Technical Documentation – Operational Quality Metrics
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<u>Introduction</u>

The Census Bureau is releasing a series of operational quality metrics that detail how the 2020 Census was managed and implemented and missing rates for select census responses, powerful indicators of data quality.

The first two releases of these metrics are included in a set of tables and interactive dashboards that allow users to explore how 2020 Census data were collected in the nation, each of the 50 states, the District of Columbia, and Puerto Rico, alongside 2010 Census data for context. While differences across decades and geographies reflect a wide variety of factors, such as changes in the way the census was conducted and population shifts, these comparisons provide a lens into the quality of the 2020 Census data.

The dashboards let you take a deep dive into different angles of census data collection for the first two sets of operational metrics. The first release (April 2021) includes the count of addresses, the status of addresses, and which operations and modes were used to determine that status. The second release (May 2021) includes preliminary metrics describing the household size of housing units counted in the 2020 Census, and which operations and methods were used to count them. Users can explore these distributions across the country with the map, contrast results by state with the State Comparison Tool, and compare results between the 2020 and 2010 censuses.

Two sets of metrics that make up the third release (August 2021) reveal additional insight into the quality of the 2020 Census operations and resulting data. The first table includes summary statistics escribing 2020 Census county-level and tract-level metrics previously included in the first release at the state-level. The second table contains item nonresponse rates for demographic characteristics across operations. Item nonresponse rates for the 2010 Census will also be released for context.

Release 4 (October 2022) contains county-level metrics that align with those released in Release 3 Table 1, and a select group of metrics at the tract-level.

<u>Definitions</u>

Address Type Definitions

- **Housing Unit:** A residence in which occupants live separately from others and have direct access from the outside or a common hall, including a house, mobile home, or apartment.
- **Group Quarters:** Places where residents live or stay in a group living arrangement that are typically managed by an entity providing housing and/or services (i.e. nursing facilities, military barracks, and college dormitories).

Address Status Definitions

- **Occupied:** A usual place of residence of a person or group of people at the time of enumeration.

- **Vacant:** Residential addresses that are unoccupied at the time of enumeration, including those listed for rent, listed for sale, or used seasonally.
- **Delete:** Addresses that do not qualify as living quarters, such as those that are uninhabitable, are nonresidential, or no longer exist.

Census Operation Categories

- **Self-Response:** Housing units that responded on their own accord using the internet (a new response option in the 2020 Census), on paper using forms delivered by mail or a census taker, or by telephone.
- **Nonresponse Followup (NRFU):** A census taker followed up with nonresponding households by collecting response information from household members or proxy respondents, such as neighbors, building managers, or landlords. The 2020 Census also used high quality administrative records, data we already have about households, to collect census data for these households. In 2010, some NRFU paper forms did not clearly identify whether the respondent was a household member or proxy respondent (labeled as Unknown Respondent Type).
- **Other Enumeration Activities:** This category includes primarily smaller operations outside of self-response and NRFU.
  - Release 1 (April 2021): For the 2010 Census, this includes Update Leave (delete address actions only), Update Enumerate (UE), Remote Update Enumerate (RUE), Remote Alaska (RA), and Coverage Followup (CFU). For 2020, this category includes Update Leave (delete address actions only), UE, RA, Coverage Improvement (Cov Imp), and Self-Response Quality Assurance operations (SRQA).
  - Release 2 (May 2021): For the 2010 Census, this includes Update Enumerate (UE), Remote Update Enumerate (RUE), Remote Alaska (RA), Enumeration at Transitory Locations (ETL), and Coverage Followup (CFU). For 2020, this category includes UE, RA, Self-Response Quality Assurance operations (SRQA), ETL, and Coverage Improvement (Cov Imp).
  - Release 3 Table 2 (August 25, 2021): For the 2010 Census, this includes UE, RUE, RA, ETL, and CFU. For 2020, this category includes UE, RA, SRQA, ETL, and Coverage Improvement.
- **Unresolved:** Housing units that did not provide sufficient information to determine the address status or population count (**Unresolved, data collection**). Imputation procedures used other data sources to fill in missing data for these addresses. In 2020, these also include housing units in which person unduplication procedures removed all person records from that unit (**Unresolved, person unduplication**).
- **Count Imputation:** Imputation procedures use available data sources to fill in missing data for housing units that did not provide sufficient information to determine the address status or population count.
- **ID and Non-ID Processing:** Household members could self-respond to the census with or without a Census ID. The Census ID is delivered to housing units by mail or by a census taker as part of the Update Leave operation. Submissions that did not include a Census ID went through non-ID processing, in which housing units were matched to an existing address record or assigned a new one.
- **Population Count Only:** Respondent provided only the household population count and no other household information (i.e., age, sex, race, etc.).

Summary Statistic Definitions

- **Mean:** The mean, or average, is calculated by dividing the sum of values in a group by the number of values in that group.
- **Standard Deviation (STD):** A measure of how spread out a set of values is.
- **Median:** The mid-point of a series of values in a group.
- **Item Nonresponse:** Item nonresponse occurs when a respondent provides some information to the survey or census but does not respond to all the questions. The item nonresponse rate is calculated by dividing the number of missing responses to a question by the number of addresses/person records that were asked that question.

<u>Additional Notes</u>

Release 1 (April 2021):

- Addresses included: Metrics represent the final 2020 Census data collection universe. These include all addresses for which the Census Bureau attempted to collect a response, with the exception of those noted below.
- Addresses not included: Transitory locations and addresses added late in data collection are included in apportionment counts, but not in the operational metrics. These data were undergoing Census processing as these metrics were produced. Transitory locations are places where people are unlikely to live year-round because of their transitory nature, such as RV parks or marinas. Addresses added late include those added between the September 27, 2020, deadline for adding new addresses and the October 15, 2020, response deadline.
- Comparable 2010 Census and 2020 Census data are provided where applicable. The following categories are new to the 2020 Census and did not exist in the 2010 Census: Internet Self-Response, Administrative Records, Self-Response Quality Assurance (a component of the Other Enumeration Activities category), and Unresolved, Person Unduplication. The following categories apply to the 2010 Census and were not included in the 2020 Census: Unknown Respondent Type (a subcategory of Nonresponse Followup), and Remote Update Enumerate (a component of the Other Enumeration Activities category). The 2020 Census Coverage Improvement operation was similar to the 2010 Census Coverage Followup operation.
- The percent of addresses resolved as self-response included in the Operational Quality Metrics is a different metric than the self-response rate reported throughout 2020 Census data collection in the Self-Response Rate Map. The percentages measure two different things for different purposes. The Self-Response Rates Map measured participation during the 2020 Census among households that were invited to respond on their own online, by phone or by mail. The percentage in the Operational Quality Metrics takes a broader view. The operational metrics look at self-response among all addresses in the 2020 Census — not just among households invited to respond on their own.
- Other Deletes include addresses that were deleted as part of the Update Leave operation. Response data from Update Leave, however, are represented in Self-Response and Nonresponse Followup.
- All data are rounded in accordance with U.S. Census Bureau disclosure review standards. No differential privacy techniques have been applied.
- Percentages may not sum to applicable totals because of rounding, especially for small cell sizes.
  - U.S. total values do not include Puerto Rico.

- Acronyms defined:
    - NRFU: Nonresponse Followup
    - UE: Update Enumerate
    - RUE: Remote Update Enumerate
    - RA: Remote Alaska
    - SRQA: Self-Response Quality Assurance
    - Cov Imp: Coverage Improvement
    - CFU: Coverage Followup

Release 2 (May 2021):

- The 2020 Census operational quality metrics included in release 2 are preliminary estimates. The operational quality metrics have been subjected to U.S. Census Bureau-approved disclosure avoidance techniques including noise infusion and rounding. Any cell with a value of less than 0.5% is noted as "<0.5%" and is not rounded to 0.0%. Final estimates will be released as part of 2020 Census Data Products or 2020 Census Operational Assessments.
- Percentages may not sum to applicable totals because of rounding, especially for small cell sizes.
- Addresses included: Metrics represent all data for occupied and vacant housing units collected in the 2020 Census. These include transitory units and addresses added late in data collection, which were not included in the first Operational Quality Metrics Release. Transitory locations are places where people are unlikely to live year-round because of their transitory nature, such as RV parks or marinas. Addresses added late include those added between the September 27, 2020, deadline for adding new addresses and the October 15, 2020, response deadline.
- Addresses not included: Group quarters, and their population, are not in these operational metrics. Group quarters are places where people live or stay in a group living arrangement that are typically managed by an entity providing housing and/or services (i.e., nursing facilities, military barracks, and college dormitories). Data describing the enumeration of deleted housing units is also excluded from these metrics.
- Comparable 2010 Census and 2020 Census data are provided where applicable. The following categories are new to the 2020 Census and did not exist in the 2010 Census: Administrative Records and Self-Response Quality Assurance (a component of the Other Enumeration Activities category). The following categories apply to the 2010 Census and were not included in the 2020 Census: Unknown Respondent Type (a subcategory of Nonresponse Followup), and Remote Update Enumerate (a component of the Other Enumeration Activities category). The 2020 Census Coverage Improvement operation was similar to the 2010 Census Coverage Followup operation.
- The percent of addresses resolved as self-response included in the Operational Quality Metrics is a different metric than the self-response rate reported throughout 2020 Census data collection in the Self-Response Rate Map. The percentages measure two different things for different purposes. The Self-Response Rates Map measured participation during the 2020 Census among households that were invited to respond on their own online, by phone or by mail. The percentage in these Operational Quality Metrics include all occupied and vacant housing units, excluding those deleted during data collection.
- For the percent of housing units enumerated as Occupied Nonresponse Followup Household and Proxy Enumerations and Vacant Nonresponse Followup Household and Proxy Enumerations, the 2010 Census values also include Unknown Respondent Type.
- U.S. total values do not include Puerto Rico.
- Acronyms defined:

- o NRFU: Nonresponse Followup
- o UE: Update Enumerate
- o RUE: Remote Update Enumerate
- o RA: Remote Alaska
- o SRQA: Self-Response Quality Assurance
- o Cov Imp: Coverage Improvement
- o CFU: Coverage Followup
- o ETL: Enumeration at Transitory Locations

Release 3, Table 1 (August 18, 2021):

- Addresses included: Metrics represent the final 2020 Census data collection universe. These include all addresses for which the Census Bureau attempted to collect a response, with the exception of those noted below.
- Addresses not included: Transitory locations and addresses added late in data collection are included in apportionment counts, but not in the operational metrics. These data were undergoing Census processing as these metrics were produced. Transitory locations are places where people are unlikely to live year-round because of their transitory nature, such as RV parks or marinas. Addresses added late include those added between the September 27, 2020, deadline for adding new addresses and the October 15, 2020, response deadline.
- The percent of addresses resolved as self-response included in the Operational Quality Metrics is a different metric than the self-response rate reported throughout 2020 Census data collection in the Self-Response Rate Map. The percentages measure two different things for different purposes. The Self-Response Rates Map measured participation during the 2020 Census among households that were invited to respond on their own online, by phone or by mail. The percentage in the Operational Quality Metrics takes a broader view. The operational metrics look at self-response among all addresses in the 2020 Census — not just among households invited to respond on their own.
- Response data from Update Leave are represented in Self-Response or Nonresponse Followup, depending on how the address responded.
- Median values for the County Metrics are suppressed for the following states that have less than five counties: Delaware, Hawaii, and Rhode Island. County Metrics are not included for DC because DC has only one county.
- Tracts with 20 or fewer addresses are excluded from Tract Metric calculations.
- All data are rounded in accordance with U.S. Census Bureau disclosure review standards. No differential privacy techniques have been applied.
- U.S. total values do not include Puerto Rico.
- Acronyms defined:
  - o NRFU: Nonresponse Followup
  - o STD: Standard Deviation

Release 3, Table 2 (August 25, 2021):

- Item nonresponse is a measure of respondent cooperation and does not consider response validity. Response validity is addressed during the editing and imputation process. Typically, imputation rates are higher than item nonresponse rates. One exception to defining item nonresponse as respondent cooperation is calculating nonresponse for administrative records

enumerations. We calculate the item nonresponse rate for administrative records enumerations the same as any other response even though, technically, the respondent did not provide that data during the 2020 Census.

- Here are a few examples to illustrate the differences between item nonresponse and imputation: If a respondent checked multiple relationship checkboxes, that is considered a response, but the response would need to be edited/imputed. If a respondent wrote in "human" or "don't know" for race or ethnicity, that is considered a response because they took the time to write something, but the response would need to be edited/imputed. If a respondent told an enumerator that they "don't know," that is not considered a response and it would need to be edited/imputed.
- The data source for this table is the Census Unedited File (CUF).
- Addresses included: Occupied units with a valid decennial address for the final collection universe.
- Addresses excluded: Addresses that went to count imputation and addresses that were generated in processing (e.g. a Group Quarters was converted to a Housing Unit).
- Person records excluded: Person records that were generated in processing to account for population count and roster reconciliation.• Response data from Update Leave are represented in Self-Response or Nonresponse Followup, depending on how the address responded.
- Self-response internet and phone modes have a "n/a" for population count because those instruments require a population count by design.
- NRFU Interviews with Unknown Respondent only applies to the 2010 Census.
- NRFU Administrative Records Enumerations only applies to the 2020 Census.
- Administrative Records Enumerations has a "n/a" for population count because those addresses have a population count provided by definition.
- For age/date of birth, a birth year or an age is required to be considered for response. If only a birth month, only a birth day, or only a birth month and birth day are provided, that is not considered a response.
- The Hispanic Origin and race questions are not asked on the extended roster for certain paper modes, so those person records are not included in the numerator or denominator for those item nonresponse calculations.
- The population count question is not asked during the Coverage Improvement (2020) and Coverage Followup (2010) interviews, so those addresses are not included in the numerator or denominator for population count.
- The population count question is not asked for Group Quarters so there is no item nonresponse rate calculated for population count for those addresses.
- The population count question was not asked on Be Counted forms in the 2010 Census, so those addresses are not included in the numerator or denominator.
- All data are rounded in accordance with U.S. Census Bureau disclosure review standards. No differential privacy techniques have been applied.
- U.S. Total values do not include Puerto Rico.
- Acronyms defined:
  - NRFU: Nonresponse Followup
  - UE: Update Enumerate
  - RA: Remote Alaska
  - SRQA: Self-Response Quality Assurance
  - ETL: Enumeration at Transitory Locations
  - Cov Imp: Coverage Improvement

- o RUE: Remote Update Enumerate
- o CFU: Coverage Followup

Release 4 (October 2022)
- Addresses included: Metrics represent the final 2020 Census data collection universe. These include all addresses for which the Census Bureau attempted to collect a response.
- The percentage of addresses resolved as self-response included in the Operational Quality Metrics is a different metric than the self-response rate reported throughout 2020 Census data collection in the Self-Response Rate Map. The percentages measure two different things that serve different purposes. The Self-Response Rates Map measured participation during the 2020 Census among households that were invited to respond on their own online, by phone or by mail. The percentages in the Operational Quality Metrics take a broader view. The operational metrics look at self-response among all addresses in the 2020 Census — not just among households invited to respond on their own.
- Response data from Update Leave are represented in Self-Response or Nonresponse Followup, depending on how the address responded.
- These metrics are protected by standard Census Bureau disclosure avoidance techniques. Discrete Gaussian noise was added to all queries given two parameters - squared global sensitivity and privacy-loss budget - before rounding for presentation purposes. The privacy-loss budget (rho = 0.1) was chosen to deliver accuracy comparable to the DRB rounding and suppression rules for smaller counts.
- Percentages may not sum to applicable totals, especially for small cell sizes, due to formal privacy techniques, and formatting practices including cell suppression and rounding.
- U.S. total values do not include Puerto Rico.

Resources for Information about the 2020 Census
- A Look Back at the 2020 Census – Contains a summary of 2020 Census data collection.
- 2020 Census Operational Plan - Contains a thorough description of 2020 Census operations.
- 2010 Type of Enumeration Area map - Defines how 2010 Census enumeration methods varied by geography.
- 2020 Census Type of Enumeration Viewer - Defines how 2020 Census enumeration methods varied by geography.
- 2020 Census Mail Contact Strategies Viewer - Details the percent of housing units in Self-Response Type of Enumeration Areas that were assigned each mailing strategy.
- 2020 Census Data Products: Disclosure Avoidance Modernization – Provides details about disclosure avoidance techniques used for 2020 Census products.
- Disclosure Avoidance for the 2020 Census: An Introduction - Details disclosure avoidance methods used for 2020 Census products
- Demographic Analysis – Population estimates produced using birth and death records, international migration data, and Medicare records.
- Post-Enumeration Survey (PES) – Describes how the PES measures the accuracy of the census.
- 2020 Census Self-Response Rates Map – Preliminary self-response rates produced during data collection.
- Administrative Records in the 2020 Census – Describes how administrative records were used in the 2020 Census.

- [U.S. Census Bureau Statement on Requests for Additional 2020 Census Metrics and Upcoming Data Quality Measures](#) – Description of 2020 Census quality measures.
- [Apportionment Results](#) - Provides the congressional apportionment population counts and number of representatives for each of the 50 states, along with the resident population counts for the nation, the 50 states, the District of Columbia and Puerto Rico.
- [Redistricting Results](#) – Contains redistricting summary files and technical documentation
- [2020 Census Data Quality](#) - Describes quality metrics released by the Census Bureau, including Release 1 of the Operational Quality Metrics.
- [Decennial Census Evaluations and Experiments](#) – Contains 2000, 2010, and 2020 decennial assessment reports

Release 1 (April 2021): Disclosure Review Board Clearance Numbers
- 2020 Census: CBDRB-FY21-DSSD007-0012
- 2010 Census: CBDRB-FY21-DSSD007-0011

Release 2 (May 2021): Data Stewardship Executive Policy Committee – Disclosure Review Board Clearance Number: CBDRB-FY21-DSEP-004

Release 3 Table 1 (August 18, 2021): CBDRB-FY21-295
Release 3 Table 2 (August 25, 2021): CBDRB-FY20-ACSO003-B0031

Release 4 (October 6, 2022): CBDRB-FY22-424