



April 2024

2020 CENSUS

The Bureau Adapted Approaches for Addressing Unexpected Results and Developing Annual Population Estimates

Why GAO Did This Study

Each decennial census is a complex and costly undertaking. The 2020 Census occurred under extraordinary circumstances due to the COVID-19 pandemic. For example, the 2020 Census experienced delays that, in some cases, required the Bureau to revise data collection activities. GAO has previously reported on quality concerns that were prompted by late design changes to the 2020 Census.

GAO was asked to report on significant operational issues from the 2020 Census. This report describes (1) what the Bureau is doing to address unexpected 2020 Census results that were identified through reviews submitted by governmental units; and (2) how the Bureau changed its methodology for developing annual population estimates compared to prior decennial censuses.

GAO examined Bureau guidance for the 2010 and 2020 programs of unexpected census results, and Bureau methodology for developing annual population estimates. Bureau officials provided GAO a detailed explanation of 2020 reviews for several cases. GAO also interviewed Bureau officials and census stakeholders from the Federal-State Cooperative for Population Estimates and the National Academies of Sciences, Engineering, and Medicine.

GAO provided a draft of this report to the Department of Commerce for its review. The Bureau provided technical comments, which GAO incorporated, as appropriate.

View [GAO-24-106594](#). For more information, contact Yvonne D. Jones at 202-512-6806 or jonesy@gao.gov.

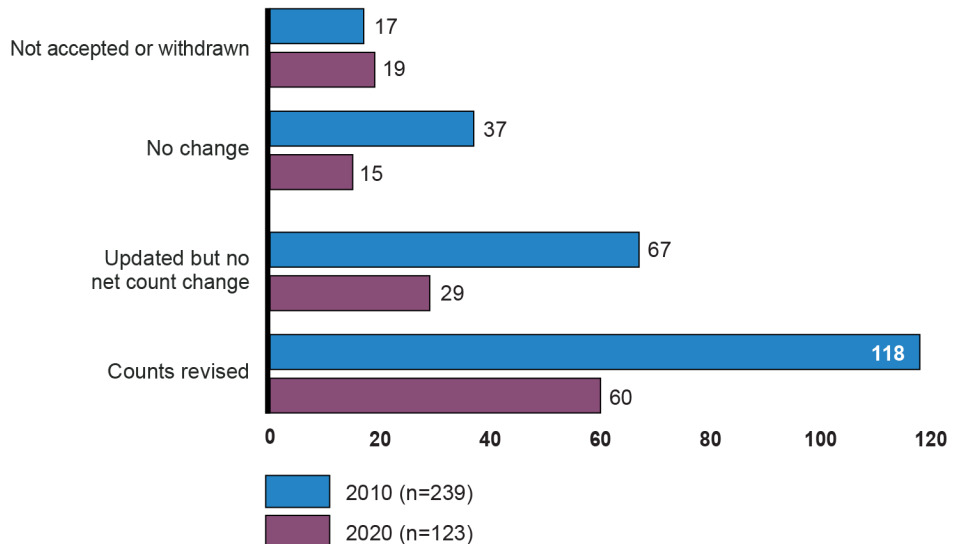
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What GAO Found

The Post-Census Group Quarters Review program was a one-time program created for the 2020 Census to address unexpected results in enumerating group quarters populations due to COVID-19. Group quarters are places where people live or stay in a group living arrangement, such as university housing. If a state, local, or tribal government (governmental unit) believed the population at a group quarter was not properly counted, it could submit a case to the Census Bureau. Of the 74 cases submitted, the Bureau approved requests, in whole or in part, for 54 cases. Since 1990, the Count Question Resolution program has allowed governmental units to challenge the location of housing units or whether a valid housing unit and its population was inadvertently excluded from the census. The figure below shows that the Bureau received 123 such cases related to the 2020 Census compared to 239 cases in 2010. Bureau officials partially attribute this decrease in case submissions to more accurate data collection using electronic software instead of paper. Of the 123 cases submitted, 104 were accepted for review, of which 29 resulted in the movement of housing units (e.g., house on wrong street), but there was no change to the population counts. Cases not accepted were determined by the Bureau to be out of scope of the program or incomplete.

2010 and 2020 Census Count Question Resolution Case Outcomes



Source: GAO analysis of U.S. Census Bureau documentation. | GAO-24-106594

Between decennial censuses, the Bureau develops annual population estimates, which are official measures of population and housing units. Following the 2020 Census, the Bureau modified its methodology for developing estimates, in part, because of challenges created by the pandemic. Historically, the base for the annual population estimate was the latest decennial census. The Bureau is now using a “blended” population base that, in addition to 2020 Census data, relies on other sources of data, such as demographic analysis. Census stakeholders GAO spoke to support this new methodology. Population changes found through the Post-Census Group Quarters Review and Count Question Resolution programs are also included in the annual population estimates.

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Abbreviations

BERT	Base Evaluation and Research Team
CQR	Count Question Resolution
FSCPE	Federal-State Cooperative for Population Estimates
NASEM	National Academies of Sciences, Engineering, and Medicine
PCGQR	Post-Census Group Quarters Review
PEP	Population Estimates Program
PES	Post-Enumeration Survey

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April 1, 2024

Congressional Requesters

The U.S. Census is mandated by the Constitution and provides vital data for the nation.¹ Accurate census data are essential in helping public and private-sector leaders make critical decisions, from redrawing congressional districts and apportioning seats in the House of Representatives, to allocating billions of dollars in federal assistance to state and local governments.

Each decennial census is a complex and costly undertaking. The 2020 Census occurred under extraordinary circumstances due to the COVID-19 pandemic.² The Census Bureau delayed and, in some cases, revised data collection activities for the 2020 Census as part of its initial COVID-19 response and to promote the safety of its workforce and the public.³ In December 2020, we identified data quality concerns prompted by late design changes to the 2020 Census, including whether such changes would affect historically undercounted population subgroups or whether the Bureau would have sufficient time to correct errors found in the data.⁴

The Bureau employs several programs—both during and after the census—to help ensure accurate counts. For example, we have previously reported on the reinterview quality assurance program of non-respondents. This program conducts a sample of reinterview cases to

¹U.S. Const., art. I, § 2, cl. 3.

²For prior reports, see GAO, *2020 Census: A More Complete Lessons Learned Process for Cost and Schedule Would Help the Next Decennial*, [GAO-23-105819](#) (Washington, D.C.: Mar. 2, 2023); *2020 Census: Bureau Released Apportionment and Redistricting Data, but Needs to Finalize Plans for Future Data Products*, [GAO-22-105324](#) (Washington, D.C.: Mar. 14, 2022); *2020 Census: The Bureau Concluded Field Work but Uncertainty about Data Quality, Accuracy, and Protection Remains*, [GAO-21-206R](#) (Washington, D.C.: Dec. 9, 2020); *2020 Census: Recent Decision to Compress Census Timeframes Poses Additional Risks to an Accurate Count*, [GAO-20-671R](#) (Washington, D.C.: Aug. 27, 2020); *2020 Census: COVID-19 Presents Delays and Risks to Census Count*, [GAO-20-551R](#) (Washington, D.C.: June 9, 2020); *2020 Census: Initial Enumeration Underway but Readiness for Upcoming Operations is Mixed*, [GAO-20-368R](#) (Washington, D.C.: Feb. 12, 2020); and *2020 Census: Status Update on Early Operations*, [GAO-20-111R](#) (Washington, D.C.: Oct. 31, 2019).

³Census Day for the 2020 Census was April 1, 2020. This date is the reference date for where (e.g., residence) and if (e.g., births and deaths) a person should be counted.

⁴GAO, *2020 Census: Census Bureau Needs to Assess Data Quality Concerns Stemming from Recent Design Changes*, [GAO-21-142](#) (Washington, D.C.: Dec. 3, 2020).

ensure that enumerators followed proper procedures and that results were not falsified during nonresponse follow-up (an operation during which enumerators personally visit households that do not respond to the census to count people living there).⁵

For the 2020 Census, beginning in 2022 and continuing through mid-2023, the Bureau used the Count Question Resolution (CQR) and Post-Census Group Quarters Review (PCGQR) programs to correct for unexpected census results. These programs enabled state, local, and tribal governments (governmental units) to formally challenge 2020 Census results with respect to (1) geographic boundaries, (2) counts of housing units and associated populations, and (3) group quarters populations.⁶ PCGQR was a new, one-time program created in response to challenges in enumerating group quarters populations during the 2020 Census due to the COVID-19 pandemic.

Additionally, mandated by federal law, the Bureau's Population Estimates Program (PEP) disseminates official measures of population and housing units between decennial censuses.⁷ These annual population estimates are used by state, local, and tribal governments to allocate federal funds, among other things.

You asked us to review significant operational issues from the 2020 Census, including census coverage of the population. In this report, we reviewed (1) what the Bureau is doing to address unexpected 2020 Census results that were identified through reviews submitted by governmental units, including how changes from unexpected 2020 Census results are used; and (2) how the Bureau changed its methodology for developing annual population estimates compared to prior decennial censuses.

To address our first objective, we reviewed Bureau guidance, processes, and related information for the 2020 CQR and PCGQR programs to identify eligibility criteria, scope, and how program results are used. We

⁵GAO, *Decennial Census: Bureau Should Assess Significant Data Collection Challenges as It Undertakes Planning for 2030*, [GAO-21-365](#) (Washington, D.C.: Mar. 22, 2021).

⁶Group quarters are places where people live or stay in a group living arrangement, and include college/university student housing, residential treatment centers, nursing/skilled-nursing facilities, group homes, military quarters, correctional facilities, and workers' group living quarters. These living facilities must have been available for occupancy on April 1, 2020.

⁷In general, the Bureau develops annual population estimates by adjusting the population base (as determined by the decennial census results) with yearly birth, death, and migration data.

reviewed Bureau data on the outcomes of challenge cases from 2020 and compared this to information from the 2010 CQR program. Additionally, to identify how the Bureau processed cases submitted by governmental units, Bureau officials provided us a step-by-step walk-through of the 2020 CQR and PCGQR operations, including reviewing the details and outcomes of several cases.

To address our second objective, we reviewed Bureau information on current processes and methodologies for PEP, including use of data sources, such as 2020 Census county-level population counts to develop annual population estimates. We reviewed and compared current PEP processes and methodologies to those from the prior decennial census.

For both objectives, we interviewed Bureau officials for procedures and processes, contextual factors contributing to methodology changes, and any resulting benefits or challenges. Additionally, we interviewed outside census stakeholders on their views of the Bureau's government challenges programs and PEP, and any changes or potential effects from these changes. Specifically, we met with members of the Federal-State Cooperative for Population Estimates (FSCPE) and representatives from the National Academies of Sciences, Engineering, and Medicine (NASEM).⁸ We met with both census stakeholders because they were knowledgeable about the CQR and PCGQR programs, as well as the annual population estimates methodology.

We conducted this performance audit from January 2023 to April 2024 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Background

Bureau Programs to Address Unexpected Census Results

The Bureau had two programs that allowed state, local, and tribal governments to request that the Bureau review unexpected 2020 Census results and make corrections when warranted.⁹ Corrections made to population counts because of these programs are incorporated into the

⁸Representatives from NASEM are the staff members of the Committee on National Statistics, and some are also members of its census-related activities, including the Panel to Evaluate the Quality of the 2020 Census.

⁹Throughout this report state, local, and tribal governments also include the territory of Puerto Rico.

Bureau’s annual population estimates, yielding higher-quality information for the tribal, state, or local areas throughout the decade. Corrected counts can also help the affected governments plan and apply for future funding. These programs do not change (1) the apportionment counts used to distribute the 435 seats in the U.S. House of Representatives among the states, (2) redistricting data which include the local area counts used to redraw legislative boundaries, or (3) any other 2020 Census data products.

The Count Question Resolution (CQR) program, created in 1990, allowed governmental units to challenge legal boundaries and geographic locations as of January 1, 2020, and the location or placement of housing and its associated population as determined by the 2020 Census as of April 1, 2020.

The Post-Census Group Quarters Review (PCGQR) program allowed governmental units to request a review of population counts in group quarters that they believe the Bureau did not correctly count as of April 1, 2020. Table 1 outlines the key characteristics of the CQR and PCGQR programs.

Table 1: Characteristics of Count Question Resolution and Post-Census Group Quarters Review Programs (2020)

	Count Question Resolution (CQR)	Post-Census Group Quarters Review (PCGQR)
Program Summary	Provided tribal, state, and local governmental units the opportunity to request that the Census Bureau review their boundaries and/or housing counts to identify errors that may have occurred while processing their 2020 Census counts. The program was created in 1990.	Provided tribal, state, and local governmental units the opportunity to request that the Census Bureau review 2020 Census population counts for group quarters facilities that were counted correctly as of April 1, 2020. The program was a new, one-time operation created to address challenges in counting populations in group quarters during the COVID-19 pandemic.
Case Submission Dates	1/3/2022 – 6/30/2023	6/6/2022 – 6/30/2023
Provides corrected official 2020 Census counts?	✓ Yes. If the Bureau finds an error, housing and corresponding population counts are corrected. The results are certified and distributed to all affected governmental units. Governments may use revised population counts for future programs that require official 2020 Census data (e.g., programs that allocate state or federal funding).	✗ No. The 2020 PCGQR program does not change 2020 Census counts due to statutory limitations of adding new data after the official 2020 Census results are released. ^a
Corrected population totals reflected in apportionment and redistricting data?	✗ No. Official apportionment and redistricting data were released in 2021, prior to the start of the CQR and PCGQR programs and were not revised. ^a	

Corrected population totals incorporated into Population Estimates Program?	✓ Yes. The Bureau’s Population Estimates Program produces and releases annual estimates of the nation’s population. Corrected counts will be included in the next annual population estimates base (as the population estimates production schedule allows).	
New data collected?	✗ No. CQR only corrects errors in processing information collected during the 2020 Census.	✓ Yes. PCGQR collected updated population counts and corresponding demographic characteristics for group quarters that were not counted during the 2020 Census.

Source: GAO analysis of U.S. Census Bureau documentation. | GAO-24-106594

^aAccording to Census officials, the Bureau is prohibited by statute from making these changes. Apportionment population counts, which are used to distribute the 435 seats in the U.S. House of Representatives among the states, were released on April 26, 2021. Redistricting data, which include the local area counts states needed to redraw legislative boundaries, were released on August 12, 2021.

Additionally, a governmental unit may request that the Bureau perform a “special census” of its population, housing units, group quarters and transitory locations. A government may request a special census if it believes the community’s population size or demographic composition changed considerably after the decennial census, for example because of annexation or new construction. The special census results can be used to update population estimates produced by the Bureau; however, the results cannot be used to review or recount decennial census results. Governmental units can use the results from a special census to request additional funding. A governmental unit that requests a special census reimburses the Bureau for all costs of the count.¹⁰

Population Estimates Program

Between decennial censuses, the Bureau’s Population Estimates Program (PEP) produces and releases annual estimates of the nation’s population and population characteristics.¹¹ Population characteristics include distribution by age, sex, race, and Hispanic origin for the nation, states, and counties. Additionally, the program produces estimates for national, state, and county-level housing units, and the total resident population for cities, towns, and other subcounty areas. These annual estimates are used in federal funding allocations and as indicators of recent demographic changes. These data also enable researchers,

¹⁰The special census is not included in the scope of this review because it is not a program designed to challenge the results of the 2020 Census. We have included the special census in the background of this report for informational purposes only.

¹¹Annual population estimates are authorized by 13 U.S.C. §181, which requires the production of “current data on total population and population characteristics.” The Bureau produces population estimates of the United States, its states, counties, cities, and towns, as well as for the Commonwealth of Puerto Rico. Additionally, the Bureau produces demographic components of population change (births, deaths, and migration) and housing unit estimates at the national, state, and county levels of geography.

community planners, and others to use the most current data in their work.

The Bureau refers to each estimate series as a “vintage.”¹² The Bureau’s latest full estimate series—Vintage 2022—covers April 1, 2020, through July 1, 2022. The Bureau releases the various estimates to its website on a rolling basis, generally from December with data such as national and state total population estimates to June with data such as county population estimates by age, sex, race, and Hispanic origin. For example, for Vintage 2022, the Bureau released those results from December 2022 through June 2023.

The Population Estimates Challenge Program allows governmental units to submit a letter and supporting evidence to challenge the PEP estimates. Similar to the CQR and PCGQR programs, governmental units may submit additional data to the Bureau for evaluation or identify a technical error that led to an inaccurate estimate. The Bureau resumed the challenge program in November 2022, following a temporary suspension to accommodate the conduct of the decennial census and related activities, as it typically does each census.

¹²According to the Bureau, the term “vintage” is used to refer to a specific version of estimates. The annual time series of estimates begins with the year of the most recent decennial census (e.g., 2020), and extends to the vintage year. When the Bureau produces a new vintage of data, it supersedes all previously produced vintage estimates. For example, Vintage 2021 estimates cover April 1, 2020, through July 1, 2021.

The Bureau Adjusted Its Approach When Addressing Unexpected 2020 Census Results

The Bureau Established a Program to Address Potential Undercounts of Group Quarters Populations

Post-Census Group Quarters Review Program

We have previously reported that Bureau field staff found it challenging during the 2020 Census to locate a point of contact at some group quarters from July 2020 to September 2020 because some facilities were closed due to the pandemic.¹³ Specifically, staff re-contacted group quarters facilities in December 2020 to obtain population counts for facilities that had zero population counts or had not been enumerated. However, at the end of the 2020 Census, some group quarters remained at a zero population count because the Bureau had not received a response from the facility.

State demographers and census stakeholders, such as FSCPE and representatives from NASEM were concerned about the accuracy of group quarters counts due to the challenges created by the pandemic. Members of FSCPE and representatives from NASEM told us that they encouraged the Bureau to create a program to allow governmental units to request a review of potential errors to population counts in group quarters. Bureau officials told us that the PCGQR was created in response to public feedback to improve the counts of group quarters following the pandemic.

Moreover, FSCPE officials told us that while they appreciated the Bureau's additional efforts to properly count persons living in group quarters, they would have liked to see better communication about this new program with state and local governments. When we spoke to Bureau officials about outreach to the public about the PCGQR, they told us that eligible government officials in the United States were sent

¹³[GAO-21-365](#).

information about how to request a review of population counts in group quarters through PCGQR. We reviewed an on-line video and several resources on its website detailing the purpose, criteria, and timeline for submitting a PCGQR case for review by the Bureau.

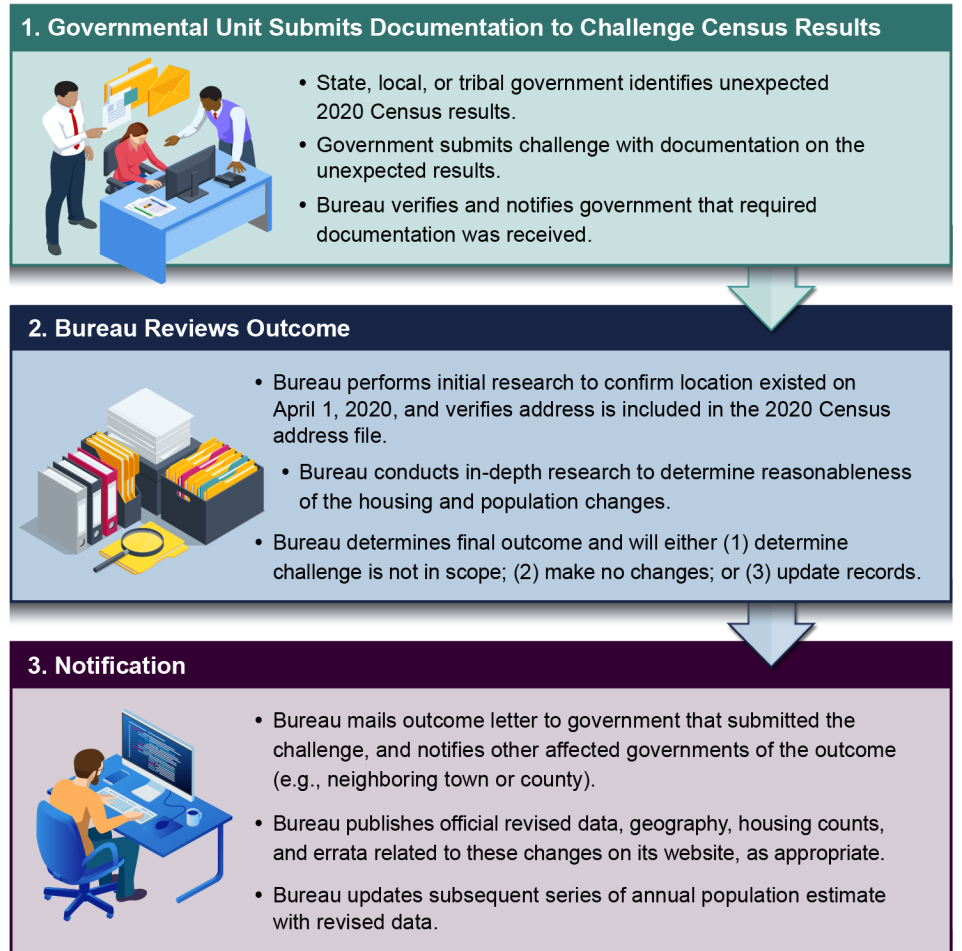
Count Question Resolution

Bureau officials identified certain administrative changes to the CQR program for 2020. In 2010, the Bureau accepted three types of CQR cases: (1) boundary corrections, when a jurisdictional boundary was listed in the wrong location; (2) geocoding, when living quarters and their populations were placed in the wrong location; and (3) coverage corrections, when an address and its population were incorrectly added or removed during data processing.

For the 2020 Census, the Bureau consolidated the geocoding and coverage case types into one type called housing count cases. The Bureau made this decision because governmental units are unlikely to know if the underlying cause for concern with their housing counts was due to errors in geocoding or coverage. For the 2020 Census, the Bureau continued to review boundary cases from governmental units, as it did in 2010. Additionally, Bureau officials stated that the overall process for managing incoming cases had not changed compared to 2010, other than that most governmental units submitted their information electronically rather than on paper.

Overall, the Bureau's steps for processing and managing the PCGQR and CQR challenge cases are the same. For example, both programs have an initial review process for all incoming cases and documentation, including a Bureau determination that the case is within the scope of the respective program requirements. In addition, the Bureau relies on quality reviews for both programs to ensure the final case determination is correct. In Figure 1, we present a high-level description of the process the Bureau used to address government challenges to the 2020 Census results.

Figure 1: Steps to Identify and Address Unexpected 2020 Census Results through Challenge Programs



Source: GAO analysis of U.S. Census Bureau documentation; Golden Sikora/stock.adobe.com. | GAO-24-106594

Note: “Government” also includes the territory of Puerto Rico.

For PCGQR cases, the Bureau officials stated that it generally takes about 90 days to complete processing, while CQR cases take between 90 to 180 days. CQR cases may take longer if the cases are complex or require research and input from other Bureau divisions. Officials also stated that after all cases have been resolved and governmental units have been notified of the outcome, the Bureau will release final reports on the 2020 CQR. However, PCGQR results are not released to the public

because the information is protected under Title 13, which requires the Bureau to protect the confidentiality of census data.¹⁴

For both CQR and PCGQR cases, when staff identify an error in population, the Bureau provides population changes, along with the sex, age, race, and Hispanic origin characteristics of any people added to the 2020 Census population in the Population Estimates Program (PEP). PEP staff then incorporate the changes into the next annual population estimate series, as determined by the series schedule.

FSCPE officials told us that the Bureau's new disclosure avoidance privacy framework can make it difficult for governmental units to challenge population counts in group quarters for PCGQR.¹⁵ They said this is difficult because governmental units are unable to see population counts in a specific group quarter. Bureau officials noted their new disclosure avoidance privacy framework protects the confidentiality of census data and that revised population counts from PCGQR cannot be released to the public.

Challenge Reviews Resulted in Some Corrections to Census Counts

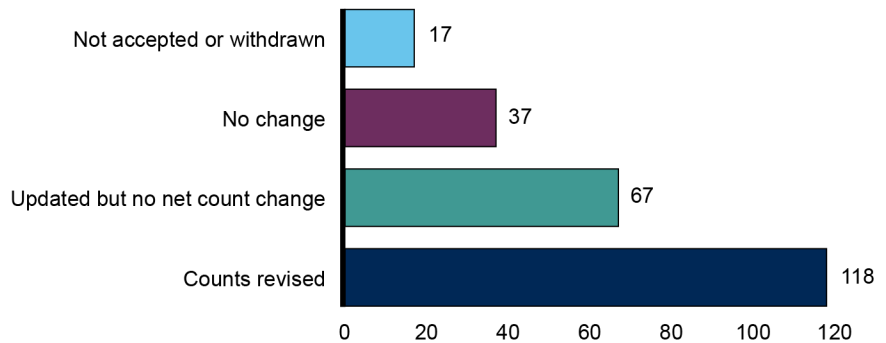
Overall, the Bureau's challenge programs to correct unexpected census results have led to slight population changes at the state and national level. For example, following the 2010 Census, the Bureau received 239 CQR cases. Of these, 118 cases resulted in a total population increase of 527 people and 224 additional housing units compared to the original 2010 Census results.¹⁶ Figure 2 shows all case outcomes for the 2010 CQR program.

¹⁴13 U.S.C. § 9(a).

¹⁵For the 2020 Census, the Bureau is using a different method of disclosure avoidance based on differential privacy because the agency found that prior disclosure avoidance methods were no longer adequate to protect the privacy of respondent data. According to the Bureau, using differential privacy means that publicly available data will include some statistical noise, or data inaccuracies, to protect the privacy of individuals.

¹⁶U.S. Census Bureau, *Notes and Errata: 2010 Census of Population and Housing* (Washington, D.C.: February 2014).

Figure 2: 2010 Count Question Resolution Case Outcomes



Source: GAO analysis of U.S. Census Bureau documentation. | GAO-24-106594

Note: N = 239 Count Question Resolution cases the Bureau received from June 1, 2011, to June 1, 2013. "Updated but no net count change" indicates, for example, an update to a housing unit's location within the same block, but no change in the population count. Cases the Bureau determined to be out of scope for the program were not accepted.

Bureau officials said that the results of its programs to correct unexpected census results may have a more noticeable effect at the local level. For example, if a rural prison population was undercounted and then corrected, it could result in a noticeable increase in a locality's total population. The increase can affect the funding the locality receives from the county or state if official census data are used to allocate funding.

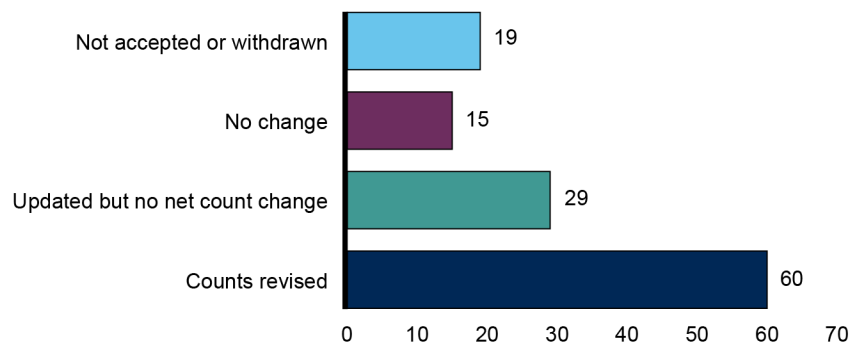
The Bureau received 123 CQR cases following the 2020 Census. This is about half the number of cases compared to the 2010 CQR operation. Bureau officials offered a few possible reasons for the decrease, including advances in mapping software to better locate housing unit and group quarter locations and electronic data collection during the 2020 Census.

Prior to the pandemic, the Bureau had developed innovations to census operations. For example, the Bureau moved from collecting data on paper to handheld devices and also offered the public the option to respond to the census using the internet. According to officials, these electronic modes of collecting data have built-in edit checks that—for example—prompt the user to fill in missing information. These checks, according to Bureau officials, improved data accuracy and completeness and likely reduced the number cases filed by governmental units in 2020 as compared to 2010.

Figure 3 shows all case outcomes for the 2020 CQR program.¹⁷ Of the 123 cases submitted, 104 were accepted and reviewed. Of those accepted, 15 resulted in no changes, 29 resulted in the movement of housing units (e.g., house on the wrong side of the street) but no change to population counts, and 60 resulted in revised housing and/or population counts for a single or multiple governmental unit(s). Cases submitted but not accepted were either withdrawn by the governmental unit, determined by the Bureau to be out of scope of the program, or the documentation submitted was incomplete.

On February 28, 2024, the Bureau released corrected 2020 Census population and housing unit counts based on CQR results. This information is available on the Bureau’s website by state. According to the website, in total 148 governmental units were affected by CQR results.¹⁸

Figure 3: 2020 Count Question Resolution Case Outcomes



Source: GAO analysis of U.S. Census Bureau documentation. | GAO-24-106594

Note: N = 123 Count Question Resolution cases the Bureau received from January 3, 2022, to June 30, 2023. “Updated but no net count change” indicates, for example, an update to a housing unit’s location within the same block, but no change in the population count. Cases the Bureau determined to be out of scope for the program were not accepted.

Additionally, the Bureau received 74 cases under the PCGQR program to review group quarters populations.¹⁹ According to Bureau documentation,

¹⁷According to Bureau officials, these data are still preliminary. Operational assessments (when released) will provide the official numbers. For a listing of operational assessments, see <https://www.census.gov/programs-surveys/decennial-census/decade/2020/planning-management/evaluate/eae.html>.

¹⁸See <https://www.census.gov/data/errata-notes/2020/dec/2020-decennial-census.html>.

¹⁹Note that one PCGQR case may contain a single or multiple types of group quarters, and numerous locations within a single category.

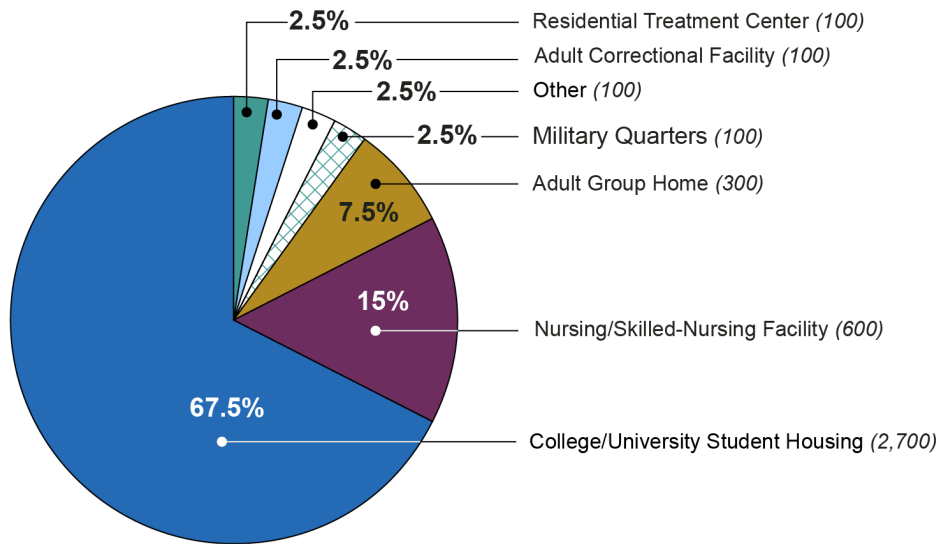
of the 74 cases submitted for review, 54 were approved.²⁰ Cases that were approved and resulted in population changes were then provided to PEP for inclusion in the next scheduled series of annual population estimates. The remaining 20 cases submitted for review were rejected for factors such as incomplete documentation submitted by governmental units, or the Bureau found no error in the 2020 Census group quarters population count after conducting its review.

As shown in figure 4, about 68 percent of the group quarters submitted to the Bureau for review were for college or university student housing. As we previously reported, enumerating college students during the 2020 Census was difficult due to the COVID-19 pandemic.²¹ During the 2020 Census, the Bureau worked with colleges remotely to collect data on residents living in college or university student housing.

²⁰According to Bureau documentation on its website, the confidentiality requirements of Title 13 prohibit the Bureau from disclosing which group quarters within a PCGQR case were in scope and accepted, including notification to the governmental unit that submitted the case. Because of this constraint, the Bureau has only notified each governmental unit about whether their respective cases were approved.

²¹[GAO-21-365](#).

Figure 4: 2020 Post-Census Group Quarters Submissions by Group Quarter Type



Source: GAO analysis of U.S. Census Bureau documentation. | GAO-24-106594

Note: Total N = 4,000 group quarters requiring review by the Bureau; a case submitted by a governmental unit may contain multiple group quarters (both in number and type of facility). The data in this table have been rounded as part of the Bureau's disclosure avoidance privacy framework.

Bureau officials stated that they plan to perform an operational assessment of the 2020 CQR and PCGQR programs after all cases are resolved in December 2023. The 2020 CQR assessment will include recommendations for implementing the CQR program following the 2030 Census. However, it is still unclear what information of the 2020 PCGQR assessment will be available to the public because the information resulting from PCGQR cases needs to be Title 13 protected. According to Bureau officials the assessments will provide additional data on the outcomes of the cases.

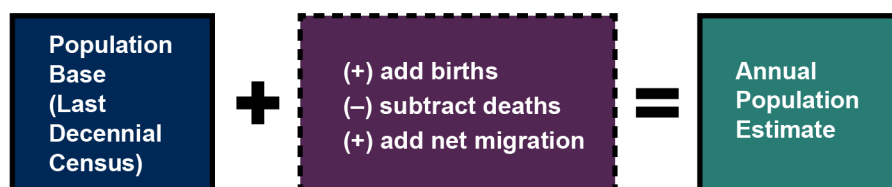
The Bureau Revised Its Methodology for Developing Annual Population Estimates to Improve Accuracy and Coverage

Following the 2020 Census, the Bureau encountered several challenges that hindered using 2020 Census results as the population base for

annual Vintage 2021 estimates.²² Those challenges included delays in availability of 2020 Census data for the PEP and a new disclosure avoidance privacy framework.

Typically, the Bureau develops its annual population estimates using a long-standing methodology that relies on the latest decennial census results as the population base or starting point. To develop the estimate, the Bureau then adds, or subtracts, current data on birth, death, and migration—components that affect the population base—to calculate the new annual population estimate. Figure 5 shows the key components of the Bureau’s typical methodology to develop annual population estimates prior to the 2020 Census.

Figure 5: Census Bureau’s Methodology to Develop Annual Population Estimates (2020 and Prior Years)



Source: GAO analysis of U.S. Census Bureau documentation. | GAO-24-106594

Note: The Bureau has used this general methodology to estimate annual population for the nation, states, and counties for 2020 and prior years. The Bureau uses a separate methodology to estimate populations below the county level.

Delays in Availability of 2020 Census Data

As previously discussed, the COVID-19 pandemic delayed census operations as well as the release of census data. Historically, the PEP relied on using complete decennial census data with full demographic detail. One of the effects of the pandemic was that these data were not available in time to develop the population base estimate for Vintage 2021.

In addition, one of the steps the Bureau undertakes prior to using any data sources (e.g., births, deaths, migration, etc.) for annual population estimates is to evaluate the data for suitability. However, the delays and uncertainty resulting from the pandemic resulted in the Bureau’s inability to apply this practice to the 2020 Census data.

New Disclosure Avoidance Privacy Framework

New disclosure avoidance privacy framework also affected the Bureau’s ability to use the 2020 Census data as the primary source for future 2021 Vintage estimates. According to Bureau officials, prior to the 2020

²²To develop the Vintage 2020 estimates, the Bureau used the results of the 2010 Census as the population base, since the 2020 Census was still underway.

Census, the Bureau adopted a modernized disclosure avoidance privacy framework for its publicly released statistical products for the 2020 Census. As a result of this change, certain variables in the census data that had previously been available for processing annual population estimates were no longer available such as the identification variable that associates census records with a specific address.

Census Bureau Modified Population Estimates by Developing a “Blended” Population Base

According to Bureau officials, the Bureau modified its previous population estimates methodology to account for the challenges described above. Officials reported that to ensure the Bureau could meet the deadline for publishing the estimates and still meet its own data quality standards, staff needed to develop a new “blended” population base without relying exclusively on decennial census data.

Beginning in July 2020, Bureau officials proposed using the “blended” population base rather than data only from the decennial census. After receiving management approval, PEP staff began research on the base. When PEP staff completed their research, the blended base was fully tested and evaluated through the PEP change control processes which ensure that the data meet all Bureau quality standards. In September 2021, management approved the implementation and use of the blended population base.

The “blended” population base used three data sources to develop its Vintage 2021 annual population estimate. Those three sources are:

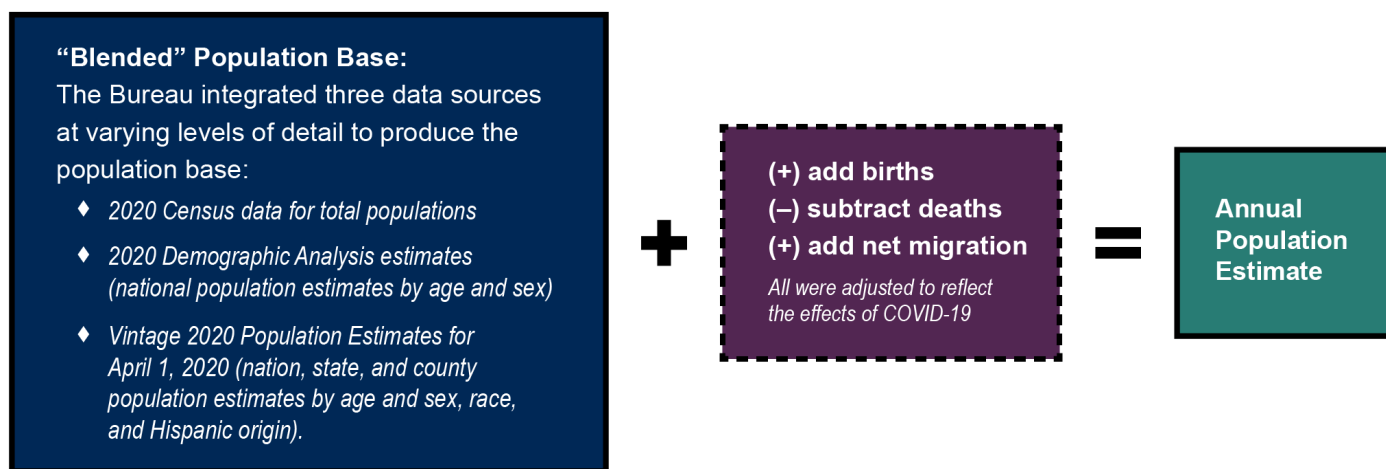
- **2020 Census Total Population Counts:** National, state, and county total population counts.
- **2020 Demographic Analysis Estimates:** National population estimates by age and sex.²³
- **Vintage 2020 Population Estimates:** 2010 Census population base as of April 1, 2020. The Bureau relied on these data to fill in the remaining detail, including race and Hispanic origin at all levels of geography and age and sex distributions at the state and county levels.

In addition to the development of a new blended base, the Bureau also adjusted the birth, death, and migration inputs to better account for the

²³Demographic analysis is a method the Bureau uses to evaluate the quality of the census. The 2020 demographic analysis estimates of the national population by age, sex, race, and Hispanic origin on April 1, 2020, were developed from current and historical vital records, estimates of international migration, and Medicare records. Demographic analysis estimates are independent of the 2020 Census.

effects of COVID-19. These adjustments included accounting for delays in migration data inputs and making use of more recent vital statistics to capture trends in births and deaths. Figure 6 summarizes the new annual population estimate methodology.

Figure 6: Census Bureau’s “Blended” Population Base Methodology to Develop Annual Population Estimates (Vintage 2021)



Source: GAO analysis of U.S. Census Bureau documentation. | GAO-24-106594

The Bureau first used the blended population base to develop the Vintage 2021 series of estimates, based on availability of the data from the sources described in figure 6. Bureau officials reported that the blended base methodology has resulted in a more demographically reasonable national age structure in the annual population estimates compared to the 2020 Census. They explained that the blended base methodology is more accurate for “age reported” because it more often captures the date of birth and not just the age. When an age was reported in the 2020 Census without the date of birth (which can be a common occurrence when a proxy, such as a neighbor, is reporting), census reports revealed higher values for ages ending in 0 or 5 than would be expected to occur naturally.²⁴ Bureau officials noted that the components of the blended base will be reviewed and adjusted for each subsequent annual population estimate, as appropriate. Subsequent annual vintage

²⁴Referred to as “age heaping,” this occurs when population counts for ages ending in preferred digits such as 0 and 5 (e.g., 20, 25, 30) are higher than would be expected based on known birth, death, and migration patterns. This pattern often appears because of proxy interviews during the decennial census, rounding or guessing age, and reporting an age as opposed to a birth date.

Census Stakeholders Support
Census Use of “Blended”
Population Base

estimates will reevaluate and update adjustments reported in the birth, death, and migration inputs.

Overall, representatives we interviewed from the Federal-State Cooperative for Population Estimates (FSCPE) and the National Academies of Sciences, Engineering, and Medicine (NASEM) supported the Bureau’s new blended base methodology. For example, FSCPE representatives reported that they provided input to the Bureau on the methodology during the development process. They said that, overall, the blended population base was a better methodology for including historically undercounted populations in the annual population estimates.

Representatives from NASEM also credited the Bureau’s use of the demographic analysis for national estimates of age and sex as an innovative solution that would likely result in better estimates for certain population subsets. NASEM representatives noted that the new methodology would likely improve estimates for historically undercounted populations, such as young children.

The Bureau Convened a
Team to Research
Improvements to the
Blended Population Base

To monitor and improve the blended population base methodology, in March 2022 the Bureau convened the Base Evaluation and Research Team (BERT). This team includes subject matter experts in population estimates, census coverage measurement, age and sex statistics, race and ethnicity, and demography. According to Bureau officials, BERT’s research will help inform decisions about what 2020 Census data the Bureau will use in the blended population base for future annual population estimates. Specifically, researchers are determining which adjustments to the population base data would result in methodologically sound and reasonable annual population estimates.

Since BERT is a multi-year effort, Bureau officials reported that recommendations from the team are provided on a rolling basis as research progresses. Prior to the start of each new vintage, the Bureau, via a public webinar, provides a methodology update, summary of recommendations, and any associated effects on the blended population base from the research conducted by BERT.

For example, during a December 2023 webinar, Bureau officials highlighted an approved recommendation to include the use of the Hispanic origin resident population totals from the 2020 Census for the blended population base.²⁵ Also, at the December 2023 webinar, BERT

²⁵See <https://www.census.gov/data/academy/webinars/2023/methodology-updates-for-the-vintage-2023-estimates.html>.

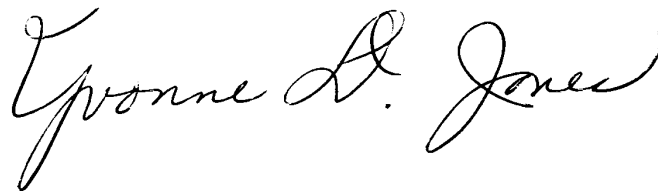
officials discussed a recommendation regarding the use of the 2020 post-enumeration survey (PES) coverage results for the Vintage 2023 annual population estimate. The PES is an independent sample of the population used to estimate how many people were missed (undercounted) and how many people were erroneously counted (overcounted (i.e., counted more than once), such as students counted at college and at their respective home address). However, BERT recommended that the Bureau not use the 2020 PES results to adjust the blended population base. According to the Bureau's website, while the PES is helpful in identifying coverage issues at the national level, it is not able to identify coverage issues as accurately at the lower levels of geography.

Agency Comments

We provided a draft of this report to the Department of Commerce for review and comment. In a letter, reproduced in appendix I, the Bureau noted that it had provided comments on the draft report. Those technical comments were incorporated, as appropriate.

We are sending copies of this report to the Secretary of Commerce, the Director of the U.S. Census Bureau, and the appropriate congressional committees. In addition, the report is available at no charge on the GAO website at <http://www.gao.gov>.

If you or your staff have any questions about this report, please contact Yvonne D. Jones at (202) 512-6806 or by email at jonesy@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made key contributions to this report are listed in appendix II.



Yvonne D. Jones
Director, Strategic Issues

List of Requesters

The Honorable Gary C. Peters
Chairman
Committee on Homeland Security and Governmental Affairs
United States Senate

The Honorable Ron Johnson
Ranking Member
Permanent Subcommittee on Investigations
Committee on Homeland Security and Governmental Affairs
United States Senate

The Honorable James Comer
Chairman
The Honorable Jamie B. Raskin
Ranking Member
Committee on Oversight and Accountability
House of Representatives

The Honorable Gerald E. Connolly
Ranking Member
Subcommittee on Cybersecurity, Information Technology, and
Government Innovation
Committee on Oversight and Accountability
House of Representatives

The Honorable Judy Chu
House of Representatives

The Honorable Steven Horsford
House of Representatives

The Honorable Jim Jordan
House of Representatives

The Honorable Chip Roy
House of Representatives

The Honorable Raul Ruiz, M.D.
House of Representatives

Appendix I: Comments from the Census Bureau



UNITED STATES DEPARTMENT OF COMMERCE
U.S. Census Bureau
Office of the Director
Washington, DC 20233-0001

March 18, 2024

Ms. Yvonne D. Jones
Director, Strategic Issues
U.S. Government Accountability Office
441 G Street, NW Washington, DC 20548

Dear Ms. Jones:

The U.S. Census Bureau appreciates the opportunity to comment on the U.S. Government Accountability Office (GAO) draft report entitled, *"2020 Census: The Bureau Adapted Approaches for Addressing Unexpected Results and Developing Annual Population Estimates"* (GAO-24-106594).

Thank you for your continued interest in and efforts towards increasing the benefits from the 2020 Census and improving future census planning for 2030.

Sincerely,

A handwritten signature in cursive script that reads "Robert L. Santos".

Robert L. Santos
Director, U.S. Census Bureau

[census.gov](https://www.census.gov)



Appendix II: GAO Contact and Acknowledgments

GAO Contact:

Yvonne D. Jones, (202) 512-6806 or jonesy@gao.gov

Staff**Acknowledgments:**

In addition to the contact named above, Lisa Pearson, Assistant Director; Heather A. Collins, Analyst-in-Charge; Mark Abraham; Michael Bechetti; Virginia Chanley, Jacqueline Chapin; Joseph Fread; Emily Gruenwald; Abinash Mohanty; Alan Rozzi; Joseph Santiago; Tyler Spunaugle; Peter Verchinski; and Timothy Wexler made significant contributions to this report.

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Chuck Young, Managing Director, youngc1@gao.gov, (202) 512-4800
U.S. Government Accountability Office, 441 G Street NW, Room 7149
Washington, DC 20548

Strategic Planning and External Liaison

Stephen J. Sanford, Managing Director, spel@gao.gov, (202) 512-4707
U.S. Government Accountability Office, 441 G Street NW, Room 7814,
Washington, DC 20548

