The Impact of New Disclosure Avoidance Procedures on Estimating Supplemental Poverty Rates Using Public Microdata Files

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Abstract

In 2023, as part of ongoing disclosure avoidance modernization, the U.S. Census Bureau began partially synthesizing geographic information available in public use Current Population Survey (CPS) data. The partial synthesis expands existing disclosure avoidance practices on CPS public use data which suppressed geographic information for areas with small populations. This synthesis is not applied to internal files thus, estimates in the annual *Poverty in the United States* report are unaffected by this change. We test whether this new procedure impacts data user's ability to replicate estimates produced in *Poverty in the United States: 2022* compared to previous releases. The results show that implementation of additional geographic synthesis does not substantially change data users' ability to replicate estimates using public use data.

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1. Introduction

The Supplemental Poverty Measure (SPM) is an extension of the official poverty measure that considers non-cash benefits and necessary expenses when determining an individual's poverty status (Creamer et al., 2022). Unlike the official poverty measure, shared resources (i.e., the net sum of income, benefits, and expenses) in the SPM are compared to geographically adjusted thresholds (Provencher, 2011). These thresholds reflect differences in housing costs for different metropolitan areas and across the country.

Prior to 2023, existing disclosure avoidance procedures prevented data users from exactly replicating published SPM estimates using public use files of the Current Population Survey Annual Social and Economic Supplement (CPS ASEC).[2] In 2023, additional disclosure avoidance procedures were implemented in the public use basic monthly Current Population Survey (CPS).[3] These procedures impacted the public use CPS ASEC by shielding the geographic information of a larger set of individuals. These changes mean that housing subsidies and the geographic adjustment factors may vary between internal and public versions of the CPS ASEC. We compare estimates produced using each source for the 2022 and 2023 CPS ASEC. Differences reflect whether additional disclosure protections have further impacted the replicability of estimates by data users.

2. Summary of Disclosure Avoidance Change

Previous disclosure avoidance rules required geographic areas with fewer than 100,000 people to be suppressed in public use data. Households located in areas under this threshold would have a different geographic adjustment factor on the public use file than on the internal file which could impact their poverty status.

The updated rules for 2023 continue to suppress geographic identifiers for areas with fewer than 100,000 people and synthesize the identifiers for select areas. These areas include respondents living in areas with 100,000 to 250,000 people and for those who live in particularly identifiable areas such as principal cities, even if they have populations over the 250,000-person threshold (Benedetto et al., 2022). These additional protections increase the number of respondents who have geographic identifiers that differ between the internal and public use files, potentially making it more difficult to replicate poverty estimates produced in *Poverty in the United States: 2022* and future releases.

The new disclosure avoidance procedures and the synthesis of geographies was phased in starting in 2023, meaning that this year's data represents partial implementation. Households were eligible for the synthesis if they met the population criteria listed above and were first

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[2] Public use files of the CPS ASEC are available here: https://www.census.gov/data/datasets/time-series/demo/cps/cps-asec.html

[3] More information on the geographic synthesis can be found in the 2023 Current Population Survey User Note here: https://www.census.gov/programs-surveys/cps/technical-documentation/user-notes/cps_2023_01.html

sampled by the CPS in 2023. Households who entered the CPS sample prior to 2023 are only subject to the existing disclosure avoidance procedure which was limited to suppressing geographic identifiers for areas with populations smaller than 100,000 people. Full details are available in Benedetto et al., (2022).

3. Results

We compare SPM rates produced using internal and public use versions of the 2022 and 2023 CPS ASEC. Comparisons using data from the later CPS ASEC reflect how new disclosure avoidance and partial synthesis procedures impact the replicability of estimates using public microdata files.

Table 1 presents poverty rates produced using internal and the public use versions of the 2022 CPS ASEC micro data (which covers calendar year 2021), which were released before the implementation of new disclosure protections. Overall, the percent of people in poverty using the internal and public use file is not statistically different. Statistically significant differences do exist between internal and public use estimates within some residence categories (in metropolitan areas and principal cities) due to the suppression of geographic information in the latter.

Table 1.
Percent of People in Poverty Using the Supplemental Poverty Measure: Internal v. Public Use File, 2021

Characteristic	Internal File		Public Use File		Difference	
	Percent	MOE[1]	Percent	MOE[1]		
All People	7.8	0.2	7.8	0.2	Z	
Sex						
Male	7.6	0.3	7.6	0.2	Z	
Female	7.9	0.2	7.9	0.2	Z	
Age						
Under 18 years	5.2	0.4	5.2	0.4	Z	
18 to 64 years	7.9	0.3	7.9	0.2	Z	
65 years and older	10.7	0.4	10.7	0.4	Z	
Type of Unit						
Married couple unit	4.4	0.2	4.4	0.2	Z	
Cohabiting partner unit	6.5	0.7	6.4	0.7	0.1	
Female reference person unit	11.7	0.8	11.7	0.8	Z	
Male reference person unit	10.6	1.2	10.8	1.2	-0.1	
Unrelated individuals	18.1	0.7	18.1	0.7	Z	
Race and Hispanic Origin						
White	6.9	0.2	6.9	0.2	Z	
White, not Hispanic	5.7	0.2	5.7	0.2	Z	
Black	11.3	0.8	11.3	0.7	Z	
Asian	9.5	0.9	9.4	0.9	Z	
American Indian and Alaska Native	12.4	2.4	12.3	2.4	0.1	
Two or more races	7.3	1.3	7.3	1.3	Z	

Hispanic (any race)	11.2	0.5	11.2	0.6	Z	
Nativity						
Native born	6.9	0.2	6.9	0.2	Z	
Foreign born	13.1	0.7	13.1	0.7	Z	
Naturalized citizen	10.3	0.8	10.3	0.8	Z	
Not a citizen	15.8	1.1	15.8	1.1	Z	
Educational Attainment						
Total, aged 25 and older	8.1	0.2	8.1	0.2	Z	
No high school diploma	19.7	0.9	19.7	1.0	Z	
High school, no college	10.3	0.4	10.3	0.4	Z	
Some college, no degree	7.3	0.4	7.3	0.4	Z	
Bachelor's degree or higher	4.3	0.2	4.3	0.2	Z	
Tenure						
Owner/mortgage	3.5	0.2	3.5	0.2	Z	
Owner/no mortgage/rent-free	8.0	0.4	8.0	0.4	Z	
Renter	13.5	0.5	13.5	0.5	Z	
Residence[2]						
In Metropolitan Area	7.9	0.2	8.1	0.3	-0.2	*
Principal City	9.8	0.4	10.2	0.5	-0.4	*
Balance of a Metropolitan Area	6.8	0.3	6.9	0.3	-0.1	
Not in a Metropolitan Area	7.1	0.6	7.1	0.6	Z	
Region						
Northeast	7.6	0.6	7.6	0.6	Z	
Midwest	5.6	0.4	5.5	0.4	Z	
South	8.4	0.4	8.3	0.4	Z	
West	8.9	0.4	8.9	0.4	Z	
Health Insurance Coverage						
With private insurance	3.8	0.2	3.8	0.2	Z	
With public, no private insurance	14.7	0.5	14.7	0.5	Z	
Not insured	17.4	1.0	17.3	1.0	0.1	
Work Experience						
Total 18 to 64 years	7.9	0.3	7.9	0.2	Z	
All workers	3.8	0.2	3.8	0.2	Z	
Worked full-time, year-round	2.0	0.1	1.9	0.1	Z	
Less than full-time, year-round	8.7	0.5	8.7	0.5	Z	
Did not work at least 1 week	21.5	0.7	21.5	0.7	Z	
Disability Status						
Total 18 to 64 years	7.9	0.3	7.9	0.2	Z	
With a disability	15.8	1.0	15.8	1.0	Z	
With no disability	7.2	0.3	7.2	0.3	Z	

* An asterisk preceding an estimate indicates change is statistically different from zero at the 90 percent confidence level.

Z Rounds to zero.

[1] A margin of error (MOE) is a measure of an estimate's variability. This number, when added to and subtracted from the estimate, forms the 90 percent confidence interval. MOEs shown in this table are based on standard errors calculated using replicate weights.

[2] Residence in the public use file is unidentified for select respondents due to disclosure avoidance. Estimates are produced using the identifiable metro and non-metro samples in each file and compared accordingly.

Notes: Details may differ due to rounding.

Source: U.S. Census Bureau, Current Population Survey, 2022 Annual Social and Economic Supplement (CPS ASEC).

Table 2 compares SPM estimates produced using internal and public use data from the 2023 CPS ASEC. Geographic information of eligible respondents in the latter is now synthesized in accordance with new disclosure avoidance protections. Again, the overall SPM rate using the internal and public use file is not statistically different. However, statistical differences between certain demographic characteristic groups exist. SPM rates for people inside (including inside principal cities and in a balance of a metro) and outside metropolitan areas differ between the internal and public use files. These differences are due to the suppression and synthesis of data from small geographies. Other statistically significant differences exist for unrelated individuals and people reporting Two or More races.

Table 2.
Percent of People in Poverty Using the Supplemental Poverty Measure: Internal v. Public Use File, 2022

Characteristic	Internal File		Public Use File		Difference	
	Percent	MOE[1]	Percent	MOE[1]		
All People	12.4	0.3	12.4	0.3	Z	
Sex						
Male	11.9	0.3	11.9	0.3	Z	
Female	12.8	0.3	12.9	0.3	Z	
Age						
Under 18 years	12.4	0.5	12.4	0.5	Z	
18 to 64 years	11.9	0.3	11.9	0.3	Z	
65 years and older	14.1	0.5	14.2	0.5	Z	
Type of Unit						
Married couple unit	7.6	0.3	7.6	0.3	Z	
Cohabiting partner unit	12.3	1.2	12.3	1.2	Z	
Female reference person unit	22.6	1.1	22.7	1.1	-0.1	
Male reference person unit	14.7	1.2	14.8	1.2	-0.1	
Unrelated individuals	22.4	0.7	22.4	0.7	0.1	*
Race and Hispanic Origin						
White	11.4	0.3	11.5	0.3	Z	
White, not Hispanic	9.1	0.3	9.2	0.3	Z	
Black	17.2	0.9	17.2	0.9	Z	
Asian	11.6	1.1	11.6	1.1	Z	
American Indian and Alaska Native	23.2	4.0	22.9	3.9	0.3	
Two or more races	11.4	1.4	11.7	1.4	-0.4	*
Hispanic (any race)	19.3	0.8	19.3	0.8	Z	
Nativity						
Native born	11.2	0.3	11.2	0.3	Z	
Foreign born	19.0	0.8	19.0	0.8	0.1	
Naturalized citizen	13.5	0.8	13.4	0.8	0.1	
Not a citizen	24.4	1.2	24.4	1.2	Z	

Educational Attainment						
Total, aged 25 and older	11.7	0.3	11.7	0.3	Z	
No high school diploma	27.9	1.2	27.9	1.2	Z	
High school, no college	15.6	0.5	15.6	0.5	Z	
Some college, no degree	10.7	0.4	10.7	0.4	Z	
Bachelor's degree or higher	5.8	0.2	5.8	0.3	Z	
Tenure						
Owner/mortgage	5.6	0.3	5.6	0.3	Z	
Owner/no mortgage/rent-free	12.0	0.5	12.0	0.5	Z	
Renter	22.2	0.6	22.3	0.6	Z	
Residence[2]						
In Metropolitan Area	12.4	0.3	12.7	0.3	-0.3	*
Principal City	15.2	0.5	15.6	0.6	-0.4	*
Balance of a Metropolitan Area	10.8	0.3	11.0	0.4	-0.2	*
Not in a Metropolitan Area	12.2	0.7	11.7	0.7	0.4	*
Region						
Northeast	11.9	0.7	12.0	0.7	Z	
Midwest	9.1	0.5	9.1	0.5	Z	
South	13.7	0.5	13.7	0.5	Z	
West	13.4	0.5	13.3	0.5	0.1	
Health Insurance Coverage						
With private insurance	5.9	0.2	5.9	0.2	Z	
With public, no private insurance	24.1	0.6	24.2	0.7	-0.1	
Not insured	26.3	1.2	26.2	1.1	0.1	
Work Experience						
Total 18 to 64 years	11.9	0.3	11.9	0.3	Z	
All workers	6.6	0.3	6.6	0.3	Z	
Worked full-time, year-round	3.6	0.2	3.6	0.2	Z	
Less than full-time, year-round	15.1	0.6	15.1	0.6	Z	
Did not work at least 1 week	29.9	0.8	30.0	0.8	-0.1	
Disability Status						
Total 18 to 64 years	11.9	0.3	11.9	0.3	Z	
With a disability	23.0	1.1	23.0	1.1	Z	
With no disability	10.9	0.3	10.9	0.3	Z	

* An asterisk preceding an estimate indicates change is statistically different from zero at the 90 percent confidence level.

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[2] Residence in the public use file is unidentified for select respondents due to disclosure avoidance. Estimates are produced using the identifiable metro and non-metro samples in each file and compared accordingly.

Notes: Details may differ due to rounding.

Source: U.S. Census Bureau, Current Population Survey, 2023 Annual Social and Economic Supplement (CPS ASEC).

4. Conclusion

This paper summarizes SPM rates produced using internal and public use data from the 2022 and 2023 CPS ASEC. Estimates produced using public use data from the 2023 CPS ASEC reflect the partial implementation of new synthetic geographies. In both years examined, overall SPM rates on the internal file and public use file were not statistically different from each other. However, SPM rates for certain subgroups, particularly those defined by residence, differ between internal and public versions of the CPS ASEC data. Differences among other subgroups do exist between internal and public versions of the 2023 ASEC.

Prior to the implementation of synthetic geographies, data users were warned that differences between internal and publicly released files exist. Although synthetic geographies do not affect the overall quality of SPM estimates, this warning still applies to all forthcoming data releases. As previously noted, the 2023 CPS ASEC only reflects a partial implementation of the new synthetic procedures. By 2025, these disclosure avoidances requirements will be fully implemented into all CPS public use files and all respondents in eligible areas will have their geographic information synthesized.

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