Addressing Data Quality Challenges in the 2020 American Community Survey

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The American Community Survey
Overview

- Introduction to the ACS

- Impact of COVID-19 on 2020 ACS Data Collection Operations and Data Quality

- Discussion of Experimental Methodology

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The American Community Survey
The Foundation

The American Community Survey is on the leading edge of survey design, continuous improvement, and data quality
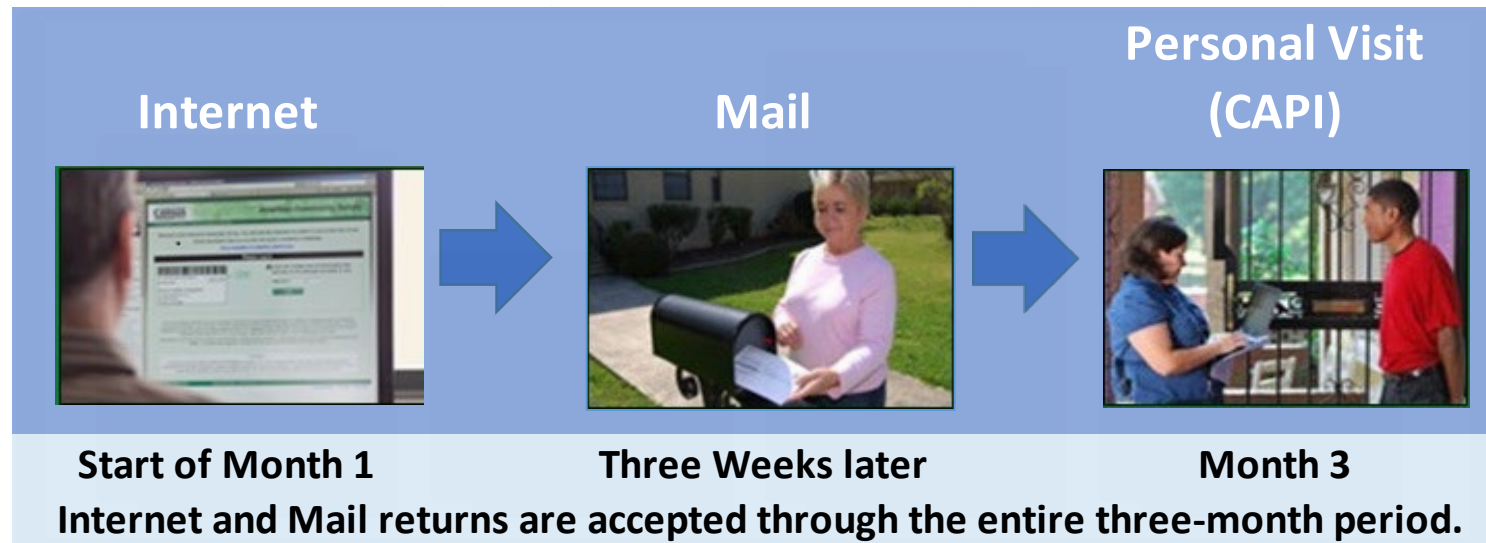
- The nation's most current, reliable, and accessible data source for local statistics on critical planning topics such as age, children, veterans, commuting, education, income, and employment

- Surveys **3.5 million** addresses and informs over **$675 billion** of Federal government spending each year

- Covers **40+ topics**, supports over **300** evidence-based Federal government uses

- Typically provides three key annual data releases:
    - 1-year Estimates (for large populations)
    - 1-year Supplemental Estimates (for small populations)
    - 5-year Estimates (for very small populations)

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ACS Data Collection Process: Pre COVID-19

- The ACS is a continuous, multimode survey that uses a multiple mailing strategy

- Data collection for each monthly panel takes place over a three-month period

Internet	**Mail**	**Personal Visit (CAPI)**
Start of Month 1	**Three Weeks later**	**Month 3**

Internet and Mail returns are accepted through the entire three-month period.

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Data Collection Modifications Due to COVID-19

Mail
- Suspended mail operations starting mid-March through June 2020
- Resumed limited mail operations in July 2020
- Restored our full 5-piece mail strategy in April 2021

Internet
- The internet option was available only to a subset of our full sample due to reduced mailings during April—June 2020

In-Person Interviewing
- In-person interviewing for housing units and group quarters was suspended mid-March—June 2020

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Impact of Data Collection Challenges on ACS Data Quality

- Given the limitations in our data collection for the 2020 ACS and our inability to fully utilize all three modes, we were unable to collect information from certain segments of the population

- As a result, significant nonresponse bias was present in the collected data

- While all surveys have nonresponse bias, our standard methods for mitigating the nonresponse bias are insufficient for this data year

- An analytical report, *An Assessment of the COVID-19 Pandemic's Impact on the 2020 ACS 1-Year Data*, with more information on the 2020 ACS 1-year data and related quality metrics was released on October 27th

census.gov/library/working-papers/2021/acs/2021_CensusBureau_01.html

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Overview of Results: Change in Respondent Sample

- To show how the respondent sample became less representative, we used our administrative and sample frame data to compare statistics between:

    1. All Occupied Housing Units-Including Nonrespondents. This is our measure of the benchmark

    2. Just Respondents

- Bigger gap between #1 and #2 (above)→ Bigger nonresponse bias, before any weighting adjustments
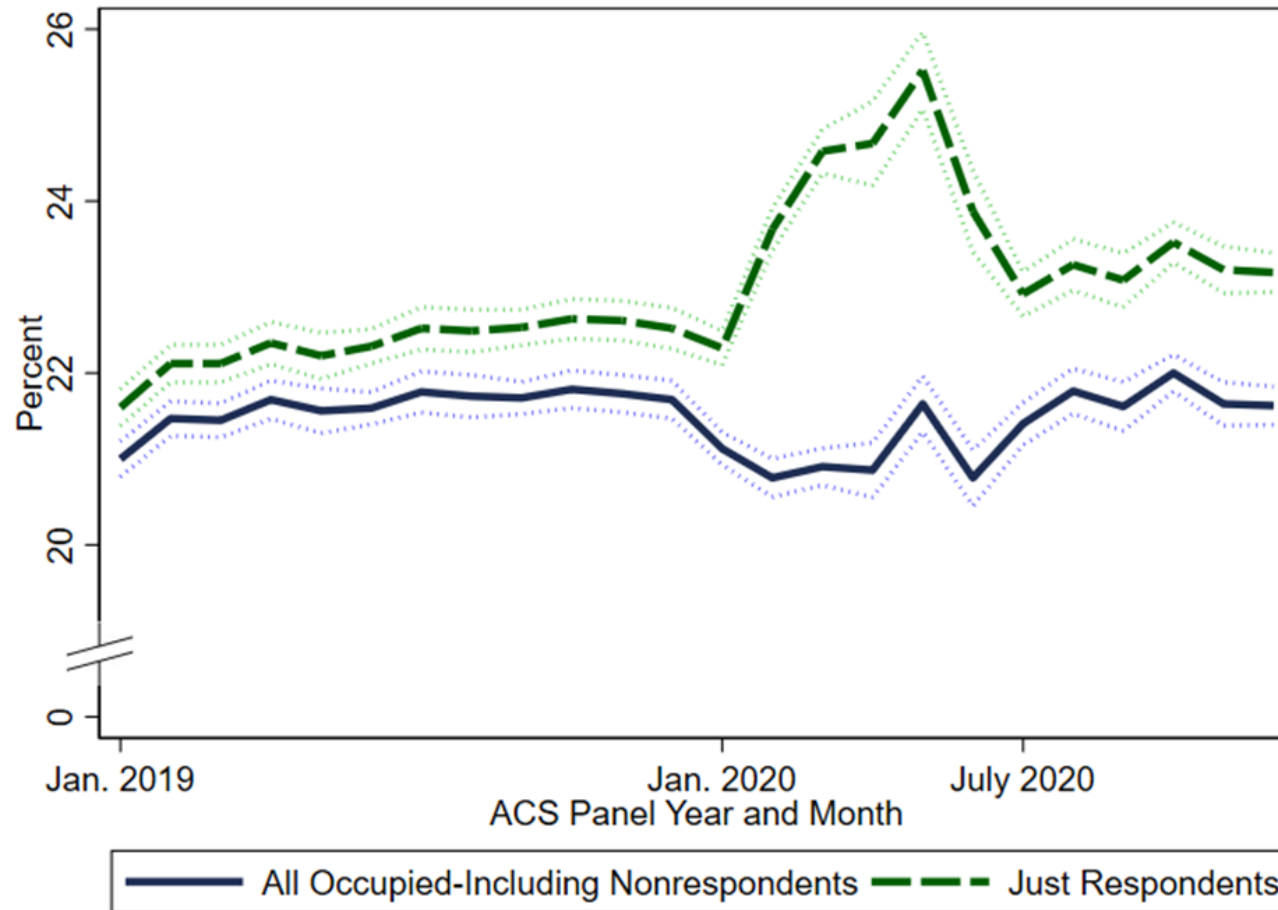
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Percent of Households with W-2 Earnings Between $1 and $25,000

Source: U.S. Census Bureau, 2019 and 2020 American Community Survey 1-Year data matched to IRS Form W-2 records.
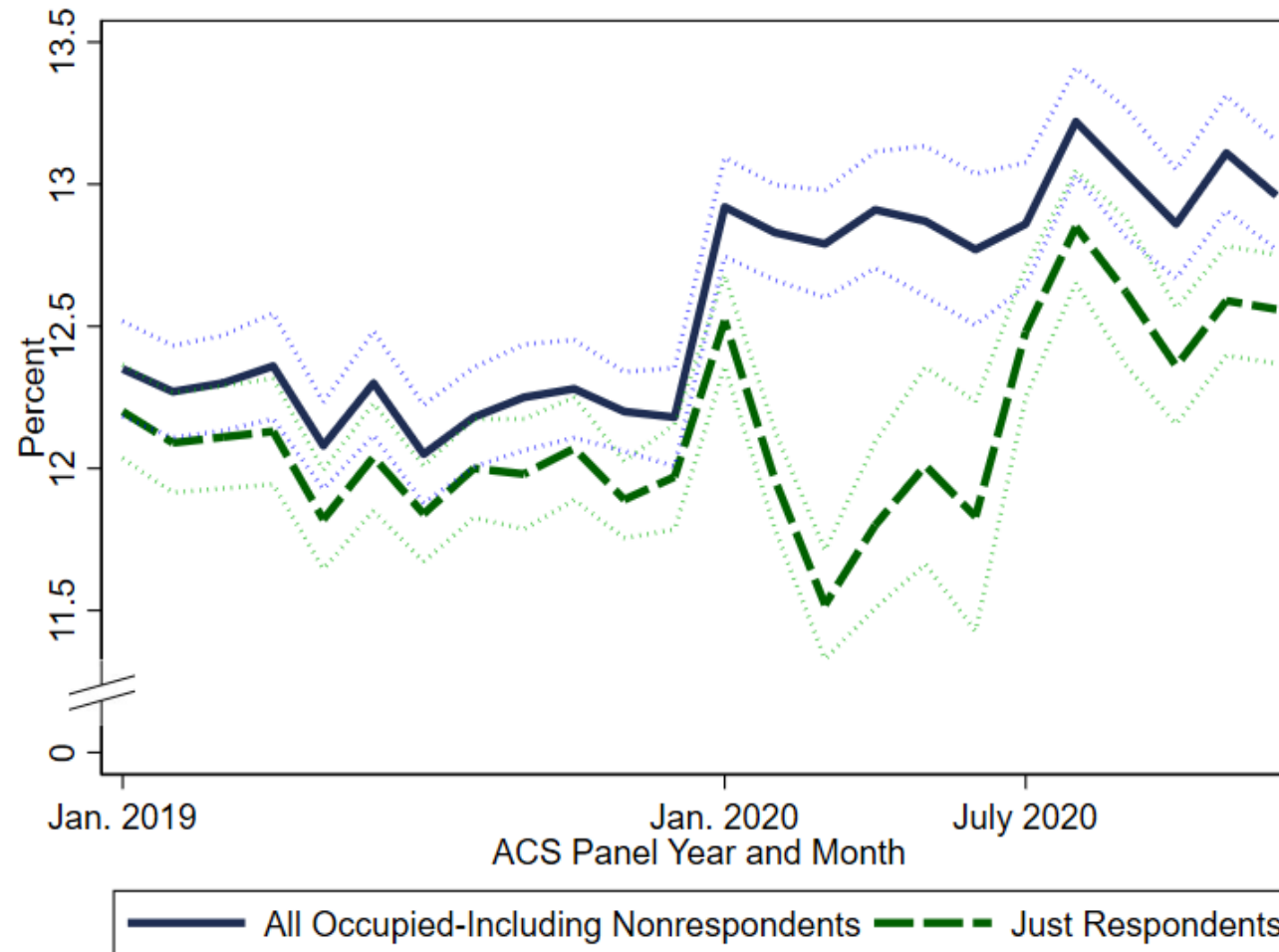
The American Community Survey
Percent of Households with W-2 Earnings Over $100,000

Source: U.S. Census Bureau, 2019 and 2020 American Community Survey 1-Year data matched to IRS Form W-2 records.

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Percent of Households Having a Worker with Four or More Jobs
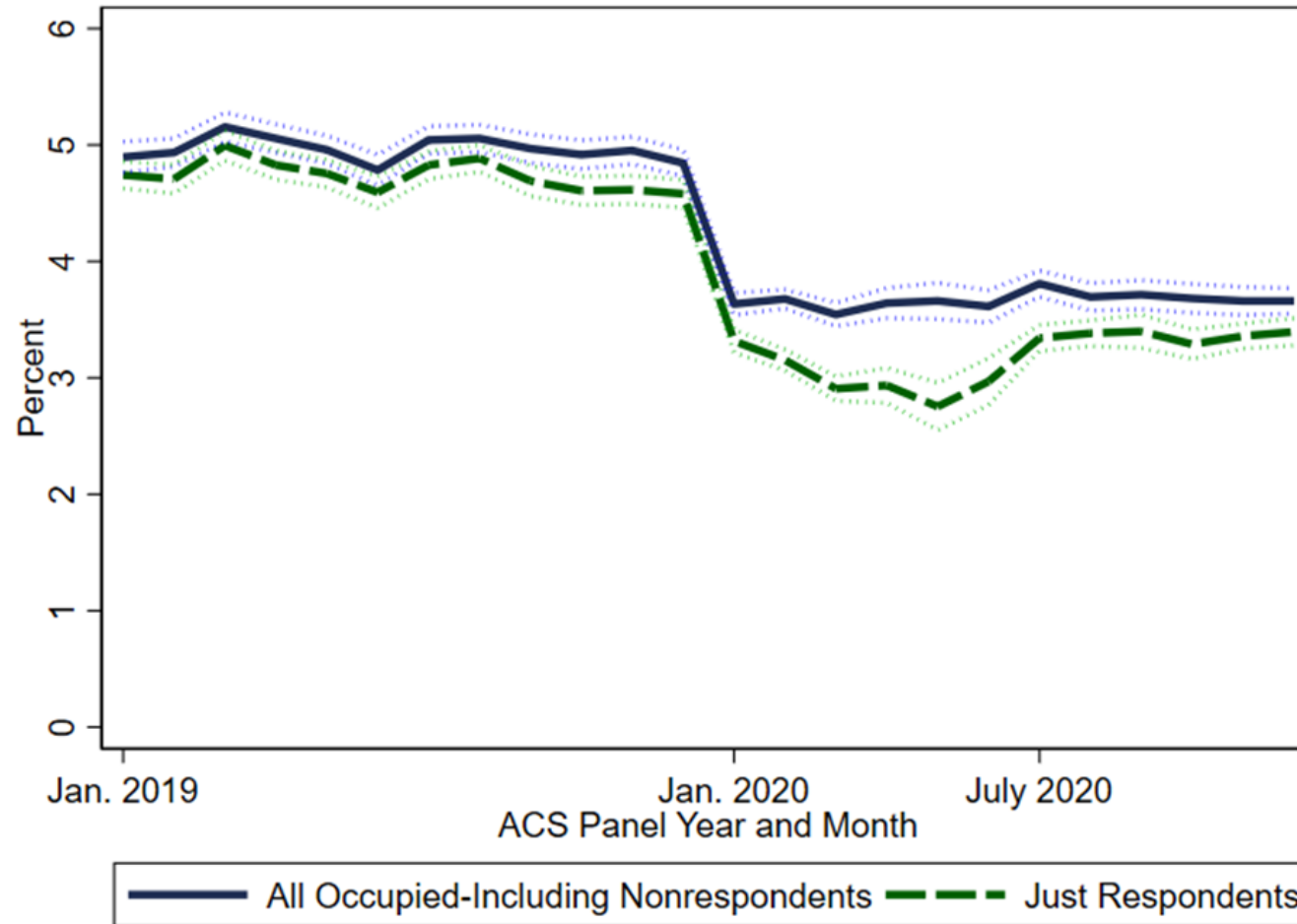
Source: U.S. Census Bureau, 2019 and 2020 American Community Survey 1-Year data matched to IRS Form W-2 records.
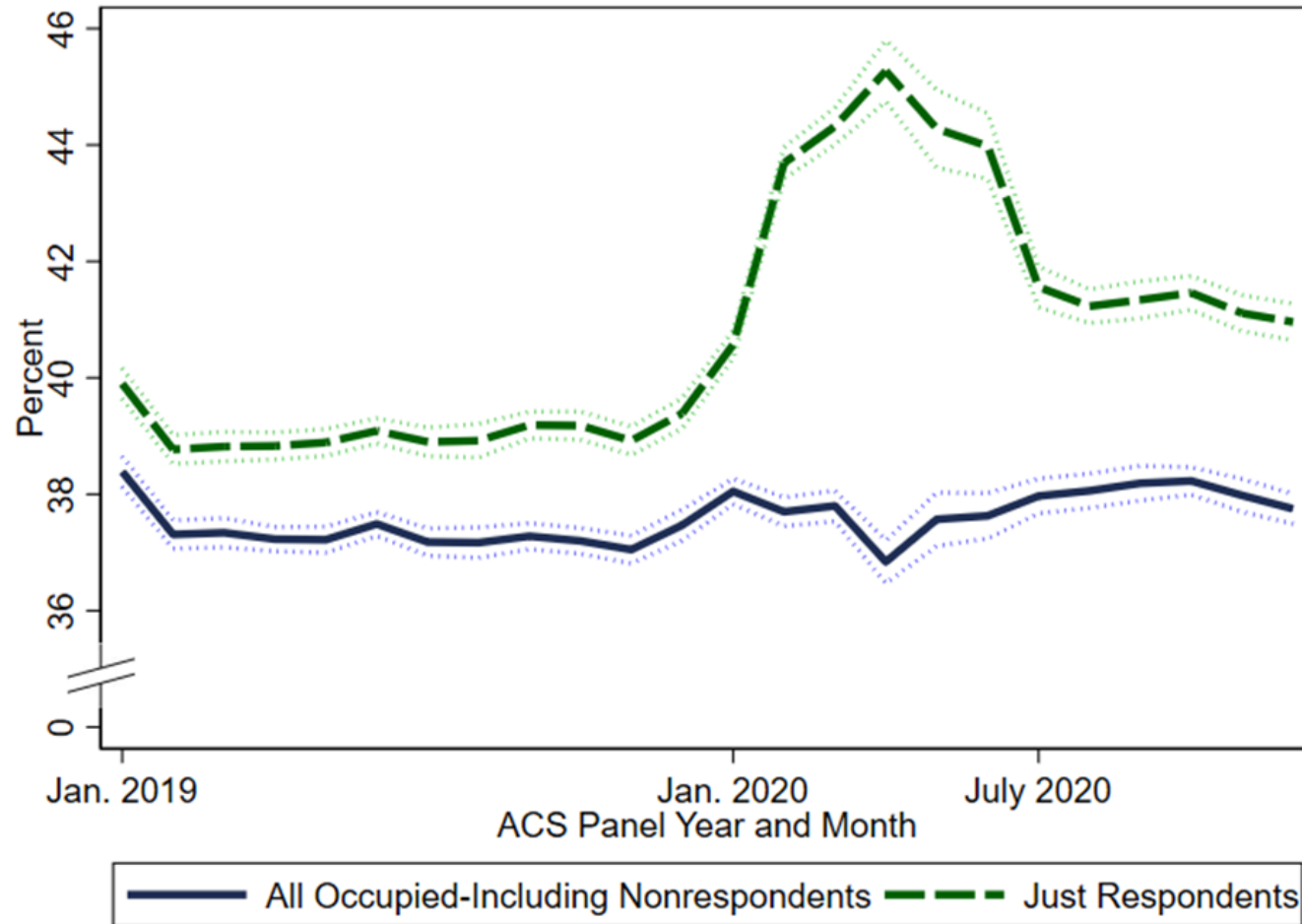
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Percent of Households Having a Member Aged Over 60 Years

The American Community Survey
Percent of Households Having a Member Aged Under 10 Years

Source: U.S. Census Bureau, 2019 and 2020 American Community Survey 1-Year data matched to IRS Form W-2 records.

The American Community Survey
Percent of Households with a Married Couple

Source: U.S. Census Bureau, 2019 and 2020 American Community Survey 1-Year data matched to IRS Form W-2 records.
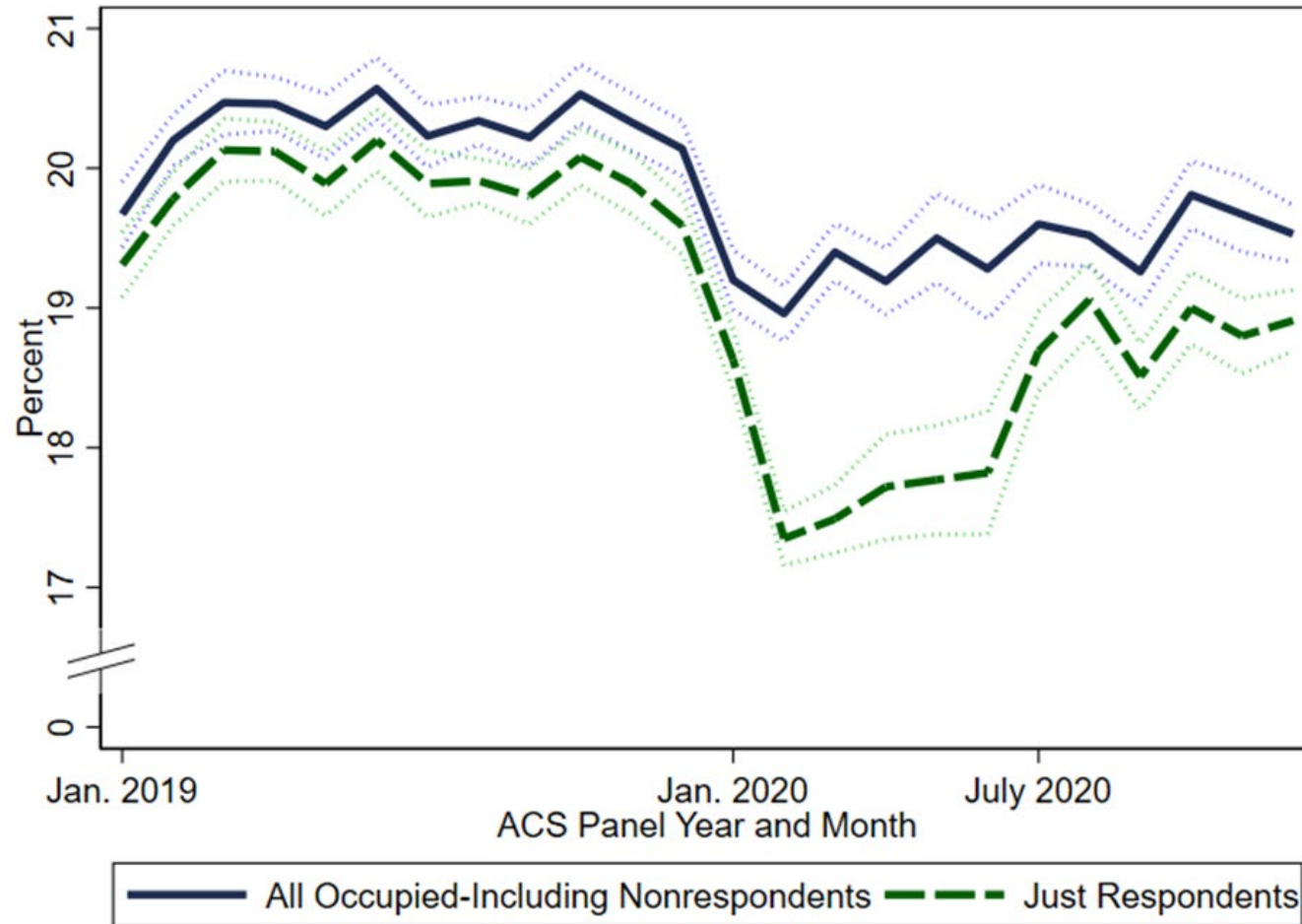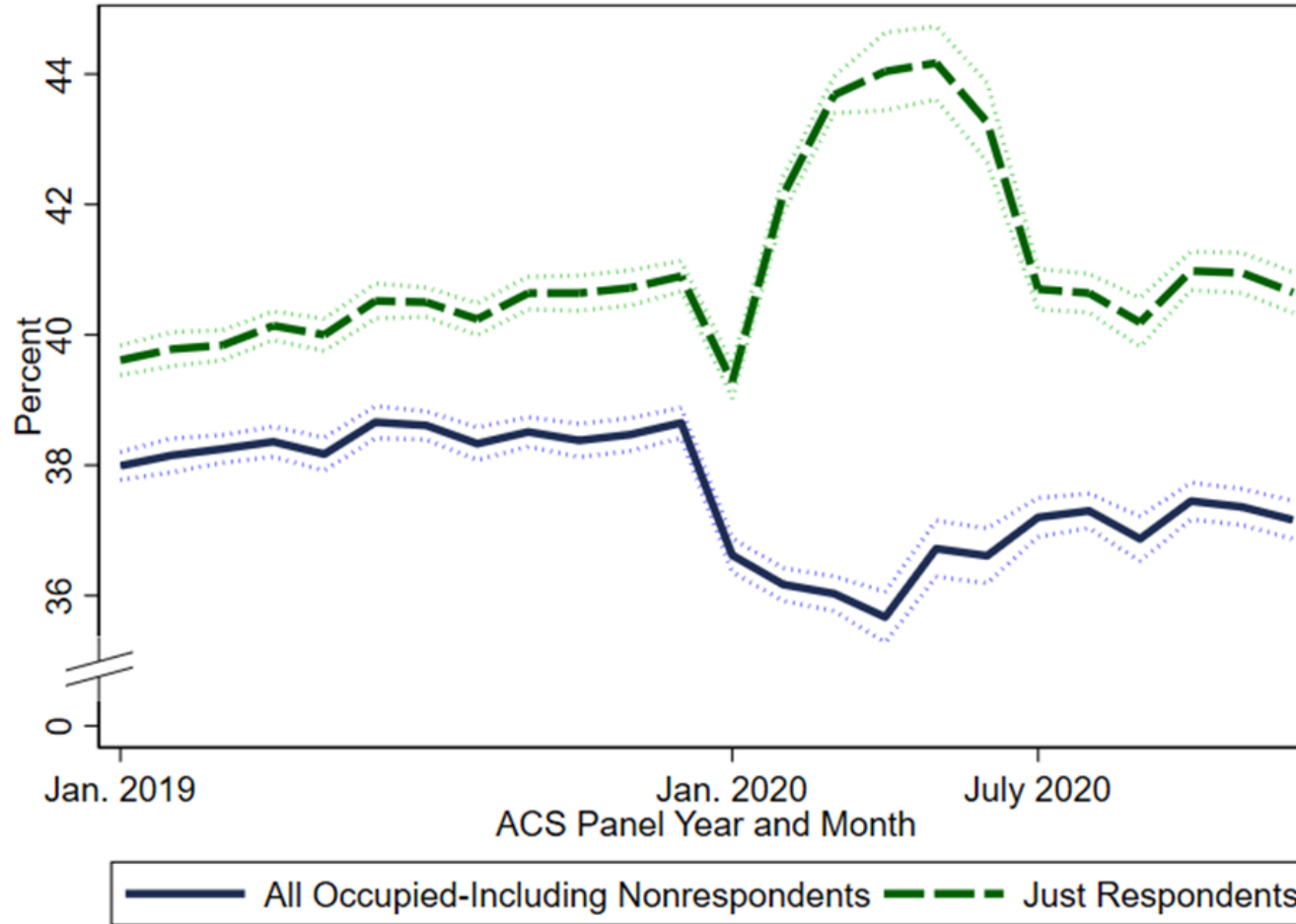
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What Do Survey Weights Do?

- Simple Overview: Increase or decrease the "importance" of individual respondents to make the responding sample look more like the target population

- For example, older individuals are more likely to respond to household surveys than younger individuals. The weighting process gives younger individuals a higher weight value to make the responding sample more representative of the target population

- Weighting process decides how many people out of the total U.S. population each ACS respondent represents

  - Note: The sum of ACS weights total to the population in each state and local area

- Weighting does not change a person's answers to the survey, only how many times their answer is repeated for calculating a statistic

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Simplified Overview of Standard ACS Weights

- Household Noninterview Adjustment

  - Adjust for differing response rates by tract and building type (e.g., single-family home vs. apartment)

- Housing Unit and Population Controls Adjustment

  - Adjust ACS weighted counts of age, race, Hispanic origin, sex, number of housing units, and number of people to independent Census population estimates at substate level (counties/group of counties)

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Overview of Experimental ACS Weights

- Add the following administrative data to ACS's weighting algorithm

  - Internal Revenue Service (IRS) forms 1040 and 1099: *Income; list of household residents; economic and financial activity*

  - Social Security Administration (SSA) program benefit data: *Retirement and Disability Information*

  - Demographic data from 2010 Census and SSA: *Age, Race, Hispanic Origin, Citizenship*

  - Industry data from the Census Business Register: *e.g., proxy for whether someone worked for a restaurant during 2020*

  - Household characteristics from the Master Address File: *Structure type*

  - Third-party home value data: *Home values, owner-occupied status*

- Intuition: Adding these new data gave us more detailed information on how ACS respondents and nonrespondents differ, which allowed us to better correct for nonresponse bias during 2020

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Overview of Experimental ACS Weights

- Use a weighting technique called *Entropy Balancing* to incorporate these additional inputs

- Suited to handling numerous inputs to the weighting model

- Allowed for a simultaneous adjustment to the weights by the administrative data and population controls

- Used in prior weighting research on the Annual Social and Economic Supplement (ASEC) of the Current Population Survey (CPS)
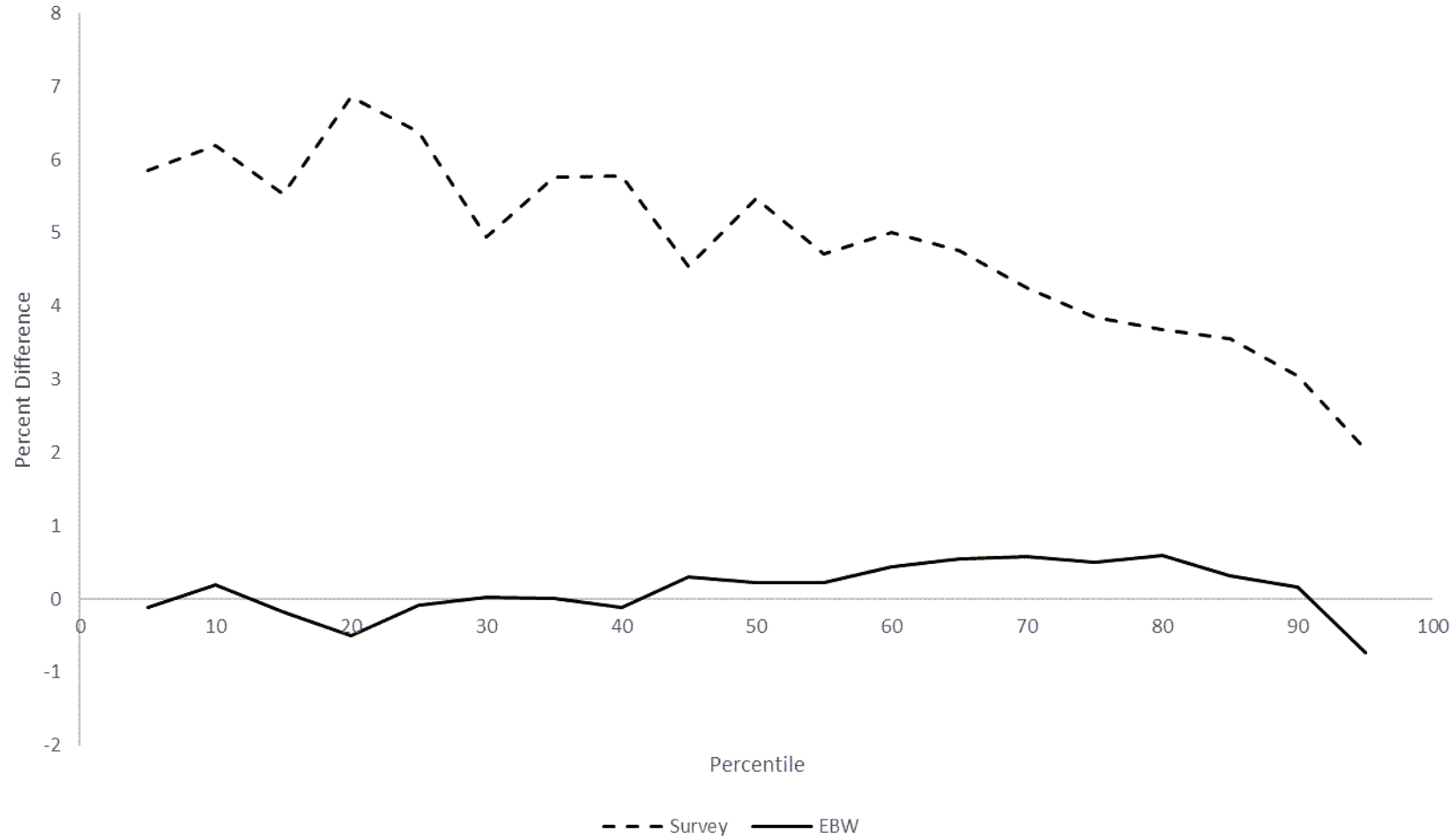
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Overview of Results: Weighting Corrections

- Following graphs show how the experimental weights changed ACS estimates compared to prior production method

- Also apply experimental weights methods to 2019 ACS to separate out:

  1. The effect of applying a new weighting method from

  2. Changes in economic and demographic characteristics of individuals between 2019 and 2020
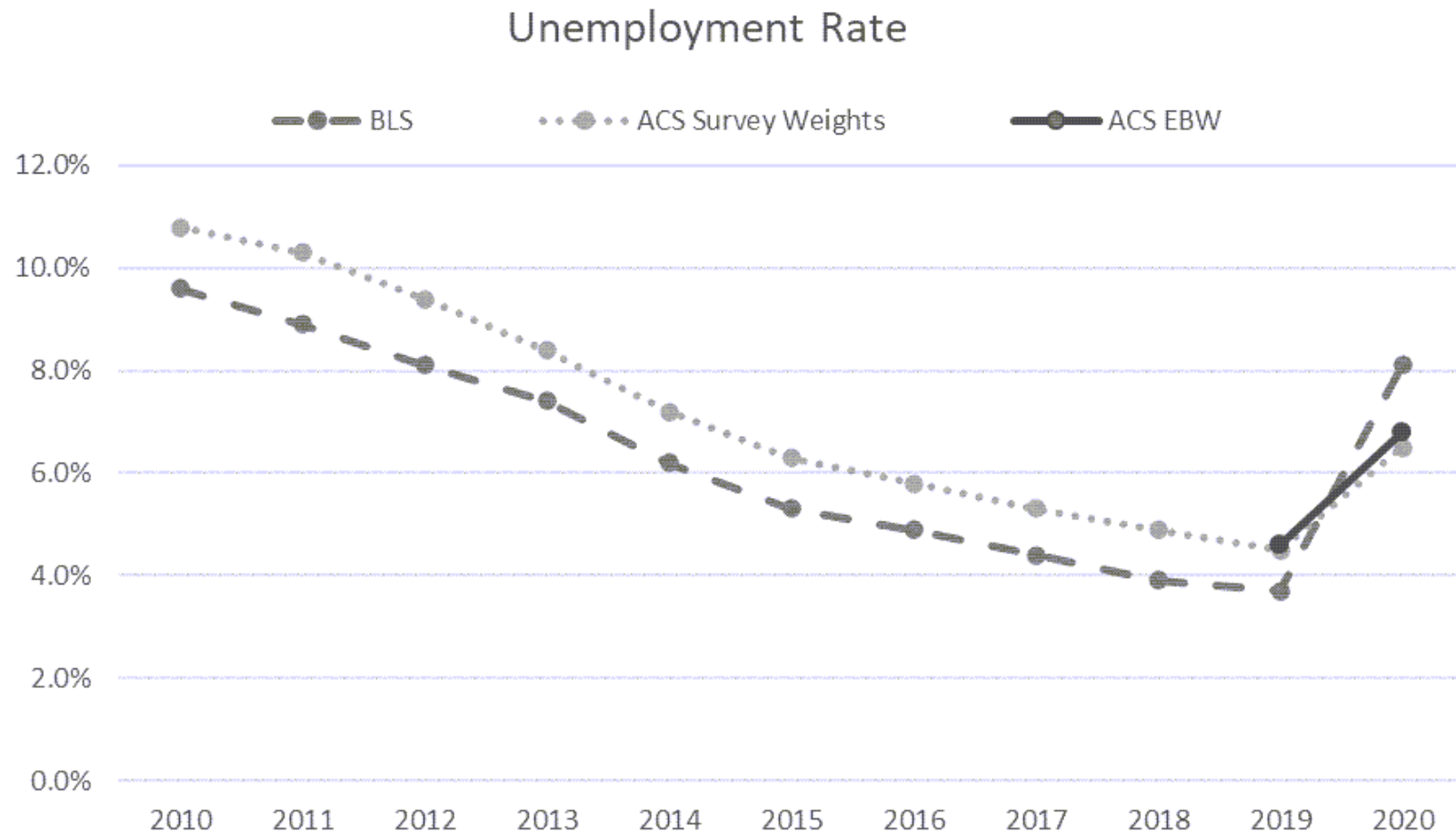
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Year-to-Year Change in Real Household Income Across the Distribution: 2019-2020

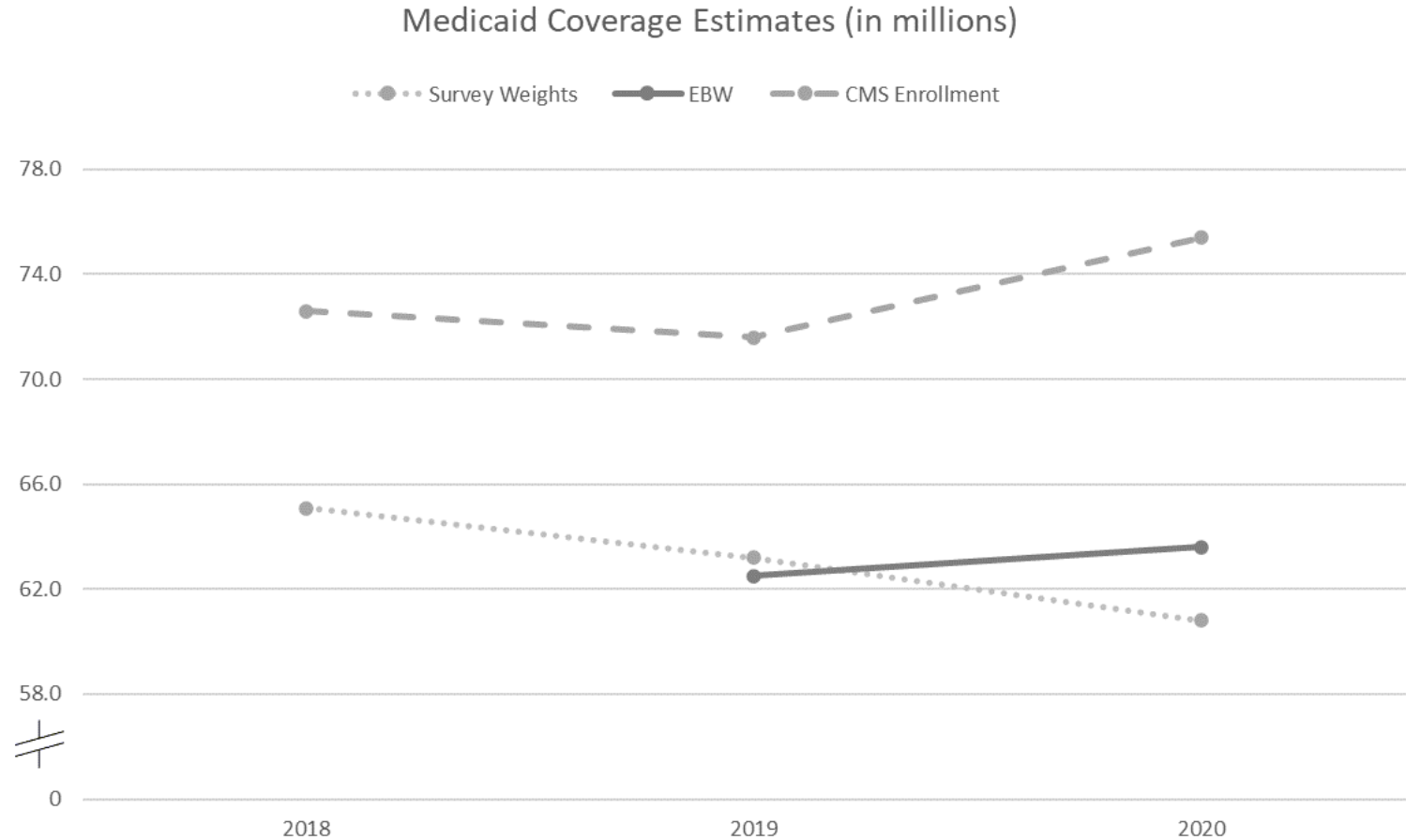Source: U.S. Census Bureau, 2019 and 2020 American Community Survey 1-Year data.

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Unemployment Rate from 2010 to 2020

Source: U.S. Census Bureau, 2019 and 2020 American Community Survey 1-Year data and Bureau of Labor Statistics 2021.

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Medicaid Coverage from 2018 to 2020

Medicaid Coverage Estimates (in millions)

Source: U.S. Census Bureau, 2018 through 2020 American Community Survey 1-year data and the Centers for Medicare and Medicaid Services Monthly Enrollment Snapshots 2018-2020.
Note: Entropy balance weights (EBW) were only produced for 2019 and 2020.

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Guidance for Data Users

- The Census Bureau encourages data users to determine whether the data are suitable for their particular use

- The Census Bureau does not recommend comparing:

  - The 2020 ACS 1-year experimental estimates with standard ACS estimates or the decennial census

  - The 2020 ACS 1-year PUMS with experimental weights with standard pre-tabulated products or PUMS-based estimates from previous years

- Experimental data should be used with caution because they may not meet all our quality standards

- Estimates for PUMAs should be used with caution because the experimental weights were not optimized to produce estimates for these areas

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Thank you!