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

10/27/2021

ACS RESEARCH AND EVALUATION REPORT MEMORANDUM SERIES # ACS21-RER-04

MEMORANDUM FOR ACS Research and Evaluation Workgroup

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Subject: An Assessment of the COVID-19 Pandemic's Impact on the 2020 ACS 1-Year Data

The Census Bureau has an obligation to produce accurate, relevant statistics about the nation's economy and people. The data collection issues experienced by the 2020 ACS severely affected the data quality of these statistics, therefore, the Census Bureau decided not to release the standard ACS 1-year data for 2020. This report describes the data collection disruptions in 2020, the modifications to standard weighting and estimation to combat the collection issues, and the resulting data quality issues that informed the decision to not release the standard 1-year ACS data products.

If you have any questions about this report, please contact the ACSO Data Users Support Team at acso.users.support@census.gov.

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10/27/2021

An Assessment of the COVID-19 Pandemic's Impact on the 2020 ACS 1-Year Data

FINAL REPORT

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1. INTRODUCTION

In 2020, the COVID-19 pandemic caused disruptions in the daily lives of people in the United States and around the world. Policies meant to slow the spread of the coronavirus (such as community-level stay-at-home orders) forced organizations to change how they operate. The pandemic complicated the operations of the American Community Survey (ACS) in a variety of ways. Throughout the year, the survey adapted to the circumstances by changing operations to protect the health and safety of Census Bureau staff and the public.

The pandemic and the resulting change in survey operations affected the quality of the 2020 ACS 1-year estimates. Due to the necessary constraints on data collection, we adopted different collection strategies from month to month as described in more detail in Section 2. As data collection continued through 2020, it became evident that our standard weighting methodology would need to be adapted to the varying data collection strategies being employed throughout the year. Possible changes to the weighting methodology were explored as soon as this became apparent, as Section 3 details.

It was clear that each month's interviews differed not only in number, but also in the population we were able to reach and have respond to the survey. Thus, the ACS began to look less like a continual monthly survey stemming from a common design and more like twelve independent monthly surveys, each with its own data collection strategy.

Despite our best efforts to mitigate the collection disruptions and modify the weighting adjustments, we could not fully evaluate the outcome until data collection ended. Since the ACS uses data collected throughout a calendar year to compute statistics, we could not know until June 2021 whether our processing, weighting, and estimation systems would be able to produce data that met our existing quality standards. Unfortunately, even with modifications focusing on known sources of bias, the Census Bureau determined that the estimates did not satisfy statistical quality standards as it became apparent that the data collected over-represented the population that was more educated, had higher incomes, and lived in single-family housing units.

On July 29, 2021, the U.S. Census Bureau announced that, due to data collection disruptions arising from the COVID-19 pandemic, it would not release the standard set of 1-year products for the 2020 ACS. The Census Bureau determined that the traditional ACS 1-year data products did not meet the Census Bureau's Statistical Quality Standards (U.S. Census Bureau, 2013).

This report describes the elements of the survey that were affected by the pandemic. The information is presented in order of survey processes.

Section 2 presents the changes to ACS data collection operations arising from the pandemic, both to the housing unit and to the group quarters operations. It describes challenges in, and updates to, mail-out operations, telephone centers, and personal interviewing.

Section 3 provides a general description of the weighting and estimation procedures. Further, it describes modifications to our estimation and weighting procedures made in response to known issues in data collection.

Section 4 includes an overview of select data quality measures and explains how those measures reflect the quality of the 2020 ACS 1-year data. This section shows the effects on critical quality measures such as response rates, item allocation rates, and coverage rates.

Section 5 presents an analysis of selected characteristics from the data. This section shows where 2020 ACS 1-year estimates were inconsistent with external benchmarks.

Finally, the report concludes with appendices that provide an overview of normal ACS procedures and additional technical details for interested readers.

2. DATA COLLECTION CHANGES IN 2020 DUE TO THE COVID-19 PANDEMIC

On March 17, 2020, the Office of Management and Budget (OMB) issued the memorandum "Federal Agency Operational Alignment to Slow the Spread of Coronavirus COVID-19" (Vought, 2020). This memorandum forced the Census Bureau's National Processing Center (NPC) and the two telephone centers to operate with minimal staffing and required a change in ACS interviewing techniques for both housing units and group quarters, such as nursing homes, college dorms, and prisons. The pandemic affected each month of 2020 ACS data collection. The impact on housing unit data collection is summarized in Table 2.1. and described in more detail below along with the impact on the group quarters operations.[1]

Table 2.1. Pandemic Impact to 2020 ACS Housing Unit Data Collection

Panel	Mailout Strategy					CAPI Operation[2]		
	Initial Mailing	Reminder Letter	Questionnaire Package	Reminder Postcard	Final Reminder	Interviewing Month	Impact to Interviewing	CAPI letter sent
January	✓	✓	✓	✓	✓	March	In-person stopped on March 20	
February	✓	✓	✓	✓	✓	April	Telephone only	
March	✓	✓	!	✗	✗	May	Telephone only - increased workload	
April	✗	✗	✗	✗	✗	June	Telephone only - increased workload	
May	✗	✗	✗	✗	✗	July	In-person available - Some areas	✓ From Regional Office
June	✗	✗	✗	✗	✗	August	In-person available - Some areas	
July	✓	✗	—	✗	✗	September	In-person available - All areas	
August	✓	✗	—	✗	✗	October	In-person available - All areas	
September	✓	✗	—	✗	✗	November	In-person available - Most areas	
October	✓	✗	✓	✗	✓	December	In-person available - Most areas	✓ From NPC
November	✓	✗	✓	✗	✓	January '21	In-person available - Most areas	
December	✓	✗	✓	✗	✓	February '21	In-person available - All areas	

✓ Mailed ! Part of workload mailed — Part of workload received questionnaire, remainder received reminder letter ✗ Was not mailed

2.1 Self-Response

The ACS mailout strategy was affected immediately upon the issuance of the OMB memorandum. NPC manages mailout and mail return operations for all surveys handled by the Census Bureau, including the ACS. NPC was in the process of mailing out the questionnaire packages for March and was able to mail only about one-quarter of the workload. The remaining mailings for the March panel and all mailings for the April, May, and June panels were cancelled. As staff returned to NPC over the summer of 2020, limited assembly and mailout operations resumed. For the July, August, and September panels, addresses received an initial mailing to invite households to respond online. A selection of the non-responding

[1] This section of the report provides an overview of how the 2020 procedures differed from normal ACS data collection procedures. The different mailing strategies are described in detail in the Appendices. Appendix A describes those normal procedures in detail; readers unfamiliar with ACS operations are advised to consult Appendix A before proceeding with this section. Additionally, Appendix B delves deeper into the ways that 2020 data collection differed from the norm.

[2] CAPI is the Computer-Assisted Personal Interviewing. CAPI is described in more detail in Section 2.2.

addresses received a questionnaire package while the remaining non-responding addresses received a reminder mailer. By October, all non-responding addresses received a questionnaire package and the final reminder letter.

As expected, these operational constraints greatly affected self-response rates. For the March panel, mailing questionnaires to only about a quarter of the eligible cases and cancelling subsequent mailings resulted in fewer online and paper responses. With no mailings from NPC for the April, May, and June panels, the only self-responses came from the online questionnaire. Field representatives encouraged online response when they called their assigned cases; for the May and June panels, the "Please Call Me" letter (explained below) sent from the regional offices encouraged some additional self-response.

The self-response rates for the July-December panels lagged the equivalent 2019 response rates. During this period, the rates were lowest in the July, August, and September panels, when only some cases received the questionnaire package and no cases received the traditional second, fourth, and fifth reminder mailings. From October to December, the rates rose due to all eligible cases receiving the questionnaire package and the resumption of the final reminder mailing at the beginning of the second month of the panel. We still had lower than usual self-response rates even later in the year; among the responses received, a much higher percentage than before came from the Internet.

2.2 Computer-Assisted Personal Interviewing (CAPI) Operation

As with the self-response operation, the computer-assisted personal interviewing, or CAPI, operation was also greatly affected by the pandemic. In-person interviewing stopped on March 20, restricting field representatives to telephone-only interviewing for the remainder of March, and April through June. In May and June, each field representative's CAPI workload was increased since interviewing was telephone only and they did not have to travel to do their interviews. It is important to keep in mind that the phone numbers used to reach addresses come mainly from third-party data vendors. While the attempt is to get the best phone numbers, the universe of addresses for which we can attain phone numbers is likely different than the universe of addresses in the CAPI workload. Thus, addresses for which we attained phone numbers are likely to over-represent certain types of households. Furthermore, the numbers often do not reach the intended household, or the household does not answer the phone. In months where interviewing was restricted to telephone only, interviewers were unable to contact about 40 percent of the CAPI workload.

In July and August, in-person interviewing was allowed in some areas; by September, in-person interviewing was extended to all areas of the U.S. Starting in November 2020 and continuing through January 2021, a few areas were restricted again to telephone-only interviewing due to COVID-19 resurgence. Even when in-person interviewing was allowed, the emphasis was to

collect as much data as possible by telephone to minimize contact and maximize the safety of both field representatives and interviewees.

Another way that addresses could choose to respond during the CAPI operation was by completing the interview online. Starting in May, the Census Bureau's six regional offices began mailing a "Please Call Me" letter to all mailable addresses selected for CAPI to encourage residents either to call the field representative or to fill out the online questionnaire. In November, NPC began assembling and mailing a similar letter to all CAPI cases to encourage response via the Internet or cooperation with interviewers.

The effect of these operational changes to the CAPI operation is evident in the response rates. In 2020, the lowest CAPI response rates occurred during those months when all areas were restricted to telephone-only interviewing (April, May, and June). As areas reopened for in-person interviewing, the CAPI response rate increased with the highest (post-March) monthly CAPI response rates recorded when all areas allowed in-person interviewing in September and October.

The distribution of CAPI outcomes also shows the effect of the changes to the CAPI operation. When interviewers were restricted to telephone-only interviewing, they were unable to contact about 40 percent of the CAPI workload. Typically, the only reason interviewers are unable to visit addresses is due to natural disasters (hurricanes, floods, fires, etc. in specific areas) which accounts for less than 1 percent of the CAPI workload in a normal year. Only being able to interview by telephone meant that there were households that interviewers had no chance of contacting and caused some potential for the bias that affected our estimates.

As in-person interviewing was allowed, the proportion of the CAPI workload that interviewers were unable to contact dropped considerably. While the proportion of the workload that interviewers were unable to contact dropped, the proportion of the workload that were non-interviews increased by 7 to 10 percentage points compared to the CAPI workloads in 2019.

2.3 Group Quarters Operation

The pandemic also affected data collection for the group quarters population. Previously, field representatives had to find alternative methods for interviewing facility contacts who did not allow entry into the building because of COVID-19 concerns. From mid-March to June, the group quarters operation was suspended. Personal visits to group quarters facilities were not permitted, and it was not feasible to do the interviews over the telephone. The inability to physically access facilities meant that there were many fewer interviews of residents than normal.

Even as the country started reopening in the summer and fall, field representatives faced continued difficulties conducting interviews at group quarters. Many of the largest types of

group quarters experienced unique challenges due to the pandemic. As a result, many nursing and correctional facilities restricted access to essential personnel only, and many colleges and universities closed their dormitory facilities to students altogether.

The response rate for persons in group quarters in 2019, January 2020, and February 2020 was about 92 percent. Halting in-person interviewing in mid-March resulted in a response rate of about 55 percent. When group quarters operations resumed in July, they were unevenly distributed across geographic areas (much like the housing unit CAPI operation). Response rates rebounded in the months when in-person interviewing was allowed in all areas but only rose to about 64 to 70 percent.

Overall, between mid-March and the end of 2020, ACS operations were substantially disrupted by the COVID-19 pandemic. These disruptions affected both housing unit and group quarters interviews and resulted in a much lower response rate than is normal for the ACS. For the 2020 ACS data collection, we had the lowest housing unit response rate in the history of the survey, at 71 percent. This was down from 86 percent in 2019 and 92 percent in 2018. Additionally, this rate was an average across the entire year and response rates during the peak pandemic months were significantly lower and varied across different areas of the country. As the next section will make clear, these limited data resulted in necessary changes to our data processing and estimation operations.

3. ESTIMATION MODIFICATIONS

With the disruptions to data collection, the Census Bureau began assessing possible modifications to the weighting procedures starting in August 2020. Weighting is the process of assigning statistical weights to sample interviews so that estimates formed from the survey data properly reflect the population of the U.S. as a whole and not just the set of persons who responded to the survey. At a high level, weighting is designed to account for the probability that a unit is selected in the sample, adjust for non-response, and, finally, adjust for under- or over-coverage that may arise due to errors in the sampling frame or as the result of errors during data collection.

There are separate weighting processes for housing units and the group quarters population. Most modifications to the weighting methodology involved the housing unit weighting, with smaller adjustments to the group quarters estimation.

Final weighting could not be completed until data collection ended, however, investigations into alternatives were explored as early as possible. This section will focus on the key issues and modifications to the weighting methodology. For a general overview of our standard weighting methodology, refer to the "ACS Accuracy of the Data (2019)" (U.S. Census Bureau, 2019a). A more detailed description is available in Chapter 11 of the "ACS Design and Methodology Report" (U.S. Census Bureau, 2014).

3.1 Housing Unit Weighting

The initial step in the housing unit weighting is to account for both the initial probability of selection and the probability of selection if the unit is selected for follow-up in our CAPI mode of data collection. This initial step sets the initial weight equal to the inverse of this total probability of selection. For example, if a household has a 1-in-40 chance of selection, then its weight would be 40.

The weighting makes use of the initial sampling parameters and the CAPI sampling parameters to calculate this weight. Neither of these sources was negatively affected by the changes to data collections or the response data we received. Thus, there were no modifications required for this portion of the weighting methodology.

3.1.1 Processing by Sample Panel Month

As data collection continued through 2020, it became evident that our standard housing unit weighting methodology would not be adequate given the varying data collection strategies being employed throughout the year, as described in Section 2. While variation in response patterns may occur from month to month, there are steps in the weighting process that smooth out these variations so that each month's interviews contribute somewhat equally to the annual estimate.

It became clear that, for each month in 2020, the number of interviews we collected varied and the response population from whom we were able to gain responses differed significantly in their characteristics both compared to 2019 and across months in 2020. Thus, the ACS began to look less like a continual monthly survey stemming from a common design and more like twelve independent monthly surveys, each with its own data collection strategy.

It was with this premise that we began to explore how we might change the weighting methodology. The first step was to try to group months together that used the same or similar data collection methods so that we could make common assumptions about the response and non-response universes. This led to grouping the data by a single or multiple sample panels. The panels for November and December of 2019 (both of which had non-responding units interviewed in 2020) and those for January and October-December of 2020 were grouped together, since they generally had all three modes of data collection (Internet and paper self-response and in-person CAPI). The remaining panels (those for February-September of 2020) were treated as discrete months. While our normal weighting process would ensure that each month's interviews contributed roughly one-twelfth of the annual estimate, we modified the process so that each sample panel contributed one-twelfth going into the subsequent weighting adjustments.

3.1.2 Vacant Housing Units

One bias that stemmed from our data collection was the underestimation of vacant housing units. This bias originates because almost all vacant units are identified by our field representatives while conducting in-person interviews. Due to the suspension of in-person interviewing, field representatives often were unable to confirm whether housing units were vacant or occupied. These housing units were defined as a special type of non-interview, called a Type-B non-interview. This is an important distinction because the weighting typically considers Type-B non-interviews to be the same as other non-interviews (e.g., refusals) and thus considers the housing units as occupied. Had we followed this procedure in 2020, we would have severely underestimated the number of vacant units and correspondingly overestimated the number of occupied units and households within them.

To address this bias, we used research from the 2020 Census that originally predicted whether non-responding housing units were occupied, vacant, or out of scope. In our case, we only needed to predict which housing units should be designated as vacant. We did not need to predict every vacant unit (since the ACS is a sample survey rather than a census) as we could use weighting adjustments in concert with the prediction model. Thus, we developed a model that used administrative data sources including IRS data, property tax records, and postal service data in combination with ACS operational and response data to assign each Type-B non-interview a probability of being vacant.

We then determined a threshold vacancy level, which varied by state, to select those Type-B non-interviews with the highest probability of being vacant. This threshold guaranteed a

minimum number of vacant housing unit records per county, ensured by selecting those Type-B non-interviews that had the highest probability of being vacant. This minimum number of vacant units would allow the weighting procedure to calibrate the annual vacancy rate, reflecting the vacancy rate measured from the non-peak pandemic months without introducing undue variance into the estimates. To achieve this balance, we selected enough records to account for approximately half of the deficit in expected vacant housing units during the peak six months. This allowed us to use the strongest model predictions while still meeting our overall goal of improving the vacancy rate.

For the selected units imputed to be vacant, the edit and allocation procedures filled in the missing data for these records, just as it does for vacant housing units in normal years. In all, we imputed approximately 10,000 vacant housing units across the country. This compares to a national total unweighted count of vacant interviews of approximately 200,000. Thus, the increase in allocations necessary to fill in the missing data for these records was a relatively small part of the total set of vacant interviews.

We then used a weighting adjustment so that the vacancy rate for the six-month period for April-September 2020 was equal to the balance of the year within substate areas defined by counties or groups of counties.

3.1.3 Occupied Housing Units

The next modification was to address the Type-B non-interviews that had not been imputed as vacant housing units. These Type-B non-interviews had their weights distributed to occupied housing units within the same sample panel group (discussed in Section 3.1.1). This was so that each panel would contribute a roughly equal proportion to the annual estimate and we could preserve the notion that the ACS represents an average across the period of 12 months.

This was particularly important because our non-interview adjustment, which transfers the weight of the non-interviews (including any Type-B non-interviews) to the interviews, is performed across months and within geography. If we did not preserve the relative weight of each panel, the non-interview adjustment would have transferred a disproportionate amount of the non-interview weights to months outside of the peak pandemic months. The result would have been a greatly diminished contribution of the peak pandemic months to the overall annual estimate and made the published estimates less comparable to previous years.

3.1.4 Non-Response Adjustments

Adjustments for non-response come from two aspects of the weighting: those adjustments typically referred to as the non-response adjustments and those adjustments labeled as coverage adjustments. Coverage adjustments mitigate the over- or under-representation of certain demographic groups that may remain after performing the non-response adjustments. Thus, if the non-response adjustment does not fully account for the degree to which certain

demographic groups may not respond to the survey, the coverage adjustments can mitigate that fact.

For 2020, rather than modify the usual non-response adjustment procedure, we expanded it by introducing additional coverage adjustments. Normally, the ACS uses population estimates produced by the Population Estimates Program (PEP) to perform our coverage adjustments. We use their annual estimates of total population for places and minor civil divisions as well as their annual estimates for counties by demographic groups. However, the PEP also produces sub-annual estimates at the state and national level both for housing units and for the population crossed by demographics.

In keeping with our 2020 approach of treating each sample panel grouping as its own survey, we implemented a sub-annual coverage adjustment for each grouping. The goal was to make the monthly estimates more representative and, in doing so, make the annual estimates formed by pooling those data more representative as well. This approach has the noted limitation that it can only address the non-response bias that (1) exists after the non-response adjustments and (2) is directly correlated with the base demographics in these controls (including race, Hispanic origin, age, and sex).

Our production methodology for 2020 therefore used sub-annual estimates by demographics as controls at the nation and state level followed by our standard use of annual PEP estimates at the county and subcounty areas. This provided a means to try to stabilize both the sub-annual contributions to the annual estimates as well as address finer geographical differences.

Beyond these additional steps in the weighting process, no additional modifications were made to the housing unit weights. We did, however, make additional adjustments for group quarters, as Section 3.2 describes.

3.2 Group Quarters Estimation

Two of the primary challenges stemming from the group quarters data collection were our inability to conduct any interviews for April through June and our difficulty in gaining access to the facilities starting in July. Addressing these challenges was less of an issue for the group quarters estimation methodology than for housing units, however, because the normal methodology already has a mechanism to impute whole-person records from interviewed persons in group quarters into those from facilities that were not in sample (and consequently have no interviews).

With only minor modifications, we could use our existing methodology on the 2020 data to impute interviewed persons in facilities to which we could not gain access. It is important to note that this imputation seeks donors from group quarters of a similar type and geographic proximity when imputing a group quarter with no interviews. For example, for an imputation for a nursing home, we first look for donors from other nursing homes in the area, and so forth.

Often during 2020, the donors for those imputations came from earlier in the year, before the pandemic hit, or later in the year, as restrictions on access began to lift.

This methodology limits the repeated use of a donor within a specific area. If this limit is reached, searches for donors expand outwards to find more distant donors within the same group quarter type (e.g., a state prison) or group quarter major type (e.g., all adult correctional facilities).

In this manner, we maintained representation of the group quarters population in all areas. While this methodology improves geographic representation, it comes at a temporal representation cost. That is because there is no way to account for what we would have collected during the peak pandemic months. Thus, the group quarters estimates generally reflect the non-peak periods, especially for group quarters that were subject to extended restricted access.

Our last area of estimation changes involved the use of administrative records for federal prisons. We had been informed by the Bureau of Prisons that we would not be allowed access to federal prisons. However, they transferred to us all administrative records that pertained to questions asked on the ACS. While those records did not contain information on all ACS topics, they did provide us with a core set of data that we could then ingest into our edit and allocation system. Our allocation methods then could create a full record of reported and imputed data for all residents of federal prisons who were in sample in 2020.

3.3 Summary of Estimation Modifications

The modifications to the housing unit weighting drew from several areas of expertise within the Census Bureau in the time allowed. By building on the work from the decennial census in predictive modeling of vacant housing units, we could rectify some of the non-response bias in the 2020 ACS data. The use of sub-annual housing and population estimates from the PEP helped to correct the bias that was correlated with base demographics on a month-by-month basis.

Overall, the modifications to our standard weighting processes were carefully selected for implementation. Each modification needed to be well understood by Census Bureau staff and needed to be implemented in our production setting without risking the integrity of the process or delaying our schedule. It was also important not to introduce radical design changes that could otherwise make the data more difficult to review if the resulting estimates were significantly affected by the changes both in design and in data collection.

Ultimately, we could not fully test these modifications using actual 2020 data while still releasing the 1-year data in a timely manner. Thus, while we could attend to various implementation details to help ensure that the modifications would perform as intended, we would not know the full extent to which they would be successful in mitigating the non-

response bias until the full ACS data review by our subject matter experts. Section 5 discusses the results of that review. The next section discusses the data quality measures that we analyzed prior to the regular data review discussed in Section 5.

4. DATA QUALITY MEASURES

After the data were processed, including with the modifications described in the previous section, we began our analyses of the data quality. These analyses are done every year, but since we had particular concerns about the 2020 data, we focused on a few specific data quality measures described below. With each release, the ACS produces four broad categories of data quality measures, which describe the overall data quality as well as the quality for specific subgroups or categories. These include:

- Sample size and interview counts
- Coverage rates
- Response rates
- Item allocation rates

4.1 Sample Size and Interview Counts

The sample size and interview counts provide an overall measure of how much of our annual housing unit or group quarters sample was allocated to a particular geographic area. The interview counts, together with the response rates, provide a measure of how successful we were in collecting interviews from those housing units or group-quarters persons in sample. They also provide a general indicator of how reliable the data may be for a particular geographic area without having to look at the individual margins of error for every estimate produced from that area.

In 2020, the reduction in the mail-out phase from April through June reduced our overall sample size from the planned 3.54 million to 2.87 million, or 18.9 percent (U.S. Census Bureau, 2013).[3] In addition, the combination of this reduced sample size and the reduced effectiveness of our data collection, over this period and into late summer, reduced our total interviews from 2.06 million in 2019 to 1.41 million in 2020, or 31.6 percent. This reduction in sample, combined with changes in our overall survey design, translated into increases in our margins of error by 20 to 30 percent. Individual areas could be affected by more or less than this amount, depending on how hard they were hit by the stay-at-home orders in 2020.

For the population in group quarters, the sample size, which reflects how many persons were eligible to be interviewed once we gained access to the facility, was dramatically lowered in 2020. Our sample size was only 97,000 in 2020, down from 167,000 in 2019, a drop of 41.9 percent. This reduction in sample reflects the suspension of data collection from April through June, the large number of vacant college dorms in the fall, and the field representatives'

[3] In the April, May, and June sample months, because there were no mail-out operations the production CAPI subsampling process was applied to the entire sample. For operational reasons, the CAPI workload had to be capped to a level that our FRs could manage. As a result, this subsample led to a sample reduction of approximately 670,000 cases during this period.

difficulty gaining access to facilities. The number of final interviews also fell from 150,000 in 2019 to 80,000 in 2020, a 46.7 percent decrease.

4.2 Coverage Rates

Coverage rates are a measure of how well the interviewed sample covers both housing units and the population, both overall and for certain demographic groups. To calculate these rates, we use the Population Estimates Program (PEP) estimates for total housing units and for population by demographics. These rates provide an independent dataset to which to compare the estimates from the ACS, prior to the use of any housing or demographic controls, to the PEP. They can help identify areas where the ACS may under- or over-cover a population or miss a segment of the population altogether.

In 2020, the overall coverage rates did not change much when looking at housing units or the total population. These measures indicate the quality of our sampling frame rather than non-response bias. Housing unit coverage dipped from 98.0 percent in 2019 to 96.7 percent in 2020. While this shift is larger than we would typically observe in a single year, it is still a relatively high coverage rate. For coverage of the total population, we had 92.2 percent in 2020 as compared to 91.8 percent in 2019 which, again, was a relatively modest shift and is not a meaningful change.

Overall, the coverage rates by race were largely skewed indicating significant shifts in the response population as shown in Table 4.1. Generally, there were significant decreases for both Black non-Hispanic and Hispanic populations. Given that the overall coverage rate for total persons did not change much, we observed significant increases for Non-Hispanic American Indian and Alaska Native and Asian groups. While there is nominally a large increase for Native Hawaiian and Other Pacific Islander groups, the change is not statistically significantly different. Thus, prior to the application of our independent population estimates as control totals (as described briefly in Section 3.1), we had a very different racial makeup of our interviewed sample.

Table 4.1. Coverage Rates for Total Population by Race: 2019 and 2020

	2019	2020
White Non-Hispanic	96.0	95.8
Black Non-Hispanic	81.2	78.1
American Indian and Alaska Native Non-Hispanic	82.7	152.9
Asian Non-Hispanic	92.9	99.8
Native Hawaiian and Other Pacific Islander Non-Hispanic	83.0	88.5
Hispanic (of any race)	85.9	84.5

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

The group quarters population had a greater shift in overall coverage. For 2019, the coverage rate was 84.1 percent, which decreased to 74.5 percent in 2020. The increased vacancy of college dormitories was a large contributor to this result, as college dorms make up a significant proportion of the group quarters population, and our benchmark estimate does not account for this change in the dorm population.

4.3 Response Rates

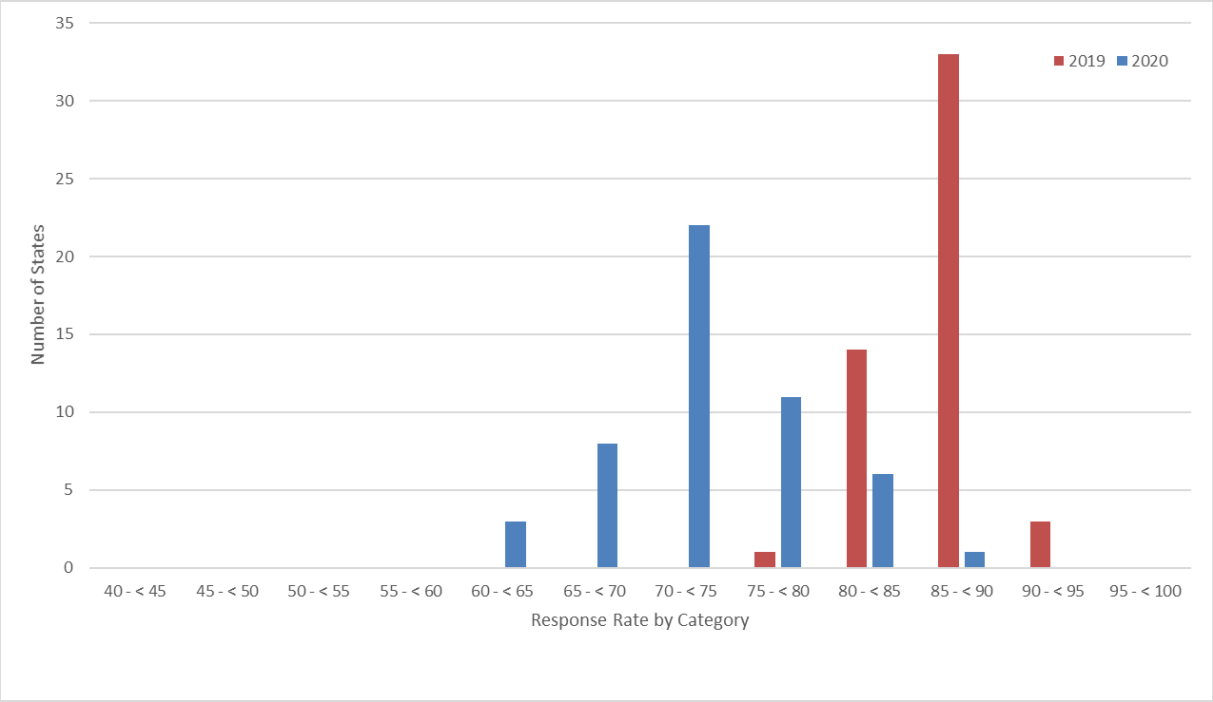
Response rates are calculated as the weighted ratio of units interviewed to the estimate of units that should have been interviewed. The rates are calculated for all units that go into the estimates for a particular data year, rather than all units that were selected in sample for a particular year. Ineligible units and units that had no opportunity to respond are removed from the denominator.

Response rates are an indicator of potential non-response bias in a survey and do not measure non-response bias directly. When considering the effect of non-response bias, two items are important: (1) the overall magnitude of the non-response and (2) the degree to which nonrespondents differ from respondents. The response rate is only an indicator of the first of these two factors. If the interviewed sample is representative, then the size of the non-response rates does not matter. If the interviewed sample is not representative, however, its effect on the final estimates is limited by the relative size of the non-response universe. Thus, the final impact is determined by the degree to which the nonresponding universe is different from the responding universe, the size of the nonresponding universe, and the ability for estimation techniques to mitigate the bias.

The overall response rate for the housing unit universe fell from 86.0 percent in 2019 to 71.2 percent in 2020. It should be noted that the response rate in 2019 was lowered by approximately 4 percentage points due to a lapse in appropriations that ran from December 2018 until February 2019 (U.S. Census Bureau, 2019c) and that in 2018 the response rate was 92.0 percent. Thus, in real terms, the response rate for 2020 was 20.8 percentage points lower than a more typical year. Out of the 28.8 percentage points of non-response (the complement of the response rate), 16.9 percentage points came from a general reason category, “Other”, of which approximately 14.0 percentage points reflected our inability to contact the housing unit due to the pandemic. Of the remaining 11.9 percentage points of non-response, 8.0 percentage points stemmed from refusals, up from 4.7 percentage points in 2019. These two sources account for 17.3 percentage points of increased non-response and thus explains most of the increase from 2018 and 2019 to 2020.

While the stay-at-home orders affected all states, the degree varied depending on factors including the extent and duration of the orders and the extent to which we typically collect responses via self-response. Figure 4.1 shows that the distribution of the state-level response rate was generally lower and exhibited more variability in 2020 as compared to 2019.

Figure 4.1. State-Level Response Rates for States and the District of Columbia, by Category



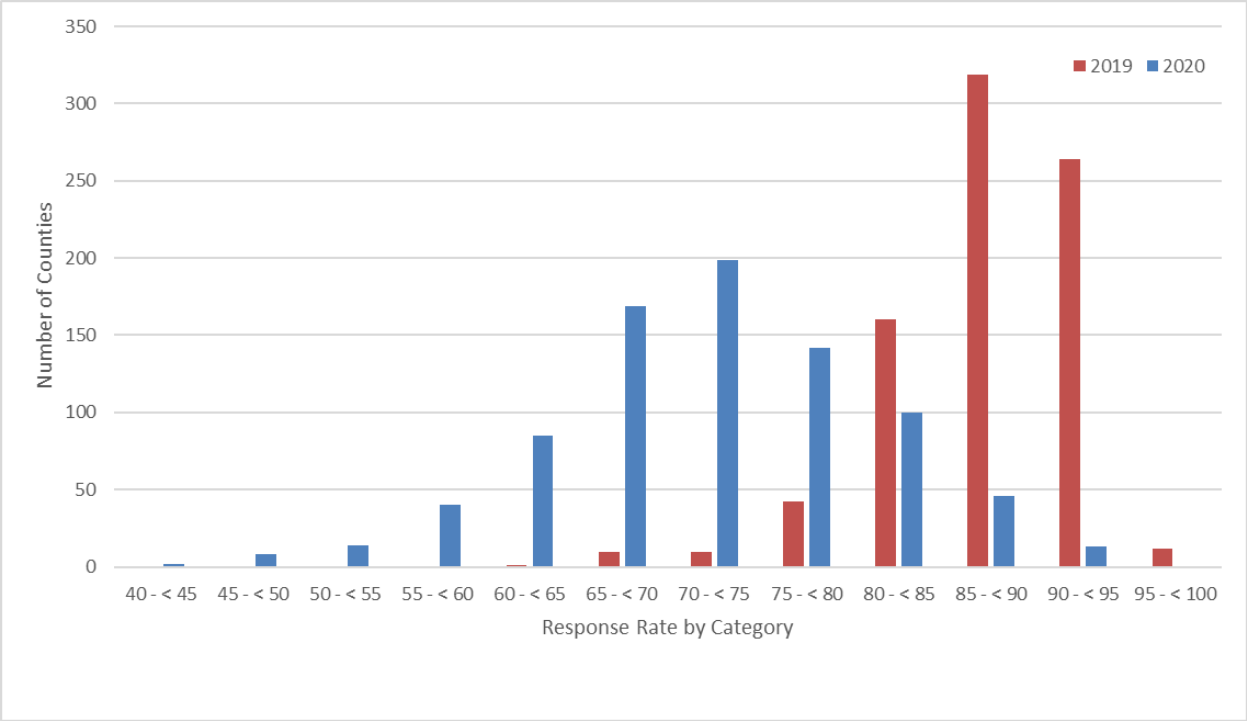
Source: U.S. Census Bureau, 2019 and 2020 American Community Survey, 1-year estimates

The state-level data only show part of the story, however, the results for lower levels of geography showed even greater effects. Figure 4.2 shows the distribution of response rates by county for the 818 published counties that met the 1-year publication threshold for 2020. Some counties showed response rates of 50 percent or less. Some of the counties with the lowest values for 2020 had among the highest response rates in 2019. Results like these raise the greatest concern, as the core mission of the ACS is to produce data for these substate geographic areas.

The reasons for this low response were not entirely due to the months in which in-person CAPI interviewing was suspended. Even after we started to resume our in-person non-response follow-up in July 2020, our field representatives faced refusal rates of up to 30 percent in some counties, likely related to concerns over COVID-19.

Group quarters response rates dropped significantly due to access issues, falling from 90.9 percent in 2019 to 47.2 percent in 2020. Nearly all of that 43.7-percentage-point drop was accounted for by two catch-all categories where the person or the group quarter was not accessible during the data collection period.

Figure 4.2. County-Level Response Rates for 1-Year Published Counties, by Category



Note: Counties with populations of 65,000 or more.
Source: U.S. Census Bureau, 2019 and 2020 American Community Survey, 1-year estimates

4.4 Item Allocation Rates

Item allocation rates are a measure the completeness of the data collected from respondents. Unlike the (unit) response rates, which simply classify a unit in sample as having either responded or not, item non-response rates measure the extent to which persons who responded to the survey answered specific questions or groups of questions. When the respondent fails to provide an answer to a particular question, the ACS will generally fill in those missing data using one of two methods:

- Assignment: This involves logical imputation, in which a response to one question implies the value for a missing response to another question. For example, school grade or level attending can often be used to assign a value to highest degree or level of school completed.

- Allocation: This involves using statistical procedures, such as values donated by other respondents either within the same household or from another household containing a person similar to the respondent, to impute missing values.

The metric used as an indicator of data completeness is the weighted percentage of the data filled in by allocation only; it does not include those instances with assignments.

The ACS Quality Measures Web page (U.S. Census Bureau, 2019b) provides the most detailed description of item allocation rates each year at the national and state levels; it also contains a time series for these metrics since 2000. The overall housing item allocation rate has been stable at 4.7 percent for the past four years. In 2020, the overall rate increased to 5.2 percent. Table 4.2 shows five characteristics that had statistically significant changes from 2019 to 2020.

Table 4.2. Allocation Rates for Selected Housing Characteristics: 2019 and 2020

Housing Characteristics	2019	2020	Change
Vacancy Status	3.9	13.8	9.9
Units in Structure	1.5	3.3	1.8
Yearly Other Fuel Cost	7.0	5.5	-1.5
Mortgage Payment Includes Insurance	6.2	4.7	-1.5
Other Monthly Mortgage Payment(s)	24.4	21.6	-2.8

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

These five changes were all 1.5 percentage points or greater in absolute values. All of these changes between 2019 and 2020 were statistically significant (at the 90 percent significance level), as most changes are at the national level.

Generally speaking, the allocation rates for more characteristics increased rather than decreased, and the cumulative effect across all characteristics was a statistically significant increase in the overall allocation rate of 0.5 percent. This increase was observed across all modes of data collection except for Telephone Questionnaire Assistance (TQA). This mode of collection is much smaller than the other methods, and while it showed a small nominal increase, the increase was not statistically significant.

For person characteristics, the increase in overall allocation rates was more pronounced, increasing from 10.6 percent in 2019 to 12.3 percent in 2020 (1.7 percentage points). The overall person characteristics allocation rate has been increasing since 2015, typically 0.2 to 0.3 percent per year with one year being 0.6 percent. While the rate had historically been increasing, the 2019 to 2020 increase of 1.7 percentage points represented a more sizable year-to-year increase than observed in the past five years. Like the housing characteristics, this increase in overall person allocation rates was statistically significant across all modes except for TQA. For both person and housing characteristics, the Internet mode of data collection showed the largest relative increases among the household population, although mail remained the mode with the highest overall allocation rates.

It is worth noting that the group quarters population had a sizeable relative and absolute increase in item allocation rates for person characteristics, with their allocation rates up approximately 50 percent in relative terms from 2019 (and an overall allocation rate of 22.8 percent). Thus, the data for the group quarters population suffers from both dramatically lower response rates and significantly increased item allocation rates.

There were twelve individual person characteristics whose allocation rates had statistically significant differences and increased by at least 3.0 percentage points from 2019 to 2020 (see Table 4.3). It is worth noting that several of these items were related to traveling to work, perhaps an indication that responding to these questions was more difficult when many were either out of work or working from home. Allocations for some of these characteristics, such as "Migration County" and the other migration variables, were related to the processing challenges of trying to bridge responses to the "residence one year ago" question, first to 2010 Census geography and subsequently to 2020 Census geography for tabulation. As such, they were not necessarily reflective of a change in respondent behavior.

Other characteristics do not have ready explanations related to either changes in survey operations or the real-world conditions. For example, there is not a clear explanation as to why sharp changes in "English-Speaking Ability" and "Other Language Spoken" allocation rates exist in the 2020 data.

Table 4.3. Allocation Rates for Selected Person Characteristics: 2019 to 2020

Person Characteristics	2019	2020	Change
Field of Degree	14.3	20.9	6.6
Time of Departure to Work	22.3	26.6	4.3
Commuting Time	16.4	20.4	4.0
Migration County	17.4	21.4	4.0
Migration State / Foreign Country	16.1	20.1	4.0
Migration Place	17.8	21.7	3.9
Migration Minor Civil Division	17.0	20.4	3.4
Carpool Size	12.8	16.1	3.3
Grade Level Attending	12.2	15.4	3.2
English-Speaking Ability	8.8	12.0	3.2
Transportation to Work	11.2	14.3	3.1
Other Language Spoken	9.8	12.9	3.1

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

4.5 Summary of Data Quality Measures

Overall, the quality measures provide some insights into the data. The coverage rates shown in Table 4.1 confirm that the groups with usually high coverage rates in the survey, including White non-Hispanic and Asian non-Hispanic populations, continued to be well-represented in 2020. However, groups that tend to be underrepresented in the estimates, such as the Black non-Hispanic and the Hispanic populations, had lower coverage rates and were less represented in 2020. This provides some of our strongest direct evidence of shifts in the response universe for 2020, particularly for geographies in which these groups were concentrated.

The sample size and response rate information demonstrate the effect of the pandemic on our data collection and our changes to data collection strategies. The sharp decrease in total interviews, approximately one-third lower than in 2019, provides the simplest one-number summary of that total impact. As shown in Figure 4.1, the distribution of the response rates at the state level generally shifted by 12 to 15 percentage points. While individual states may have decreased by more or less than the national level, all states were affected.

Item allocation rates increased overall, although this is generally not a worrisome result, especially for the household population. While caution should be used in analyzing these data given the changes in the response populations, the data may provide some insights into what types of questions were more difficult for respondents to complete given the changes in their lives.

All of the quality measures presented showed more troubling results for the group quarters population. In general, compared to a usual ACS year, the response rate for the group quarters population was very low, the data received were significantly less complete, and the coverage rate was much lower. In short, the group quarters data posed some of the greatest challenges to the ACS program.

5. ANALYSIS OF SELECTED CHARACTERISTICS

Once the processing steps are complete, the edited and weighted datasets are provided to subject-matter analysts for their review. Analysts are responsible for determining whether the survey estimates are reasonable. Using external data – for example, administrative data from government agencies or survey data collected independently of the ACS – analysts develop metrics to assess whether the ACS estimates are consistent with their knowledge of the topic.

For the 2020 ACS 1-year data, analysts formed expectations using the usual methods. Based on the pandemic and economic changes, certain subjects were expected to show change in a particular direction. Other topics are less likely to experience year-to-year change, even during the extraordinary circumstances of 2020.

Home ownership, income, employment, employment-based health insurance, and poverty are among the estimates for which changes might be expected given the magnitude of the economic shock experienced by the U.S. economy with the onset of the COVID-19 pandemic. However, the complexities of the ACS survey design make it difficult to assess reasonableness of these changes. An estimate that was found to be counter to expectation would not, in and of itself, be a reason to reject the data.

For some topics, we have timely and reliable external benchmarks. Using these data can make it clearer that the issue may be in the ACS 1-year estimate. For example, the Center on Medicaid and Medicare Statistics (CMS) releases monthly enrollment data, which provide a specific reference for the ACS estimate. Historically, while levels of Medicaid enrollment in the CMS data and ACS data have differed, the year-to-year trends have been consistent. However, in 2020, CMS enrollment data and the ACS estimate of Medicaid coverage moved in different directions. This divergence between ACS 1-year estimates and the CMS data is compelling evidence of an issue with ACS.

Marital status, educational attainment, building structures and the size of the foreign-born population are topics that tend not to change dramatically from one year to the next. Large year-to-year changes in any of these estimates would call into question the reasonableness of the data, particularly the ability of the weighting procedures to correct for non-response bias.

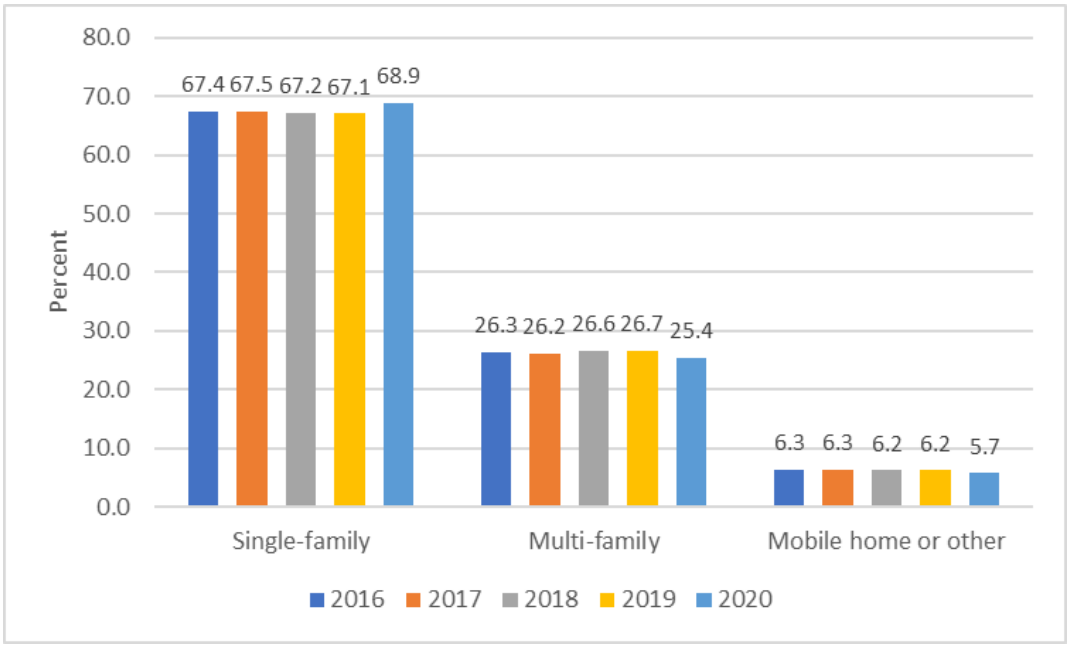
This section presents a set of characteristics that demonstrate the ways in which certain data were unreasonable. The selected topics are not the only ones about which analysts raised concerns. As a consequence of the size and characteristics of the non-interviewed population described in previous sections, the interviewed sample was more economically advantaged than in earlier years. The examples in this section illustrate a pattern of issues related to the composition of the respondent population.

5.1 Building Structure Type

The ACS measures the structure type of the building in which housing units are located (e.g., mobile homes, single-family detached homes, 50+ unit apartment buildings, etc.). This measure typically changes incrementally over time, as housing units are added to or removed from the nation's residential housing stock through new construction, demolition, conversion to non-residential uses, and other processes. The year-over-year changes in building structure type between 2016 and 2019 illustrate this incremental change, with the estimated share of each structure type changing by no more than 0.4 percentage points between any two years. In contrast, the estimates in the 2020 ACS imply an increase of 1.8 percentage points in the share of single-family units (see Figures 5.1a and 5.1b).

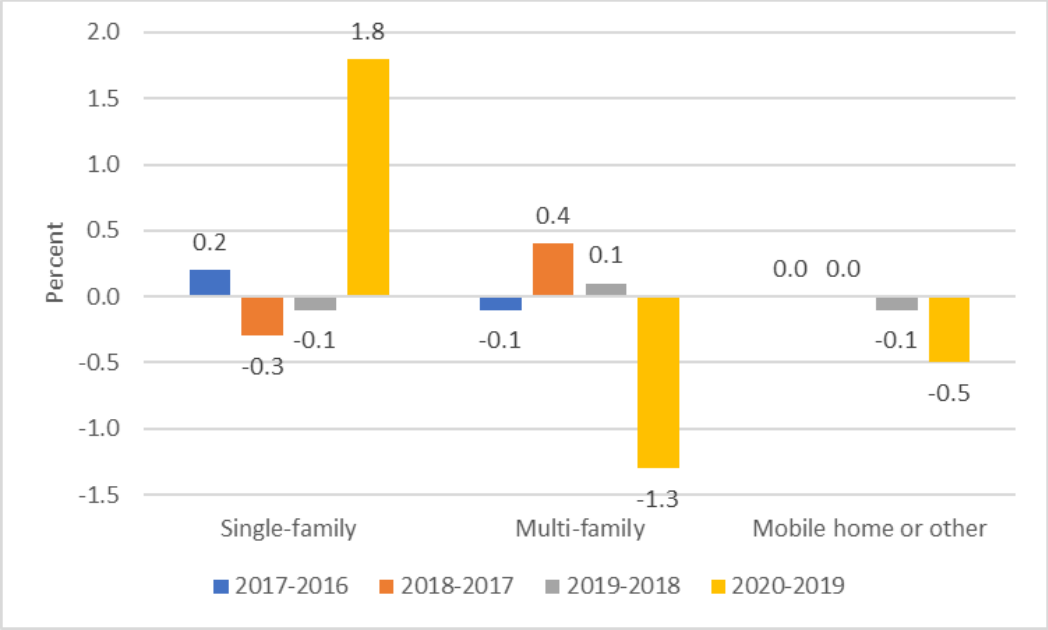
If this were accurate, this change from 2019 to 2020 would imply an increase of more than 3.2 million single-family homes during a period when the total number of housing units (of all types) increased by only 1.1 million units. Offsetting this increase, the 2020 ACS estimates also imply year-over-year losses of 570,000 mobile homes and 1.6 million units in buildings with 2 or more apartments between 2019 and 2020. As Section 3 on estimation modifications and Section 4 on quality measures demonstrated, the composition of the responding households was not representative of the housing units in typical years despite best efforts to adjust for the collection disruptions. These dramatic year-over-year changes from 2019 to 2020 raised concerns about the accuracy of the 2020 estimates and the non-response bias.

Figure 5.1a. Structure Type: 2016 to 2020



Source: U.S. Census Bureau, 2016 to 2020 American Community Survey, 1-year estimates

Figure 5.1b. Change in Structure Type: 2016 to 2020

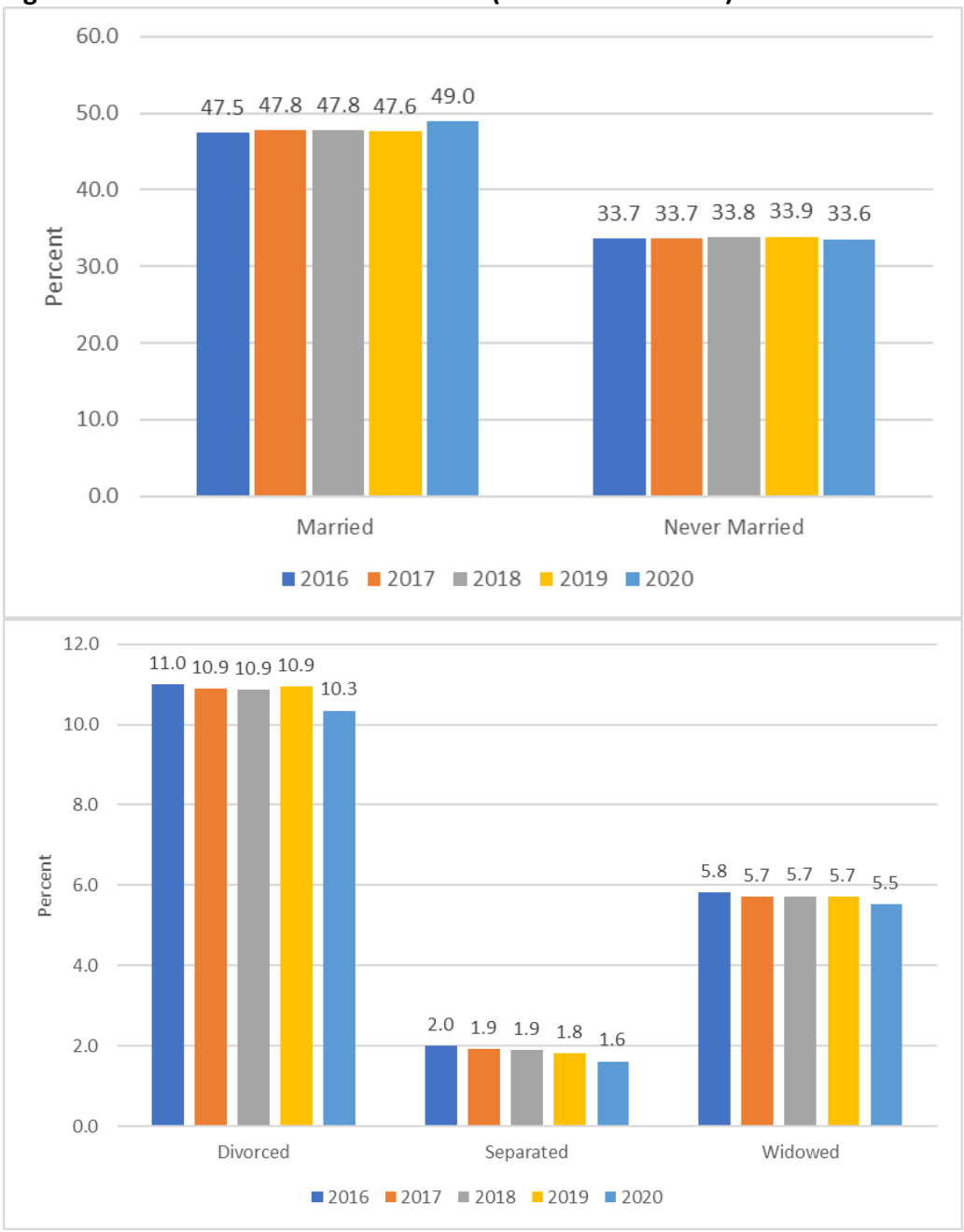


Source: U.S. Census Bureau, 2016 to 2020 American Community Survey, 1-year estimates

5.2 Marital Status

The 2020 ACS data show a marked increase in the percentage of adults who were married and a decrease in the percentage of those who were never married, compared to earlier years. Figure 5.2a shows the distribution of marital status had been fairly stable over the prior four years of the ACS, so the shift in the 2020 data was notable. For example, the percentage of those 15 and over who were married shifted no more than 0.3 percentage points year-to-year from 2016 through 2019. However, between 2019 and 2020, the married population increased 1.4 percentage points, and we had no reason to believe that this result reflected an actual change in the marital status of U.S. residents (see Figure 5.2b). Conversely, the never-married population increased between and 2019 by less than 0.2 percentage points per year but decreased by 0.3 percentage points between 2019 and 2020, the greatest difference since 2016. Shifts in the other marital status categories (divorced, separated, widowed) were also larger between 2019 and 2020 than they had been during 2016 to 2019.

Figure 5.2a. Marital Status Distribution (15 Years and Over): 2016 to 2020



Source: U.S. Census Bureau, 2016 to 2020 American Community Survey, 1-year estimates

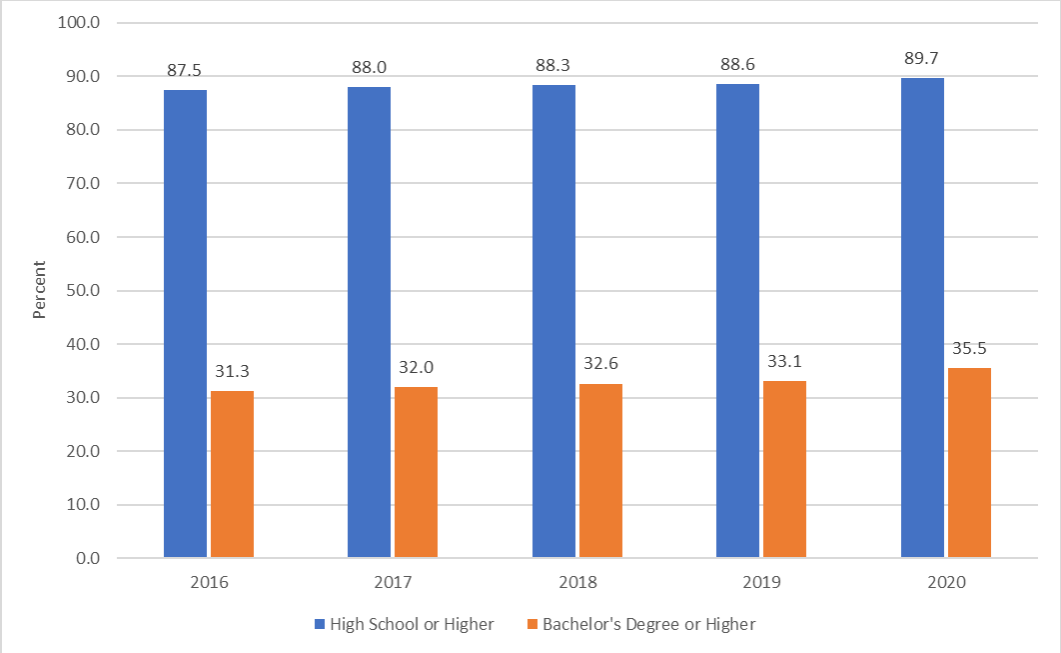
Figure 5.2b. Change in Marital Status Distribution (15 Years and Over): 2016 to 2020

Source: U.S. Census Bureau, 2016 to 2020 American Community Survey, 1-year estimates

5.3 Educational Attainment

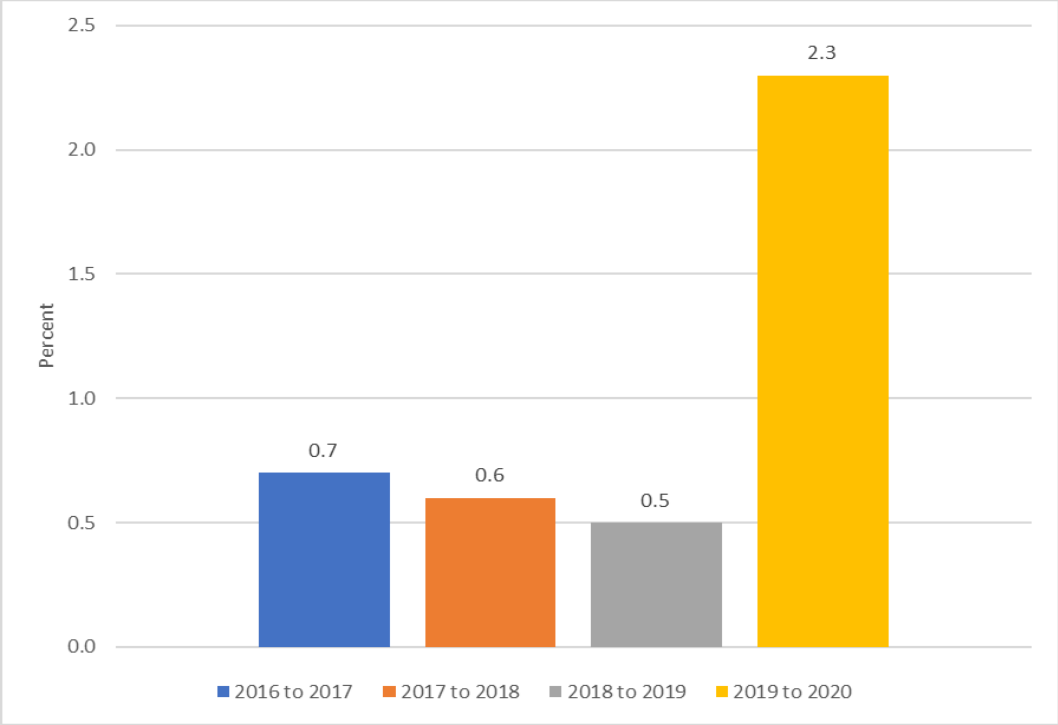
The proportion of adults with a bachelor's degree or higher has not increased by more than 0.7 percentage points in a year from 2016 to 2019 (see Figure 5.3b). However, Figures 5.3a and 5.3b show a large increase from 2019 to 2020, with the number of people aged 25 and over with a bachelor's degree or higher growing by 2.3 percentage points.

Figure 5.3a. Educational Attainment (25 Years and Over): 2016 to 2020



Note: Differences may not add up due to rounding.
Source: U.S. Census Bureau, 2016 to 2020 American Community Survey, 1-year estimates

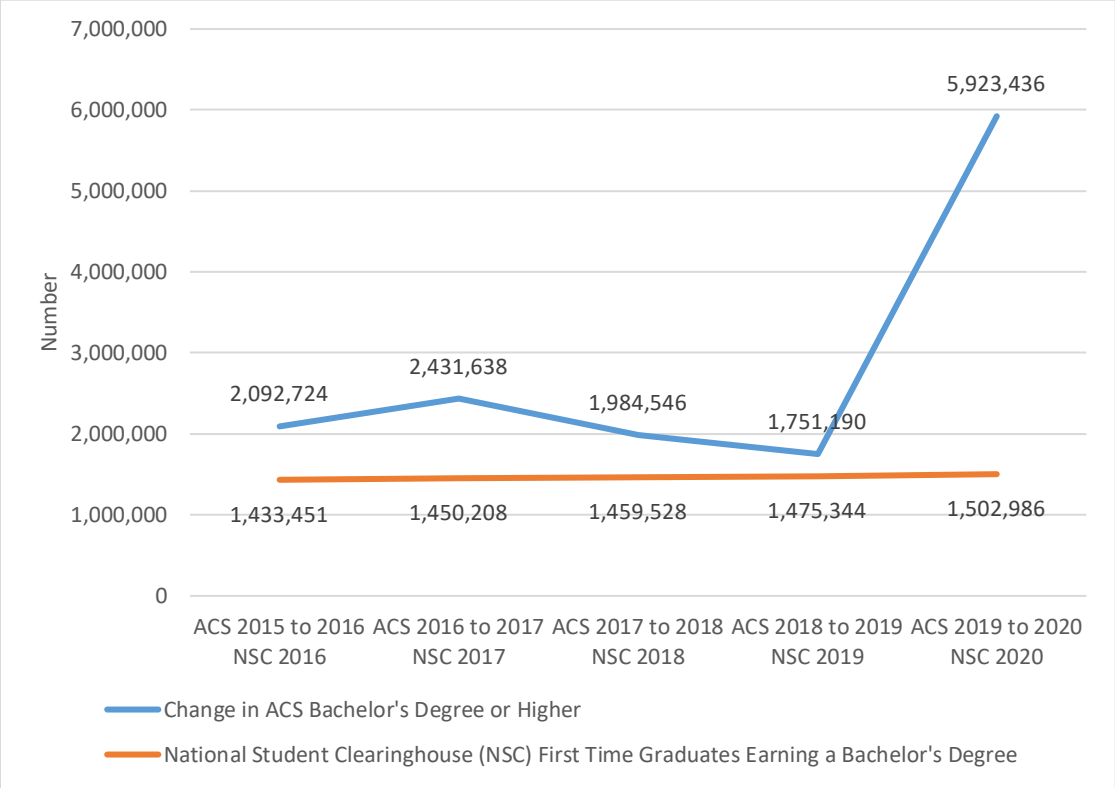
Figure 5.3b. Change in Percent Bachelor's Degree or Higher (25 Years and Over): 2016 to 2020



Source: U.S. Census Bureau, 2016 to 2020 American Community Survey, 1-year estimates

If this were accurate, it would suggest that there was an increase of about 6 million people in the U.S. with a bachelor's degree from 2019 to 2020 (see Figure 5.3c). Comparing this result with the increase of around 2 million bachelor's degrees in the ACS in recent years, we quickly saw that there was reason to doubt the accuracy of the 2020 ACS 1-year estimates. These estimates are especially suspicious given that other data sources, such as administrative records from the National Student Clearinghouse (Huie et al., 2021) do not show a large increase in the number of first-time graduates earning a bachelor's degree in the 2019 to 2020 academic year.

Figure 5.3c. Bachelor's Degree or Higher from the ACS and the First-Time Graduates Earning a Bachelor's Degree from the National Student Clearinghouse



Note: These lines represent different concepts. The ACS line shows the difference in the number of people in the U.S. with a bachelor's degree or higher, and accounts for things like bachelor's degrees earned, migration, and death. The National Student Clearinghouse data show the number of the first-time graduates earning a bachelor's degree.
Source: U.S. Census Bureau, 2015 to 2020 American Community Survey, 1-year estimates and the National Student Clearinghouse 2016 to 2020.

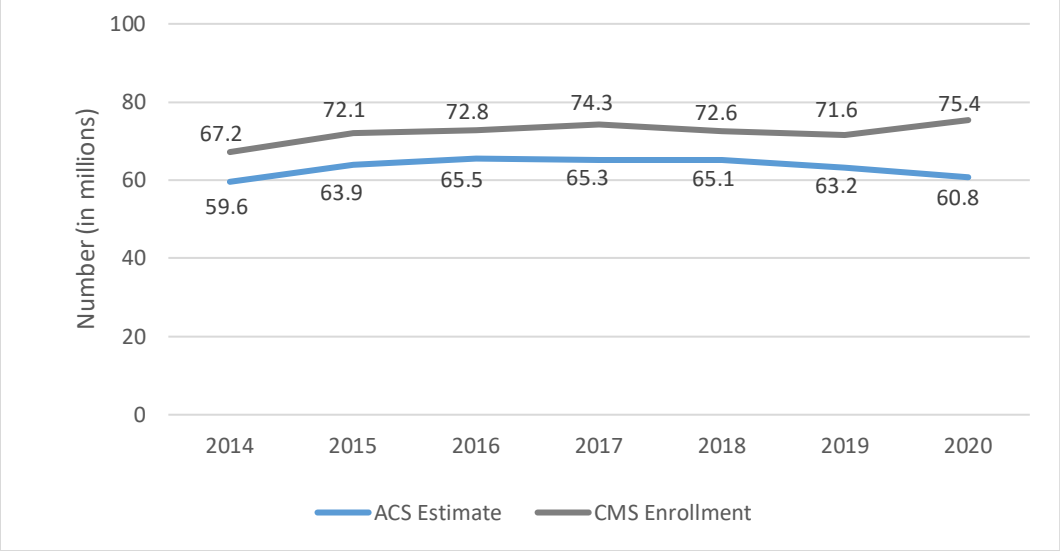
This result provided another reason to question the representativeness of the data collected in 2020 and showed that the non-response bias was leaning towards a more highly educated population.

5.4 Medicaid Coverage

The ACS asks respondents to report whether they have any of six types of health insurance coverage. The fourth type of coverage option is generally referred to as "Medicaid," although the exact question wording is "Medicaid, Medical Assistance, or any kind of government-assistance plan for those with low incomes or a disability."[4]

Given the complex health insurance environment, it is not surprising that ACS estimates of the number of people covered by Medicaid and the Children's Health Insurance Program (CHIP) tend to be lower than enrollment counts from administrative records, as reported by the Centers for Medicare and Medicaid Studies (CMS). Figure 5.4 shows the ACS estimate of the number of people covered by "Medicaid" and the number of people enrolled in Medicaid and CHIP according to CMS.[5] From 2014 to 2019, ACS estimates of the number of people covered by Medicaid at the time of interview generally tracked well against the administrative data from CMS, a pattern that did not hold in 2020.

Figure 5.4. Medicaid Coverage Estimates from the ACS and CMS: 2014 to 2020



Note: The ACS estimates are for all persons in households.
For 2014 to 2017, the CMS estimate is the reported enrollment for July.
For 2018, 2019, and 2020, CMS is the average of the 12 months from the monthly report.
Source: U.S. Census Bureau, 2014 to 2020 American Community Survey, 1-year estimates and the Centers for Medicare and Medicaid Services Monthly Enrollment Snapshots 2014-2020.

[4] The ACS questionnaire does not explicitly ask about CHIP (Children's Health Insurance Program) or state-specific plans (e.g., Peach State Health Plan, a Georgia-based Medicaid managed care plan). Yet, research has shown that while some people may be uncertain about which coverage they receive, many of those with Medicaid, or those with children covered by CHIP, accurately report their coverage (Boudreaux et al., 2019; Call et al., 2008).

[5] CMS reports monthly enrollment in Medicaid and CHIP, whereas ACS reports an annual estimate. For purposes of illustration, CMS enrollment data from each July were used for 2014 to 2017. For 2018 to 2020, the figure uses an annual average. Given the dramatic change in Medicaid enrollments during 2020, the estimate shown (75.4 million) is consistent with the ACS measure. For context, the July 2020 enrollment number from CMS was 76.0 million.

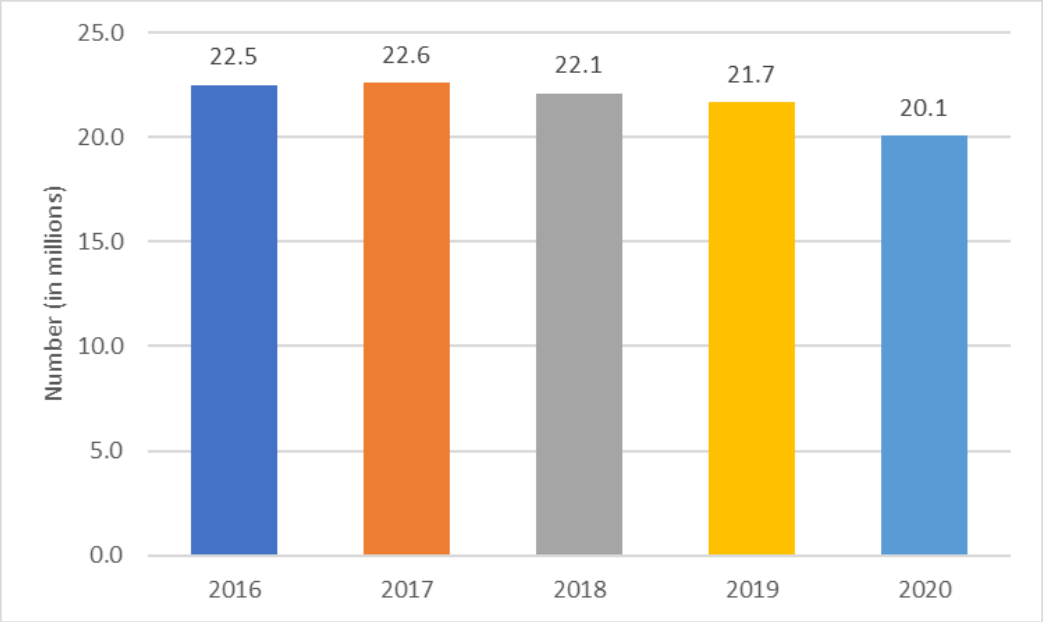
The 2020 ACS 1-year estimates show that Medicaid covered 60.8 million people, or 18.9 percent of the population compared with 63.2 million people (19.7 percent) in 2019. Typically, enrollment in Medicaid and other means-tested programs rise during economic downturns (Benitez et al., 2020; Buchmueller et al., 2019). Given the COVID-19 pandemic and its associated economic shock in 2020, one would expect an increase in Medicaid enrollment in 2020. Instead, the ACS estimates suggest the number of people with Medicaid coverage declined by 2.4 million (0.8 percentage points), which is counter to expectations and to the CMS data (Center for Medicare and Medicaid Services, 2021).

Specifically, Medicaid and CHIP enrollment, as reported by CMS, increased from about 70.7 million to about 80.5 million people between February 2020 and January 2021, an increase of about 10 million people. The 2020 ACS 1-year estimate was inconsistent with the Medicaid enrollment data from CMS. The final interviewed households in the 2020 ACS were more advantaged in terms of education and income than in previous years (as discussed in other sections of this report), and therefore less likely to be eligible for and/or report Medicaid coverage.

5.5 Non-Citizen Population

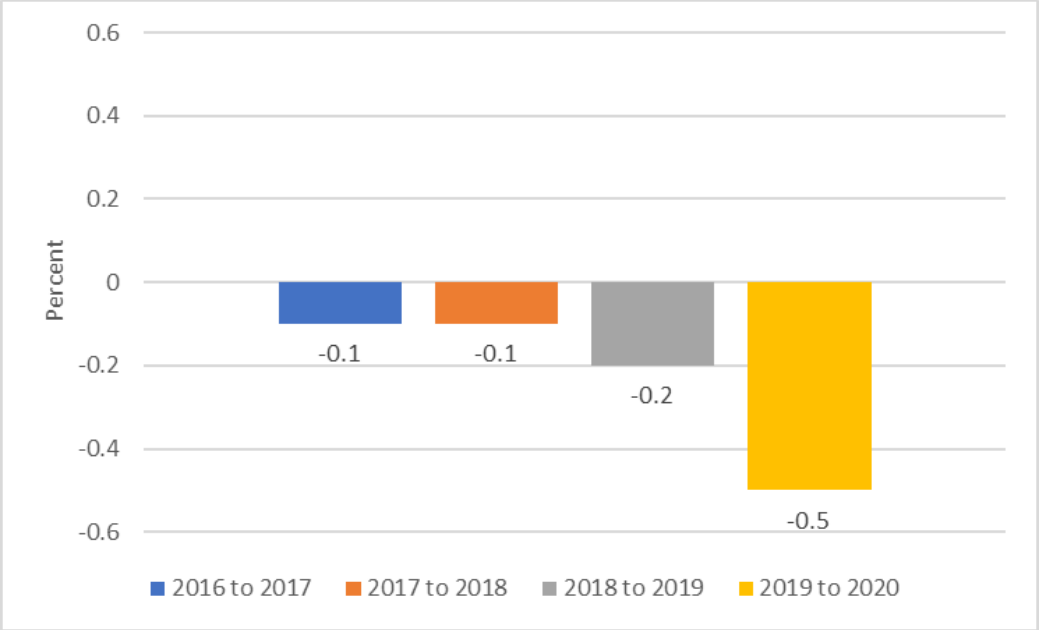
The 2020 ACS data show a notable decrease in the non-citizen population. The non-citizen population has hovered between 21.7 and 22.6 million nationally for the years 2016 to 2019, but the 2020 ACS put the population at 20.1 million, which is a decline of about 1.6 million from the prior data year (see Figure 5.5a). While some of this decrease may be due to a change in net international migration, much of the observed decline is likely due to non-response bias, since the foreign born – and non-citizens in particular – disproportionately respond to the ACS via in-person response follow-up methods like CAPI, and those follow-up methods were significantly curtailed in 2020 (as discussed in Section 2).

Figure 5.5a. Number of Non-Citizens: 2016 to 2020



Source: U.S. Census Bureau, 2016 to 2020 American Community Survey, 1-year estimates

Figure 5.5b. Change in Share of Non-Citizens: 2016 to 2020



Note: The graphic shows the share of the total population who are non-citizens.
Source: U.S. Census Bureau, 2016 to 2020 American Community Survey, 1-year estimates

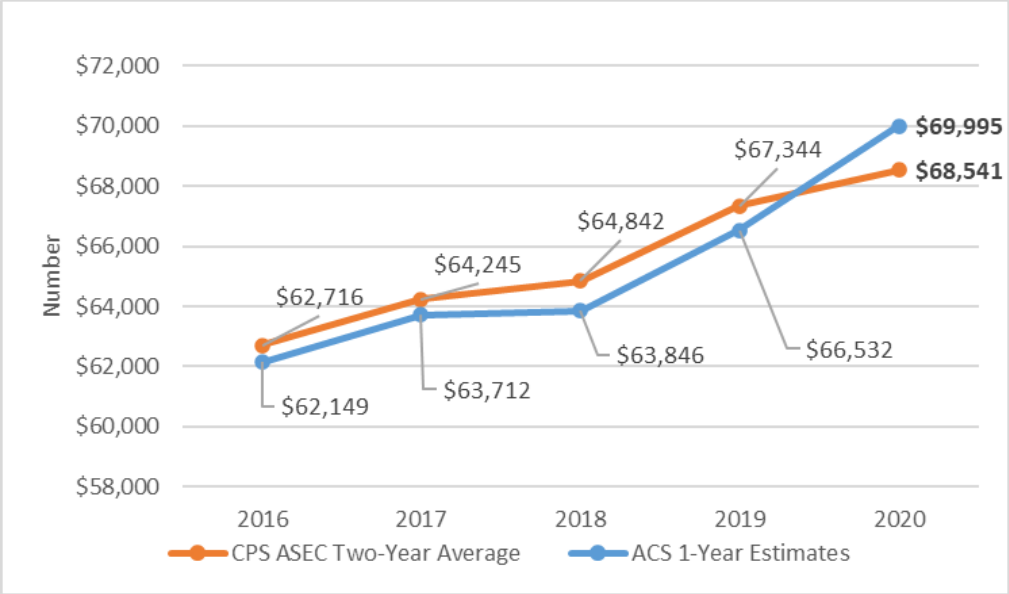
5.6 Median Household Income

Measuring median household income during an unprecedented period of economic uncertainty would have challenges without having to consider the impacts of collecting data during a global pandemic that shut down businesses, saw vast unemployment, and mandated stay-at-home orders. While the ACS traditionally has shown lower median household incomes compared to

the Current Population Survey Annual Social and Economic Supplements (CPS ASEC) for myriad reasons, estimates from the two surveys traditionally have not diverged to the degree seen comparing the 2020 ACS and the 2020-2021 CPS ASEC.[6]

Figure 5.6a shows that the median household income in the 2020 ACS was $1,454 higher than the 2020-2021 CPS ASEC, with all previous years showing the ACS with lower median household income (Rothbaum and Hokayem, 2021).[7]

Figure 5.6a. Median Household Income: 2016 to 2020



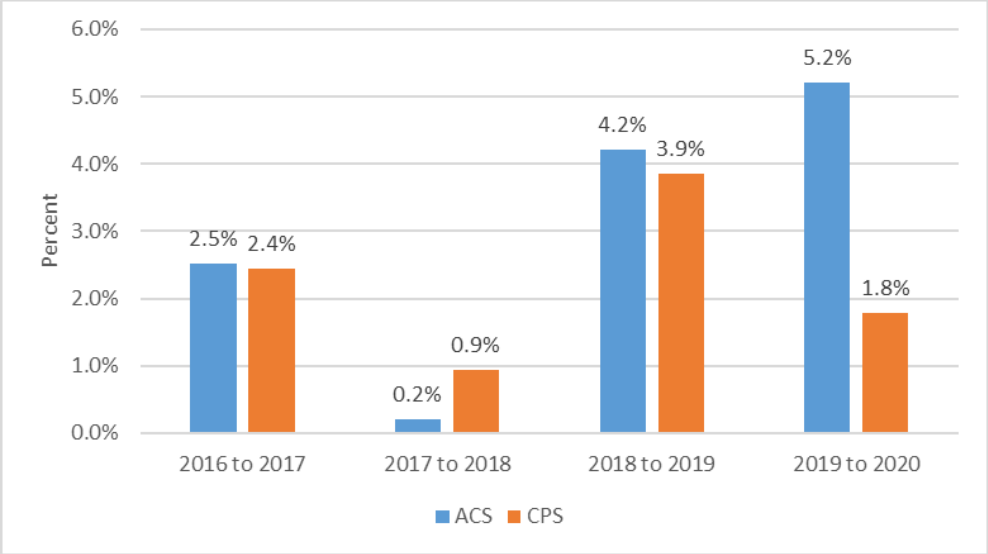
Note: All estimates are in 2020 dollars.
Source: U.S. Census Bureau, 2016 to 2020 American Community Survey, 1-year estimates and the U.S. Census Bureau, Current Population Survey, 2016 to 2021 Annual Social and Economic Supplements (CPS ASEC).

Not only is the difference between the ACS and the CPS ASEC concerning, but the difference between the 2019 and 2020 ACS is also notable. Figure 5.6b shows that median household income increased 5.2 percent, larger than any change in the last five years.

[6] One-year ACS estimates are compared to two-year average CPS ASEC estimates to account for the differences in the reference periods for the two surveys. The CPS ASEC asks respondents to report on their income in the previous calendar year while the ACS asks about income in the prior 12 months. Since the ACS is a continuous survey administered throughout the year, some respondents to the 2020 ACS (those who fill out the survey in January 2020) are reporting income received between January 2019 and December 2019 while other respondents (those who fill out the survey in December 2020) are reporting income received between December 2019 and November 2020. Therefore, 2020 ACS estimates can be thought of as roughly centered around the end of Jan 2020. The estimates from the 2020 and 2021 CPS ASEC are for income received in 2019 and 2020, respectively, so their average is roughly centered around the beginning of January 2020. Thus, the 2-year average of the CPS estimates is about the best one can do to get timing of income reports comparable to those used by the 1-year ACS estimates.

[7] CPS ASEC estimates shown in these figures are those published in September 2021. If the 2019 and 2020 CPS ASEC estimates used had been those corrected for non-response bias, the differences would have been even greater.

Figure 5.6b. Change in Median Household Income: 2016 to 2020



Note: All estimates are in 2020 dollars.
Source: U.S. Census Bureau, 2016 to 2020 American Community Survey, 1-year estimates and the U.S. Census Bureau, Current Population Survey, 2016 to 2021 Annual Social and Economic Supplements (CPS ASEC).

5.7 Summary of the Selected Characteristics

The set of characteristics highlighted in this section demonstrates that the 2020 ACS data were not reasonable. The selected topics are not the only ones about which analysts raised concerns, however, they illustrate that the respondents to the 2020 ACS were more economically advantaged compared to previous years. At face value, these data make it appear that the U.S. population had higher levels of education, had more married couples and fewer never married individuals, had less Medicaid coverage, had higher median household incomes, had fewer non-citizens, and were more likely to live in single-family housing units. In the midst of a pandemic that negatively affected so many lives in 2020, these data show that the respondents were not nationally representative and that the weighting methods did not account for the non-response bias.

Furthermore, these findings are at the national level. When the data are this biased at the national level, one can only assume that state level data, as well as lower levels of geographies, will show varying degrees of unreasonableness, and may exhibit even greater anomalies.

6. SUMMARY

The Census Bureau has an obligation to produce accurate, relevant statistics about the nation's economy and people. The data collection issues experienced by the 2020 ACS severely affected the data quality of these statistics. For these reasons, the Census Bureau decided not to release the standard ACS 1-year data for 2020.

The COVID-19 pandemic significantly limited our ability to reach people and limited their ability to participate in the ACS in 2020. Keeping our staff and respondents safe (and complying with national, state, and local health guidelines) was of paramount importance, so we temporarily stopped many of our operations. We scaled back the mailing operations at NPC and closed our telephone centers. We stopped collecting data in-person due to stay-at-home orders. We also could not conduct in-person follow-up interviews with households that had not responded. Collection activities from nursing homes, college dorms, prisons and other group quarters facilities were also suspended.

As a result, the households that did respond to the 2020 ACS were those who more likely to respond without any prompting or follow-up from the Census Bureau. A variety of evidence suggests that nonrandom non-response resulted in biased estimates, even with the survey weights (discussed in Section 3), which are designed to address differential response by race, Hispanic origin, age, and gender. Compelling evidence comes from substantial changes observed among estimates for four characteristics that do not change much from year to year, which are described in detail in Section 5. Since one does not expect large year-to-year changes to these topics, the fact that substantial differences were observed led subject matter analysts to question the reliability of the 2020 ACS 1-year estimates. These unexpected estimates informed the decision to not release the standard set of 1-year data, because they did not meet the Census Bureau's quality standards.

Instead, we will release a set of experimental estimates from the 1-year data as well as a technical working paper that shows the differences in estimates between the 2020 production data and the 2020 experimental weights.

Appendix A. Normal ACS Operations

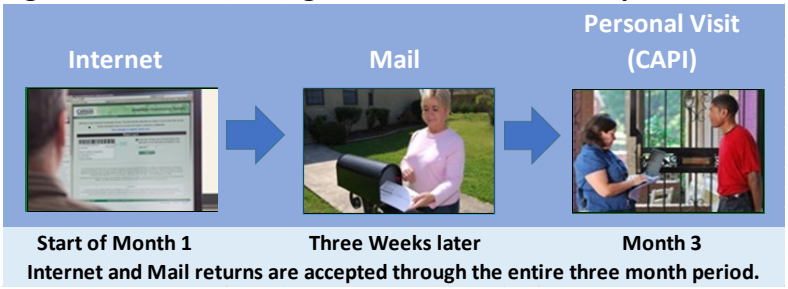
This appendix describes the standard ACS data collection methodology that we used before the COVID-19 pandemic and have since resumed.[8] For more details, please see the ACS Design and Methodology Report (U.S. Census Bureau, 2014).

A.1 Housing Unit Data Collection

Most people in the United States live in something we refer to as a housing unit. Dwellings such as houses, apartments, and mobile homes are considered housing units. The remainder (approximately 3 percent) reside in group quarters, which include college dormitories, nursing homes, and prisons.

The ACS samples approximately 3.5 million U.S. housing unit addresses each year, divided into 12 monthly sample panels. Data collection for these monthly panels occurs continuously throughout the year and uses multiple modes. The data collection for each panel takes place over three months, as shown in Figure A-1. In the first and second months, respondents at the sampled addresses can respond via the Internet, mail, or Telephone Questionnaire Assistance (TQA). A response via any of these methods is considered self-response. For those addresses for which we do not receive a response via one of these three methods, we select a sample for follow-up with in-person interviews during the third month. These interviews are conducted by field representatives and constitute the Computer-Assisted Personal Interview (CAPI) operation. CAPI interviewers attempt to conduct interviews and encourage self-response among those reluctant to participate in a personal interview. People at the sampled addresses can self-respond throughout the three-month data collection period.

Figure A-1. ACS Housing Unit Data Collection Operations

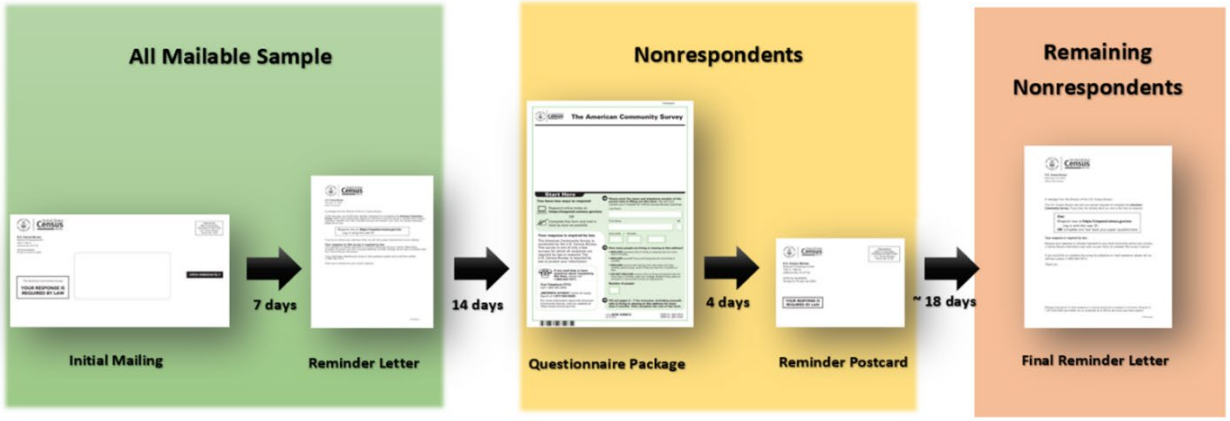


A.1.1 Self-Response

Sampled addresses with a valid mailing address receive a series of mailings in the first two months of data collection to encourage self-response prior to the CAPI operation. The different kinds of mailings, as shown in Figure A-2, are assembled by and sent from the National Processing Center (NPC).

[8] Normal data collection resumed with the April 2021 panel.

Figure A-2. Current ACS Contact Strategy



Note: This contact strategy has been in use since August 2018.

Initial Mailing (1st): The initial mailing is an invitation to respond via the Internet. This mailing is sent to all sample addresses with a mailable street address (which excludes post office boxes, rural route numbers, etc.) and consists of a letter that includes a URL and a frequently asked questions (FAQ) document. This mailing also includes a multilingual brochure with information in English, Spanish, Chinese, Korean, and Russian.

Reminder Letter (2nd): A reminder letter, in the form of a pressure-seal mailing, is sent to all addresses that received the initial mailing about 4 days after the initial mailing is sent. A pressure-seal mailing is a one-page document with a pre-applied adhesive that is folded and sealed with pressure.

Questionnaire Package (3rd): The questionnaire package is sent to all nonrespondents about 2 weeks after the reminder letter. This package contains a paper questionnaire and informs the respondent that he or she can respond online or return a completed form.

Reminder Postcard (4th): A reminder postcard is sent to all addresses that received the questionnaire package about 4 days after the questionnaire package is sent.

Final Reminder Letter (5th): About 18 days after the reminder postcard, remaining nonrespondents are sent a final reminder letter, a pressure-seal mailing, in a last effort to attain a response prior to the start of the CAPI operation.

Internet responses are received electronically and processed daily. Paper questionnaire responses are received via the United States Postal Service (USPS) and processed at NPC using key-from-image technology. This process requires staff to sort, scan, and key the forms. They also apply associated quality assurance measures to the keyed data.

A.1.2 Failed-Edit Follow-Up (FEFU) Operation

After response data are keyed from the paper questionnaire or returned from the Internet instrument, the data go through a computerized editing process to check for consistency. This edit identifies cases requiring additional information; these cases are eligible for the failed-edit follow-up (FEFU) operation. This operation is conducted by telephone, so cases become part of the FEFU workload if a telephone number for the sample address is available. A new set of FEFU cases is generated each business day, and telephone center staff call respondents to obtain the missing data. The interview period for each FEFU case is three weeks.

A.1.3 Telephone Questionnaire Assistance (TQA) Operation

The TQA telephone number is listed on the questionnaire, as well as on all of the letters, brochures, and postcards sent to sample addresses. Alternate TQA numbers are listed on the questionnaire for Spanish speakers and for a telephone device for the deaf (TDD). Respondents who call the toll-free TQA number reach an interactive voice recognition telephone system that provides answers to questions about completing the questionnaire or assists respondents in requesting a questionnaire in another language. If a respondent chooses to speak directly to an agent, the agent answers the caller's questions and gives the respondent the option to complete the questionnaire over the telephone. Agents use an automated survey instrument to capture the respondent's answers.

A.1.4 Computer-Assisted Personal Interview (CAPI) Operation

The CAPI operation begins in the third month of data collection for each panel. A proportion of nonresponding addresses, generally about 35 to 40 percent, is sampled for CAPI follow-up. When interviewers unsuccessfully attempt to contact a household member at an address, they leave letters with instructions for the household to respond via the Internet. They also provide this information to household members with whom they make contact but who may prefer to complete the interview online. Because of the encouragement by interviewers to respond via the Internet, the portion of the Internet response rate from responses received during the CAPI month has more than doubled since early 2014 (Baumgardner, 2018).

A.2 Group Quarters Operation

Group quarters are places where people live or stay in a group living arrangement that is owned or managed by an organization providing housing and/or services for the residents. Group quarters include places such as college residence halls, residential treatment centers, skilled nursing facilities, group homes, military barracks, prisons, and worker dormitories.

The ACS group quarters sample consists of 12 independent samples; like the housing unit sample, a new group quarters sample is introduced each month. Data collection for each monthly sample lasts six weeks and does not include a formal non-response follow-up operation. The group quarters data collection operation is conducted in two phases. First, field representatives conduct interviews with the contact person or administrator of the selected

group quarters facility (referred to as the group quarters level interview) to confirm the type of group quarters and create the sample of residents to interview. Second, field representatives conduct interviews with the selected individuals from the facility (referred to as the person- or resident-level interview). Interviewers collect data from approximately 195,000 sample residents at group quarters each year.

Appendix B. Changes to ACS Data Collection Due to the COVID-19 Pandemic

This appendix provides additional detail on the ACS data collection operations during 2020. Section 2 provides an overview of these operations, but this appendix goes into more depth.[9]

On March 17, 2020, the Office of Management and Budget (OMB) issued the memorandum "Federal Agency Operational Alignment to Slow the Spread of Coronavirus COVID-19" (Vought, 2020). This memorandum forced the National Processing Center (NPC) and the Census Bureau's two telephone centers to operate with minimal staffing and required a change in ACS interviewing techniques for both housing units and group quarters, such as nursing homes, college dorms, and prisons. The pandemic affected all 2020 ACS panels in varied ways as summarized in Table B.1 and described in more detail below.

Table B-1. Pandemic Impact to 2020 ACS Housing Unit Data Collection

Panel	Mailout Strategy					CAPI Operation		
	Initial Mailing	Reminder Letter	Questionnaire Package	Reminder Postcard	Final Reminder	Interviewing Month	Impact to Interviewing	CAPI letter sent
January	✓	✓	✓	✓	✓	March	In-person stopped on March 20	
February	✓	✓	✓	✓	✓	April	Telephone only	
March	✓	✓	!	✗	✗	May	Telephone only - increased workload	
April	✗	✗	✗	✗	✗	June	Telephone only - increased workload	
May	✗	✗	✗	✗	✗	July	In-person available - Some areas	✓ From Regional Office
June	✗	✗	✗	✗	✗	August	In-person available - Some areas	
July	✓	✗	—	✗	✗	September	In-person available - All areas	
August	✓	✗	—	✗	✗	October	In-person available - All areas	
September	✓	✗	—	✗	✗	November	In-person available - Most areas	
October	✓	✗	✓	✗	✓	December	In-person available - Most areas	✓ From NPC
November	✓	✗	✓	✗	✓	January '21	In-person available - Most areas	
December	✓	✗	✓	✗	✓	February '21	In-person available - All areas	

✓ Mailed ! Part of workload mailed — Part of workload received questionnaire, remainder received reminder letter ✗ Was not mailed

Initial Mailing:
- August and October received pressure seal mailers instead of the full initial mailing

Questionnaire Package:
- March—26 percent mailed before NPC was closed, remainder of cases did not receive the mailing
- July—67 percent received questionnaire package, 33 percent received pressure-seal mailer
- August—84 percent received questionnaire package, 16 percent receive pressure-seal mailer
- September—82 percent received questionnaire package, 18 percent received pressure-seal mailer

B.1 Modifications to Self-Response Operations

Due to the OMB memorandum that closed the National Processing Center (NPC), major operations for the ACS at NPC were halted. These operations included the assembly and mailout of mail packages and data capture of completed paper questionnaires. The USPS

[9] Measures in this appendix were computed using ACS operational data and differ slightly from comparable published estimates computed using final ACS data.

continued to deliver completed questionnaires to NPC, but there were no staff to process them, so the questionnaires were stored in a secure building.

When operations halted on March 19, NPC was mailing out the questionnaire packages for the March panel. NPC processed only about one-quarter of the workload before operations were halted. The remaining mailings for the March panel and all mailings from NPC for the April, May, and June panels were cancelled.

Staff started returning to NPC gradually in early June; however, social distancing rules and the very limited number of staff returning restricted the resumption of operations. The priority was getting the invitation to respond by Internet and paper questionnaires into the hands of respondents.

The problem with that approach was that creating the initial and questionnaire mail packages is a labor-intensive process, requiring the insertion of the materials into the package and then addressing them through the open window of the envelope. At first, staff at NPC were not able to assemble and address the full complement of mailing pieces while maintaining social distancing. Instead, we replaced some of the mail packages with pressure-seal letters, which take far fewer resources to produce than the mail packages.

First, for the initial package with the Internet invitation, we switched from using a mail package to a simple pressure-seal letter for the August and October panels. Second, in some cases we replaced the questionnaire package with a pressure-seal letter. Usually, we send the questionnaire package to about 220,000 addresses per panel; the entire process, from labelling to mailout, normally takes one week. NPC determined that they could start mailing questionnaire packages again in July, but they would not be able to produce and label the number of packages needed within the usual timeframe. For July, they produced 150,000 packages in two weeks. In August and September, NPC produced and mailed 175,000 packages in one week. The remaining cases in these months received a pressure-seal letter which explained how they could respond online.

When deciding which cases would receive the questionnaire versus the pressure-seal letter, we prioritized sending the questionnaire to areas that were more likely to respond on paper and to lower response areas. To accomplish this, all addresses in Internet Choice[10] areas for the 2020 Census and all addresses in areas sampled at the highest rate for in-person interviewing in the ACS received paper questionnaires. For other addresses in the paper questionnaire workload, we took a statistical sample to determine which addresses received which treatment to ensure that at least some cases in all areas received the paper questionnaire package. By October, all addresses in the paper questionnaire workload received the paper questionnaire package

[10] For the 2020 Census, addresses in 'Internet Choice' areas received both the option to respond via Internet and the paper questionnaire in the first mailing. Based on historical self-response rates by mode, these areas were more likely to respond using the paper questionnaire.

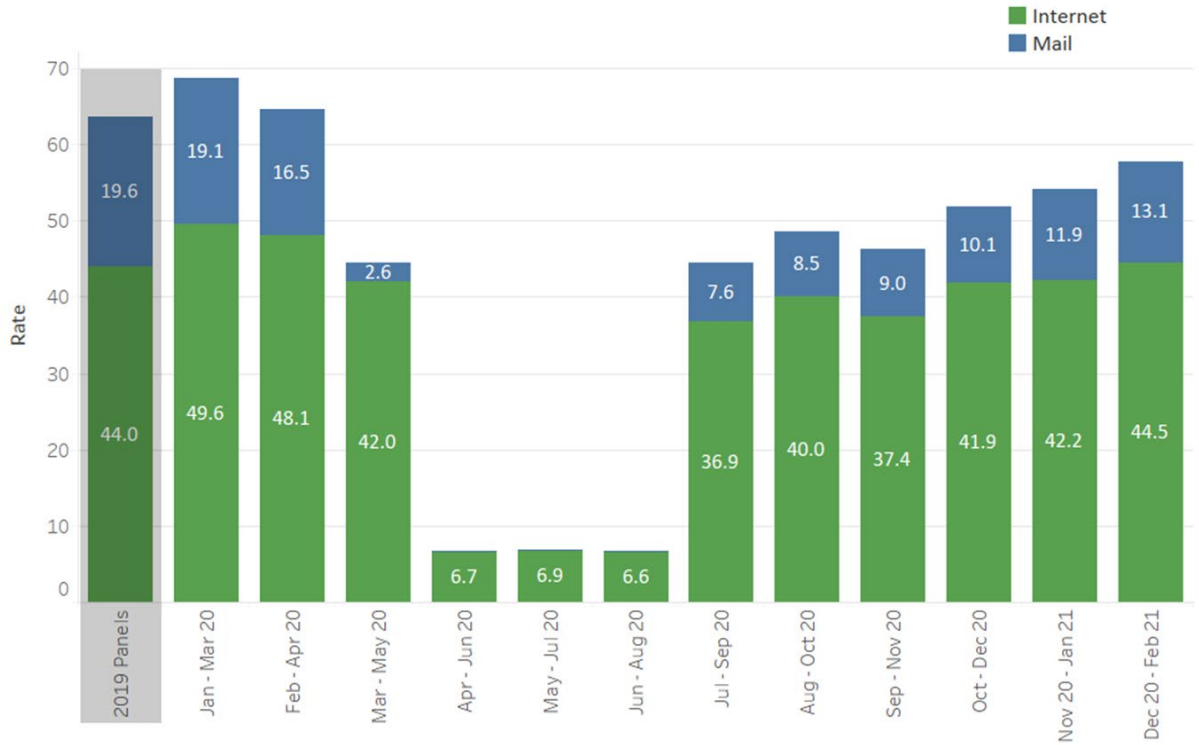
within the usual one-week timeframe from labelling to mailout. We resumed mailing questionnaire packages to all cases, as well as the traditional fifth mailing (the final reminder letter), for the October panel. We did not resume the second (reminder letter) or fourth (reminder postcard) mailings until 2021.

The pandemic accelerated the implementation of a content change to the final reminder letter, adding a due date and additional language about removing addresses from additional follow-up. These changes had performed well during an earlier test, and we had planned to implement them in 2021. In response to the pandemic, we decided to make the changes earlier.

Like NPC, the telephone centers were also limited in operations, as only managers reported to the centers for work. The FEFU operation was suspended, and respondents calling the TQA number were told to leave messages. Managers returned those calls when possible. The FEFU operation resumed in late May, and the TQA operation resumed in July.

As Figure B-1 shows, these operational constraints affected self-response response rates, a result that is not surprising since the mailings are meant to work in concert to increase self-response. The figure also shows the overall rate for 2019 as a comparison.

Figure B-1. Self-Response Response Rates by Data Collection Panel by Mode



Note: Panel labels show the full data collection period, i.e., the label for the January 2020 panel is 'Jan – Mar 20'.
Source: U.S. Census Bureau, American Community Survey Operational Data

The effects of the methodological modifications are evident in these rates. Note that the self-response rates were higher for the January and February panels than in 2019; that was likely a result of increased public awareness of the Census Bureau due to the build-up to the 2020 Census. For the March panel, only mailing questionnaires to about a quarter of the eligible cases and cancelling subsequent mailings meant that not only few paper questionnaires were completed but also that we did not see the bump in Internet response that those mailings usually prompt those mailings.

With no mailings from NPC for the April, May, and June panels, the only self-responses were from the online questionnaire. Field representatives encouraged online response when they called their assigned cases; for the May and June panels, the "Please Call Me" letter (explained below) sent from the regional offices encouraged some additional self-response.

The self-response rates for the July to December panels still lagged the 2019 response rates. During this period, the rates were lowest in the July, August, and September panels, when only some cases received the questionnaire package and no cases received the traditional second, fourth, and fifth reminder mailings. From October to December, the rates rose due to all eligible cases receiving the questionnaire package and the resumption of the final reminder mailing at the beginning of the second month of the panel. We still had lower than usual self-response rates even later in the year, and a higher percentage of self-responses coming from the Internet than before. Part of that may be due to people becoming more comfortable doing things online during the pandemic.

Note that the use of a pressure-seal mailer for the initial mailing instead of the full package in August and October did not seem to negatively affect response rates. That surprised us and led us to do a test in the May 2021 panel of those options. The results of that test are expected in late 2021. If the test results indicate that a pressure-seal mailer is as effective as a full package, we may implement this change to the initial mailing.

B.2 Modifications to the CAPI Operation

Not surprisingly, the pandemic greatly affected field operations, just as it did the mailing operations. As of March 20, the Census Bureau's field representatives could not visit respondents in-person; they were restricted to telephone-only interviewing. Interviewing by telephone had always been an option, so field representatives were already familiar with it. The phone numbers used to reach addresses come mainly from third-party data vendors. The addresses for which we can attain phone numbers are not random and are likely to represent certain types of households. Furthermore, the numbers often do not reach the intended household, or the household does not answer the phone.

The April, May, and June CAPI operations (collecting data for the February, March, and April panels, respectively) were conducted by telephone only. The usual CAPI workload for in-person interviewing is between 64,000-68,000 cases per month; for May and June, we allowed about

80,000 cases, since field representatives' travel time was not an issue with the operation being telephone only.

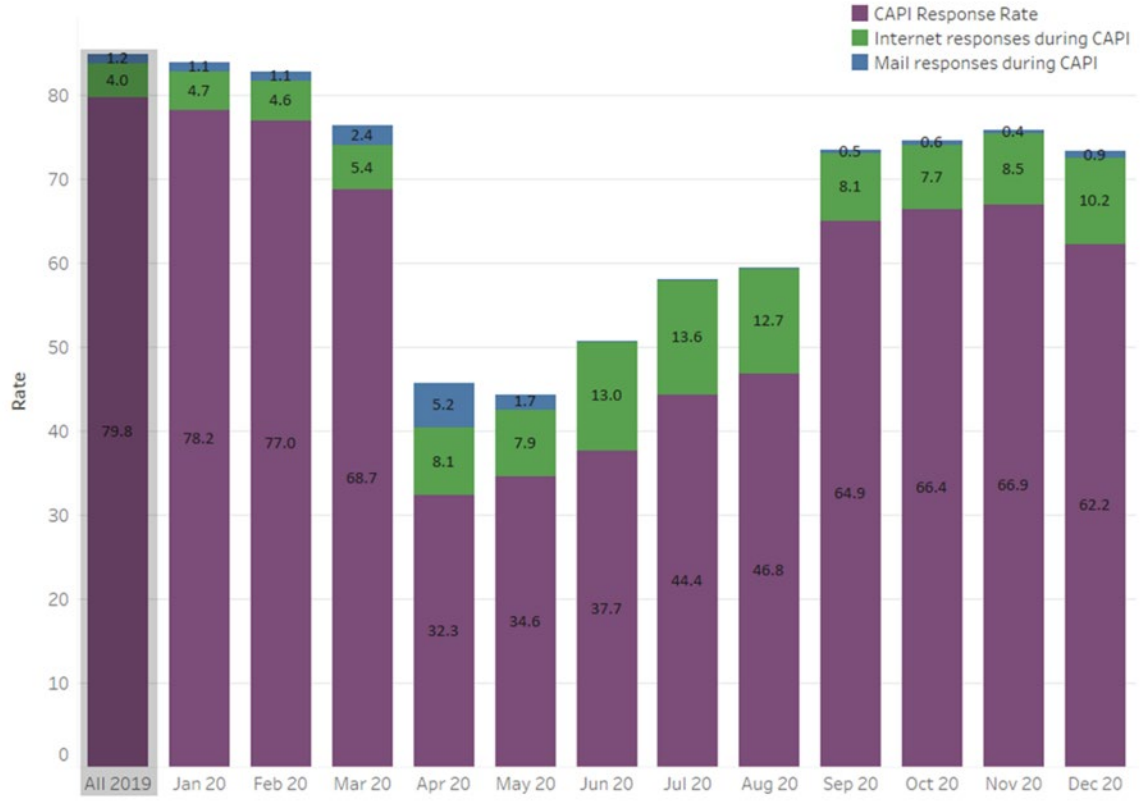
For the July CAPI operation, the Census Bureau allowed personal-visit interviews in geographic areas where it was not restricted by local orders or otherwise impractical. These personal-visit interviews made up about 28 percent of the CAPI workload in July and 36 percent in August. Personal-visit interviews were allowed in all areas in September and October, but when COVID-19 cases began to spike again, restrictions were reinstated in a few areas.[11] Even when in-person interviewing was allowed, regional office guidance instructed interviewers to collect as much data as possible by telephone.

Sampled CAPI addresses could respond via the Internet instrument. In April, for a sample unit to be aware of this option, it had to be in the CAPI universe and successfully contacted by the field representative to instruct them on how to respond online. Starting in May, the Census Bureau's six regional offices began mailing a "Please Call Me" letter to all mailable addresses selected for CAPI in their region. This letter encouraged residents to call the field representative to complete an interview or to complete the interview online. The "Please Call Me" letter was used through the October CAPI operation. In November, NPC began assembling and mailing a similar letter to all CAPI cases to encourage response via the Internet and cooperation with field representatives.

How did this affect CAPI response rates? Figure B-2 shows the response rates by CAPI month. Note that the "Jan 20" column shows the CAPI response rate for the November 2019 panel, which was collected in CAPI in January 2020 and whose data are therefore part of the 2020 1-year estimates.

[11] About 5 percent of CAPI cases in November and 13 percent in December were in areas where interviewing was restricted to telephone only.

Figure B-2. CAPI Response Rate by Data Collection Month by Mode



Source: U.S. Census Bureau, American Community Survey Operational Data

January and February are in line with typical CAPI response rates. In March, the abrupt halt to in-person interviewing resulted in a lower CAPI response rate compared to January and February and the 2019 CAPI months. From April through June, when interviewing was restricted to telephone only, the CAPI response rate was less than half the rate in January and February. The April CAPI response rate was the lowest of all 2020 months, at 32.3 percent.

In-person interviewing was allowed again in some geographies starting in July, and consequently the CAPI response rate increased over the June rate. As more geographies opened for in-person interviewing in August, the CAPI response rate increased. Starting in September and through October, in-person interviewing was allowed in all areas, and CAPI response rates increased over the June through August rates. By late November, some areas were again restricted to telephone-only interviewing, and the November CAPI response rate did not increase over the October rate. In December, more areas were restricted to telephone-only interviewing, resulting in a CAPI response rate that was lower than the September, October, and November rates.

We can also look at the distribution of outcomes of the CAPI interviews. Figure B-3 breaks out the outcomes of the CAPI interviews into six categories.

Figure B-3. Distribution of CAPI Outcomes by Data Collection Month

Note: Rates may not sum to 100 percent due to rounding.
Source: U.S. Census Bureau, American Community Survey Operational Data

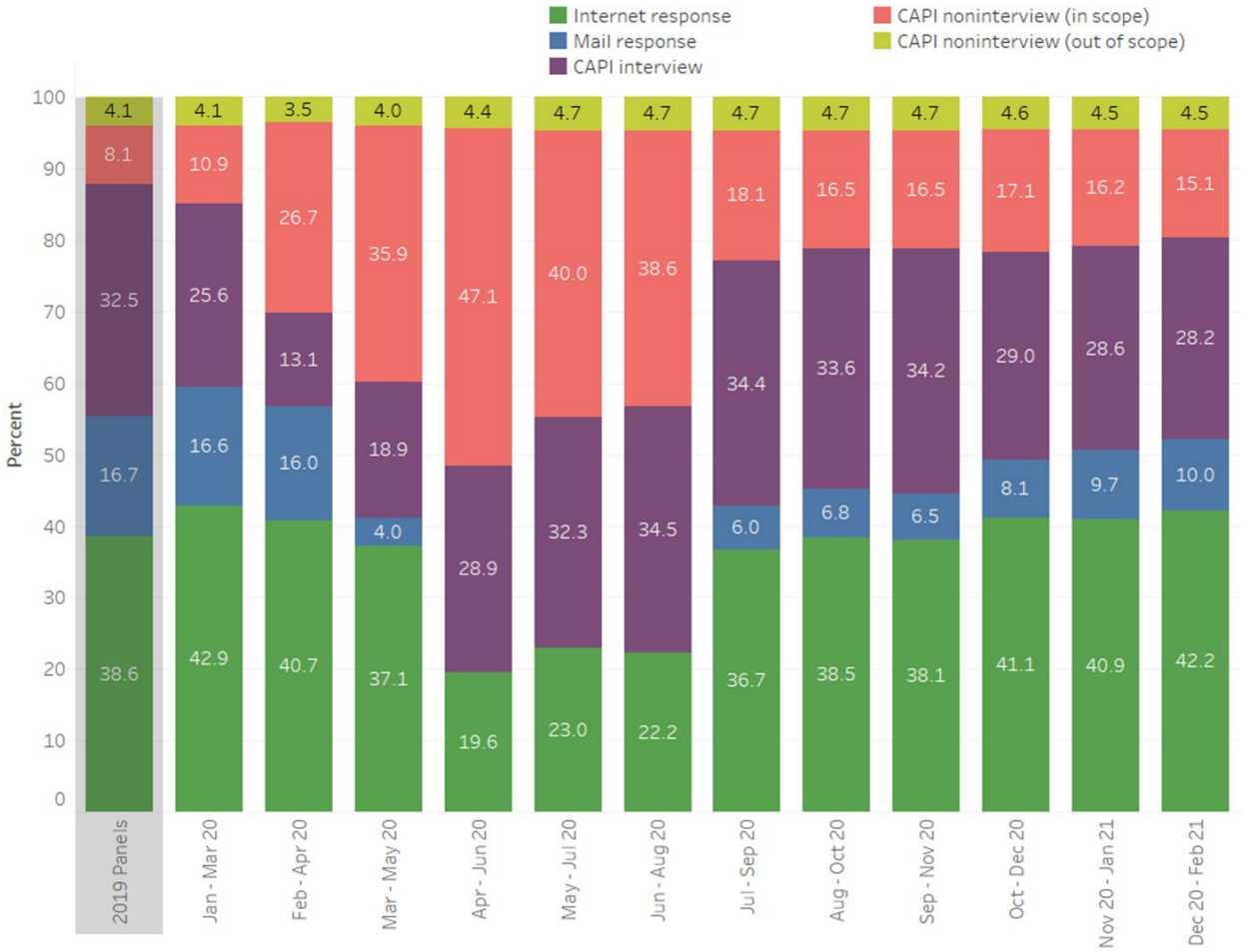
In April, interviewers were unable to contact 41 percent of the CAPI workload. This was mostly due to the absence of good telephone numbers for addresses in CAPI. Even though the CAPI operation was also limited to telephone interviewing in May and June, interviewers were able to conduct more interviews in occupied housing units than they were in April. This could indicate that interviewers became more adept at contacting households over the telephone and that the "Please Call Me" letters were having an effect. However, the proportion of the workload that interviewers were unable to contact due to personal visit restrictions during the telephone only months remained at about 40 percent.

As areas reopened to in-person interviewing starting in July and August, the proportion of the CAPI workload that interviewers were unable to contact dropped considerably. When all areas were open to in-person interviewing in September and October, interviewers were unable to contact less than 1 percent of the workload; however, there is an uptick in the proportion of cases that were unable to be contacted in November and December, when some areas were again restricted to telephone interviewing only. While the proportion of the workload that interviewers were unable to contact remained less than 5 percent in the latter part of the year, the proportion of the workload that were non-interviews increased to about 22 percent of the workload.

B.3 Effects of Self-Response and CAPI Changes on the Housing Unit Sample Disposition

A sample disposition chart, showing the status of the final sample of cases, indicates the effects of the self-response and CAPI data collection modifications on housing unit response. Figure B-4 provides sample disposition information for the 2019 data collection panels and each of the twelve 2020 panels.

Figure B-4. Housing Unit Sample Disposition by Data Collection Panel



Note: Panel labels show the full data collection period, i.e., the label for the January 2020 panel is 'Jan – Mar 20'.
Rates may not sum to 100 percent due to rounding.
Source: U.S. Census Bureau, American Community Survey Operational Data

The figure shows that even in the January panel, which was active through the end of March, we saw an uptick in CAPI non-response due to the curtailment of personal-visit interviewing. The percentage of cases that were CAPI nonrespondents grew through the April panel and accounted for about 40 percent of the sample in the May and June panels. The June panel had CAPI data collection in August, the last month with substantial restrictions on CAPI personal-visit interviewing. The April to June panels had low self-response (all Internet) due to the lack of mailing and personal-visit restrictions. From the July panel on, we still had lower than normal

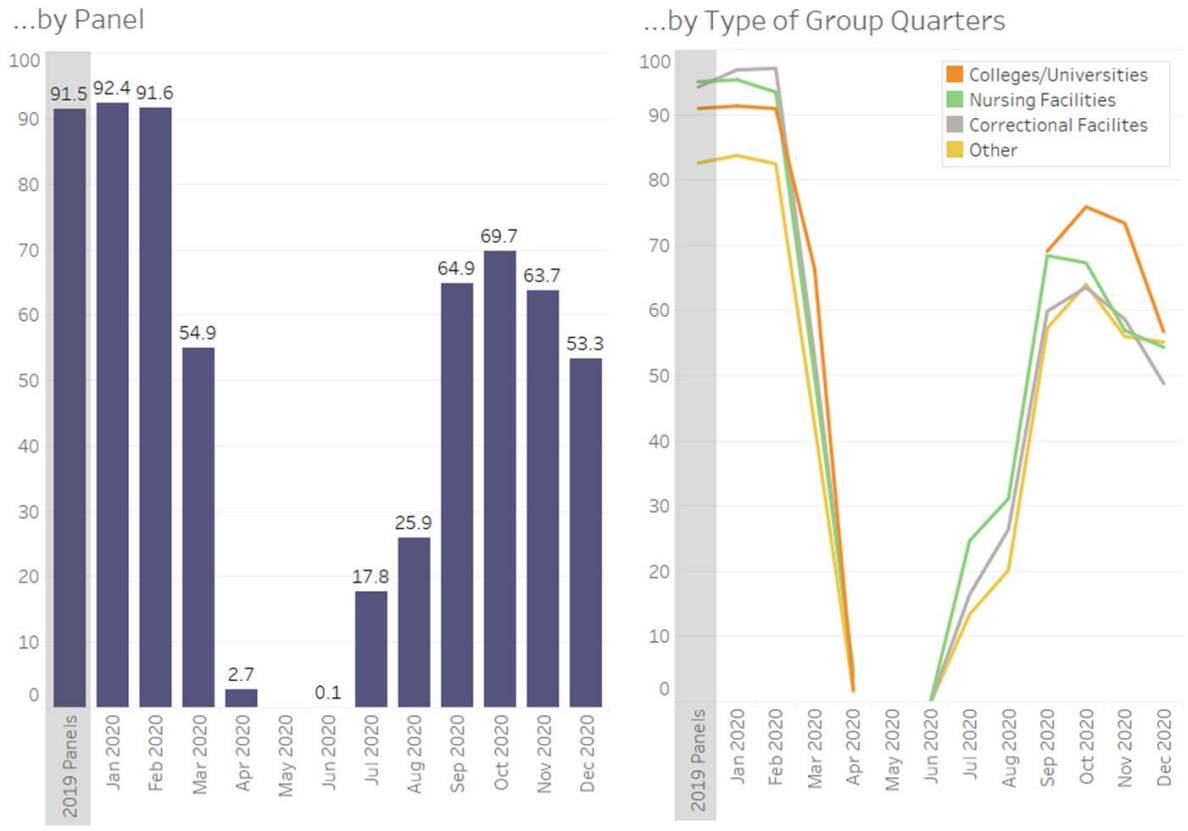
self-response (combining Internet and mail) and higher than normal CAPI non-response, despite some improvement.

B.4 Modifications to the Group Quarters Operation

The pandemic also substantially affected the data collection for group quarters. Before March 19, field representatives had to find alternative methods for interviewing contacts whose facilities did not allow entry into the building. From mid-March to June, the group quarters operation was put on hold, since personal visits to group quarters facilities were not permitted and there was no way to do the interviews over the telephone. The inability to physically access group quarters meant there were many fewer interviews of these residents than normal.

Even as the country started reopening in the summer and fall, it continued to be difficult to conduct interviews in group quarters because the largest types of group quarters – nursing/skilled nursing facilities, correctional facilities, and college/university student housing – were especially affected by the pandemic. Many nursing and correctional facilities did not allow access to non-essential personnel, and many college/university students were asked not to return to campus following their spring breaks. Figure B-5 shows that the result of these restrictions on group quarters response rates were substantial.

Figure B-5. Group Quarters Person-Level Response Rate by Data Collection Panel



Source: U.S. Census Bureau, American Community Survey Operational Data

The impact of halting in-person interviewing in mid-March is evident in the March 2020 response rate. In April through June, group quarters data collection operations were suspended; however, a very small number of cases was able to be worked in April and June, resulting in a handful of responses. Like the housing unit CAPI operation, some group quarters were in geographic areas that reopened for in-person interviewing in July; more opened in August, and all areas were open for in-person interviewing in September, October, and much of November. In the latter part of November and December, some geographies were again restricted to telephone-only interviewing. The changes in the type of interviewing allowed had a clear effect on group quarters response rates.

We also looked at response rates by group quarters type. The patterns for the three largest group quarters types were similar: rates above 90 percent in 2019 and early 2020, rebounding rates in the fall of 2020 to between 60 and 75 percent, and as pandemic conditions worsened in December 2020, rates between 50 and 60 percent. (Note the orange line for college and university student housing has a break midyear because they are out of scope in the summer.)

The effects of these data collection challenges are seen in the group quarters sample disposition chart in Figure B-6. In 2019, about 82 percent of facilities responded to the survey and about 2 percent did not respond. Interviewers were unable to contact about 2 percent[12], and about 14 percent were considered out-of-scope non-interviews. Group quarters facilities are considered to be out of scope for a variety of reasons, including if there are no residents in the facility during the survey period. This reason accounted for about 4 percent of the facilities in sample in 2019.

[12] These cases all occurred in January of 2019, when ACS operations were suspended due to a lapse in appropriations.

Figure B-6. Group Quarters Facility-Level Sample Disposition by Data Collection Panel

Note: Rates may not sum to 100 percent due to rounding.
Source: U.S. Census Bureau, American Community Survey Operational Data

In March 2020, only about 51 percent of group quarters facilities in sample responded to the survey and interviewers were unable to contact about 22 percent of facilities. In addition, about 25 percent were considered out-of-scope non-interviews. About 15 percent of facilities in sample were out-of-scope non-interviews because there were no residents in the facility; the majority of these were in college/university student housing.

From April 2020 through June 2020, group quarters operations were suspended, and most facilities during these months received an outcome of "Unable to Contact." Because group quarters assignments are released early to interviewers, some of them worked a few cases from the April panel prior to the suspension of operations in mid-March. The miscoding of some June panel cases is likely the cause of the few cases not coded as "Unable to Contact" in June.

In July and August, interviewers were able to make in-person visits in some areas and about 20 percent of facilities in July and 29 percent in August provided a response. Still, field representatives were unable to contact a sizeable portion of the sample in these months.

In September, October, and most of November, in-person visits were allowed in all areas. While the portion of the sample that provided a response in these months ranged from 51 percent to 63 percent, the portion of the sample that were out of scope non-interviews was about 17

percent in September, 20 percent in October, and 25 percent in November. About 8 percent of the sample in September, 10 percent of the sample in October, and 13 percent of the sample in November were facilities with no residents present. As in March, the majority of these no resident non-interviews occurred in college and university student housing.

In December, more areas were restricted to telephone-only interviewing and interviewers were unable to interview about 17 percent of the facilities in sample. Almost 37 percent of the facilities in sample in December were out-of-scope non-interviews. More than a quarter (27 percent) of the December sample were out-of-scope non-interviews because there were no residents at the facility, mostly in college and university student housing.

ACKNOWLEDGEMENTS

Stephanie Baumgardner and **David Raglin** in the American Community Survey Office prepared the section on data collection changes in 2020 due to the COVID-19 pandemic. **Mark Asiala** in the Decennial Statistical Studies Division prepared the section on estimation modification and data quality measures. **Matthew Spence** in Population Division prepared the section on the non-citizen population. In the Social, Economic, and Housing Statistics Division, **Stephanie Galvin** prepared the section on marital status and educational attainment; **Trudi Renwick** prepared the section on median household income; **Jonathan Spader** prepared the section on building structure type; and **Sharon Stern** and **Laryssa Mykyta** prepared the section on Medicaid coverage.

Michael Starsinic, Jennifer Berkley, Eunha Choi, and Sirius Fuller in the Decennial Statistical Studies Division conducted statistical review. **Matthew Marlay** provided editorial review; **Eric Stone** provided graphic design assistance; and **Hyon B. Shin** provided the overall direction and preparation of the report – all in the Social, Economic, and Housing Statistics Division.

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