Out-of-Pocket Medical Expenditures in the Redesigned Current Population Survey: Evaluating Improvements to Data Processing

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This paper evaluates how the redesign of the Current Population Survey Annual Social and Economic Supplement (CPS ASEC) processing system, completed in 2019, affected estimates of medical expenditures and medical burden. Using data from the 2018 CPS ASEC Production and Bridge files, we compare family medical expenditures across two processing methods for the same respondent information.

The legacy processing system, used in the 2018 CPS ASEC Production file, imputed health insurance coverage and medical expenditures separately and included limited information about family income in that imputation. The updated processing system, used in the 2018 CPS ASEC Bridge file introduced a joint imputation for health insurance premiums and non-premium medical expenditures, and considered income when imputing both topics.

Findings show that the updated processing system produced median family medical expenditures not statistically different from the legacy system,[4] but the percentage of families with a high medical burden (those for whom medical expenses are at least 10% of their family income) is lower using the updated processing system. Furthermore, the two methods produced different distributions of family expenditures, with families in the highest income quintile reporting higher medical expenditures and families in the lowest quintile reporting lower expenditures using the updated processing system compared to legacy procedures.

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[3] Any views expressed are those of the author(s) and not necessarily those of the U.S. Census Bureau. The data used are subject to error arising from a variety of sources. For more information on confidentiality protection, sampling error, nonsampling error, and definitions, see <www2.census.gov/programs-surveys/cps/techdocs/cpsmar18.pdf>. This paper uses Current Population Survey, Annual Social and Economic Supplement 2018 Production and Bridge files and 2017 Production and Research files. 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-FY19-POP001-0036.
[4] Unless otherwise denoted, significance throughout this paper is defined as $p<0.05$ using 2-tailed tests.

The Current Population Survey Annual Social and Economic Supplement (CPS ASEC) is widely used as a source of information on the nation's health insurance coverage and medical expenditures (U.S. Census Bureau 2019d). The CPS ASEC provides nationally representative information on health insurance coverage status and type along with rich socioeconomic and demographic characteristics, making it a valuable resource for researchers interested in health insurance coverage in the United States. The 2011 CPS ASEC introduced three questions on out-of-pocket medical expenses in the previous calendar year which capture: (1) the amount paid in health insurance premiums; (2) non-premium medical expenditures (e.g. co-pays and cost of medical devices); and (3) over-the-counter medical spending. Researchers have used these data to examine the affordability of care and the effects of Medicaid expansion on out-of-pocket medical expenditures (Abramowitz and O'Hara 2016, Abramowitz 2018). Medical expenditures are also a key input in the Supplemental Poverty Measure which extends the official poverty measure by considering both resources and essential expenditures when determining a person's poverty status. Thus, changes to the methods used to process medical expenditure variables may have implications for poverty measurement using this metric.

Recently, the CPS ASEC has completed a two-stage redesign. For the first stage, implemented in 2014, the questionnaire was redesigned to address ongoing concerns regarding under-reporting of health insurance coverage (Klerman et. al. 2009, O'Hara 2009) and to improve measures of income and family relationships (U.S. Census Bureau 2019g). In the second phase of the redesign, completed in 2019, the survey processing system was updated to incorporate improvements in survey questions while extracting and imputing the data (U.S. Census Bureau 2019c). Following data collection, the CPS ASEC undergoes processing to resolve logically inconsistent answers, to impute missing information based on observed characteristics for item non-response on the survey, and to account for survey sampling by applying weights. To ensure timely data release in 2014, the data were extracted and processed using legacy procedures. Following the completion of the redesigned processing system in 2019, CPS ASEC data files using the improved processing were released for calendar years 2017 and 2018. These files, the 2017 CPS ASEC Research file and the 2018 CPS ASEC Bridge file were based on the same respondent information previously released in the 2017 and 2018 production files but incorporated processing changes from the second phase of the redesign (which improved data extraction and imputation for demographics, income, health insurance, and medical expenditures), while the 2017 and 2018 CPS ASEC Production files were based on the legacy processing system.

The Current Population Survey is a useful tool to evaluate medical burden and the incidence of high medical burden (Abramowitz and O'Hara 2015). Prior research found that the 2014 questionnaire redesign did not significantly change the prevalence of high medical burden, but did increase estimates of medical expenditures and the prevalence of high medical burden for certain subgroups (such as non-elderly people using private insurance) (Hill et. al. 2019). However, the effects of the more recent processing system redesign on medical expenditures and medical burden have not yet been evaluated. This paper will examine how the second stage of the CPS ASEC redesign affects median family out-of-pocket medical expenditures and medical burden in the CPS ASEC.

2014 CPS ASEC Questionnaire Redesign

In 2014, the Census Bureau introduced redesigned income and health insurance questions to address ongoing concerns about the accuracy of the survey's findings. For example, prior to the redesign, estimates of health insurance coverage from the CPS ASEC were consistently lower than other federal surveys and administrative records (Klerman 2009). For the 2014 CPS ASEC, two questionnaires were fielded. One included traditional questions on income and expenditures while the other included redesigned questions. Both featured redesigned health insurance questions (U.S. Census Bureau 2019a). Updates to the health questionnaire included changes to the ordering of questions to better elicit responses, as well as additional questions about health insurance type, including new questions about direct purchase of insurance through a marketplace such as healthcare.gov. In addition, the new questionnaire better accounts for subannual coverage, including beginning and end dates for health insurance spells. From both a respondent and data processing perspective, differences in the health insurance questions may affect the measurements of health insurance coverage and out-of-pocket premiums, an important component of medical out-of-pocket expenditures.

Health insurance and income information from this fully redesigned questionnaire were imputed with some improvements to account for a person's insurance type and policyholder status in 2014 (Hill et.al. 2019, Janicki 2016), but the data were largely processed using legacy procedures. For example, the legacy health insurance imputation methods were shown to overestimate the proportion of people who were uninsured while simultaneously overestimating the percent of people with multiple coverage types (Davern et. al. 2007, Jackson 2019, Jackson and Berchick 2020). This left room to improve the imputation of health insurance and income data by fully leveraging the new information in the survey redesign.

CPS ASEC Processing System Redesign

Beginning with the 2017 CPS ASEC Research file, the data reflect improved measurement for health insurance and income content (Berchick et. al. 2019, US Census Bureau Website 2019f, Rothbaum 2019). The 2018 CPS ASEC Bridge File and the 2017 CPS ASEC Research file reflect changes in both the questionnaire and an updated system of data processing, imputation, and weighting (Rothbaum 2019) to more accurately capture income, poverty, and health insurance rates in the United States (US Census Bureau Website 2019f). The updated processing system leverages data from the redesigned questionnaire to improve how income, health insurance, and medical expenditure missing data are imputed, how family relationships are assigned (same-sex marriages are now acknowledged), and how key health insurance measures are constructed (including subannual measures to determine when in the calendar year a person had health insurance coverage) (Berchick et. al. 2019).

A few features of the updated processing system have particular importance for medical expenditures and warrant further discussion here. First, the updated processing system improves the handling of whole unit imputes, cases for whom no one in the household reports health insurance information. For files processed using the legacy system, these cases had health insurance and medical expenditure information imputed separately and at the individual level. The updated processing system identifies people within a household who are eligible to

share insurance and simultaneously imputes their health insurance and medical expenditure information using data from a matched donor health insurance unit (for further description of the imputation method see Jackson and Berchick,2020). This changes improves the joint distribution of family insurance status and medical expenditures by jointly imputing the insurance and medical expenditure data simultaneously for all individuals in a household eligible to share insurance.

Second, improvements to the imputation of medical expenditures were made for respondents who had missing medical expenditure data but reported some health insurance information. Under both the legacy and updated processing systems, cases with missing information are imputed using hotdeck imputation (Andridge and Little, 2010). However, under the updated processing system, people missing health insurance premiums and non-premium medical expenses had their premium and non-premium expenses imputed jointly.

The updated processing system also improves imputation of medical expenses for people who have private insurance coverage. Policyholders of employer-sponsored insurance plans have very different premiums than policyholders purchasing coverage directly, the updated processing system imputed these insurance types separately, and the hotdeck for employer-sponsored insurance considered firm size and employer subsidy when imputing premium information. Finally, the legacy processing system did not consider a family's income-to-poverty ratio when imputing medical expenditures. This was an important limitation given that income may constrain the amount families may spend on their medical care (U.S. Census Bureau 2019h). The updated processing system address this limitation by including family income-to-poverty ratio in the hotdeck model. Taken together, these improvements to the imputation of health insurance and medical expenditure data may result in differences in medical expenditures in files processed using the updated processing procedures when compared to files processed using legacy procedures.

Imputation of income was also improved as part of the updated processing system (Berchick and Jackson 2019, U.S. Census Bureau 2019e). Chief among these improvements was consideration of range information reported when imputing a case's missing value. While this change may sound inconsequential, over 70% of cases with missing values reported some range information (Rothbaum 2019). Because medical burden is calculated as high medical expenses relative to income, though the changes to imputation of income may not affect absolute medical expenditures it could affect the relative burden of these expenditures for families.

In sum, the second stage of the CPS ASEC redesign introduced changes to the processing of health insurance, income, and medical expenditures that may have directly and indirectly affected out-of-pocket medical spending as well as the ratio of a family's medical spending to total income.

Analytic Approach

To examine how these changes to the CPS ASEC processing system have affected estimates of medical expenditures, we use the 2018 CPS ASEC Production and Bridge files. Both the 2018 CPS ASEC Production and Bridge files are based on the same household sample of

approximately 68,000 households. Differences between the files reflect changes in data extraction, imputation, and weighting. In this analysis we only include people in-sample for both 2018 Bridge and Production files (U.S. Census Bureau 2019b).[5] Table 1 shows the demographic characteristics of people in our two analytic datasets. The updated processing system does not have a statistically significant effect on the sociodemographic characteristics such as age, race, and Hispanic origin between the two files. These characteristics typically have low item non-response rates, and thus will be less likely to be affected by changes in the processing system. Conversely, there are significant changes among several categories of health insurance status. The percentage of people with certain types of insurance is lower likely due to lower multiple coverage types under the updated processing system (US Census Bureau 2019f).

The analysis consists of three parts. First, we describe median family medical expenditures, overall, and by level of income. To understand the burden of medical expenses on family economic wellbeing, we also examine the percent of people facing a high burden from medical spending across these two files. Consistent with past analyses, we defined high medical burden as people who have family medical expenditures that make up at least 10% of the family's income (Hill et. al. 2019). Next, we compare the characteristics of people with high medical burden between the Bridge and Production files to examine the composition of this group under the two processing systems. Finally, this paper quantifies the effect of the processing system in a series of linear regression models.

The first model is an unadjusted model where high medical burden is predicted by the processing system. The next model adjusts for demographics including age, race, sex, marital status, and education (detailed in Table 1) in order to estimate the net effect of processing system changes on medical burden. The third model adds family income-to-poverty ratio to the list of covariates, and the final model adds controls for type of health insurance coverage, including employer-sponsored insurance, direct purchase coverage, Medicaid, Medicare, military coverage, multiple coverage types, and policyholder status, to isolate the effect of processing system changes on high medical burden. Given that most of the changes in processing affect cases with imputed values, we estimated models using cases that had no family medical expenditure data imputed as a final sensitivity check. These unimputed cases should have little to no change in medical burden across files. As a sensitivity check, we replicate all analyses on the 2017 CPS ASEC Production and Research files; results are shown in Appendix A.

Results

Table 2 shows median family income, median family medical expenditures, and percent of people who face a high medical burden across the 2018 CPS ASEC Production and Bridge files. Relative to the Production file, median family income and medical expenditures are

[5]For 2018, there are 180,084 observations in the edited legacy file and 180,095 observations in the edited update file. 180,070 observations are used in this analysis.

statistically unchanged in the Bridge File. However, there is a decrease in the percent of families with a high medical burden. In total, the percentage of people who face high medical burdens is roughly 1.86 percentage points lower in the Bridge file, which represents approximately 6 million people in the total population.

Table 3 shows the difference in the percentage of people with a high medical burden (those for whom medical expenses are ≥10% of income) and the median medical expenditures by family income quintile between the two processing systems. These results reveal that, high medical burden is less likely under the updated processing system for families in the lowest two income quintiles. While Table 2 indicated no significant difference in median family medical expenditures across the legacy and updated processing systems, Table 3 reveals heterogeneity in the difference in median family medical expenditures across the income distribution under the new processing system. For example, under the updated processing system, median family medical expenditures are significantly lower for the lowest two quintiles of family income and significantly higher for the fourth and highest income quintiles. Specifically, the median family medical expenditures for a family in the lowest quintile of income is $120 less using the updated processing system, while the median family medical expenditures for someone in the top quintile of earnings increased by $409 in the updated processing system.

Table 4 reports characteristics of the population with high family medical burden across the legacy and updated processing systems. Consistent with findings from Table 3, there are some significant differences across files in the distribution of high medical burden. For example, differences in high family medical burden shift based on income to poverty ratio. Under the legacy processing system, approximately 22.3 percent of people with a high medical burden had family income between 100-199% of the federal poverty threshold compared with 20.5% under the updated processing system, a difference of about 1.8 percentage points. In contrast, 20.8% of people with high medical burden had family incomes at or above 400% of the federal poverty threshold using the legacy processing system, compared with 24.0% of people using the updated processing system, which is about 3.2 percentage points higher. Additionally, there are significant differences in the types of health insurance coverage held by people with high medical burden across processing systems.

Specifically, people with high medical burden are more likely to have Medicare coverage and are less likely to have direct purchase coverage, military coverage, or multiple types of coverage during the calendar year, and they are less likely to be uninsured under the updated processing system compared with the legacy processing system. Overall, results suggest that the updated processing system has fewer people (a lower percentage of the population) facing high medical burden. Furthermore, there are compositional changes to the group of people with high medical burden including more individuals at or above 400% FPL, fewer unmarried people, and fewer children under 18 years of age, but more elderly people 65 years of age or older.

Appendix Table B1 shows the corresponding change in demographic characteristics of those without high medical burdens for the year 2018. For completeness, Table B2 shows the results for 2017.

Regression results reported in Table 5 more formally quantify the change in medical burden across processing systems. Using a model without controls, the likelihood of experiencing high medical burden differs by 1.86 percentage points between processing systems (Model 1.) The point estimate is not statistically different after controlling for demographic characteristics and income-to-poverty ratio (Model 3.) However, after including controls for type of health insurance coverage in Model 4 the difference between processing systems in high family medical burden moves towards zero (-1.07 percentage points.) In other words, a portion of the difference in high medical burden between processing systems can be attributed to differences in health insurance coverage across processing systems, while changes in socio-demographic characteristics cannot fully explain the reduction in high medical burdens.

Given that most changes to processing reflect updates to hotdeck imputation, logical edits, and other forms of assigning missing information, it might be expected that this change in medical burden is driven by cases with imputed medical expenditures. Table 6 supports this hypothesis. Among cases that had all medical expenditure information reported, the unadjusted difference between processing systems was just -0.45 percentage points and after controlling for all relevant factors was -0.43 percentage points.[6] The remaining difference of -0.43 percentage points, although statistically significant, is relatively small and may reflect changes in how families were grouped across files as well as minor improvements to data extraction processes.

CPS ASEC data for 2017 was also released under both the legacy and new processing systems (as the Production and Research file, respectively.) For completeness, Appendix A presents the same analysis for the previous year of data. The majority of results did not statistically change. This stability in the effects of the processing change indicates that the updated processing system will likely affect estimates of medical burden and expenditures in a similar manner in future years

Discussion

The CPS ASEC, an important source of information on health insurance and medical expenditures, completed a two-stage redesign with the aim of improving the quality of income, health insurance, and medical expenditure data. This paper explored whether and how the updated processing system affected estimates of medical expenditures. Findings from this paper suggest that while the changes in processing did not result in statistically different median family medical expenditures using 2018 data, the redesign reduced the share of people facing a high family medical burden. Indeed, Table 4 shows significant differences in both health insurance types and poverty rates among people facing high medical burden. Under the updated processing system, people with high family medical burden are less likely to be uninsured or covered by direct purchase insurance, military coverage, or multiple coverage types. This finding is likely driven by improvements to health insurance imputation processes

[6] The difference between the point estimate for Model 1 (-0.45 percentage points) and Model 2 (-0.43 percentage points) is not statistically significant

which resulted in a lower uninsured rate and prevalence of multiple coverage types (Jackson 2019, Jackson and Berchick 2020).

The updated processing system also reduced both family median medical expenditures and high medical burden among those in the lowest quintile of family income and increased median family medical expenditures for those in the highest quintile of family income. These changes in the relationship between income and medical expenditures may result from the inclusion of family income in imputing health insurance coverage and medical expenditures under the updated processing system. The legacy processing system did not consider family income in imputing health coverage or medical spending.

An important implication of this processing system change is the effect on the Supplemental Poverty Measure (SPM), and our understanding of how medical expenditures affects poverty (Fox 2019). Unlike the official poverty measure which only examines gross pre-tax cash income, the SPM deducts necessary expenses such as out-of-pocket medical expenditures. Given that the percentage of people with high medical burden was lower among the lowest two income quintiles, family medical expenditures may move fewer people into poverty in the SPM under the updated processing system (Fox 2019). This is consistent with existing research which shows that the processing change affects poverty rates for certain demographic groups (Edwards and Creamer 2019).

Overall, this analysis shows that while updates to the CPS ASEC processing system did not statistically change median family medical expenditures in 2018, the improvements did alter the income distribution of people who had high medical expenditures. The improvements to measures of medical expenditures and health insurance have important implications for researchers interested in understanding the implications of these changes on the relationship between poverty and medical expenditures.

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Table 1: Characteristics of All People in the 2018 CPS ASEC Production and Bridge Files

	2018 CPS ASEC Production File		2018 CPS ASEC Bridge File		Difference	
	Estimate	SE	Estimate	SE		
Age						
Under 18 Years of Age	22.89%	0.03	22.92%	0.03	0.03	
18-64 Years of Age	61.30%	0.05	61.27%	0.05	-0.03	
65 Years of Age or Older	15.81%	0.04	15.80%	0.04	-0.01	
Race-Ethnicity						
White Non-Hispanic	60.50%	0.03	60.49%	0.03	-0.01	
Black Non-Hispanic	12.29%	0.04	12.29%	0.04	0.00	
Asian Non-Hispanic	5.84%	0.04	5.85%	0.03	0.01	
Other Non-Hispanic	3.04%	0.02	3.03%	0.02	-0.01	
Hispanic	18.33%	0.01	18.33%	0.01	0.00	
Marital Status						
Married	40.67%	0.18	40.99%	0.17	0.32	
Not Married	59.33%	0.18	59.01%	0.17	-0.32	
Highest Educational Attainment						
Less than High School	8.41%	0.09	8.39%	0.09	-0.02	
High School Diploma	22.08%	0.15	22.06%	0.15	-0.02	
Some College	14.29%	0.10	14.29%	0.10	0.00	
Associate's Degree	7.46%	0.08	7.47%	0.08	0.01	
Bachelor's Degree	15.91%	0.13	15.90%	0.13	-0.01	
Master's Degree or Higher	8.96%	0.10	8.97%	0.10	0.01	
Income to Poverty Ratio						
Below Federal Poverty Level	12.31%	0.17	12.27%	0.17	-0.04	
Between 100-199% of Federal Poverty Level	17.36%	0.19	17.36%	0.19	0.00	
Between 200-299% of Federal Poverty Level	15.92%	0.17	15.73%	0.16	-0.19	
Between 300-399% of Federal Poverty Level	12.91%	0.17	13.27%	0.16	0.36	
At or Above 400% of Federal Poverty Level	41.50%	0.26	41.37%	0.27	-0.13	
Health Insurance Status						
Employer Sponsored Insurance	56.02%	0.23	55.31%	0.21	-0.71	*
Direct Purchase Insurance	16.04%	0.19	10.99%	0.13	-5.05	***
Medicaid	19.34%	0.19	18.51%	0.17	-0.83	**
Medicare	17.21%	0.07	17.38%	0.07	0.17	+
Military Coverage	4.81%	0.14	3.48%	0.11	-1.33	***
Multiple Coverage Types	20.25%	0.18	13.37%	0.12	-6.88	***
Uninsured	8.83%	0.12	7.92%	0.11	-0.91	***
Health Insurance Policy Holder	36.53%	0.14	36.25%	0.13	-0.28	

P<.10 + P<.05 * P<.01 ** P<.001 ***

Note: Weighted using replicate weights for the Production and Bridge files, respectively. Standard errors calculated using balanced repeated replication variance estimation.
Highest Educational Attainment percentages do not sum to 100 because children under 18 are not assigned an education level.

Source: U.S. Census Bureau, Current Population Survey, 2018 Annual Social and Economic Supplement Production and Bridge files.

Table 2: Median Family Income, Median Family Medical Expenses, and Percent with High Medical Burden Across 2018 CPS ASEC Production and Bridge Files

	2018 CPS ASEC Production File		2018 CPS ASEC Bridge File		Difference	
	Estimate	SE	Estimate	SE		
Median Family Income	$67,100	$510	$67,500	$620	$400	
Median Family Medical Expenditures	$2,749	$37.00	$2,799	$28	$50	
Percent with High Medical Burden	23.14%	0.21%	21.28%	0.20%	-1.86%	***
Observations = 180070						

P<.10 + P<.05 * P<.01 ** P<.001 ***

Note: Weighted using replicate weights for the Production and Bridge files, respectively. Standard errors calculated using balanced repeated replication variance estimation. Dollar values rounded to the nearest dollar.

Source: U.S. Census Bureau, Current Population Survey, 2018 Annual Social and Economic Supplement Production and Bridge Files.

Table 3: Family Medical Expenditures and Burden by Income Quantile in the 2018 CPS ASEC Production and Bridge Files

	Change in Percent with High Medical Burden (Medical Expenditures > 10% of Income)						Change in Median Medical Expenditures (In Dollars)					
	2018 CPS ASEC Production File		2018 CPS ASEC Bridge File		Difference		2018 CPS ASEC Production File		2018 CPS ASEC Bridge File		Difference	
	Estimate	SE	Estimate	SE			Estimate	SE	Estimate	SE		
Lowest Quintile of Family Income	38.78%	0.49%	34.21%	0.44%	-4.57%	***	$430	$14	$310	$15	$-120	***
2nd Quintile of Family Income	27.93%	0.49%	24.23%	0.42%	-3.70%	***	$1,727	$46	$1,549	$29	$-178	**
3rd Quintile of Family Income	24.44%	0.44%	23.52%	0.38%	-0.92%		$3,198	$63	$3,200	$63	$2	
4th Quintile of Family Income	17.72%	0.38%	17.99%	0.42%	0.27%		$4,746	$66	$5,017	$62	$271	**
Highest Quintile of Family Income	6.63%	0.30%	6.54%	0.29%	-0.09%		$5,991	$86	$6,400	$72	$409	***

P<.10 + P<.05 * P<.01 ** P<.001 ***

Note: Weighted using replicate weights for the Production and Bridge files, respectively. Standard errors calculated using balanced repeated replication variance estimation.

Source: U.S. Census Bureau, Current Population Survey, 2018 Annual Social and Economic Supplement Production and Bridge files.

Family medical expenditures rounded to the nearest dollar.

Table 4: Characteristics of People with High Family Medical Burden in the 2018 CPS ASEC Production and Bridge Files

	2018 CPS ASEC Production File		2018 CPS ASEC Bridge File		Difference	
	Estimate	SE	Estimate	SE		
Age						
Under 18 Years of Age	23.09%	0.21	22.32%	0.24	-0.77	*
18-64 Years of Age	57.92%	0.27	57.90%	0.29	-0.02	
65 Years of Age or Older	18.99%	0.25	19.78%	0.26	0.79	*
Race-Ethnicity						
White Non-Hispanic	61.93%	0.37	63.34%	0.41	1.41	*
Black Non-Hispanic	12.31%	0.27	12.13%	0.32	-0.18	
Asian Non-Hispanic	4.96%	0.17	4.78%	0.18	-0.18	
Other Non-Hispanic	3.14%	0.12	3.00%	0.12	-0.14	
Hispanic	17.66%	0.32	16.76%	0.33	-0.91	*
Marital Status						
Married	39.56%	0.34	41.27%	0.36	1.71	***
Not Married	60.44%	0.34	58.73%	0.36	-1.71	***
Highest Educational Attainment						
Less than High School	9.64%	0.21	9.25%	0.20	-0.38	
High School Diploma	25.26%	0.30	25.07%	0.31	-0.19	
Some College	14.78%	0.22	15.45%	0.23	0.66	*
Associate's Degree	7.45%	0.16	7.76%	0.17	0.30	
Bachelor's Degree	13.35%	0.24	13.53%	0.24	0.18	
Master's Degree or Higher	6.43%	0.17	6.63%	0.19	0.20	
Income to Poverty Ratio						
Below Federal Poverty Level	24.19%	0.46	22.97%	0.47	-1.23	+
Between 100-199% of Federal Poverty Level	22.29%	0.41	20.52%	0.44	-1.78	**
Between 200-299% of Federal Poverty Level	19.59%	0.34	19.15%	0.40	-0.44	
Between 300-399% of Federal Poverty Level	13.11%	0.32	13.37%	0.34	0.25	
At or Above 400% of Federal Poverty Level	20.81%	0.39	24.00%	0.44	3.19	***
Health Insurance Status						
Employer Sponsored Insurance	53.87%	0.44	52.75%	0.46	-1.12	+
Direct Purchase Insurance	25.34%	0.40	19.64%	0.35	-5.70	***
Medicaid	17.05%	0.34	16.30%	0.33	-0.75	
Medicare	20.63%	0.27	21.87%	0.29	1.24	**
Military Coverage	3.09%	0.14	1.78%	0.11	-1.31	***
Multiple Coverage Types	24.65%	0.30	18.41%	0.29	-6.24	***
Uninsured	7.10%	0.20	6.46%	0.21	-0.64	*
Health Insurance Policy Holder	40.66%	0.30	40.23%	0.33	-0.43	

P<.10 + P<.05 * P<.01 ** P<.001 ***

Note: Weighted using replicate weights for the Production and Bridge files, respectively. Standard errors calculated using balanced repeated replication variance estimation.
Highest Educational Attainment percentages do not sum to 100 because children under 18 are not assigned an education level.

Source: U.S. Census Bureau, Current Population Survey, 2018 Annual Social and Economic Supplement Production and Bridge files.

Table 5: Linear Probability Models Examining Probability of High Medical Expenditures Across Processing Systems

	(1) Unadjusted Model	(2) Model Adjusted for Demographics	(3) Model Adjusted for Income and Demographics	(4) Model Adjusted for Health Insurance, Income and Demographics
Updated Processing System	-0.0186***	-0.0186***	-0.0187***	-0.0107***
	(0.00190)	(0.00190)	(0.00184)	(0.00177)
Adjusted for:				
Demographics		X	X	X
Income			X	X
Health Insurance				X

P<.10 + P<.05 * P<.01 ** P<.001 ***

Note: Weighted using replicate weights for the Production and Bridge files, respectively. Standard errors are given in parenthesis and are calculated using balanced repeated replication variance estimation.

Source: U.S. Census Bureau, Current Population Survey, 2018 Annual Social and Economic Supplement Production and Bridge files.

Table 6: Verification Check Linear Probability Models Examining Probability of High Medical Expenditures Across Processing Systems for Cases where All Family Medical Expenditure Information is Non-Imputed

	(1) Unadjusted Model	(2) Model Adjusted for Health Insurance, Income and Demographics
Updated Processing System	-0.00454***	-0.00433***
	(0.00109)	(0.00103)
Adjusted for:		
Demographics		X
Income		X
Health Insurance		X

P<.10 + P<.05 * P<.01 ** P<.001 ***

Note: Weighted using replicate weights for the Production and Bridge files, respectively. Standard errors are given in parenthesis and are calculated using balanced repeated replication variance estimation.

Source: U.S. Census Bureau, Current Population Survey, 2018 Annual Social and Economic Supplement Production and Bridge files.

Appendix A Replication on 2017 CPS ASEC Research File

Tables A1 to A6 replicate the analysis shown in the main results by comparing estimates from the 2017 CPS ASEC Production file and the 2017 CPS ASEC Research file (which uses the updated processing system, analogous to the 2018 Bridge file.) There are a few differences compared to the results from 2018. First, unlike the results presented in Table 3, there is no statistically significant difference in the estimates of median family medical expenditures for families in the second quintile of family income between the two files[7]. The results of the by-quintile analysis may be found in Appendix Table A3. As seen in Appendix Table A4, there are differences in the way demographic characteristics of those with high medical burdens changed under the new processing system. Unlike 2018, there were no significant changes to race and ethnicity under the new processing system in 2017[8]. In the 2017 sample shown in Appendix Table A4, there is a significant decrease in health insurance policyholders with high medical burden, while we do not see a significant change in 2018 (Table 4)[9]. However, we find that the models predicting the probability of high medical expenditures across processing systems have negative and statistically significant values in both years of analysis[10].

[7] The difference between estimates in 2017 and 2018 is not statistically significant.
[8] The difference between estimates in 2017 and 2018 is not statistically significant.
[9] However, the percentage of people with high medical burden who are policyholders is not statistically different between 2017 and 2018.
[10] The difference between point estimates in 2017 and 2018 is not statistically significant.

Table A1: Characteristics of All People in the 2017 CPS ASEC Production and Research Files

	2017 CPS ASEC Production File		2017 CPS ASEC Research File		Difference	
	Estimate	SE	Estimate	SE		
Age						
Under 18 Years of Age	23.11%	0.03	23.12%	0.03	0.01	
18-64 Years of Age	61.51%	0.05	61.51%	0.05	0.00	
65 Years of Age or Older	15.38%	0.04	15.38%	0.04	0.00	
Race-Ethnicity						
White Non-Hispanic	61.01%	0.03	61.00%	0.03	-0.01	
Black Non-Hispanic	12.25%	0.04	12.26%	0.04	0.01	
Asian Non-Hispanic	5.73%	0.04	5.73%	0.04	0.00	
Other Non-Hispanic	3.00%	0.02	3.01%	0.02	0.01	
Hispanic	18.00%	0.00	18.00%	0.00	0.00	
Marital Status						
Married	40.78%	0.16	41.04%	0.16	0.26	
Not Married	59.22%	0.16	58.96%	0.16	-0.26	
Highest Educational Attainment						
Less than High School	8.48%	0.09	8.48%	0.09	0.00	
High School Diploma	22.22%	0.15	22.21%	0.15	-0.01	
Some College	14.50%	0.11	14.50%	0.11	0.00	
Associate's Degree	7.51%	0.08	7.52%	0.08	0.01	
Bachelor's Degree	15.41%	0.11	15.41%	0.11	0.00	
Master's Degree or Higher	8.77%	0.10	8.77%	0.10	0.00	
Income to Poverty Ratio						
Below Federal Poverty Level	12.70%	0.14	12.77%	0.14	0.07	
Between 100-199% of Federal Poverty Level	17.08%	0.18	17.18%	0.17	0.10	
Between 200-299% of Federal Poverty Level	16.16%	0.17	15.82%	0.17	-0.34	
Between 300-399% of Federal Poverty Level	13.30%	0.15	13.25%	0.16	-0.05	
At or Above 400% of Federal Poverty Level	40.76%	0.25	40.99%	0.25	0.23	
Health Insurance Status						
Employer Sponsored Insurance	55.70%	0.22	54.98%	0.24	-0.72	*
Direct Purchase Insurance	16.22%	0.17	11.80%	0.13	-4.42	***
Medicaid	19.45%	0.18	18.87%	0.18	-0.58	*
Medicare	16.66%	0.07	16.83%	0.08	0.17	
Military Coverage	4.57%	0.11	3.42%	0.09	-1.15	***
Multiple Coverage Types	19.62%	0.14	13.47%	0.11	-6.15	***
Uninsured	8.76%	0.10	7.85%	0.09	-0.91	***
Health Insurance Policy Holder	36.58%	0.13	36.27%	0.12	-0.31	+

P<.10 + P<.05 * P<.01 ** P<.001 ***

Note: Weighted using replicate weights for the Production and Research files, respectively. Standard errors calculated using balanced repeated replication variance estimation.
Highest Educational Attainment percentages do not sum to 100 because children under 18 are not assigned an education level.

Source: U.S. Census Bureau, Current Population Survey, 2017 Annual Social and Economic Supplement Production and Research files.

Table A2: Median Family Income, Median Family Medical Expenses, and Percent with High Medical Burden Across 2017 CPS ASEC Research and Production Files

	2017 CPS ASEC Production File		2017 CPS ASEC Research File		Difference	
	Estimate	SE	Estimate	SE		
Median Family Income	64880.00	310.00	64830.00	560.00	-50.00	
Median Family Medical Expenditures	2799.00	25.00	2889.00	34.00	90.00	*
Percent with High Medical Burden	23.93%	0.22%	22.50%	0.19%	-1.43%	***
Observations = 185900						

P<.10 + P<.05 * P<.01 ** P<.001 ***

Note: Weighted using replicate weights for the Production and Research files, respectively. Standard errors calculated using balanced repeated replication variance estimation.

Source: U.S. Census Bureau, Current Population Survey, 2017 Annual Social and Economic Supplement Production and Research Files.

Table A3: Percent with High Family Medical Burden and Average Family Medical Expenditures by Income Quintile in the 2017 CPS ASEC Production and Research Files

	Change in Percent with High Medical Burden (Medical Expenditures > 10% of Income)						Change in Median Medical Expenditures (In Dollars)					
	2017 CPS ASEC Production File		2017 CPS ASEC Research File		Difference		2017 CPS ASEC Production File		2017 CPS ASEC Research File		Difference	
	Estimate	SE	Estimate	SE			Estimate	SE	Estimate	SE		
Lowest Quintile of Family Income	38.78%	0.47%	34.21%	0.41%	-4.56%	***	$439	$11	$330	$13	$-109	***
2nd Quintile of Family Income	28.48%	0.43%	26.60%	0.43%	-1.88%	**	$1,679	$38	$1,610	$41	$-69	
3rd Quintile of Family Income	26.19%	0.47%	25.88%	0.48%	-0.32%		$3,273	$63	$3,297	$62	$24	
4th Quintile of Family Income	18.68%	0.42%	18.88%	0.42%	0.20%		$4,800	$75	$5,158	$73	$358	***
Highest Quintile of Family Income	7.39%	0.31%	7.05%	0.34%	-0.34%		$5,997	$108	$6,576	$70	$579	***

P<.10 + P<.05 * P<.01 ** P<.001 ***

Note: Weighted using replicate weights for the Production and Research files, respectively. Standard errors calculated using balanced repeated replication variance estimation. Family medical expenditures rounded to the nearest dollar.

Source: U.S. Census Bureau, Current Population Survey, 2017 Annual Social and Economic Supplement Production and Research files.

Table A4: Characteristics of People with High Family Medical Burden in the 2017 CPS ASEC Research and Production Files

	2017 CPS ASEC Production File		2017 CPS ASEC Research File		Difference	
	Estimate	SE	Estimate	SE		
Age						
Under 18 Years of Age	23.04%	0.21	22.55%	0.23	-0.49	
18-64 Years of Age	57.53%	0.25	57.57%	0.25	0.05	
65 Years of Age or Older	19.44%	0.25	19.88%	0.27	0.44	
Race-Ethnicity						
White Non-Hispanic	63.67%	0.40	64.01%	0.39	0.35	
Black Non-Hispanic	12.45%	0.29	12.01%	0.30	-0.44	
Asian Non-Hispanic	4.69%	0.17	4.60%	0.18	-0.09	
Other Non-Hispanic	2.88%	0.11	2.99%	0.13	0.11	
Hispanic	16.32%	0.28	16.38%	0.32	0.07	
Marital Status						
Married	40.40%	0.33	42.02%	0.33	1.63	***
Not Married	59.60%	0.33	57.98%	0.33	-1.63	***
Highest Educational Attainment						
Less than High School	63.67%	0.40	64.01%	0.39	0.35	
High School Diploma	12.45%	0.29	12.01%	0.30	-0.44	
Some College	4.69%	0.17	4.60%	0.18	-0.09	
Associate's Degree	2.88%	0.11	2.99%	0.13	0.11	
Bachelor's Degree	16.32%	0.28	16.38%	0.32	0.07	
Master's Degree or Higher	6.40%	0.16	6.54%	0.17	0.14	
Income to Poverty Ratio						
Below Federal Poverty Level	23.87%	0.40	22.28%	0.39	-1.59	**
Between 100-199% of Federal Poverty Level	21.09%	0.41	20.51%	0.43	-0.58	
Between 200-299% of Federal Poverty Level	20.26%	0.37	19.65%	0.40	-0.61	
Between 300-399% of Federal Poverty Level	14.07%	0.32	13.89%	0.35	-0.18	
At or Above 400% of Federal Poverty Level	20.72%	0.37	23.67%	0.37	2.96	***
Health Insurance Status						
Employer Sponsored Insurance	52.44%	0.39	51.67%	0.42	-0.78	
Direct Purchase Insurance	26.43%	0.40	21.00%	0.37	-5.43	***
Medicaid	17.07%	0.30	16.63%	0.32	-0.44	
Medicare	21.04%	0.28	21.93%	0.30	0.89	*
Military Coverage	3.19%	0.15	1.72%	0.10	-1.47	***
Multiple Coverage Types	24.98%	0.34	18.89%	0.31	-6.09	***
Uninsured	7.06%	0.19	6.48%	0.18	-0.58	*
Health Insurance Policy Holder	40.98%	0.28	39.97%	0.28	-1.01	*

P<.10 + P<.05 * P<.01 ** P<.001 ***

Note: Weighted using replicate weights for the Production and Research files, respectively. Standard errors calculated using balanced repeated replication variance estimation.
Highest Educational Attainment percentages do not sum to 100 because children under 18 are not assigned an education level.

Source: U.S. Census Bureau, Current Population Survey, 2017 Annual Social and Economic Supplement Production and Research files.

Table A5: Linear Probability Models Examining Probability of High Family Medical Burden Across Processing Systems

	(1) Unadjusted Model	(2) Model Adjusted for Demographics	(3) Model Adjusted for Income and Demographics	(4) Model Adjusted for Health Insurance, Income and Demographics
Updated Processing System	-0.0143***	-0.0143***	-0.0141***	-0.00649***
	(0.00193)	(0.00193)	(0.00186)	(0.00182)
Adjusted for:				
Demographics		X	X	X
Income			X	X
Health Insurance				X
Observations	371800	371800	371800	371800

P<.10 + P<.05 * P<.01 ** P<.001 ***

Note: Weighted using replicate weights for the Production and Research files, respectively. Standard errors are given in parenthesis and are calculated using balanced repeated replication variance estimation.

Source: U.S. Census Bureau, Current Population Survey, 2017 Annual Social and Economic Supplement Production and Research files.

Table A6: Verification Check Linear Probability Models Examining Probability of High Medical Expenditures Across Processing Systems for Cases where All Family Medical Expenditure Information is Non-Imputed

	(1) Unadjusted Model	(2) Model Adjusted for Health Insurance, Income and Demographics
Updated Processing System	-0.00315**	-0.00272*
	(0.00112)	(0.00111)
Adjusted for:		
Demographics		X
Income		X
Health Insurance		X

P<.10 + P<.05 * P<.01 ** P<.001 ***

Note: Weighted using replicate weights for the Production and Research files, respectively. Standard errors are given in parenthesis and are calculated using balanced repeated replication variance estimation.

Source: U.S. Census Bureau, Current Population Survey, 2017 Annual Social and Economic Supplement Production and Research Files.

Table B1: Characteristics of People without High Family Medical Burden in the 2018 CPS ASEC Production and Bridge Files

Selected Characteristics of People Without High Medical Burden	2018 CPS ASEC Production File		2018 CPS ASEC Bridge File		Difference	
	Estimate	SE	Estimate	SE		
Age						
Under 18 Years of Age	22.83%	0.07	23.09%	0.07	0.26	**
18-64 Years of Age	62.32%	0.09	62.18%	0.09	-0.14	
65 Years of Age or Older	14.85%	0.09	14.73%	0.08	-0.12	
Race-Ethnicity						
White Non-Hispanic	60.07%	0.12	59.72%	0.12	-0.35	*
Black Non-Hispanic	12.28%	0.08	12.34%	0.08	0.05	
Asian Non-Hispanic	6.10%	0.06	6.14%	0.06	0.05	
Other Non-Hispanic	3.01%	0.04	3.04%	0.04	0.03	
Hispanic	18.53%	0.09	18.75%	0.09	0.23	+
Marital Status						
Married	41.01%	0.18	40.92%	0.18	-0.09	
Not Married	58.99%	0.18	59.08%	0.18	0.09	
Highest Educational Attainment						
Less than High School	8.04%	0.09	8.16%	0.09	0.12	
High School Diploma	21.13%	0.17	21.25%	0.16	0.12	
Some College	14.14%	0.12	13.97%	0.12	-0.17	
Associate's Degree	7.46%	0.09	7.39%	0.09	-0.07	
Bachelor's Degree	16.68%	0.15	16.54%	0.15	-0.14	
Master's Degree or Higher	9.73%	0.12	9.60%	0.12	-0.12	
Income to Poverty Ratio						
Below Federal Poverty Level	8.94%	0.15	9.58%	0.16	0.64	**
Between 100-199% of Federal Poverty Level	15.83%	0.21	16.47%	0.21	0.63	*
Between 200-299% of Federal Poverty Level	14.78%	0.19	14.77%	0.17	-0.01	
Between 300-399% of Federal Poverty Level	12.82%	0.20	13.21%	0.18	0.39	
At or Above 400% of Federal Poverty Level	47.62%	0.32	45.97%	0.29	-1.65	***
Health Insurance Status						
Employer Sponsored Insurance	56.67%	0.27	56.01%	0.23	-0.66	+
Direct Purchase Insurance	13.24%	0.00	8.65%	0.14	-4.59	***
Medicaid	20.03%	0.22	19.11%	0.19	-0.92	**
Medicare	16.18%	0.00	16.17%	0.10	-0.01	
Military Coverage	5.32%	0.18	3.94%	0.14	-1.38	***
Multiple Coverage Types	18.93%	0.21	12.01%	0.14	-6.92	***
Uninsured	9.35%	0.13	8.32%	0.12	-1.04	***
Health Insurance Policy Holder	35.28%	0.16	35.18%	0.15	-0.10	

P<.10 + P<.05 * P<.01 ** P<.001 ***

Note: Weighted using replicate weights for the Production and Bridge files, respectively. Standard errors calculated using balanced repeated replication variance estimation.

Source: U.S. Census Bureau, Current Population Survey, 2018 Annual Social and Economic Supplement, Production and Bridge files.

Table B2: Characteristics of People without High Family Medical Burden in the 2017 CPS ASEC Production and Research Files

Selected Characteristics of People Without High Medical Burden	2017 CPS ASEC Production File		2017 CPS ASEC Research File		Difference	
	Estimate	SE	Estimate	SE		
Age						
Under 18 Years of Age	23.14%	0.08	23.28%	0.08	0.14	
18-64 Years of Age	62.76%	0.09	62.65%	0.09	-0.11	
65 Years of Age or Older	14.10%	0.09	14.07%	0.09	-0.04	
Race-Ethnicity						
White Non-Hispanic	60.17%	0.13	60.13%	0.12	-0.05	
Black Non-Hispanic	12.19%	0.10	12.33%	0.10	0.14	
Asian Non-Hispanic	6.06%	0.07	6.06%	0.07	0.00	
Other Non-Hispanic	18.53%	0.09	18.47%	0.09	-0.06	
Hispanic	3.04%	0.04	3.01%	0.05	-0.04	
Marital Status						
Married	40.90%	0.18	40.76%	0.18	-0.14	
Not Married	59.10%	0.18	59.24%	0.18	0.14	
Highest Educational Attainment						
Less than High School	8.18%	0.10	8.29%	0.10	0.11	
High School Diploma	21.32%	0.16	21.30%	0.16	-0.02	
Some College	14.25%	0.12	14.20%	0.13	-0.05	
Associate's Degree	7.38%	0.09	7.41%	0.09	0.02	
Bachelor's Degree	16.22%	0.12	16.11%	0.13	-0.11	
Master's Degree or Higher	9.51%	0.13	9.41%	0.13	-0.10	
Income to Poverty Ratio						
Below Federal Poverty Level	9.35%	0.15	10.17%	0.15	0.82	***
Between 100-199% of Federal Poverty Level	15.78%	0.21	16.18%	0.20	0.40	
Between 200-299% of Federal Poverty Level	14.84%	0.18	14.68%	0.18	-0.17	
Between 300-399% of Federal Poverty Level	13.04%	0.17	13.04%	0.18	0.00	
At or Above 400% of Federal Poverty Level	46.99%	0.29	45.94%	0.30	-1.05	*
Health Insurance Status						
Employer Sponsored Insurance	56.73%	0.26	55.94%	0.27	-0.78	*
Direct Purchase Insurance	13.01%	0.17	9.13%	0.13	-3.87	***
Medicaid	20.19%	0.21	19.53%	0.21	-0.67	*
Medicare	15.28%	0.11	15.36%	0.11	0.07	
Military Coverage	5.00%	0.14	3.91%	0.12	-1.09	***
Multiple Coverage Types	17.93%	0.17	11.90%	0.13	-6.03	***
Uninsured	9.29%	0.13	8.25%	0.11	-1.04	***
Health Insurance Policy Holder	35.20%	0.16	35.19%	0.16	0.00	

P<.10 + P<.05 * P<.01 ** P<.001 ***

Note: Weighted using replicate weights for the Production and Research files, respectively. Standard errors calculated using balanced repeated replication variance estimation.

Source: U.S. Census Bureau, Current Population Survey, 2017 Annual Social and Economic Supplement, Production and Research files.