits received (and expenses incurred) at the SPM unit level differs between the original and 2-year imputation methods for all imputed variables except for WIC and capped housing subsidies. Differences in the valuation of these components by imputation method is greater in the 2021 ACS than in the 2019 ACS for school lunch, SNAP, school lunch and SNAP, and total medical expenses.

Differences in the valuation of these same benefits are also higher for the 1-year imputations as compared to the original imputations for all variables except for capped housing subsidies, capped work and childcare expenses, and medical expenses. Differences in the valuation of these components by imputation method is greater in the 2021 ACS than in the 2019 ACS for all imputed variables except for capped housing subsidies and WIC.

Table 2: Imputations into ACS Using Different Numbers of Years of CPS ASEC														
	2021										2019			
	3 years of CPS ASEC		2 years of CPS ASEC		1 year of CPS ASEC		Difference (2 years less 3 year)		Difference (1 year less 3 year)		Difference (2 years less 3 years)		Difference (1 years less 3 years)	
	Est.	Std. Err.	Est.	Std. Err.	Est.	Std. Err.	Est.	Est.	Est.	Std. Err.	Est.	Std. Err.	Est.	Std. Err.
Percent of households receiving benefit														
School lunch	16.54	0.05	16.25	0.05	17.73	0.05	*-0.29	0.07	*1.19	0.07	0.06	0.07	*0.22	0.07
Free/reduced lunch	11.69	0.04	12.21	0.04	14.24	0.05	*0.52	0.06	*2.55	0.06	*0.14	0.06	*0.40	0.06
WIC	1.72	0.02	1.64	0.02	1.57	0.02	*-0.08	0.02	*-0.15	0.02	-0.03	0.02	0.01	0.02
Rent subsidy	4.81	0.03	4.74	0.03	4.94	0.03	*-0.06	0.04	*0.14	0.04	-0.01	0.04	0.03	0.04
Conditional means for households														
Energy assistance	\$602	5.26	\$628	5.86	\$672	5.49	*\$26	7.87	*\$71	7.60	*\$16	5.15	\$9	5.62
SNAP	\$2,823	9.49	\$3,015	9.48	\$3,226	10.09	*\$192	13.41	*\$404	13.85	*-\$73	13.76	*-\$138	12.51
Childcare expenses	\$165	0.78	\$163	0.65	\$170	0.78	*-\$2	1.01	\$5	1.10	-\$1	0.92	*\$4	0.93
Insurance premiums	\$2,798	4.95	\$2,784	5.16	\$2,677	4.11	*-\$14	7.15	*-\$121	6.44	-\$3	7.89	\$6	8.17
Other medical expenses	\$1,249	3.06	\$1,236	3.94	\$1,242	3.64	*-\$12	4.99	-\$6	4.76	-\$6	4.85	*-\$10	5.07
SPM unit benefits and expenses														
School lunch	\$1,054	3.16	\$1,108	3.19	\$1,175	3.01	*\$54	4.49	*\$121	4.36	\$3	3.27	*\$14	3.21
SNAP benefits	\$2,571	9.33	\$2,746	8.94	\$2,939	9.79	*\$175	12.92	*\$368	13.5	*-\$66	13.18	*-\$124	11.58
School lunch and SNAP	\$2,036	6.21	\$2,166	5.47	\$2,271	6.17	*\$130	8.27	*\$235	8.75	*-\$30	7.83	*-\$53	7.26
Capped Housing subsidies	\$5,775	30.14	\$5,779	29.30	\$5,797	30.22	\$4	42.04	\$22	42.68	\$1	34.50	-\$21	34.38
Energy assistance	\$559	5.07	\$583	5.59	\$625	5.36	*\$24	7.55	*\$67	7.38	*\$14	4.92	\$8	5.37
WIC	\$583	2.74	\$582	2.70	\$590	3.10	Z	Z	*\$7	4.14	\$1	4.37	\$4	4.28
Capped work and childcare expenses	\$3,000	2.75	\$2,982	2.69	\$3,000	2.73	*-\$18	3.85	-\$1	3.88	*-\$9	5.12	-\$4	5.06
Total medical expenses	\$4,707	6.44	\$4,667	7.14	\$4,598	6.74	*-\$40	9.61	*-\$109	9.32	-\$11	10.10	-\$5	10.48
* Estimate is significantly different from zero at the 90 percent confidence level. Z represents or rounds to zero. Note: Differences may not sum due to rounding. Source: U.S. Census Bureau, 2019 and 2021 American Community Survey 1-year Public Use Estimates and 2018 through 2022 Current Population Survey Annual Social and Economic Supplements.														

These varying imputation methods impact overall ACS SPM rates. As shown in Table 2, different imputation methods change the valuation of benefits received and expenses incurred. A unit is in poverty if the sum of their resources falls below their geographically-adjusted poverty threshold. Since poverty thresholds remain unchanged in any given year, variation in the expected value of any single resource can change a unit's overall sum of resources and their subsequent poverty status.

In Table 3, ACS SPM rates are shown for 2019 and 2021 using 3 years, 2 years, or 1 year of CPS ASEC data in the imputations. For 2021, there is no significant difference in SPM rates overall or for any of the age groups when using 2 years of CPS ASEC compared to 3 years of CPS ASEC in the imputations. Conversely, the overall SPM rate and the SPM rates for each age group are significantly different when using 1 year of CPS ASEC compared to 3 years of CPS ASEC in the imputations. If either alternative imputation method is applied to the valuation of resources in the 2019 ACS, the 2019 ACS SPM rate does not significantly change overall or for each of the three major age groups in the U.S. (children, adults aged 18 to 64, and adults aged 65 and older).

	3 years of CPS ASEC		2 years of CPS ASEC		1 years of CPS ASEC	
	Est.	Std. Err.	Est.	Std. Err.	Est.	Std. Err.
2021						
All people	9.87	0.04	9.83	0.04	*9.68	0.04
Under 18 years	7.28	0.06	7.26	0.06	*7.03	0.06
18 to 64 years	10.39	0.05	10.36	0.05	*10.22	0.05
65 years and over	11.46	0.06	11.38	0.06	*11.29	0.06
2019						
All people	14.23	0.06	14.25	0.06	14.32	0.06
Under 18 years	15.30	0.11	15.34	0.10	15.51	0.11
18 to 64 years	14.10	0.06	14.11	0.05	14.18	0.06
65 years and over	13.24	0.06	13.24	0.07	13.19	0.07

*Estimate is significantly different from 3 year ACS SPM rate at the 90 percent confidence level.
Source: U.S. Census Bureau, 2019 and 2021 American Community Survey 1-year Public Use Estimates and 2018 through 2022 Current Population Survey Annual Social and Economic Supplements.

Table 4 lists the percentage point impact of using an alternative imputation method to estimate the value of an individual component of a unit's resources for all seven components missing in the ACS individually and overall.

Using the original imputation method yields a 2021 ACS SPM rate of approximately 9.87 percent. If an alternative imputation method using only 1 year of CPS ASEC data is applied to the valuation of SNAP, the ACS SPM rate is expected to decrease by approximately a tenth of a percentage point to 9.75 percent. If the same alternative imputation method is applied to the valuation of all seven missing resource components in the ACS, the ACS SPM rate is expected to decrease by approximately 0.19 percentage points to 9.68 percent. These differences were not observed when using 2 years of CPS ASEC data in the imputations for the 2021 ACS SPM or when using either 2 years or 1 year of CPS ASEC data in the imputations for the 2019 ACS SPM.

Overall, there were large programmatic and benefit changes to school lunch and SNAP from 2020 to 2021. Table 2 shows significantly larger valuations of these benefits using 1 year of CPS ASEC

data as opposed to 2 years of data. Furthermore, ACS SPM rates using 2 years of CPS ASEC data to impute the value of school lunch or SNAP are not significantly different than those using the original imputation method (Table 3). On the other hand, implementing an alternative imputation method with only 1 year of CPS ASEC data to estimate the value of school lunch or SNAP significantly lowers ACS SPM rates for all people and children under age 18 (Table 3). Although the use of 2 years of CPS ASEC data may better capture pre- and post- pandemic-related differences in the economy, we believe that significant changes in social safety net programs between 2020 and 2021 are best captured using 1 year CPS ASEC imputes.

The use of 1 year of CPS ASEC data in the imputations is not without its drawbacks. The most serious of which is that three variables, SNAP, energy assistance, and childcare expenses, do a predictive means match by state while the remaining variables use logistic regression with a state variable as one of the predictors. This is an issue because the Census Bureau recommends the use of 3 years of pooled CPS ASEC for state level estimates. For larger states this is less of a concern, but there may be a loss of representativeness with the estimates coming from smaller states. Caution should be used when examining imputed variables in the 2021 ACS SPM.

Table 4: Effect on SPM Rates of Imputing Benefits and Expenses: 2019 and 2021																
	Using Two Years of CPS ASEC								Using One Year of CPS ASEC							
	All People		Under 18 years		18 to 64 years		65 years and over		All People		Under 18 years		18 to 64 years		65 years and over	
	Est.	Std. Err.	Est.	Std. Err.	Est.	Std. Err.	Est.	Std. Err.	Est.	Std. Err.	Est.	Std. Err.	Est.	Std. Err.	Est.	Std. Err.
	2021															
SPM rate (3 years of CPS ASEC)	9.87	0.04	7.3	0.06	10.4	0.05	11.46	0.06	9.87	0.04	7.3	0.06	10.4	0.05	11.46	0.06
School lunch	0.009	0.058	0.024	0.090	0.006	0.070	-0.001	0.085	-0.007	0.058	-0.014	0.090	-0.005	0.070	-0.004	0.085
SNAP benefits	-0.063	0.057	-0.090	0.088	-0.052	0.069	-0.063	0.085	*-0.120	0.059	*-0.198	0.090	-0.101	0.071	-0.086	0.083
School lunch and SNAP	-0.054	0.057	-0.065	0.088	-0.046	0.069	-0.064	0.086	*-0.127	0.059	*-0.212	0.090	-0.106	0.071	-0.089	0.083
Capped Housing subsidies	0.009	0.058	0.013	0.090	0.013	0.071	-0.011	0.084	-0.015	0.058	-0.017	0.090	-0.011	0.070	-0.027	0.084
Energy assistance	-0.001	0.058	0.004	0.090	-0.003	0.070	Z	Z	-0.009	0.058	-0.007	0.089	-0.010	0.070	-0.010	0.084
WIC	0.003	0.058	0.008	0.091	0.001	0.070	0.001	0.084	0.003	0.058	0.010	0.090	0.001	0.070	Z	Z
Capped work and childcare expenses	0.008	0.058	0.012	0.091	0.012	0.070	-0.010	0.084	-0.002	0.058	-0.006	0.090	-0.001	0.070	Z	Z
Total medical expenses	0.005	0.057	0.054	0.088	0.004	0.070	-0.055	0.084	-0.051	0.056	-0.013	0.086	-0.059	0.069	-0.069	0.086
All imputed variables	-0.038	0.057	-0.015	0.089	-0.036	0.069	-0.078	0.086	*-0.190	0.057	*-0.243	0.088	*-0.175	0.069	*-0.172	0.087
	2019															
SPM rate (3 years of CPS ASEC)	14.23	0.06	15.3	0.11	14.1	0.06	13.24	0.06	14.23	0.06	15.3	0.11	14.1	0.06	13.24	0.06
School lunch	0.001	0.081	0.004	0.151	Z	Z	-0.001	0.088	-0.011	0.080	-0.024	0.150	-0.007	0.081	-0.004	0.088
SNAP benefits	0.033	0.080	0.091	0.106	0.022	0.081	-0.002	0.088	0.052	0.081	0.147	0.150	0.030	0.081	0.004	0.089
School lunch and SNAP	0.034	0.080	0.089	0.147	0.023	0.081	-0.003	0.088	0.042	0.081	0.123	0.150	0.024	0.080	-0.001	0.089
Capped Housing subsidies	-0.003	0.081	0.004	0.150	-0.010	0.081	0.012	0.089	-0.003	0.081	0.004	0.150	-0.010	0.081	0.012	0.089
Energy assistance	Z	Z	-0.003	0.150	0.001	0.081	-0.003	0.088	-0.004	0.080	-0.005	0.151	-0.003	0.081	-0.004	0.088
WIC	-0.003	0.081	-0.006	0.151	-0.002	0.081	-0.001	0.088	Z	Z	0.003	0.151	-0.001	0.081	-0.003	0.088
Capped work and childcare expenses	-0.011	0.081	-0.026	0.149	-0.008	0.081	-0.003	0.088	-0.002	0.081	0.006	0.151	-0.004	0.080	-0.003	0.088
Total medical expenses	-0.010	0.082	-0.039	0.152	-0.001	0.081	-0.005	0.093	0.044	0.081	0.038	0.150	0.075	0.081	-0.062	0.089
All imputed variables	0.019	0.081	0.041	0.148	0.015	0.081	0.001	0.093	0.086	0.082	0.202	0.153	0.080	0.081	-0.057	0.09

*Estimate is significantly different from zero at the 90 percent confidence level.
Z represents or rounds to zero.
Source: U.S. Census Bureau, 2019 and 2021 American Community Survey 1-year Public Use Estimates and 2018 through 2022 Current Population Survey Annual Social and Economic Supplements.

IV. Public Assistance

In this section we discuss concerns regarding the reported values of public assistance. We present suggestive evidence that economic impact payments (EIP), commonly called stimulus payments, could potentially be double counted by those receiving public assistance in the ACS SPM if we follow our typical methodology. Following the ACS SPM methodology, EIP are estimated using NBER's TAXSIM model. However, households in the ACS may have incorrectly included the value of EIP in their reported receipt of public assistance. A series of approaches to reconciling this potential double-counting problem are considered, tested, and discussed.

A potential source of EIP misreporting may be the interpretation of the ACS question on public assistance. The ACS questionnaire describes public assistance as follows:

Any public assistance or welfare payments from the state or local welfare office.

It's subsequently possible that respondents interpreted EIP as public assistance payments. Help text clarifying that EIP, also known as stimulus payments, should not be included in reported income was posted online. However, this help text was not readily available on paper forms. There is evidence that few internet respondents accessed this online help text and mail respondents were not provided with a physical copy.¹⁰

There is suggestive evidence that supports the hypothesis that EIP may have been misreported as public assistance income in the ACS. We present this evidence through a series of figures comparing how the ACS captures this benefit over time and relative to the CPS ASEC.

In Figure 1, two things are shown. First, the "Any" category shows that 2.06 percent of SPM units reported receiving public assistance in 2019 compared to 3.19 percent in 2021. Second, there are several values around which bunching occurred. The percentages shown for each dollar value are conditional on receiving public assistance. For a reference, the December 2020 stimulus payment was \$600 per adult and per child, and the March 2021 stimulus payment was \$1400 per adult and \$1400 per child.¹¹ We see significantly more bunching in 2021 than in 2019 at the \$600, \$1,200, \$1,400, \$2,000, \$3,000, \$4,000, \$5,000, and \$10,000 levels.

¹⁰ Refer to <https://www.census.gov/programs-surveys/acs/technical-documentation/user-notes/2022-11.html> for a note on potential misreporting of public assistance.

¹¹ Refer to <https://home.treasury.gov/policy-issues/coronavirus/assistance-for-american-families-and-workers/economic-impact-payments> for more information about the economic impact payments.

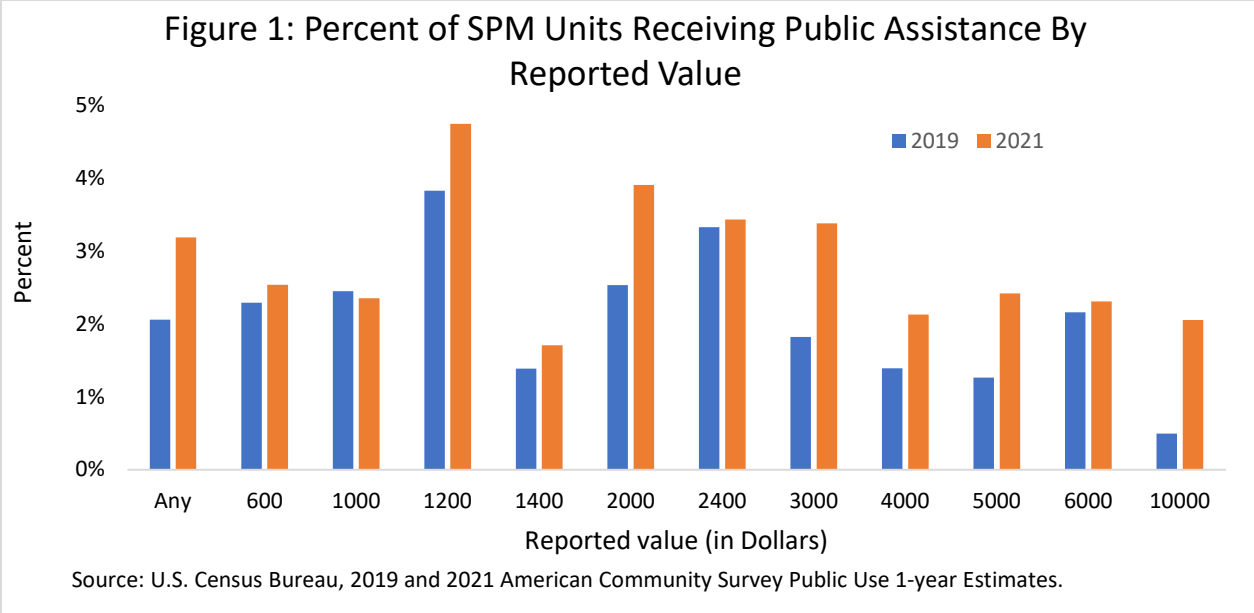


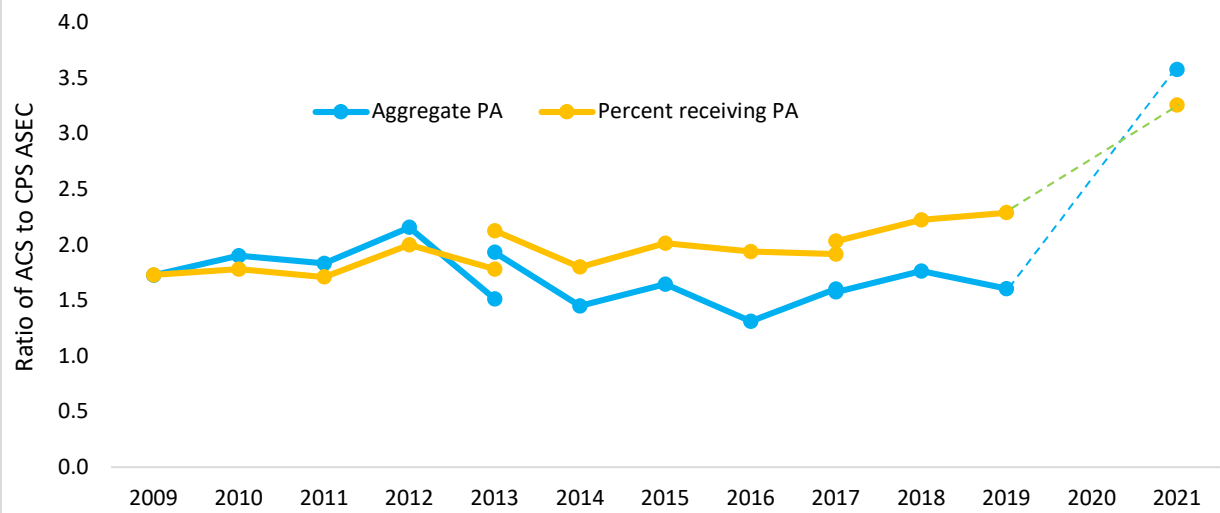
Figure 2 presents two ratios comparing reported public assistance receipt in both surveys over time.¹² The first ratio compares the percentage of people that report receiving *any* public assistance between surveys. This ratio is above one if a greater percentage of people report receiving public assistance in the ACS than in the CPS ASEC. The second ratio (in blue) compares the aggregate value of reported public assistance in the ACS to the reported value in the CPS ASEC. This ratio is above one if the estimated total value of public assistance across the entire sample is greater in the ACS than in the CPS ASEC.

From 2009 to 2021, public assistance receipt was higher in the ACS than in the CPS ASEC. However, the ratio of public assistance receipt between the ACS and CPS ASEC increased substantially from 2019 to 2021.

The ratio of total reported public assistance benefits between surveys (in blue) increased from approximately 1.6 in 2019 to 3.6 in 2021. In other words, in 2019 the total value of public assistance was approximately 60 percent greater in the ACS than in the CPS ASEC, but about 200 percent greater in 2021. A simple explanation of this result would be the inclusion of economic impact payments in the ACS public assistance response.

¹² In Figures 2, 3, and 4, there are two sets of estimates in 2013 and 2017. The 2013 estimates reflect original and redesigned income questions in the CPS ASEC and the 2017 estimates are a result of an updated processing system in the CPS ASEC.

Figure 2: Public Assistance: Ratio of ACS to CPS ASEC



Note: The CPS ASEC data for 2017 and beyond reflect the implementation of an updated processing system. The CPS ASEC data for 2013 and beyond reflect the implementation of the redesigned income questions. Due to the experimental nature of 2020 ACS estimates, no ratios are shown for 2020.

Source: U.S. Census Bureau, 2009 through 2019 and 2021 American Community Survey Public Use 1-year Estimates and 2010 through 2022 Current Population Survey Annual Social and Economic Supplements.

Figure 3 shows the average value of public assistance, conditional on public assistance receipt, at the SPM unit level over time. This conditional average value did not change significantly from 2019 to 2021 in the CPS ASEC. On the other hand, the average value of public assistance in the ACS increased by about fifty-seven percent between 2019 and 2021. This increase is strong evidence that respondents likely included the value of EIP in their reported public assistance income.

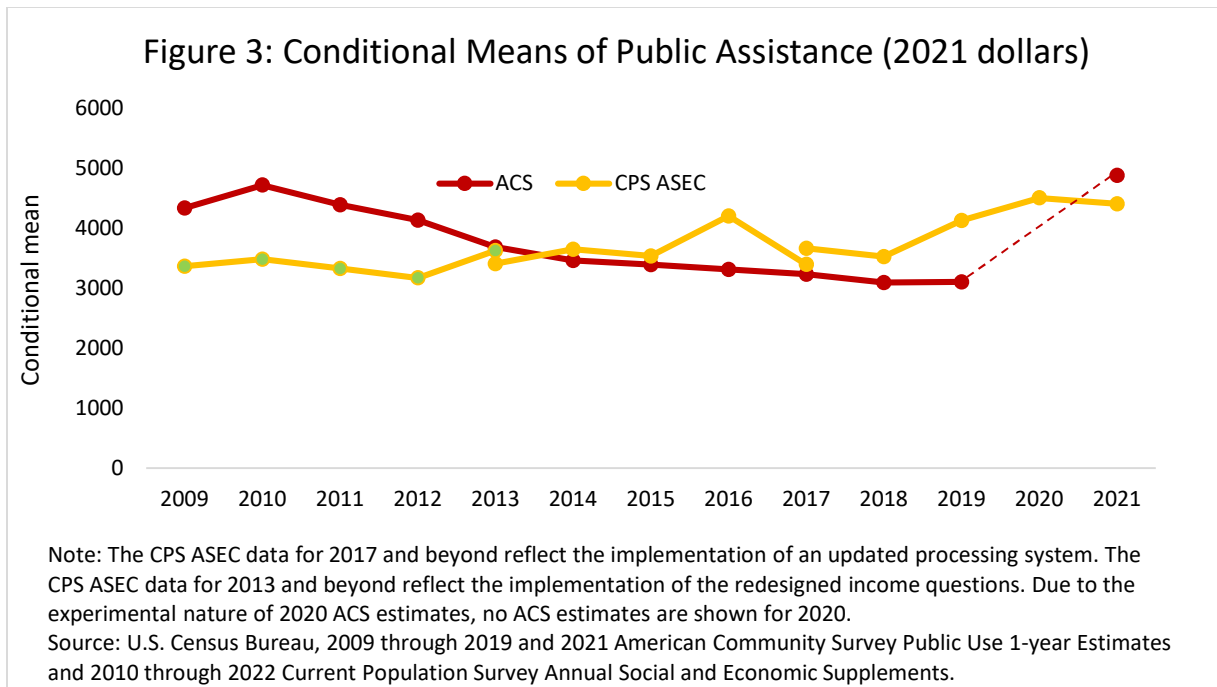
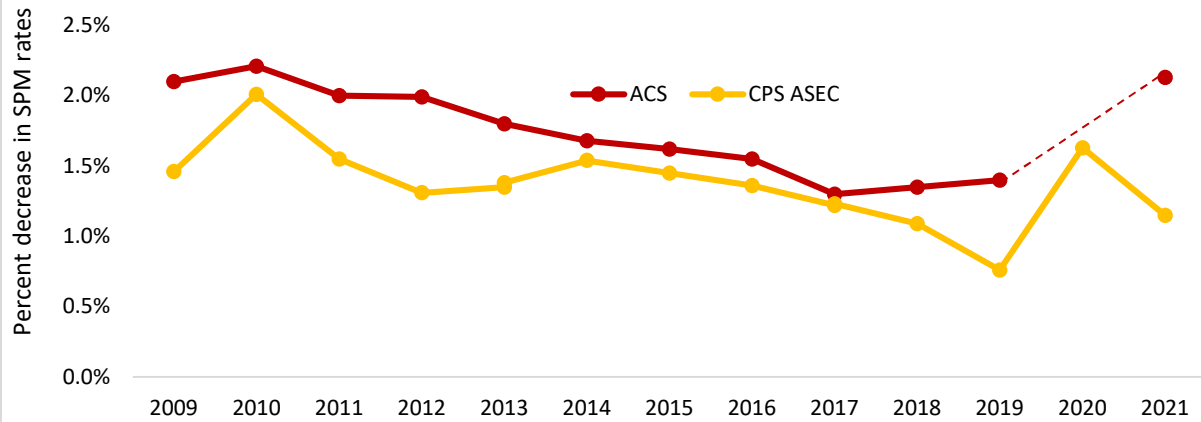


Figure 4 shows the poverty reducing impact of public assistance over time using the SPM. In 2019, public assistance decreased the ACS SPM rate by approximately 1.4 percent. However, in 2021, this same program decreased the ACS SPM rate by 2.1 percent. For comparison, there was no significant change in the effect of public assistance on SPM rates in the CPS ASEC from 2019 to 2021. Coupled with prior evidence presented in this section, the substantial increase in the estimated poverty reducing impact of public assistance in the 2021 ACS (but not the CPS ASEC) suggests that additional income, likely from EIPs, was systematically misreported in the ACS. As a note of caution, this analysis was done using the original imputation method for all years of the ACS SPM.

Figure 4: Effect of Public Assistance on SPM Rates



Note: The CPS ASEC data for 2017 and beyond reflect the implementation of an updated processing system. The CPS ASEC data for 2013 and beyond reflect the implementation of the redesigned income questions. Due to the experimental nature of 2020 ACS estimates, no ACS estimates are shown for 2020.
 Source: U.S. Census Bureau, 2009 through 2019 and 2021 American Community Survey Public Use 1-year Estimates and 2010 through 2022 Current Population Survey Annual Social and Economic Supplements.

As shown in this section, there appears to be a problem with reported public assistance in the 2021 ACS. Documenting that is the easy part, but finding a solution is more difficult. We subsequently implement a variety of modifications to the current methodology to estimate the value of public assistance in the ACS. These modifications result in different estimates of public assistance and Supplemental Poverty.

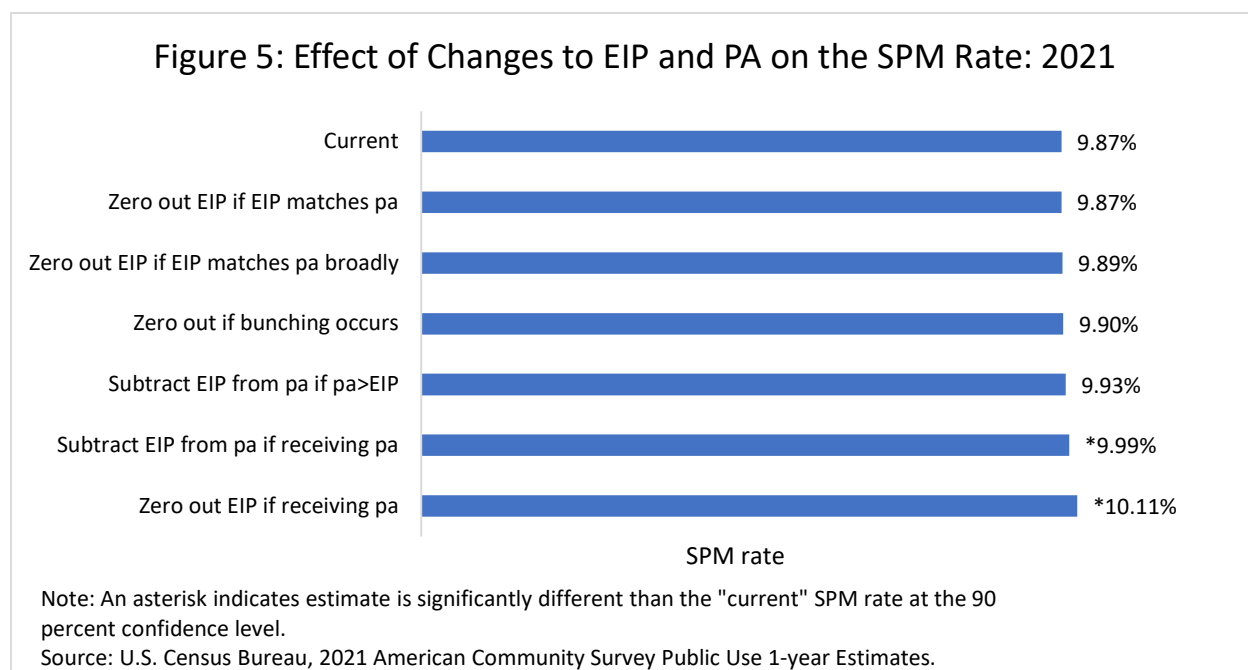
Figure 5 shows how different modifications or proposed solutions for valuing public assistance affect 2021 ACS SPM rates. The two most extreme options are shown at the top and bottom of the figure: either keep the current levels of public assistance and economic impact payments, or set economic impact payments to zero if an SPM unit reports receiving public assistance. Implementing the former option and using the data as is produces a 2021 SPM rate of approximately 9.9 percent. Implementing the latter option and zeroing out EIP payments for public assistance recipients produces an SPM rate of approximately 10.1 percent.

Between these two extremes are a number of alternative solutions. We compare values of public assistance and EIP to determine whether to correct the reported value of the former benefit. Public assistance is reported by respondents while EIP is estimated using TAXSIM. If these values match, it's likely that respondents misreported their EIP as public assistance and, thus, we set public assistance to zero. Implementing this solution does not significantly change the ACS SPM rate. Since EIP are estimated, we modify this solution and instead use a broad match to determine whether the two resources are within \$500 of each other. This solution also does not yield a significantly different ACS SPM rate.

If an unusually large number of respondents report receiving similar amounts of public assistance or bunching occurs, we suspect systematic misreporting of EIP. A tabulation of the public assistance values across all recipients at the SPM unit level shows where bunching occurs. If an SPM

unit’s reported public assistance was near a “bunch”, their benefit value was set to zero. Since some amount of bunching normally occurs with public assistance, this was only done for “bunched” values whose frequency of occurrence was at least 50 percent higher in 2021 than in 2019. These values include \$2000, \$3000, \$4000, \$5000, and \$10,000. Applying this solution did not significantly change the 2021 ACS SPM rate.

The final two tested solutions involve subtracting EIP from reported public assistance rather than zeroing out the value of the latter benefit. A broad solution is to subtract EIP from public assistance for all SPM units receiving this benefit. Implementing this solution increases the ACS SPM rate by approximately 0.1 percentage points to 10.0 percent. This solution can be narrowed by only subtracting EIP from public assistance for SPM units that report receiving more public assistance than EIP. Incorporating this refinement has no significant effect on the ACS SPM rate.



In this paper, we implement the solution that subtracts EIP from reported public assistance if an SPM unit reports a value of public assistance that is greater than their estimated receipt of EIP. This solution produces an SPM rate of 9.9 percent, which is not significantly different at the 90 percent confidence level from the current SPM rate.

V. SPM Rates with both changes

Figure 6 shows final ACS SPM rates using the original method, the new, proposed imputation method using a single year of CPS ASEC data (discussed in section III), the public assistance adjustment subtracting the value of EIP from public assistance in cases where reported public assistance exceeds modeled EIP (discussed in section IV), and both revisions to the methodology. The SPM rate labeled

“current” is what the SPM rate would have been if the original imputation method were used and no adjustments were made to account for the double counting of public assistance in the ACS. If we make no adjustment to public assistance and use one year CPS ASEC imputes in place of three year imputes, the ACS SPM rate significantly decreases by approximately 0.2 percentage points to 9.7 percent. If we only implement the proposed public assistance fix, the SPM rate does not significantly change. When we implement both changes, the SPM rate significantly decreases to 9.7 percent. We believe the combination of these two fixes produces the most accurate estimate of SPM in the 2021 ACS.

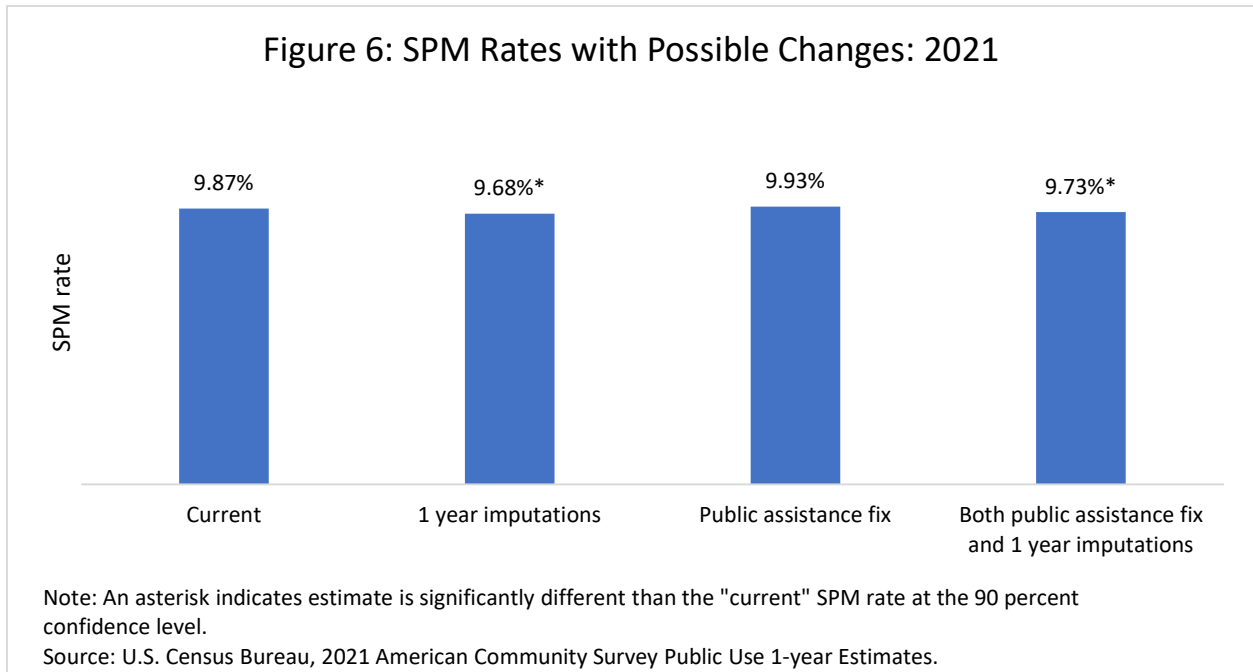
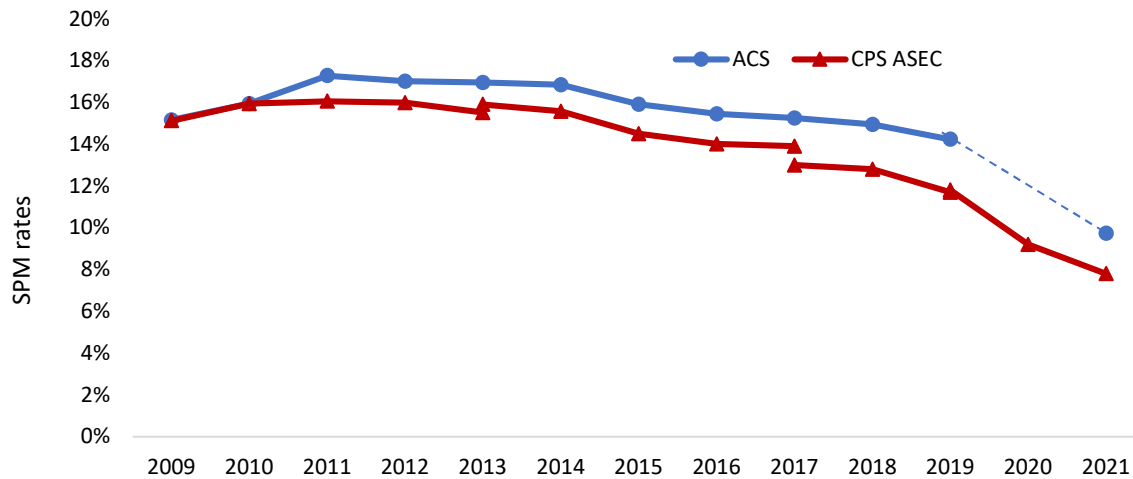


Figure 7 shows SPM rates over time using the CPS ASEC and the ACS. The 2021 ACS SPM rate in this series, incorporates both the proposed public assistance adjustment and one year CPS ASEC imputes. The difference in SPM rates using the ACS and CPS ASEC is between 1.9 to 2.5 percentage points from 2017 (i.e., the year the latter survey updated its processing system) onwards.

Figure 7: SPM Rates by Survey



Note: The CPS ASEC data for 2017 and beyond reflect the implementation of an updated processing system. The CPS ASEC data for 2013 and beyond reflect the implementation of the redesigned income questions. Due to the experimental nature of 2020 ACS estimates, no ACS estimates are shown for 2020.
Source: U.S. Census Bureau, 2009 through 2019 and 2021 American Community Survey Public Use 1-year Estimates and 2010 through 2022 Current Population Survey Annual Social and Economic Supplements.

VI. Conclusion

Producing the 2021 ACS SPM was not as straightforward as in previous years. There were two main complications. First, there was a major disruption in the status quo due to the 2020 COVID pandemic, which provoked a major shutdown in the economy and subsequent changes to social safety-net programs. Imputations used to estimate resources in the 2021 ACS SPM would have normally used 2020, 2021 and 2022 CPS ASEC data (which correspond to calendar years 2019, 2020, and 2021, respectively). Using data on a pre-pandemic economy to measure post-pandemic poverty would have been inappropriate.

We subsequently test the implementation of one- and two-year CPS ASEC imputes in the ACS and compare resulting SPM rates to those produced using the original methodology. Modifying the CPS ASEC sample used to impute missing resources in the ACS significantly changes overall SPM rates. In particular, the effect on SPM rates of school lunch and SNAP benefits significantly differ when using one year CPS ASEC imputes rather than the three year imputes. These differences are specific to 2021 ACS sample. We don't see significant changes when implementing and testing these alternatives with 2019 ACS data.

The second complication was the introduction of EIP. We present suggestive evidence that among the 3 percent of households that reported receiving public assistance, some may have misreported EIP as public assistance income in the ACS. This is problematic because we use NBER's TAXSIM to estimate EIP and do not want to double-count this program. Consequently, without correction, we could potentially double count of these payments and artificially inflate resources in the

ACS. To address this issue, we subtract the value of EIP from public assistance income if an SPM unit's reported receipt of the latter was higher than the former.

After implementing adjustments to account for both complications, the ACS SPM rate (9.7 percent) is now approximately 0.2 percentage points lower than what it would have been had the original methodology been followed (9.9 percent).

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Shrider, Em. "School Lunch and P-EBT Benefit Valuation in the 2021 Supplemental Poverty Measure". U.S. Census Bureau. SEHSD Working Paper #2022-15. September 2022.

Appendix

Table A1: Imputation Details		
Dependent variable	Statistical method	Independent variables
SNAP benefits (\$)	Predictive means match by state (if reported receipt of SNAP)	Household composition; household income; received public assistance; Medicaid; disability; employment status; race and Hispanic origin; tenure status
Received energy assistance (y/n)	Logistic regression	Household composition; household income; received public assistance; disability; employment status; race and Hispanic origin; tenure status; received SNAP; SNAP benefits; state
Energy assistance benefits (\$)	Predictive means match by state (if received energy assistance)	
Received housing assistance (y/n) ¹	Logistic regression	Household composition; household income; received public assistance; disability; employment status; race and Hispanic origin; tenure status; received SNAP; SNAP benefits; energy assistance benefits; state
Received WIC (y/n) ²	Logistic regression (if income less than 185% of FPL or reported receiving SNAP)	Household composition; household income; age; gender; marital status; Medicaid; education; received public assistance; disability; employment status; received SNAP
Received school lunch (y/n) ³	Logistic regression for households with school-age children	Household composition; household income; age; gender; marital status; Medicaid; education; received public assistance; disability; employment status; received SNAP; state
Received free or reduced-price lunch (y/n) ³	Logistic regression if received school lunch and eligible for WIC	
Have childcare expenses (y/n)	Logistic regression	Household composition; household income; share of family income earned; hours worked; marital status; received public assistance
Childcare expenses (\$)	Predictive means match by state for people who are predicted to have childcare expenses	
Insurance premiums (\$) and other medical expenses(\$)	Predictive means match separately for individuals, Age 65+, single and married families, and people with and without premiums	Person/household income; age; type of health insurance; race and Hispanic origin; education; marital status; disability; gender; predicted insurance premiums (only in regression of other medical expenses)
<p>¹ Housing assistance benefits assigned to those predicted to receive housing assistance using a statistical match of Housing and Urban Development (HUD) administrative data.</p> <p>² WIC benefits based on number of children less than 5 and mother of child 1 or below multiplied by a national average WIC value for 2019 and prior and on average state WIC values for 2021 forward.</p> <p>³ School lunch benefits are based on the number of school-age children multiplied by the number of average school days and by school lunch valuations for paid, reduced, and free lunch (2019 and prior). In 2021, these benefits also varied by average in-person days in the spring and fall by state and whether or not the family received P-EBT.</p>		