



# 2020 CENSUS

## Changes Planned to Improve Data Quality

Accessible Version

December 2019

# GAO Highlights

Highlights of [GAO-20-282](#), a report to congressional requesters

## Why GAO Did This Study

The decennial census produces data vital to the nation. The data are used for congressional apportionment and redistricting; to allocate billions each year in federal funds; and to provide a social, demographic, and economic profile of the nation to guide policy decisions at all levels of government.

Given census data's importance, it is incumbent upon the Bureau to ensure their quality. If people are counted in the wrong place, some states and localities may unduly lose or gain political power through apportionment and redistricting disproportionate to their actual population. Poor outcomes can also result if some households are over counted due to multiple responses, not counted due to missing responses, or miscounted due to incomplete or conflicting responses.

GAO was asked to describe the Bureau's plans for the 2020 Census to resolve multiple, missing, incomplete, and conflicting responses. This report describes how, for 2020, the Bureau plans to (1) determine where to count people, including those in complex living situations, and how this differs from 2010; and (2) resolve multiple, missing, incomplete, and conflicting responses after data collection, and how this differs from 2010. GAO reviewed relevant Bureau documents and interviewed officials responsible for the 2020 Census.

GAO provided a draft of this report to the Bureau. The Bureau provided technical comments, which were incorporated as appropriate.

View [GAO-20-282](#). For more information, contact Robert Goldenkoff at (202) 512-2757 or [goldenkoff@gao.gov](mailto:goldenkoff@gao.gov).

December 2019

## 2020 CENSUS

### Changes Planned to Improve Data Quality

## What GAO Found

To determine where people should be counted during each decennial census, the Census Bureau (Bureau) has established residence criteria (see figure). For most people, applying these criteria is straightforward. For others who may be more mobile, like members of the military, college students, migrant farm workers, and people living in group quarters such as federal detention centers or in-patient hospice facilities, it can be more complicated. Therefore, for each decennial the Bureau issues guidance describing how the criteria should be applied to certain complex living situations. For the 2020 Census, the Bureau has updated its guidance on where to count people in six complex living situations, such as U.S. employees deployed overseas. The Bureau plans to count people in other living situations in the same manner as it did in 2010. As in 2010, the Bureau will count prisoners at the correctional facility where they are housed, but also plans to make other resources available to states that want to use prisoners' in-state, pre-incarceration addresses for redistricting purposes instead of their prison addresses.

### Bureau Residence Criteria

1. Count people at their usual residence, which is the place where they live and sleep most of the time.
2. People in certain types of group facilities on Census Day are counted at the group facility.
3. People who do not have a usual residence, or who cannot determine a usual residence, are counted where they are on Census Day.

Source: U.S. Census Bureau documentation for 2020 Census. | [GAO-20-282](#)

To resolve multiple responses for a single address, for 2020 the Bureau plans to use a longstanding automated routine—its Primary Selection Algorithm—to determine who to count at the address. For 2020, Bureau documents indicate it updated the algorithm after reviewing various response scenarios and data from past censuses and tests.

To resolve missing household responses following data collection, as it did in 2010, the Bureau plans to use for 2020 a technique it refers to as count imputation, which draws data from similar nearby households to determine whether a housing unit exists, whether it is occupied, and, if so, by how many people. However, for 2020, the Bureau will also try to reduce the number of households which otherwise would have required count imputation and help reduce follow-up field work by drawing on relevant data from administrative records of sufficient quality in conjunction with its non-response follow-up field work.

To resolve incomplete and conflicting information within a household response, the Bureau plans to use a technique it refers to as edit and characteristic imputation. This technique involves drawing data from the same household response, prior census and other administrative records or similar nearby households, which the Bureau believes will improve data quality and produce more accurate results.

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December 20, 2019

The Honorable Gary Peters  
Ranking Member  
Committee on Homeland Security and Governmental Affairs  
United States Senate  
The Honorable Brian Schatz  
United States Senate

The decennial census is constitutionally mandated and produces data vital to the nation.<sup>1</sup> The data are used to apportion the seats of the U.S. House of Representatives; realign the boundaries of the legislative districts of each state; allocate hundreds of billions of dollars each year in federal financial assistance; and provide a social, demographic, and economic profile of the nation’s people to guide policy decisions at each level of government. Furthermore, businesses, nonprofit organizations, universities, and others regularly rely on census data to support their work.

Given the importance of census data to the nation, it is incumbent upon the Census Bureau (Bureau) to count people once, only once, and in the right place. For example, if people are counted in the wrong place—that is, away from where they live and sleep most of the time—some states and localities may unduly lose or gain political power through apportionment and redistricting that inaccurately reflects their proportion of the population. Similarly, they may unduly lose or gain key benefits through improperly distributed federal funds or poorly informed policies. Inappropriate outcomes can also result if some household residents are counted more than once due to multiple census responses for the same address or if they are not counted at all due to missing responses. Further data quality issues may arise if answers within a household response are left incomplete or conflict with one another, resulting in missing or erroneous characteristics—such as age, sex, race, and ethnicity—which are key to informing public policy and other decisions of importance to our nation.

Leading up to each decennial census, the Bureau determines how it will ensure that people are counted in the right place and that multiple,

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<sup>1</sup>U.S. Const., art. I, § 2, cl. 3.

missing, incomplete, and conflicting responses are resolved. These determinations are informed in part by the Bureau's review of how well this was done during the prior decennial, societal changes during the intervening years that merit an updated approach, and internal and external stakeholder input regarding needed changes.

You asked us to describe the Bureau's plans for the 2020 Census to resolve multiple, missing, incomplete, and conflicting responses. This report describes how, for the 2020 Census, the Bureau (1) plans to determine where to count people, including those in complex living situations, and how these plans differ from those for the 2010 Census; and (2) plans to resolve multiple, missing, incomplete, and conflicting responses following data collection and how these plans differ from those for the 2010 Census.

To address our objectives, we reviewed Bureau planning, operational, evaluation, and assessment documents related to the Bureau's efforts to enumerate the population for the 2020 Census and prior decennials. We also interviewed Bureau officials responsible for planning and executing the 2020 Census and with experience in prior decennials about planned changes from the 2010 Census.

To describe the Bureau's plans for determining where to count people for the 2020 Census, we reviewed Bureau documentation and *Federal Register* publications related to 2020 Census residence criteria and residence situations. We also reviewed Bureau evaluations and assessments of the 2010 Census which identified concerns related to counting certain populations. We interviewed Bureau officials responsible for developing and overseeing the implementation of 2020 Census residence criteria and residence situations. To understand changes from 2010, we compared the 2010 Census residence criteria and residence situations to the 2020 Census residence criteria and residence situations and interviewed Bureau officials to discuss their rationale for these changes.

To describe the Bureau's plans for resolving multiple, missing, incomplete, and conflicting responses following data collection for the 2020 Census, we reviewed and summarized Bureau documentation of how data are processed after they are collected, including program management briefings and memorandums, internal process flow diagrams, internal and external presentations related to post processing, and documents describing relevant system coding for data processing. We also interviewed Bureau officials responsible for developing,

administering, and overseeing the internal processing of response data following collection. To understand changes from 2010, we compared the 2010 Census internal processes to those planned for 2020 and we interviewed Bureau officials to discuss the rationale for these changes.

We conducted this performance audit from June to December 2019 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.

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## Background

The Bureau is charged with counting every person in the decennial census once, only once, and in the right place. To ensure fairness and consistency in where people are counted, for the first decennial in 1790, Congress established the concept of counting people where they usually reside. The Bureau has relied on that concept ever since.

Building on the concept of usual residence, the Bureau subsequently established criteria, which it refers to as residence criteria, to determine where people should be counted during each decennial (see text box).

### Residence criteria

1. Count people at their usual residence, which is the place where they live and sleep most of the time.
2. People in certain types of group facilities on Census Day are counted at the group facility.
3. People who do not have a usual residence, or who cannot determine a usual residence, are counted where they are on Census Day.

Source: U.S. Census Bureau documentation for 2020 Census. | GAO-20-282

For most people, applying the concept of usual residence and the Bureau's associated residence criteria is straightforward. For others who may be more mobile, like members of the military, college students, migrant farm workers, and people living in group quarters, determining where to count them can be more complicated. Therefore, for each decennial the Bureau issues guidance describing how the criteria should be applied to certain complex living situations for which people commonly request clarification. The guidance is intended to inform the public about

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how to respond and to assist enumerators and other Bureau staff in administering a proper count.<sup>2</sup>

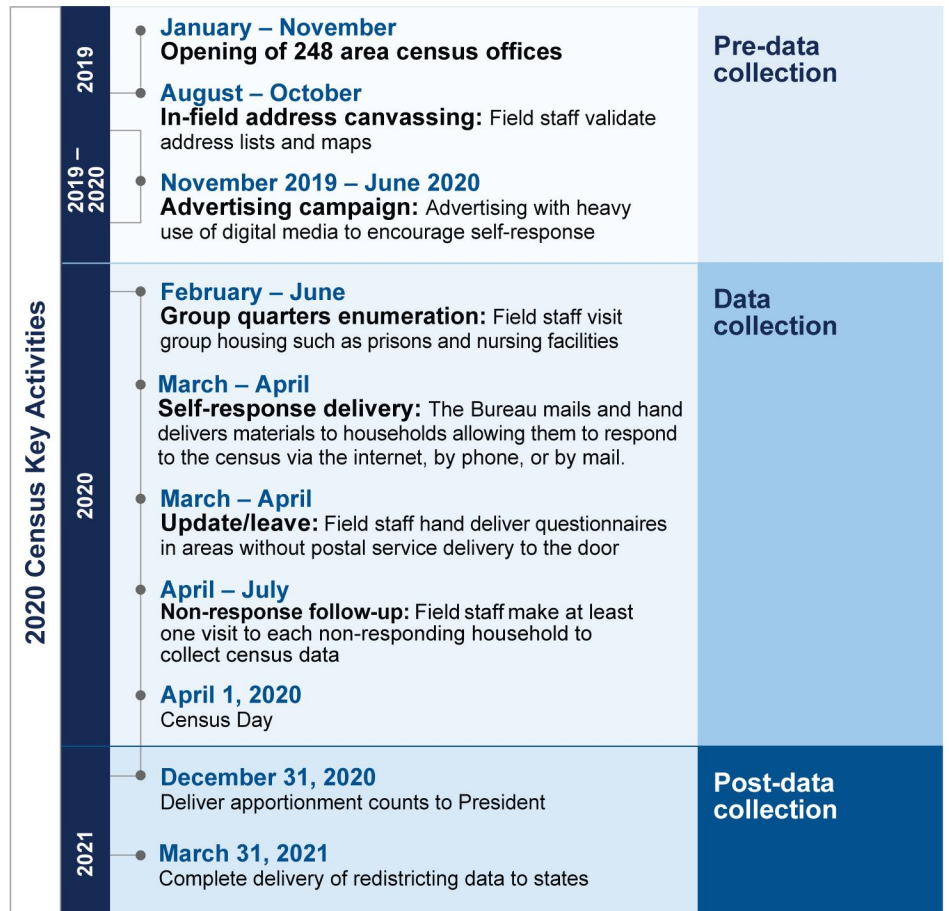
In addition to counting the nation's population accurately, the Bureau must complete the count and tabulate it against a backdrop of immutable deadlines. The Bureau is required by law to count the population as of April 1, 2020 (Census Day); deliver state apportionment counts to the President by December 31, 2020; and provide redistricting data to the states by April 1, 2021. To meet these deadlines and ensure an accurate count, the Bureau carries out thousands of interrelated activities before, during, and after data collection (see figure 1 for a timeline of selected key activities).

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<sup>2</sup>Enumerators are Bureau employees throughout the country who travel door to door to try to obtain census data from individuals who do not respond through other means (such as by mail, telephone, or the internet).



**Figure 1: Timeline of Key Census Activities**



Source: GAO analysis of U.S. Census Bureau documentation. | GAO-20-282

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## The Bureau Has Refined its Residence Guidance to Help Ensure More People Are Counted in the Right Place

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### The Bureau Has Updated Its Guidance on Where to Count People in Six Complex Living Situations

The Bureau plans to use its concept of usual residence and its associated residence criteria to determine where to count people in the 2020 Census generally as it did in 2010, but in 2018 the Bureau updated its guidance on how to apply that concept to count people in six complex living situations (see figure 2 for an overview of these changes). In developing the guidance for 2020, the Bureau sought input from external stakeholders on needed changes and solicited public comments on the draft guidance through the *Federal Register*.<sup>3</sup> In response, the Bureau received input and comments from a variety of entities including federal, state, local, and tribal governments, as well as civil rights and other advocacy organizations.

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<sup>3</sup>See, 80 Fed. Reg. 28950 (May 20, 2015); 81 Fed. Reg. 42577 (June 30, 2016); 83 Fed. Reg. 5525 (Feb. 8, 2018).

**Figure 2: The Bureau Plans to Count People in Six Complex Living Situations Differently in 2020 Than It Did in 2010**

Living situation	Where counted		Basis for change
	2010	2020	
 <p>Military and civilian employees of the U.S. deployed overseas who are U.S. citizens.</p>	Counted in state of home address of record for apportionment.	Counted at usual U.S. home address for apportionment and redistricting.	Bureau research on personnel data and consultation with stakeholders found that those on temporary assignments most often return to the same stateside home.
 <p>Military and civilian employees of the U.S. deployed overseas who are legal U.S. residents but not citizens.</p>	Not counted.		
 <p>Military and civilian employees of the U.S. assigned or stationed overseas who are legal U.S. residents but not citizens and any of their dependents living with them.</p>	Not counted.	Counted in state of home address of record for apportionment.	Bureau sought to treat all U.S. residents who are employees of the U.S. working overseas more consistently.
 <p>Crews of U.S. maritime and merchant vessels sailing between a U.S. and a foreign port.</p>	Not counted.	Counted at onshore home address or, if none, at U.S. port.	Bureau 2010 assessment and consultation with U.S. Maritime Administration found these crew members should be counted similarly to those that sail from one U.S. port to another.
 <p>Juveniles in noncorrectional residential treatment centers.</p>	Counted at facility location.	Counted at usual home address or, if none, at facility.	Bureau research indicated that most juveniles return to their usual home address when leaving treatment.
 <p>Religious group quarters residents.</p>	Counted at usual home address or, if none, at facility.	Counted at facility.	Bureau research indicated that most residents are long-term and do not have a separate address of record.

Source: GAO analysis of U.S. Census Bureau documentation. | GAO-20-282

**Military and civilian employees of the United States deployed overseas.** In 2010, overseas military and civilian employees of the United States who were U.S. citizens were counted at their home state of record for apportionment purposes only. For 2020, the Bureau decided to count these personnel differently depending on whether their permanent duty station was in the United States. Personnel assigned or stationed overseas will continue to be counted as they were in 2010. Personnel stationed in the United States while deployed overseas, however, will instead be counted at their usual home address in the United States for both apportionment and redistricting purposes. According to Bureau documentation, this change resulted from Bureau analysis of data from the Department of Defense which found that personnel deployed overseas were there for shorter periods and were likely to return to their

prior usual place of residence, whereas personnel assigned or stationed overseas generally remained overseas for greater periods and often did not return to their prior stateside location.

**Military and civilian employees of the United States deployed, stationed, or assigned overseas who are legal U.S. residents but not citizens.** For 2020, the Bureau plans to count this population the same way it counts U.S. citizens working for the federal government overseas, as described above. According to a Bureau assessment of how it counted personnel overseas in 2010, its guidance for federal agencies that provide the Bureau with data on overseas personnel was unclear on the treatment of non-citizens. According to Bureau officials, it is therefore likely that other federal agencies following that guidance generally excluded non-citizens from the 2010 count. Based on the Bureau's assessment, the Bureau plans to make clear in its 2020 guidance that U.S.-resident non-citizens working for the federal government overseas are to be counted the same way as U.S. citizens. Bureau officials stated that this change should ensure that U.S.-resident non-citizens are counted more consistently with other U.S. residents.

**Crews of U.S. maritime and merchant vessels sailing between a U.S. and a foreign port.** In 2010, if a U.S. maritime or merchant vessel was sailing between a U.S. and a foreign port on Census Day, then the crewmembers were not counted. For 2020, the Bureau plans to count these crewmembers at their onshore usual residence in the United States or, if they have none, then at the vessel's U.S. port of departure or arrival. This matches how the Bureau counts crewmembers if their vessel is at a U.S. port or sailing between two U.S. ports. According to Bureau documentation, this change resulted from Bureau analysis and consultation with stakeholders (including the Maritime Administration) which found that crewmembers in each of these situations usually retain an onshore residence in the United States where they live and sleep most of the time so they should be counted in the same way.

**Juveniles in non-correctional residential treatment centers.** For 2020, the Bureau plans to count this population at the U.S. residence where they live and sleep most of the time or, if they have no usual home address, then at the facility. In 2010, they were counted at the facility. The Bureau made this change after concluding that these juveniles typically only stay at residential treatment center facilities temporarily and generally have a usual home elsewhere to which they return after treatment is completed.

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**Religious group quarters residents.** For the 2020 Census, the Bureau will count this population at the religious group quarters facility. In 2010, this population was counted at their usual home address or, if they had no usual home address, then at the facility. The Bureau made this change after concluding that this population typically does not have a place of usual residence elsewhere.

According to Bureau officials, the Bureau expects the updated guidance will provide greater clarity and result in more informed responses and, thus, higher quality data. Among other things, Bureau officials stated that the data will more accurately reflect the composition of local communities.

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### The Bureau Will Continue to Count People in Other Living Situations as It Did in 2010

For the 2020 Census, the Bureau did not change its guidance regarding where to count people in other complex living situations. For example, the Bureau did not make changes to where it will count college students, who will continue to be counted at their parents' or guardians' home if they live and sleep there most of the time or, if they live away from their parents' or guardians' home, then at their on- or off-campus residence. See table 1 for an overview of where the Bureau will count people in complex living situations the same as it did in 2010.

**Table 1: For 2020, the Bureau Will Continue to Count People in Many Complex Living Situations as It Did in 2010**

Where counted	Living situation
Typically counted at the residence where they live and sleep most of the time. If this cannot be determined, then counted where they are staying on Census Day.	People away from their usual residence
Typically counted at the residence where they live and sleep most of the time. If this cannot be determined, then counted where they are staying on Census Day.	Visitors on Census Day
Typically counted at the residence where they live and sleep most of the time. If this cannot be determined, then counted where they are staying on Census Day.	Foreign citizens living in the United States <sup>a</sup>
Typically counted at the residence where they live and sleep most of the time. If this cannot be determined, then counted where they are staying on Census Day.	People who live or stay in more than one place, such as mobile workers, snowbirds, or children in shared custody
Typically counted at the residence where they live and sleep most of the time. If this cannot be determined, then counted where they are staying on Census Day.	People in housing for older adults, such as active adult communities, independent living, or retirement communities
Typically counted at the residence where they live and sleep most of the time. If this cannot be determined, then counted where they are staying on Census Day.	Relatives and nonrelatives, such as foster children, unmarried partners, housemates and roommates, roomers and boarders, etc.

Where counted	Living situation
Typically counted at the residence where they live and sleep most of the time. If this cannot be determined, then counted where they are staying on Census Day.	People moving into or out of a residence around Census Day (counted at their residence as of Census Day)
Typically counted at the residence where they live and sleep most of the time. If this cannot be determined, then counted where they are staying on Census Day.	People born on or deceased around Census Day (counted only if living on Census Day) <sup>b</sup>
Typically counted at the residence where they live and sleep most of the time. If this cannot be determined, then counted where they are staying on Census Day.	People in transitory locations, such as campgrounds, recreational vehicle parks, circuses, carnivals, etc.
Typically counted at the residence where they live and sleep most of the time. If this cannot be determined, then counted where they are staying on Census Day.	People in workers' residential facilities and Job Corps centers
Typically counted at the residence where they live and sleep most of the time. If this cannot be determined, then counted where they are staying on Census Day.	People displaced by natural disasters and other emergencies
Typically counted at the residence where they live and sleep most of the time. If this cannot be determined, then counted where they are staying on Census Day.	People who are at soup kitchens and regularly scheduled mobile food vans that provide food to people experiencing homelessness
Typically counted at the residence where they live and sleep most of the time. If this cannot be determined, then counted where they are staying on Census Day.	People in non-correctional residential treatment centers for adults

Where counted	Living situation
Typically counted at the residence where they live and sleep most of the time. If this cannot be determined, then counted where they are staying on Census Day.	People in hospitals and other health care facilities for reasons other than long-term nonacute care
Typically counted at the residence where they live and sleep most of the time. If this cannot be determined, then counted where they are staying on Census Day.	People on military ships
Facility residents typically counted where they are staying on Census Day. Facility staff members counted where they live and sleep most of the time (unless no usual home elsewhere, then counted at facility).	People in correctional facilities for adults
Facility residents typically counted where they are staying on Census Day. Facility staff members counted where they live and sleep most of the time (unless no usual home elsewhere, then counted at facility).	College students (and staff) living in college housing while attending college in the United States <sup>c</sup>
Facility residents typically counted where they are staying on Census Day. Facility staff members counted where they live and sleep most of the time (unless no usual home elsewhere, then counted at facility).	Students in residential schools for people with disabilities
Facility residents typically counted where they are staying on Census Day. Facility staff members counted where they live and sleep most of the time (unless no usual home elsewhere, then counted at facility).	People in domestic violence shelters or in emergency and transitional shelters for people experiencing homelessness



Where counted	Living situation
Facility residents typically counted where they are staying on Census Day. Facility staff members counted where they live and sleep most of the time (unless no usual home elsewhere, then counted at facility).	People in non-correctional group homes intended for adults
Facility residents typically counted where they are staying on Census Day. Facility staff members counted where they live and sleep most of the time (unless no usual home elsewhere, then counted at facility).	People in mental (psychiatric) units or hospitals providing long-term nonacute care
Facility residents typically counted where they are staying on Census Day. Facility staff members counted where they live and sleep most of the time (unless no usual home elsewhere, then counted at facility).	People in nursing or skilled nursing facilities providing long-term nonacute care
Facility residents typically counted where they are staying on Census Day. Facility staff members counted where they live and sleep most of the time (unless no usual home elsewhere, then counted at facility).	People in military barracks and medical treatment facilities

Source: GAO analysis of U.S. Census Bureau documentation. | GAO-20-282

<sup>a</sup>Foreign citizens living in the United States who are members of the diplomatic community are counted at the embassy, consulate, United Nations facility, or other residences where diplomats live.

<sup>b</sup>Newborn babies in hospitals are counted at the home where they will live.

<sup>c</sup>Boarding school students below the college level living away from their parents' or guardians' home are counted at their parents' or guardians' home.

In addition, the Bureau's guidance includes examples of situations in which people should not be counted in the census, such as the following:

- people living outside the United States on Census Day who are not military or civilian employees of the U.S. government and are not dependents living with military or civilian employees of the U.S. government;

- babies born after Census Day or people who die before Census Day;
- college students living at and attending college outside the United States; and
- citizens of foreign countries visiting the United States, such as on vacation or a business trip.

To help census respondents understand who and where to count household members and others, the Bureau is translating key terms from its census form for 2020 into 59 languages and making it available to community partners and others who may be in a position to help linguistically isolated groups provide accurate responses. It is translating scripted responses to questions about complex living situations into 12 foreign languages to be used by staff who will help answer questions about and take responses over the telephone.

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### The Bureau Will Continue to Count Prisoners at the Correctional Facility but Plans to Offer States Supplemental Tools for Redistricting with Prisoners' Pre-Incarceration Addresses

The Bureau reports that stakeholder feedback on where to count prisoners largely urged the Bureau to count them at their pre-incarceration addresses to avoid shifting political power to the prison locations at the expense of the prisoners' home communities.<sup>4</sup> However, the Bureau concluded that counting prisoners anywhere other than the correctional facility would be less consistent with the concept of usual residence, since the majority of people in prisons live and sleep there most of the time. Therefore, for 2020, the Bureau decided that it will continue to count prisoners at the correctional facility as it did in 2010. However, the Bureau will make available to states two tools to allow them to "move" their prisoner population to the prisoners' pre-incarceration addresses for redistricting purposes. The tools are intended to support such movement within but not across state boundaries.

- The Bureau is providing states with an online tool that will identify the census geographical block that the population would be tabulated in for any state-provided addresses. If a state wants to "move" the

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<sup>4</sup>The Bureau uses the term "prisoners," which includes inmates, who are incarcerated, as well as those who are detained, such as people in federal detention centers, federal and state prisons, local jails, and other municipal confinement facilities.

tabulation of specific prisoners within its boundaries, this information will let state officials know which block tabulations to adjust. On November 4, 2019, the Bureau launched the web page that will support states in using this tool. The Bureau plans to update it with 2020 Census geographic data in February 2021, before the Bureau is required to provide redistricting data to the states.<sup>5</sup>

- The Bureau also plans to provide states with data on group quarters, which will contain a separate count of their prisoner populations, as part of each state's redistricting file.<sup>6</sup> By including group quarters data in the redistricting file, the Bureau plans to provide these group quarters data to users 1 to 2 months earlier than it did in 2010 when it provided group quarters data separately from the redistricting file. According to the Bureau, this earlier release will benefit many users, including state officials who must consider whether to include or exclude certain populations when redrawing boundaries as a result of state legislation.

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## The Bureau Is Planning Additional Changes to Improve Count Accuracy, Completeness, and Consistency Following Data Collection





Once the Bureau has completed its decennial data collection efforts, it generally finds that a small proportion of responses have data quality issues that were not resolved during preceding operations. In these cases, (1) some addresses have multiple responses, (2) some households are missing responses altogether, or (3) some responses include answers that are incomplete or conflict with one another. The Bureau has a variety of plans to resolve these issues (see figure 3).

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<sup>5</sup>The Census Geocoder is a public web-based address look-up tool accessible at [www.census.gov/programs-surveys/geography/technical-documentation/complete-technical-documentation/census-geocoder.html](http://www.census.gov/programs-surveys/geography/technical-documentation/complete-technical-documentation/census-geocoder.html).

<sup>6</sup>Under Public Law 94-171, the officers or public bodies having initial responsibility for the legislative apportionment or districting of each state may, prior to the census date, identify geographic areas for which specific tabulations of population are desired; the Bureau is then required to deliver these data no later than 1 year from Census day. See 13 U.S.C. §141(c).

**Figure 3: For 2020, the Bureau Has Various Plans to Resolve Multiple, Missing, Incomplete, and Conflicting Responses after Data Collection**

DATA QUALITY ISSUE	MULTIPLE	MISSING	INCOMPLETE	CONFLICTING
DESCRIPTION	 <p>More than one response is received for the same address.</p>	 <p>No response is obtained from a household even following in-person follow-up.</p>	 <p>A household response is obtained, but not all questions have been answered.</p>	 <p>Information provided as part of a household response conflicts with other information in the same response.</p>
PLANNED RESOLUTION	<p>Determine who should be counted at the address using the Bureau's Primary Selection Algorithm, a longstanding automated routine.</p>	<p>Determine whether an address exists, is occupied or vacant, and how many people live there using a statistical technique the Bureau refers to as count imputation, which draws data from similar nearby households.</p>	<p>Fill in missing answers and resolve conflicting answers using a technique the Bureau refers to as edit and characteristic imputation, which draws data from the same household response, prior census and other administrative records, or similar nearby households.</p>	
KEY CHANGE FROM 2010	<p>Updated based on Bureau's review of various response scenarios and data from past censuses and census tests.</p>	<p>Enhanced by use of administrative records.</p>		

Source: GAO analysis of U.S. Census Bureau documentation. | GAO-20-282

## Determining Whom to Count at Addresses with Multiple Responses

The Bureau may receive multiple census responses from a household for various reasons. For example, different members of the same household could each respond by mail or over the internet, or one member could mail a response and another answer a census worker's questions in person during the Bureau's non-response follow-up operation. The Bureau assessed its response processing in 2010, and identified about 14 million responses for households that already had another response (roughly 10 percent of the total number of households included in the final

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2010 count). The widespread option to respond over the internet is new for 2020, and while having included it in multiple census tests, Bureau officials have not set expectations on the extent to which it may increase the number of addresses at which it gets multiple responses.

To guard against overcounting, as it has in prior decennials, for 2020 the Bureau plans to use an automated routine—referred to as the Primary Selection Algorithm—to determine whom to count at addresses for which it has received multiple responses once data collection is complete. According to Bureau officials, in making this determination, the algorithm takes into account a wide range of information, including results from its fraud detection efforts.<sup>7</sup> We did not examine the algorithm for this review. In addition, to help ensure the integrity of these determinations, the Bureau does not disclose the details of the algorithm publicly and permits only Bureau officials with an operational need to know to access the algorithm. According to Bureau documentation, the Bureau has updated the algorithm for 2020 based on its review of various response scenarios and data from past censuses and census tests.

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## Filling in Missing Household Responses

When the Bureau, after its data collection efforts are completed, has been unable to reach anyone able and willing to respond at a particular address or to obtain information about the address and its potential occupants in other ways—such as through neighbors or a building manager—it may be left not knowing whether a housing unit even exists at the address or whether it is occupied, and, if so, by how many people. As it did in 2010, for 2020 the Bureau plans to use a statistical technique it refers to as count imputation to fill in missing data about the existence and number of people living at an address in question. Count imputation has three types.

- **Residence status.** This is used when the Bureau does not know whether an address is a real and livable residence. In contrast, it could be a business or in such disrepair that no one could live there.

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<sup>7</sup>For more information regarding the Bureau's fraud detection efforts, see GAO, *2020 Census: Additional Actions Needed to Manage Risk*, [GAO-19-399](#) (Washington, D.C.: May 31, 2019).

- **Occupancy status.** This is used when the Bureau knows that an address is a real housing unit, but not whether it is vacant or occupied.
- **Household size.** This is used when the Bureau knows an address is a real, occupied home, but not how many people live there.

To carry out each of these types of count imputation, the Bureau uses a technique referred to as hot-deck imputation which employs continually updated census data from similar nearby households as the basis for filling in the missing statuses and household size. The Bureau has been using some form of hot-deck imputation since at least the 1960 Census.

According to Bureau reporting, in 2010, about 500,000 of 137 million addresses counted in the decennial (0.4 percent) were missing an entire response and the Bureau therefore used count imputation to determine a combination of their residence and occupancy status and household size.<sup>8</sup> The Bureau's count imputation in 2010 added about 1.2 million people to the final census count. For 2020, however, some of the missing responses which otherwise would have required count imputation will instead be resolved through the use of administrative records in conjunction with the Bureau's door-to-door non-response follow-up effort. Specifically, the Bureau plans to draw on relevant data from records of sufficient quality thereby reducing the amount of follow-up field work needed and the number of households in need of count imputation. According to Bureau officials, they plan to finalize a decision memorandum in December 2019 specifying the Bureau's thresholds for determining whether administrative records are of sufficient quality for such uses.

According to Bureau officials, tests and evaluations performed during the preceding decade demonstrate that these uses of administrative records will provide more accurate results than traditional methods of seeking information about the address from neighbors and others or from count imputation alone. Bureau testing and evaluation also identified improvements to its count imputation technique for 2020, including enhanced use of administrative records in its hot-deck imputation, which it expects will generate results better aligned with actual data for those addresses where it had been missing.

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<sup>8</sup>The Bureau imputed whether an address was livable for 0.12 percent of addresses, whether it was occupied or vacant for 0.03 percent, and its household size for 0.24 percent.

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## Resolving Incomplete and Conflicting Answers within a Household Response

Once the Bureau has determined the total number of households and people as of Census Day for apportionment purposes, it resolves incomplete and conflicting information within individual household responses for redistricting and final tabulation purposes. Specifically, for 2020, the Bureau plans to ensure that each household response includes complete and consistent information regarding, for occupied housing units, the age, date of birth, sex, race, and ethnicity (Hispanic or non-Hispanic origin) of each household resident; their relationship to the householder;<sup>9</sup> whether the housing unit is rented or owned by a member of the household; for group quarters, the type of such quarters, such as federal detention center or in-patient hospice facility; and, if the unit is vacant, why (see figure 4).<sup>10</sup>

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<sup>9</sup>The Bureau defines householder as someone who lives in the unit and owns it or pays its rent or, if the owner or rent payer lives elsewhere, then any adult living in the unit. This person is to be listed first in the census response.

<sup>10</sup>An additional type of information that may be incomplete is the census identification number. These numbers are assigned to most addresses, but some people responding to the census may not know their number, such as when responding by internet or telephone. The Bureau resolves this type of incomplete return by comparing the reported information to internal databases to see whether the associated address already has an identification number. If one cannot be found, the Bureau will assign a new one.

**Figure 4: For 2020, the Bureau Plans to Ensure That Certain Information within Individual Household Responses Is Complete and Consistent**

This figure is not a real census form—for example, due to limited space, it includes only a subset of response options for race—but it illustrates the types of information that the Bureau will ensure is complete and consistent in household responses

**3. Is this house, apartment, or mobile home?** Mark  ONE box.

**Owned** by you or someone in this household with a mortgage or loan? *Include home equity loans.*

**Owned** by you or someone in this household free and clear *(without a mortgage or loan)?*

**Rented?**

Occupied without payment of rent?

**Person 2**

**5. What is this person's age and what is this person's date of birth?** *For babies less than a year old, do not write the age in months. Write 0 as the age.*

Age on April 1, 2020      Month      Day      Year of birth

years

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**Person 1**

**5. Please provide information for each person living here. If there is someone living here who pays the rent or owns this residence start by listing him or her as Person 1. If...**

**6. Is this person of Hispanic, Latino or Spanish origin?**

No, not of Hispanic, Latino, or Spanish origin

Yes, Mexican, Mexican Am. Chicano

Yes, Puerto Rican

Yes, Cuban

Yes, another Hispanic, Latino, or Spanish origin  
*Print, for example, Salvadoran, Dominican, Colombian Guatemalan, Spaniard, Ecuadorian, etc...*

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**Person 2**

**3. How is this person related to Person 1?** Mark  ONE box.

<input type="checkbox"/> Opposite-sex husband/wife/spouse	<input type="checkbox"/> Father or mother
<input type="checkbox"/> Opposite-sex unmarried partner	<input type="checkbox"/> Grandchild
<input type="checkbox"/> Same-sex husband/wife/spouse	<input type="checkbox"/> Parent-in-law
<input type="checkbox"/> Same-sex unmarried partner	<input type="checkbox"/> Son-in-law or daughter-in-law
<input type="checkbox"/> Biological son or daughter	<input type="checkbox"/> Other relative
<input type="checkbox"/> Adopted son or daughter	<input type="checkbox"/> Roommate or housemate
<input type="checkbox"/> Stepson or stepdaughter	<input type="checkbox"/> Foster child
<input type="checkbox"/> Brother or sister	<input type="checkbox"/> Other non-relative

**4. What is this person's sex?** Mark  ONE box.

Male       Female

**7. What is this person's race?**  
Mark  one or more boxes AND print origins

White - *Print, for example, German, Irish, English, Italian, Lebanese, Egyptian, etc.*

Black or African Am. - *Print, for example, African American, Jamaican, Haitian, Nigerian, Ethiopian etc.*

American Indian or Alaska Native - *Print name of enrolled or principal tribe(s), for example, Navajo Nation*

Some other race - *Print race or origin*

Source: GAO illustration adapted from U.S. Census forms. | GAO-20-282

Note: Additional characteristics the Bureau plans to ensure are complete and consistent are vacancy status (i.e., if the unit is vacant, why) and, for group quarters, the type of such quarters, such as federal detention center or in-patient hospice facility.



These characteristics (which the Bureau refers to as person and housing characteristics) may be incomplete or conflicting for various reasons, including intentional or accidental omissions or errors by the person filling out the form. According to Bureau data, in 2010, responses for 13 percent of the people counted in the decennial (about 40 million of the about 300 million counted) contained incomplete or conflicting person characteristics that the Bureau had to resolve.

For 2020, as it did for 2010, the Bureau plans to use a technique it refers to as edit and characteristic imputation to fill in incomplete and reconcile conflicting information in individual household responses. As summarized in table 2 and described below, it does so using one of three methods, depending on which characteristics are incomplete or conflicting and on what other information the Bureau has about those characteristics. The Bureau has been using some form of characteristic imputation since at least the 1940 Census.

**Table 2: For 2020, the Bureau Has Three Methods to Resolve Incomplete and Conflicting Answers within a Household Response**

Method	Where used	Potential data sources: 2020 census response	Potential data sources: Prior census and other administrative records	Potential data sources: Similar nearby people or households
Use existing information about same person or household	Some person and household characteristics are incomplete or conflicting	yes	yes	no
Use existing information about other people or households	Some person and household characteristics are incomplete or conflicting	yes	no	yes
Use existing information about same or other households	All person characteristics are incomplete	no	yes	yes

Source: GAO analysis of Census Bureau documentation. | GAO-20-282

- Use existing information about same person or household.** This method is used when some, but not all, person and household characteristics are incomplete or conflicting and those characteristics can be filled in or reconciled using other information about the same person or household reported within the 2020 response or in prior census or other administrative records. For example, if a person’s date of birth is reported but not his or her age, the Bureau will fill in the age based on the date of birth. If neither age nor date of birth is reported, the Bureau will look to the 2010 Census to fill in both characteristics, adjusting for the intervening years.

- **Use existing information about other people or households.** As with the prior method, this method is used when some, but not all, person and household characteristics are incomplete or conflicting. However, unlike the prior method, the incomplete or conflicting characteristics cannot be filled in or reconciled using other information about the same person or household reported within the 2020 response or in prior census or other administrative records. Therefore, the Bureau will look instead to information about other people included in the same 2020 response or to nearby people or households from other 2020 responses.

For example, if race is reported for a parent but not a child, the Bureau will fill in the child's race using the race provided for the parent. If there is no information within the household response that can be used to fill in the child's race, the Bureau will use a hot-deck imputation method. As discussed earlier, this method employs continually updated census data from similar nearby households as the basis for filling in the needed information.

- **Use existing information about same or other households.** This method is used when all person characteristics are incomplete. In this instance, the Bureau will first look to prior census and other administrative records. If the household size reflected in those records matches the household size reflected in the 2020 response, the Bureau will use those records to fill in all person characteristics available in previous census and administrative records. Remaining characteristics not filled in by previous census and other administrative records will be filled in using the methods discussed above. If the household size totals do not match, the Bureau will use a hot-deck imputation method, drawing the missing information from continually updated census data from similar nearby households.

As with other areas of the 2020 Census, the key change in the Bureau's plan for resolving incomplete and conflicting information is the enhanced use of prior census and other administrative records. Specifically, in 2010 the Bureau relied on such records to fill in only race and ethnicity. In contrast, as discussed above, for 2020 the Bureau plans to use prior census and other administrative records as an integral part of its edit and characteristic imputation methods. The Bureau believes this will result in improved data quality and more accurate results.

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## Agency Comments

We provided a copy of this draft report to the Department of Commerce. The Census Bureau provided technical comments, which we 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 me at (202) 512-2757 or [goldenkoff@gao.gov](mailto:goldenkoff@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 I.



Robert Goldenkoff  
Director  
Strategic Issues

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# Appendix I: GAO Contact and Staff Acknowledgments

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## GAO Contact

Robert Goldenkoff, (202) 512-2757 or [goldenkoff@gao.gov](mailto:goldenkoff@gao.gov)

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## Staff Acknowledgments

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