

National Census Coverage Estimates for People in the United States by Demographic Characteristics

2020 Post-Enumeration Survey Estimation Report

Shadie Khubba, Krista Heim, and Jinhee Hong

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Estimation Report*

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Director

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DSSD 2020 POST-ENUMERATION SURVEY MEMORANDUM SERIES #2020-G-01

MEMORANDUM FOR Patrick J. Cantwell
Chief, Decennial Statistical Studies Division

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Subject: 2020 Post-Enumeration Survey Estimation Report: National
Census Coverage Estimates for People in the United States by
Demographic Characteristics

This report provides a summary of the United States coverage results for people in households.

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EXECUTIVE SUMMARY

This document summarizes the 2020 survey-based coverage estimates of the 2020 Census for the household population living in the United States, excluding Remote Alaska areas. The estimates are also broken down by demographic characteristics. The Post-Enumeration Survey (PES) program estimated net coverage error rates at the national level using a statistical technique called dual-system estimation.

The PES program also estimated the components of census coverage for people. These components include correct enumerations, erroneous enumerations, omissions, and whole-person imputations.

Overall Household Population

The following are the key findings for the household population.

- The 2020 Census did not have a significant net coverage error rate. At the national level, the PES estimated a net coverage error rate of -0.24 percent (0.25 percent standard error) or 782,000 (821,000 standard error) people. The PES population estimate was not significantly different from the 2020 Census count. However, there were statistically significant undercounts or overcounts for specific subgroups.
- The estimated rate of erroneous enumerations was 2.2 percent (0.04 percent standard error). This rate was lower in 2020 compared to the 2010 Census. This was due largely to a new effort to find and remove duplicated people in the 2020 Census.
- The whole-person imputation rate was 3.4 percent. This rate increased from that of the 2010 Census. Greater levels of missing characteristics in the 2020 Census, as well as an increase in unresolved addresses resulting from the unduplication effort, contributed to the rise in the imputation rate.

Coverage by Race and Hispanic Origin

The PES measured net coverage error rates by race and Hispanic origin. Except for the category Non-Hispanic White Alone, we defined race and Hispanic origin groups as “alone or in combination with other groups.”

- We estimated undercounts for the groups Black or African American, American Indian or Alaska Native, Some Other Race, and Hispanic or Latino. Overcounts were estimated for White, Non-Hispanic White Alone, and Asian.

Coverage by Tenure (Owner, Renter)

- The 2020 Census undercounted renters and overcounted owners. This trend was seen in previous censuses.

Coverage by Age and Sex

- The 2020 Census undercounted some age-sex groups and overcounted other groups.
- The 2020 Census undercounted people under the age of 50 and overcounted people over the age of 50.
- Adult males were undercounted, and adult females were overcounted in the 2020 Census.
- Young children (aged 0 to 4) were undercounted, while the estimated net coverage error rates for older children (ages 5 to 9 and 10 to 17) were not statistically significant.

1. INTRODUCTION

As part of the 2020 Census, the U.S. Census Bureau conducted the Post-Enumeration Survey (PES) to estimate the coverage of the decennial census.¹

The major goals² of the PES (Kennel, 2019) were to:

- Provide measures of net coverage error.
- Produce measures of the components of census coverage, including correct enumerations, erroneous enumerations, imputations, and omissions.
- Produce measures of coverage for demographic groups and key census operations.

This document summarizes the PES estimates of coverage for the 2020 Census by demographic characteristics.³ The coverage estimates in this report are for the household population, excluding people living

in Remote Alaska areas.⁴ The PES did not produce estimates of coverage for the population living in group quarters (e.g., college dormitories and correctional facilities). Remote Alaska has historically been out of scope for Census Bureau post-enumeration surveys because of the seasonal movement of people throughout the year, which makes it infeasible to accurately conduct the matching and follow-up operations necessary for dual-system estimation. Group quarters are out of scope because their populations can change significantly between census and PES enumeration interviews.

Section 2 provides background on the methodology of the estimation of census coverage. Section 3 discusses the coverage results for the total population. Section 4 discusses the coverage results for demographic and tenure groupings.

¹ In addition to operational assessments and evaluations, the Census Bureau has relied on two principal methods to evaluate the coverage of the decennial census. One method is the survey-based approach, which is the topic of this report. The other method is Demographic Analysis.

² There are no plans to use PES results to produce adjusted population estimates for the purposes of apportionment, and there will be no such recommendation.

³ The Census Bureau's Disclosure Review Board has reviewed this product for unauthorized disclosure of confidential information and has approved the disclosure avoidance practices applied to this release. CBDRB-FY22-136.

⁴ Remote Alaska refers to the Remote Alaska enumeration area as defined by the 2020 Census. A map of the Remote Alaska enumeration area is available in the "2020 Census: Type of Enumeration Area (TEA) Viewer" located at <www.census.gov/newsroom/press-releases/2019/tea-viewer.html>.

2. METHODOLOGY

This section provides a brief overview of the methodology to estimate net coverage and the components of census coverage.⁵

Like the 1980, 1990, 2000, and 2010 post-enumeration surveys, the 2020 PES estimated the number of people in the population using dual-system estimation. Estimates of net coverage are calculated by comparing census counts to these estimates. As with the 2010 post-enumeration survey (called the Census Coverage Measurement survey or CCM), the 2020 PES used logistic regression modeling to produce synthetic estimates of net coverage.⁶

As part of this estimation, we implemented operations to account for missing data and to reduce the sampling and nonsampling errors in the estimates. This included imputation of missing characteristics, imputation of unresolved statuses, a weighting adjustment for noninterviewed PES housing units, and an adjustment to make PES estimates of sex ratios agree with those from Demographic Analysis.

To estimate correct and erroneous enumerations, we used a design-based estimator with a calibration adjustment.⁷

The 2020 Census faced many challenges, such as conducting fieldwork during the COVID-19 pandemic. Other challenges to the 2020 Census included controversy around a proposed citizenship question, and changes in the duration of the Nonresponse Followup and other operations.

The PES estimates are subject to sampling and nonsampling errors. Like the 2020 Census, the PES also faced challenges driven by the COVID-19 pandemic and general trends of decreasing response to surveys. In many circumstances, the PES made operational changes to mitigate or overcome these issues. The Source and Accuracy of the 2020 Post-Enumeration Survey Person Estimates (Marra and Kennel, 2022), as well as forthcoming methodology memos, quality assessments, and reports about the quality of the PES, will document specific measures the Census Bureau took to ensure the quality of the PES.

⁵ More information is available in the Source and Accuracy Statement (Marra and Kennel, 2022) and the forthcoming estimation design document (Zamora, 2022).

⁶ The forthcoming estimation design document will contain more information on the synthetic estimator (Zamora, 2022).

⁷ More detail on individual components and methods is available in the forthcoming estimation design document (Zamora, 2022).

In documentation from recent post-enumeration surveys, the U.S. Census Bureau defined the net undercount as the PES dual-system estimate (DSE) minus the census count. For this 2020 report, to be consistent with other programs, we reverse the sign and define the net coverage error as the census count minus the DSE:

$$\text{Net coverage error} = \text{Census} - \text{DSE}$$

A positive estimate indicates a net overcount, while a negative estimate indicates a net undercount.

3. RESULTS OF CENSUS COVERAGE FOR THE TOTAL HOUSEHOLD POPULATION

This section summarizes the net coverage and the components of census coverage for the household population, excluding Remote Alaska.

Estimates of Net Coverage Error

Table 1 displays the results for post-enumeration surveys from 1990 to 2020. At the national level, we did not estimate a significant undercount or overcount for the household population in the 2020 Census. Significance is reported in this document at the 10 percent level using a two-tailed test.

Estimates of Components of Coverage

Table 2 presents the estimates of the components of census coverage for the household population. The first part of the table shows how the census household population count of 323.2 million was distributed among correct enumerations, erroneous enumerations, and whole-person census imputations. Whole-person imputations represented 3.4 percent of the total census count. We estimated that 94.4 percent (0.04 percent standard error) of the census count was correctly enumerated, and 2.2 percent (0.04 percent standard error) was erroneously enumerated. This estimate of correct enumerations allows a person to be enumerated correctly in a housing unit

anywhere in the nation. Table 2 provides a further breakdown of this estimate using stricter geographic requirements.

The PES estimated that 92.6 percent (0.24 percent standard error) of the people counted in the census were correctly counted in the right basic collection unit (BCU) or in a neighboring BCU. A BCU is the smallest geographic level for 2020 Census data collection and roughly corresponds to a block.⁸

Table 2 also provides details about the estimated erroneous enumerations in the 2020 Census. Of the total census count, 1.6 percent (0.04 percent standard error) were erroneous enumerations due to duplication, and 0.6 percent (0.03 percent standard error) were erroneous enumerations for other reasons. Unlike the 2010 Census, the 2020 Census included an unduplication operation to remove people counted in the census at two different places (Keller and King, 2021). Sometimes this unduplication effort removed all the people at an address. When this happened, the address became unresolved and

⁸ More information is available in "The Design of the Post-Enumeration Survey for the 2020 Census" located at www.census.gov/programs-surveys/decennial-census/decade/2020/planning-management/plan/memo-series/2020-memo-2022_06.html, (Kennel, 2019).

Table 1.

National Estimates of Net Coverage Error for the United States Household Population

(Numbers in thousands)

Year	Census count ¹	Net coverage error ²			
		Estimate	Standard error	Estimate (percent)	Standard error (percent)
2020	323,200	-782	821	-0.24	0.25
2010	300,700	36	429	0.01	0.14
2000	273,600	*1,332	542	*0.49	0.20
1990	248,700	*-3,994	488	*-1.61	0.20

* Denotes a (percent) net coverage error that is significantly different from zero.

¹ Estimates and counts do not include people in group quarters or people in Remote Alaska and are rounded for disclosure avoidance.

² A negative (positive) estimate of net coverage error indicates an undercount (overcount).

Source: U.S. Census Bureau, Decennial Statistical Studies Division, 2020 Post-Enumeration Survey (March 2022 Release) and 2010 Census Coverage Measurement Survey.

a status of either nonexistent, vacant, or occupied was imputed. The unduplication effort also increased the number of addresses sent to count imputation and thus increased the total number of whole-person imputations.

The bottom of Table 2 summarizes the PES population estimate. The PES estimated that the household population (excluding people living in Remote Alaska) was 323.9 million people. This dual-system estimate (DSE) is broken down into two groups: correct enumerations and omissions. The estimate of correct enumerations is the same 305.1 million shown earlier

in the table. The PES estimated 18.8 million (819,000 standard error) omissions. Omissions are people who should have been correctly counted in the census but were not. The census may have accounted for many of these omitted people by the 10.9 million whole-person census imputations.

$$\text{Omissions} = \text{DSE} - \text{Correct enumerations}$$

Table 2.

Components of Census Coverage for the United States Household Population

(Numbers in thousands)

Component of census coverage	2020				2010			
	Estimate	Standard error	Percent	Standard error (percent)	Estimate	Standard error	Percent	Standard error (percent)
Census count	323,200	X	100.0	X	300,700	X	100.0	X
Correct enumerations ¹	305,100	145	94.4	0.04	284,700	199	94.7	0.07
Enumerated in the same basic collection unit ²	299,400	775	92.6	0.24	280,900	220	93.4	0.07
Enumerated in the same county, though in a different basic collection unit	3,711	763	1.1	0.24	2,039	55	0.7	0.02
Enumerated in the same state, though in a different county	1,025	29	0.3	0.01	830	34	0.3	0.01
Enumerated in a different state	977	37	0.3	0.01	948	31	0.3	0.01
Erroneous enumerations	7,167	145	2.2	0.04	10,040	199	3.3	0.07
Due to duplication	5,170	129	1.6	0.04	8,521	194	2.8	0.06
For other reasons ³	1,997	88	0.6	0.03	1,520	45	0.5	0.01
Whole-person census imputations ⁴ ..	10,850	X	3.4	X	5,993	X	2.0	X
Estimate of population from the Post-Enumeration Survey ⁵	323,900	821	100.0	X	300,700	429	100.0	X
Correct enumerations ¹	305,100	145	94.2	0.24	284,700	199	94.7	0.10
Omissions ⁶	18,800	819	5.8	0.24	16,000	440	5.3	0.10
Net coverage error ⁷	-782	821	-0.24	0.25	36	429	0.01	0.14

X Not applicable.

¹ For the national table, someone who should have been counted is considered a correct enumeration if he or she was enumerated anywhere in the United States.

² More precisely, enumerated in the search area for the correct basic collection unit. For definitions of basic collection unit and search area, see accompanying text.

³ Other reasons include fictitious people; those born after April 1, 2020; those who died before April 1, 2020, etc.

⁴ These imputations represent people from whom we did not collect sufficient information. Their records are included in the census count.

⁵ This number is the PES estimate of people who should have been counted in the PES household universe. It does not include people in group quarters or people living in Remote Alaska areas.

⁶ Omissions are people who should have been correctly enumerated in the United States, but were not. Many of these people may have been accounted for in the whole-person census imputations above.

⁷ A negative (positive) estimate of net coverage error indicates an undercount (overcount).

Note: Estimates are rounded for disclosure avoidance. As a result, counts may not sum to totals shown.

Source: U.S. Census Bureau, Decennial Statistical Studies Division, 2020 Post-Enumeration Survey (March 2022 Release) and 2010 Census Coverage Measurement Survey.

Whole-Person Imputations

The PES tallied 10.9 million whole-person census imputations in the 2020 Census—all characteristics were imputed for these census person records. Table 3 provides the whole-person census imputations by imputation procedure in the last three post-enumeration surveys. Note that Table 3 excludes imputations for people living in Remote Alaska or group quarters.

Three types of count imputations are listed in the table. Status imputation included records where the address was not found during census operations or had conflicting or insufficient information associated with it, or when all people living at the address were marked as duplicates. Occupancy imputation

was applied when it was evident that a housing unit was at the address, but no definitive information was available to determine if the housing unit was occupied or vacant. When an occupied housing unit was observed yet information on the total number of occupants was unavailable, household size imputation was used to fill in this information.

Whole-person census imputations where the population count was already known included situations where a proxy respondent or household resident knew the number of people living at a household but had very limited information about the occupants.⁹

⁹ More information on the count imputation categories and methods used in the 2020 Census is available in “2020 Census Count Imputation—High-Level Overview” (Zamora, 2021).

Count Imputation

- Status imputation—No information about the address; imputed as a valid housing unit or nonexistent. Those imputed as nonexistent were removed from the census files.
- Occupancy imputation—Existence of housing unit confirmed, but no information as to occupancy status; imputed as occupied or vacant.
- Household size imputation—Occupied status confirmed, but no information as to household count; the household population count, greater than 0, was imputed.

Population Count Already Known for the Housing Unit

- Whole household—Population count known; all characteristics imputed for the entire household.
- Partial household—Population count known; all characteristics imputed for some, but not all, people in the household.

Table 3.

Whole-Person Census Imputations by Type

Whole-person census imputations	2020		2010		2000	
	Count (millions)	Percent	Count (millions)	Percent	Count (millions)	Percent
Total	10.85	3.4	5.99	2.0	5.77	2.1
Count imputation.	1.86	0.6	1.16	0.4	1.17	0.4
Status imputation.	1.55	0.5	0.24	0.1	0.42	0.2
Occupancy imputation	0.12	Z	0.05	Z	0.26	0.1
Household size imputation.	0.19	0.1	0.87	0.3	0.50	0.2
Population count already known	8.99	2.8	4.83	1.6	4.60	1.7
Whole household	6.95	2.2	4.61	1.5	2.27	0.8
Partial household	2.04	0.6	0.22	0.1	2.33	0.9

Z Represents or rounds to zero.

Note: Percentage is out of the total census count, excluding people in group quarters and people in Remote Alaska areas.

Source: U.S. Census Bureau, Decennial Statistical Studies Division, 2020 Post-Enumeration Survey (March 2022 Release) and 2010 Census Coverage Measurement Survey.

4. RESULTS OF CENSUS COVERAGE FOR DEMOGRAPHIC AND TENURE GROUPINGS

This section summarizes the net coverage and the components of census coverage by demographic characteristics for the household population, excluding Remote Alaska. Although the PES did not estimate a significant undercount or overcount at the national level, the PES estimated undercounts or overcounts for various subgroups in 2020, some larger in magnitude than estimated in the 2010 survey.

Race and Hispanic Origin

Table 4 shows the 2020 and 2010 percent net coverage error estimates for race alone or in combination and Hispanic origin.

For the various race classifications, a person may fall into several rows of this table based on self-identification with more than one race or Hispanic origin categories. According to the 2020 Census, the proportion of people identifying with more than one race has increased in 2020 from 2010, suggesting that the categories in this table may be less comparable across surveys (Jones et al., 2021). More information on the definition and collection of race and ethnicity data can be found at the 2020 Census Frequently Asked Questions About Race and

Ethnicity webpage located at <www.census.gov/programs-surveys/decennial-census/decade/2020/planning-management/release/faqs-race-ethnicity.html>.

For the American Indian or Alaska Native population, estimates are broken down by geographic area. There are several types of American Indian areas including American Indian reservations and trust lands, tribal jurisdiction statistical areas, Alaska Native Regional Corporations, Alaska Native village statistical areas, and tribal designated statistical areas. Table 4 presents net coverage error rates for American Indian or Alaska Natives living on American Indian reservations, on all other American Indian areas, and off American Indian areas. American Indian Reservations are regions designated for tribal use by federal or state governments, with geographic borders defined by treaty, statute, or executive or court order. Balance of the United States refers to any other geographic area not considered to be an American Indian area (Geographic Areas Reference Manual, Chapter 5).

We estimated undercounts for the Black or African American, American Indian or Alaska Native, Some Other Race, and Hispanic or Latino populations.

Table 4.

Net Coverage Error Rates for the Household Population in the United States by Race and Hispanic Origin

(In percent)

Race or Hispanic Origin	2020		2010	
	Estimate	Standard error	Estimate	Standard error
Total	-0.24	0.25	0.01	0.14
Race alone or in combination with one or more other races:				
White	*0.66	0.21	*0.54	0.14
Non-Hispanic White alone	*1.64	0.21	*0.83	0.15
Black or African American	*-3.30	0.61	*-2.06	0.50
Asian	*2.62	0.77	0.00	0.52
American Indian or Alaska Native	*-0.91	0.54	-0.15	0.71
On Reservation	*-5.64	2.72	*-4.88	2.37
American Indian Areas Off Reservation ..	3.06	2.72	3.86	2.99
Balance of the United States	*-0.86	0.47	0.05	0.58
Native Hawaiian or Other Pacific Islander. .	1.28	2.11	-1.02	2.06
Some Other Race	*-4.34	0.49	*-1.63	0.31
Hispanic or Latino	*-4.99	0.53	*-1.54	0.33

* Denotes a (percent) net coverage error that is significantly different from zero.

Note: A negative (positive) estimate of net coverage error indicates an undercount (overcount). A person can be included in multiple rows.

Source: U.S. Census Bureau, Decennial Statistical Studies Division, 2020 Post-Enumeration Survey (March 2022 Release) and 2010 Census Coverage Measurement Survey.

Overcounts were estimated for the White, Non-Hispanic White Alone, and Asian populations.

Table 5 displays the components of census coverage by race reported alone or in combination with other races and Hispanic origin.

Table 5.

Components of Census Coverage for the Household Population in the United States by Race and Hispanic Origin

Race or Hispanic Origin	Correct enumerations		Erroneous enumerations				Whole-person census imputations		DSE ¹ correct		Omissions		Net coverage error	
	Percent	Standard error	Duplication		Other reasons		Percent	Standard error	Percent	Standard error	Percent	Standard error	Percent	Standard error
			Percent	Standard error	Percent	Standard error								
Total	94.4	Z	1.6	Z	0.6	Z	3.4	X	94.2	0.2	5.8	0.2	-0.24	0.25
Race alone or in combination with one or more other races:														
White	94.9	Z	1.5	Z	0.6	Z	3.0	X	95.5	0.2	4.5	0.2	*0.66	0.21
Non-Hispanic White														
Alone	94.9	0.1	1.5	Z	0.6	Z	2.9	X	96.5	0.2	3.5	0.2	*1.64	0.21
Black or African American	92.9	0.1	1.9	0.1	0.7	0.1	4.5	X	89.8	0.6	10.2	0.6	*-3.30	0.61
Asian	94.0	0.2	1.8	0.2	0.7	0.1	3.5	X	96.5	0.7	3.5	0.7	*2.62	0.77
American Indian or Alaska Native	94.5	0.2	1.7	0.2	0.6	0.1	3.2	X	93.6	0.5	6.4	0.5	*-0.91	0.54
On Reservation	91.7	0.4	4.6	0.4	0.5	0.1	3.2	X	86.5	2.5	13.5	2.5	*-5.64	2.72
American Indian Areas Off Reservation	94.7	0.7	2.0	0.7	0.4	0.2	2.9	X	97.6	2.7	2.4	2.7	3.06	2.72
Balance of the United States	94.7	0.2	1.5	0.2	0.6	0.1	3.2	X	93.8	0.5	6.2	0.5	*-0.86	0.47
Native Hawaiian or Other Pacific Islander	92.2	0.6	3.3	0.6	0.9	0.2	3.6	X	93.4	1.8	6.6	1.8	1.28	2.11
Some Other Race	94.2	0.1	1.5	0.1	0.6	Z	3.7	X	90.1	0.5	9.9	0.5	*-4.34	0.49
Hispanic or Latino	94.2	0.1	1.4	0.1	0.6	Z	3.8	X	89.5	0.5	10.5	0.5	*-4.99	0.53

* Denotes a (percent) net coverage error that is significantly different from zero.

X Not applicable.

Z Represents or rounds to zero.

¹ Dual-system estimate.

Note: A negative (positive) estimate of net coverage error indicates an undercount (overcount). A person can be included in multiple rows.

Source: U.S. Census Bureau, Decennial Statistical Studies Division, 2020 Post-Enumeration Survey (March 2022 Release) and 2010 Census Coverage Measurement Survey.

Table 6.

Net Coverage Error Rates for the Household Population in the United States by Tenure

(In percent)

Tenure	2020		2010		2000		1990	
	Estimate	Standard error	Estimate	Standard error	Estimate	Standard error	Estimate	Standard error
Total	-0.24	0.25	0.01	0.14	*0.49	0.20	*-1.61	0.20
Owner	*0.43	0.24	*0.57	0.12	*1.25	0.20	-0.04	0.21
Renter	*-1.48	0.53	*-1.09	0.30	*-1.14	0.36	*-4.51	0.43

* Denotes a (percent) net coverage error that is significantly different from zero.

Note: A negative (positive) estimate of net coverage error indicates an undercount (overcount).

Source: U.S. Census Bureau, Decennial Statistical Studies Division, 2020 Post-Enumeration Survey (March 2022 Release) and 2010 Census Coverage Measurement Survey.

Table 7 presents the components of census coverage by tenure.

Age and Sex Groups

Table 8 displays estimates of net coverage error for the 2020 Census by sex. Adult males and children

were estimated to have net undercounts, while adult females had a net overcount.

Table 9 shows the estimated components of census coverage by sex.

Table 7.

Components of Census Coverage for the Household Population in the United States by Tenure

Tenure	Correct enumerations		Erroneous enumerations				Whole-person census imputations		DSE ¹ correct		Omissions		Net coverage error	
	Percent	Standard error	Duplication		Other reasons		Percent	Standard error	Percent	Standard error	Percent	Standard error	Percent	Standard error
			Percent	Standard error	Percent	Standard error								
Total	94.4	Z	1.6	Z	0.6	Z	3.4	X	94.2	0.2	5.8	0.2	-0.24	0.25
Owner . . .	95.4	Z	1.3	Z	0.5	Z	2.8	X	95.8	0.2	4.2	0.2	*0.43	0.24
Renter . . .	92.6	0.1	2.2	0.1	0.9	0.1	4.4	X	91.2	0.5	8.8	0.5	*-1.48	0.53

* Denotes a (percent) net coverage error that is significantly different from zero.

X Not applicable.

Z Represents or rounds to zero.

¹ Dual-system estimate.

Note: A negative (positive) estimate of net coverage error indicates an undercount (overcount).

Source: U.S. Census Bureau, Decennial Statistical Studies Division, 2020 Post-Enumeration Survey (March 2022 Release) and 2010 Census Coverage Measurement Survey.

Table 8.

Net Coverage Error Rates for the Household Population in the United States by Sex

(In percent)

Sex	Estimate	Standard error
Total	-0.24	0.25
Children	*-0.84	0.38
Adult male	*-1.28	0.26
Adult female	*1.09	0.26

* Denotes a (percent) net coverage error that is significantly different from zero.

Note: A negative (positive) estimate of net coverage error indicates an undercount (overcount).

Source: U.S. Census Bureau, Decennial Statistical Studies Division, 2020 Post-Enumeration Survey (March 2022 Release) and 2010 Census Coverage Measurement Survey.

Table 9.

Components of Census Coverage for the Household Population in the United States by Sex

Sex	Correct enumerations		Erroneous enumerations				Whole-person census imputations		DSE ¹ correct		Omissions		Net coverage error	
	Percent	Standard error	Duplication		Other reasons		Percent	Standard error	Percent	Standard error	Percent	Standard error	Percent	Standard error
			Percent	Standard error	Percent	Standard error								
Total	94.4	Z	1.6	Z	0.6	Z	3.4	X	94.2	0.2	5.8	0.2	-0.24	0.25
Children	93.7	0.1	1.7	0.1	0.5	Z	4.1	X	92.9	0.3	7.1	0.3	*-0.84	0.38
Adult male	94.6	0.1	1.6	Z	0.7	Z	3.1	X	93.4	0.2	6.6	0.2	*-1.28	0.26
Adult female	94.7	0.1	1.5	Z	0.6	Z	3.2	X	95.7	0.3	4.3	0.3	*1.09	0.26

* Denotes a (percent) net coverage error that is significantly different from zero.

X Not applicable.

Z Represents or rounds to zero.

¹ Dual-system estimate.

Note: A negative (positive) estimate of net coverage error indicates an undercount (overcount).

Source: U.S. Census Bureau, Decennial Statistical Studies Division, 2020 Post-Enumeration Survey (March 2022 Release) and 2010 Census Coverage Measurement Survey.

Table 10 presents net coverage results by age and sex for recent post-enumeration surveys. Males aged 18 to 29 and males aged 30 to 49 were undercounted in each of these censuses. Similarly, both the aged 50 and over male and female populations saw overcounts in each census. Children aged 0 to 4 were undercounted in 2020 and 2010.

Table 11 displays estimates of net coverage error by age groups. Young children (aged 0 to 4) were undercounted while older children (ages 5 to 9 and 10 to 17) did not have statistically significant rates of net coverage error. People aged 0 to 17 (combined), 18 to 29, and 30 to 49 were undercounted, while the 50-and-over age group was overcounted.

Table 10.

Net Coverage Error Rates for the Household Population in the United States by Age and Sex

(In percent)

Age and sex	2020		2010		2000		1990	
	Estimate	Standard error	Estimate	Standard error	Estimate	Standard error	Estimate	Standard error
Total	-0.24	0.25	0.01	0.14	*0.49	0.20	*-1.61	0.20
0 to 17	*-0.84	0.38	0.33	0.22	N	N	*-3.18	0.29
0 to 9	*-1.40	0.49	-0.20	0.29	0.46	0.33	N	N
0 to 4	*-2.79	0.64	*-0.72	0.40	N	N	N	N
5 to 9	-0.10	0.56	0.33	0.31	N	N	N	N
10 to 17	-0.21	0.43	*0.97	0.29	*1.32	0.41	N	N
18-to-29 males	*-2.25	0.57	*-1.21	0.45	*-1.12	0.63	*-3.30	0.54
18-to-29 females	*-0.98	0.58	0.28	0.36	*1.39	0.52	*-2.83	0.47
30-to-49 males	*-3.05	0.35	*-3.57	0.20	*-2.01	0.25	*-1.89	0.32
30-to-49 females	0.10	0.36	*0.42	0.21	*0.60	0.25	*-0.88	0.25
50-and-over males	*0.55	0.25	*0.32	0.14	*0.80	0.27	*0.59	0.34
50-and-over females	*2.63	0.25	*2.35	0.14	*2.53	0.27	*1.24	0.29

* Denotes a (percent) net coverage error that is significantly different from zero.

N Not available.

Note: A negative (positive) estimate of net coverage error indicates an undercount (overcount).

Source: U.S. Census Bureau, Decennial Statistical Studies Division, 2020 Post-Enumeration Survey (March 2022 Release) and 2010 Census Coverage Measurement Survey.

Table 11.

Net Coverage Error Rates for the Household Population in the United States by Age Group

(In percent)

Age	Estimate	Standard error
Total	-0.24	0.25
0 to 17	*-0.84	0.38
0 to 9	*-1.40	0.49
0 to 4	*-2.79	0.64
5 to 9	-0.10	0.56
10 to 17	-0.21	0.43
18 to 29	*-1.62	0.57
30 to 49	*-1.47	0.35
50 and over	*1.65	0.25

* Denotes a (percent) net coverage error that is significantly different from zero.

Note: A negative (positive) estimate of net coverage error indicates an undercount (overcount).

Source: U.S. Census Bureau, Decennial Statistical Studies Division, 2020 Post-Enumeration Survey (March 2022 Release) and 2010 Census Coverage Measurement Survey.

The PES estimated the components of census coverage based on the nine age-sex groups shown in Table 12.

Table 13 presents the components of census coverage for 2020 by age group.

Table 12.

Components of Census Coverage for the Household Population in the United States by Age and Sex

Age and sex	Correct enumerations		Erroneous enumerations				Whole-person census imputations		DSE ¹ correct		Omissions		Net coverage error	
	Percent	Standard error	Duplication		Other reasons		Percent	Standard error	Percent	Standard error	Percent	Standard error	Percent	Standard error
			Percent	Standard error	Percent	Standard error								
Total	94.4	Z	1.6	Z	0.6	Z	3.4	X	94.2	0.2	5.8	0.2	-0.24	0.25
0 to 17	93.7	0.1	1.7	0.1	0.5	Z	4.1	X	92.9	0.3	7.1	0.3	*-0.84	0.38
0 to 9	93.6	0.1	1.7	0.1	0.5	Z	4.3	X	92.3	0.4	7.7	0.4	*-1.40	0.49
0 to 4	93.4	0.1	1.4	0.1	0.8	0.1	4.4	X	90.8	0.6	9.2	0.6	*-2.79	0.64
5 to 9	93.7	0.1	1.9	0.1	0.3	Z	4.2	X	93.6	0.5	6.4	0.5	-0.10	0.56
10 to 17	93.9	0.1	1.8	0.1	0.4	Z	3.9	X	93.7	0.4	6.3	0.4	-0.21	0.43
18-to-29 males	92.5	0.1	2.3	0.1	1.2	0.1	4.0	X	90.5	0.5	9.5	0.5	*-2.25	0.57
18-to-29 females	92.5	0.1	2.5	0.1	1.2	0.1	3.8	X	91.6	0.5	8.4	0.5	*-0.98	0.58
30-to-49 males	94.9	0.1	1.3	0.1	0.5	Z	3.3	X	92.0	0.3	8.0	0.3	*-3.05	0.35
30-to-49 females	95.3	0.1	1.2	Z	0.4	Z	3.1	X	95.4	0.3	4.6	0.3	0.10	0.36
50-and-over males	95.3	0.1	1.5	0.1	0.6	Z	2.6	X	95.8	0.2	4.2	0.2	*0.55	0.25
50-and-over females	95.1	0.1	1.4	0.1	0.6	0.1	2.9	X	97.6	0.2	2.4	0.2	*2.63	0.25

* Denotes a (percent) net coverage error that is significantly different from zero.

X Not applicable.

Z Represents or rounds to zero.

¹ Dual-system estimate.

Note: A negative (positive) estimate of net coverage error indicates an undercount (overcount).

Source: U.S. Census Bureau, Decennial Statistical Studies Division, 2020 Post-Enumeration Survey (March 2022 Release) and 2010 Census Coverage Measurement Survey.

Table 13.

Components of Census Coverage for the Household Population in the United States by Age

Age	Correct enumerations		Erroneous enumerations				Whole-person census imputations		DSE ¹ correct		Omissions		Net coverage error	
	Percent	Standard error	Duplication		Other reasons		Percent	Standard error	Percent	Standard error	Percent	Standard error	Percent	Standard error
			Percent	Standard error	Percent	Standard error								
Total	94.4	Z	1.6	Z	0.6	Z	3.4	X	94.2	0.2	5.8	0.2	-0.24	0.25
0 to 17	93.7	0.1	1.7	0.1	0.5	Z	4.1	X	92.9	0.3	7.1	0.3	*-0.84	0.38
0 to 9	93.6	0.1	1.7	0.1	0.5	Z	4.3	X	92.3	0.4	7.7	0.4	*-1.40	0.49
0 to 4	93.4	0.1	1.4	0.1	0.8	0.1	4.4	X	90.8	0.6	9.2	0.6	*-2.79	0.64
5 to 9	93.7	0.1	1.9	0.1	0.3	Z	4.2	X	93.6	0.5	6.4	0.5	-0.10	0.56
10 to 17	93.9	0.1	1.8	0.1	0.4	Z	3.9	X	93.7	0.4	6.3	0.4	-0.21	0.43
18 to 29	92.5	0.1	2.4	0.1	1.2	0.1	3.9	X	91.0	0.5	9.0	0.5	*-1.62	0.57
30 to 49	95.1	0.1	1.3	Z	0.4	Z	3.2	X	93.7	0.3	6.3	0.3	*-1.47	0.35
50 and over	95.2	0.1	1.4	Z	0.6	Z	2.8	X	96.7	0.2	3.3	0.2	*1.65	0.25

* Denotes a (percent) net coverage error that is significantly different from zero.

X Not applicable.

Z Represents or rounds to zero.

¹ Dual-system estimate.

Note: A negative (positive) estimate of net coverage error indicates an undercount (overcount).

Source: U.S. Census Bureau, Decennial Statistical Studies Division, 2020 Post-Enumeration Survey (March 2022 Release) and 2010 Census Coverage Measurement Survey.

Relationship to Householder

The householder is usually the primary owner or renter of a housing unit; otherwise, the householder is generally an adult living in the unit. The person designated as the householder is the “reference person” to whom the relationship of all other household members is recorded.

To calculate the DSE of the number of people with a given characteristic, we must be able to measure the characteristic consistently between the census and the PES. Although they both collect relationship to the householder, this characteristic is sometimes not consistently reported across the two enumerations, for several reasons.

First, relationship depends on who is designated as the reference person, which may vary between the census and the PES. Census and PES instructions ask respondents to list the householder first when rostering the household. However, respondents do not always follow these instructions. Further, the census

householder may no longer live in the PES household at the time of the PES interview.

Second, relationships can change over time as people move in or out. For example, an adult “child” may live with his or her parents on Census Day and be identified as a child in the census. If this child moves out of the household and into a PES sample block, the relationship recorded in the PES will depend on the situation in the new PES household and may well differ.

Because the relationship of an enumerated person may be recorded differently between the census and the PES, we did not calculate DSEs or net coverage error for this characteristic. However, the components of census coverage—correct enumerations, erroneous enumerations, and whole-person census imputations—are based only on the characteristic of the census enumeration, not the PES enumeration. Thus, we can estimate these components of census coverage. The results are shown in Table 14.

Table 14.

Components of Census Coverage for the Household Population in the United States by Relationship to Householder

Relationship to householder	Correct enumerations		Erroneous enumerations				Whole-person census imputations	
	Percent	Standard error	Duplication		Other reasons		Percent	Standard error
			Percent	Standard error	Percent	Standard error		
Total	94.4	Z	1.6	Z	0.6	Z	3.4	X
Householder	95.0	0.1	1.5	Z	0.5	Z	3.0	X
Spouse (same and opposite sex)	96.0	Z	0.9	Z	0.3	Z	2.8	X
Unmarried partner (same and opposite sex)	94.6	0.1	1.7	0.1	0.5	0.1	3.3	X
Biological and adopted child ..	93.3	0.1	1.8	0.1	0.8	Z	4.2	X
Grandchild.	92.4	0.2	2.6	0.2	0.7	0.1	4.2	X
All other relatives.	93.0	0.2	2.3	0.1	1.0	0.1	3.7	X
All other nonrelatives	92.5	0.2	2.7	0.2	1.5	0.2	3.4	X

X Not applicable.

Z Represents or rounds to zero.

Source: U.S. Census Bureau, Decennial Statistical Studies Division, 2020 Post-Enumeration Survey (March 2022 Release) and 2010 Census Coverage Measurement Survey.

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