

**Testimony Before the United States Senate Committee on Homeland Security and Government
Affairs**
Hearing on “Reviewing the 2020 Census: Local Perspectives in Michigan”
July 25, 2022

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When the 2020 Census population counts came out, I was taken aback. As a demographer and sociologist who conducts ongoing research in Detroit in connection with the Detroit Metro Area Communities Study (DMACS), I regularly track the demographics of Detroit. In news accounts, I had read that Detroit’s 2020 Census count of 639,111 people represented a 10.5% population decline since the 2010 Census. But what puzzled me was a data point that was receiving little media attention: the stark difference between the 2020 Census population count and the Census Bureau’s 2019 population estimate for Detroit. Specifically, the Census Bureau previously estimated the city’s population in 2019 to be 670,031, so the 2020 Census count suggested that Detroit had singularly lost over 30,900 people, or 4.6% of its population, in one year alone. I was skeptical that such a sizable portion of Detroit’s 10-year population decline occurred in such a short time frame. I wondered whether other cities had experienced similar declines between 2019 and 2020, perhaps due to common causes, like the pandemic. I also wondered whether the Census Bureau had devoted adequate time and resources to counting the population of Detroit, where a large share of the population lacks internet access and would not be able to respond to the census online.

Shortly after the Census Bureau released the 2020 data, Mayor Duggan’s office reached out to me and a group of other local demographers and social scientists to ask if we could conduct research that would shed light on the validity of the 2020 Census count.¹ The Mayor, who had already publicly expressed concerns that the 2020 Census had undercounted Detroit, asked us to undertake a study to determine whether there was evidence of such an undercount. My colleagues and I agreed to design such a study under the condition that it would be an independent assessment, and we cautioned that such an investigation could fail to support the Mayor’s impression that the city had been undercounted. The Mayor strongly supported the idea of an independent and scientifically rigorous study of the 2020 Census count.

This research is still ongoing, but the preliminary findings are striking. By way of background, Census data suggest that the precipitous drop Detroit experienced in both its population and housing counts in the 2020 Census is anomalous in comparison to other cities and inconsistent with previous population and housing trends in Detroit. The research we conducted underscores this incongruity. First, in many parts of the City, the 2020 Census failed to count a substantial

number of housing units (whether occupied or vacant), which would correspondingly exclude people living in these housing units from the 2020 Census population count. Our research also found that the 2020 Census undercounted the number of occupied homes in certain parts of the City we examined, thereby underestimating the population count in these areas, as well. A common theme in the undercounted areas we examined was lower levels of self-responding to the census. Areas with lower levels of self-response require more time and staffing devoted to the census Nonresponse Followup (NRFU) operation to ensure an accurate count. Thus, the undercount of people and housing in Detroit appears to be linked to the inadequacy of the 2020 NRFU operation.

Putting Detroit's 2020 Census Count in Perspective

The purported loss of 30,900 people in Detroit in just one year suggested by the 2020 Census is unprecedented in comparison to population changes in Detroit over the prior decade. Figure 1 shows the decennial census counts of Detroit's population in 2010 and 2020 as well as annual Census Bureau population estimates of Detroit's population in the intervening years (extending through 2021).² From 2011 to 2014, the Census Bureau estimates suggest that the city was losing an average of just over 7,000 people annually. In the second half of the decade, Detroit's population loss slowed considerably, with an average annual loss of only 2,500 people from 2015 through 2019. The purported loss of 30,900 people in Detroit from the 2019 population estimate to the 2020 Census count is over three times greater than the largest estimated annual population loss the city had experienced in the previous nine years.³ Notably, the sharp decline in population reflected in the 2020 Census did not continue into 2021, even though many major cities suffered record population losses from 2020 to 2021 due to the pandemic.⁴ According to the Census Bureau's population estimates, Detroit lost slightly fewer than 6,000 people from 2020 to 2021.⁵ If Detroit really had lost over 30,000 people from 2019 to 2020, I would have expected to see a somewhat comparable decline during the following year, but this is not what the data show. In short, the 2020 Census population count for Detroit was anomalous and difficult to reconcile with the city's population trend over the prior decade or its estimated population change from 2020 to 2021.

The 2020 Census count in Detroit was also an outlier compared to population changes in other major U.S. cities. Figure 2 shows the 2020 Census counts for the 50 largest U.S. cities as percentages of the Census Bureau's July 2019 estimates of their population. The only other cities of this size that experienced comparable population declines (i.e., 2020 Census counts that were 4% or more below the Census Bureau's 2019 estimate) were Phoenix, Miami, and San Antonio, all of which have much larger percentages of foreign-born and non-citizen residents. The publicity and controversy surrounding efforts to add a citizenship question to the 2020 Census help explain why these cities may have experienced an undercount,⁶ but such concerns are less likely to explain Detroit's low census count. Moreover, other industrial cities in the Midwest and Northeast did not experience similar population declines between 2019 and 2020, suggesting that

Detroit's population drop was not driven by pandemic-related departures (which would be similar in peer cities).⁷

One factor that may explain why the 2020 Census population count was so low in Detroit compared to other cities is the Census Bureau's shift to self-reporting online. In 2020, the Bureau introduced a new internet-based self-response portal (while still offering opportunities to respond by mail and phone).⁸ Detroit, however, is one of the “least-connected” big cities in the country.⁹ Not surprisingly, Detroit had the lowest self-response rate (51%) to the 2020 Census among the 50 largest cities in the U.S.¹⁰ It is widely recognized that areas with low self-response rates are more difficult to enumerate and more likely to be undercounted.¹¹ This phenomenon plays out in Detroit, as our research reveals that housing units were more likely to be undercounted in census tracts with lower self-response rates.

Focusing on the Housing Count

The Panel to Evaluate the Quality of the 2020 Census at the National Academies of Sciences, Engineering, and Medicine recently observed that “the decennial census is as much an inventory of housing and residential addresses/locations as an enumeration of persons.”¹² The decennial census has always been based on addresses and housing unit locations, which are contained in the Master Address File (MAF). The quality and completeness of census data depends on the quality and completeness of the MAF, since every person counted in the census must be tied to a housing unit at a specific address that is recognized in the MAF. Accordingly, our research investigated two pathways through which the 2020 Census may have undercounted housing, and therefore population, in Detroit: (1) erroneous omissions of legitimate housing units from the MAF (by dropping or failing to count) and (2) misclassification of occupied housing units as vacant.

Undercount of Housing Units

In the years leading up to the decennial census, the Census Bureau provides an opportunity for local governments to review and provide feedback on the residential address list for their respective jurisdictions through the Local Update of Census Addresses (LUCA) operation. In 2018, the Census Bureau shared with the City its list of addresses for 367,637 residential housing units in Detroit. The City then reviewed this list and proposed addresses to delete (e.g., because of demolitions, duplicates, or incorrect addresses) and add (e.g., because of new construction or missing units).¹³ After reviewing the City's submission, the Census Bureau returned an updated file (called the “feedback file”) and summary of actions taken. That file contained 385,136 addresses, most of which were housing units. However, the 2020 Census showed only 309,913 residential housing units in Detroit, which represents a staggering decline of over 75,000 housing units from the updated address file.

Like the population count, the 2020 Census count of residential housing units was anomalous in comparison to previous trends in Detroit. Figure 3 shows the residential housing counts from the 2010 and 2020 decennial censuses as well as the estimated housing counts for intervening years from the Census Bureau’s American Community Survey (ACS). The ACS estimates of residential housing units from 2017 and 2018 are very close to the number of units that the Census Bureau shared with the City in the LUCA Address Count File. By 2019, the ACS estimate had fallen slightly to 359,623 units. But the 2020 Census enumerated only 309,913 residential housing units, suggesting a single year decline of nearly 50,000 housing units, which would constitute a 13.8% drop in its residential housing stock.¹⁴ The decline Detroit experienced in residential housing units counted in the 2020 Census compared to the 2019 ACS is also a large outlier compared to the rest of the 50 largest cities in the U.S., as shown in Figure 4.

The most powerful evidence we have that the 2020 Census undercounted housing units in Detroit comes from an extensive visual audit of housing units on 4,350 census blocks where the City filed a request to the Census Bureau for a review of the residential housing unit count as part of its Count Question Resolution (CQR) program.¹⁵ The CQR program allows local governments to request a review of census housing counts “to determine whether census processing error(s) excluded valid housing and associated population data.”¹⁶

As part of our audit study, a team of 106 “raters” reviewed images from Google Maps Street View and/or Detroit Street View of 114,274 specific addresses listed on the blocks submitted for review in the CQR program.¹⁷ The raters reviewed two images for each residential address -- one that was closest in time before April 1, 2020,¹⁸ and another that was closest in time after April 1, 2020 -- to determine whether there was a housing structure at the site that met the Census Bureau’s definition of a residential housing unit.¹⁹ Our audit study also included a quality control process in which a sample of addresses was rated by a second rater, who was also provided with a site license to access a database of aerial images that was not publicly available.²⁰ Moreover, all cases in which the initial rater could not determine whether a given housing structure met the Census Bureau’s criteria for being considered a residential housing unit were assigned to a second rater who had access to the aerial imagery.

Our audit validated that the 2020 Census had undercounted the number of housing units on 69.7% of the census blocks we reviewed (i.e., 2,990 of the 4,350 blocks that the City submitted for review as part of the CQR).²¹ The magnitude of this housing undercount was substantial. Across these 2,990 blocks, we counted a total of 78,887 residential housing units compared to only 69,553 in the 2020 Census, meaning the census missed 11.8% of the residential housing units on these blocks. These results suggest that the Census Bureau omitted a substantial number of residential housing units from the MAF. Crucially, anyone living in a housing unit that was not listed on the MAF could not be included in the 2020 Census population count.

I conducted further analysis of our audit data to understand what features of blocks may have contributed to the undercount of residential housing units in Detroit. The factor that emerged as the strongest predictor of the housing undercount was the census self-response rate. Figure 5 illustrates how the census undercount of housing units (measured at the block level) is associated with the 2020 Census self-response rate (measured at the tract level). The block-level housing undercount was over 3.5 times higher in tracts with self-response rates of less than 25% compared to those with self-response rates 75% or more.

This finding is important because places with lower self-response rates require more nonresponse followup (NRFU) field work, making these areas more difficult to enumerate, which can lead to more errors in coverage (when persons or housing units are either missing from the census count or appear in the wrong place).²² Although we already knew from previous research, including the Census Bureau's Postenumeration Survey,²³ that omissions of people from the census count are more common in tracts with lower self-response rates, our analysis shows that omissions of housing units are also more common in such areas. These problems can be exacerbated if not enough time and resources are devoted to the NRFU operation in places with low self-response rates. As Mayor Duggan explains in his testimony (and the attached signed statements from 11 census enumerators further support), the NRFU operation in Detroit started late, ended prematurely, and was not adequately staffed or supervised.

Undercount of Occupied Housing Units

The housing audit described above provides evidence that the 2020 Census undercounted the total number of residential housing units, regardless of whether they were occupied or vacant. Our team also conducted research showing that the 2020 Census understated the number of *occupied* housing units in a sample of Detroit neighborhoods that we analyzed in a report released in December 2021.²⁴ In this study, we examined 2020 Census counts of occupied housing in two sets of neighborhoods, each consisting of five census block groups. The first set of block groups should have been relatively easy to count because they had higher rates of self-response (the average tract-level self-response rate was 66.7%), relatively high rates of residential stability, and a preponderance of single-unit, owner-occupied housing, and yet the 2020 Census produced anomalously low counts of occupied housing. The second set of block groups was selected to represent areas that should have been harder to count because they had lower self-response rates (the average was 32.4%), lower rates of residential stability, and higher vacancy rates.

Our study compared the 2020 Census count of occupied housing units in each block group to data from two independent sources: (a) the United States Postal Service (USPS) Delivery Sequence File from June 2020 and (b) a canvass of all residential housing units in the first sample of block groups (conducted by Wayne State University), in which canvassers counted

occupied units through inspection, and, when necessary, conversations with potential occupants.²⁵

The upshot is that we documented a substantial undercount of occupied housing units in all 10 block groups and obtained very similar results when comparing the 2020 Census data to either the USPS data or data from our canvass. The undercount of occupied housing units was more pronounced in the second sample of block groups, where self-response rates were lower.²⁶ In comparing the USPS data to the census data across all 10 block groups, we estimated that the census had undercounted the population in these areas by 8.1%. Although we do not know for certain the extent to which these are generalizable to the rest of the city, if undercounts of a similar magnitude are found in a majority of the city's more than 600 block groups, the ultimate size of a population undercount could be in the tens of thousands.

Additional Insights from the Census Bureau's 2020 Post-Enumeration Survey

In thinking about how large the 2020 Census undercount may have been throughout Detroit, it is useful to consider some of the findings from the Census Bureau's 2020 Post-Enumeration Survey (PES). Because the Census Bureau does not share results from the PES for specific cities or local jurisdictions below the state level, the national results provide our best indication of which demographic and geographic subgroups were undercounted in the 2020 Census.

The PES results show that the 2020 Census missed 3.3% of the nation's Black population.²⁷ According to the 2020 Census, more than three-quarters (77.2%) of Detroit's population is Black/African American. Although the Census Bureau has not provided PES estimates below the state level, it is reasonable to conclude that the census missed a similarly high percentage of Detroit's Black residents.

The PES also documented an undercount of renters of nearly 1.5%, while homeowners were overcounted. Over half of the households in Detroit are renters, well above the national average of about a third of households. Again, this means a higher proportion of Detroit households were at risk of being missed.

Finally, the PES revealed "significant net undercounts" in the 20 percent of census tracts in the nation with the lowest self-response rates. Detroit's self-response rate at the start of the Nonresponse Follow-up (NRFU) operation was 48.7 percent. An additional 2.3 percent of households self-responded during NRFU, for a final self-response rate of 51 percent (as of 10/28/20), which was below the 2010 Census self-response rate (53.6%) and well below the national self-response rate (67%). Unfortunately, a large swath of Detroit's neighborhoods fell into the bottom 20 percent of census tracts with the lowest self-response rates nationwide.

Ideas for Improving Census Accuracy Moving Forward

The decennial census is a massive and complex operation that serves as the backbone for national statistics in the United States. Among its many functions, it determines how congressional seats are apportioned to states, where the boundaries of legislative, school and voting precincts are drawn, and how more than \$1 trillion in federal funding is allocated.²⁸ It also informs the annual population estimates that the Census Bureau issues between the decennial years.

Although I have been critical of the 2020 Census for undercounting Detroit's population and residential housing stock, I also want to acknowledge the severe and unprecedented operational challenges that the Census Bureau faced in implementing the 2020 Census and commend the Bureau for its heroic efforts in adapting to extremely difficult circumstances and completing its work. The COVID-19 pandemic presented problems for the Nonresponse Followup (NRFU) operation, requiring the Bureau to balance its operational demands with concerns for public health, including the health of its staff. The Bureau also confronted challenges preceding the implementation of the census, including underfunding that led to cutting key pre-census tests and programs, and the proposed addition of a question on citizenship, which created a climate of distrust that likely lowered self-response rates.²⁹ Moreover, when the pandemic delayed the onset of field operations, the Census Bureau tried to extend the census deadlines for field data collection and data delivery, but Congress did not act on this request, leading to extensive litigation and ultimately a decision by the U.S. Supreme Court to extend the deadline for field operations to October 15, 2020.³⁰ This chaotic process stoked concerns that the census was being inappropriately rushed.³¹

But, as the recent interim report from the Panel to Evaluate the Quality of the 2020 Census at the National Academies of Sciences, Engineering, and Medicine concludes, "The fact that the 2020 Census was completed under difficult circumstances is not the same, and is not meant to be interpreted, as a broader statement that the 2020 Census and its data products are high quality and credible."³²

What stands out to me from my experience in working with the City of Detroit to investigate and challenge its 2020 Census undercount is the lack of transparency in how the Census Bureau develops its Master Address File (MAF) during the operation of the census and the implications this has for counting housing and population. The address list is the foundation of the census enumeration and it is critical that local governments be able to review, validate, and correct this information, especially since it forms the basis for federal and state decisions that significantly impact these communities.

In reflecting on their unsuccessful challenge of the 2010 Census count in New York City under the Count Question Resolution Program, Salvo and Lobo explained how, despite improvements

that Census Bureau has made in the way it maintains and develops the MAF, it is common for errors to occur due to “incomplete or incorrect addresses, questions about the very existence of housing units and/or confusion over whether a building even qualifies as an inhabitable structure.”³³ Such problems “can undermine the integrity of the MAF, and by extension, the enumeration.”³⁴

Since the passage of The Census Address List Improvement Act of 1994 (Public Law 103-430), the Census Bureau has made great efforts to work with local governments to improve the way it develops and maintains the MAF. This law created the Local Update of Census Addresses (LUCA) program, which gave local governments the opportunity to examine the list of all addresses in their jurisdiction before the decennial census enumeration, allowing them to suggest adding, deleting, or changing addresses in the MAF.

But, LUCA provides only a brief window of opportunity for local governments to work with the Census Bureau in developing the MAF, and this window closes once the enumeration process begins. In its efforts to challenge and correct the count of residential housing units, the City of Detroit is not permitted to view which addresses are included in the MAF or learn which addresses were dropped from the MAF since the LUCA process ended and the enumeration period began. Allowing local governments continual access to specific information about which housing units are accounted for in the MAF before, during, and after the census enumeration period would substantially improve the quality of the census enumeration and minimize the risk of undercounts like the one Detroit experienced in the 2020 Census. I join Salvo and Lobo in advocating for “a continuous address list operation conducted throughout the decade, aimed at incorporating incremental improvements, based on a frequent dialog with local entities.”³⁵ Such an expansion of LUCA would be “the next logical step in the process that began when LUCA first opened the door to substantive address input from local governments.”

FIGURES

Figure 1. Decennial Census Population Counts and Census Bureau Population Estimates for Detroit: 2010 to 2021

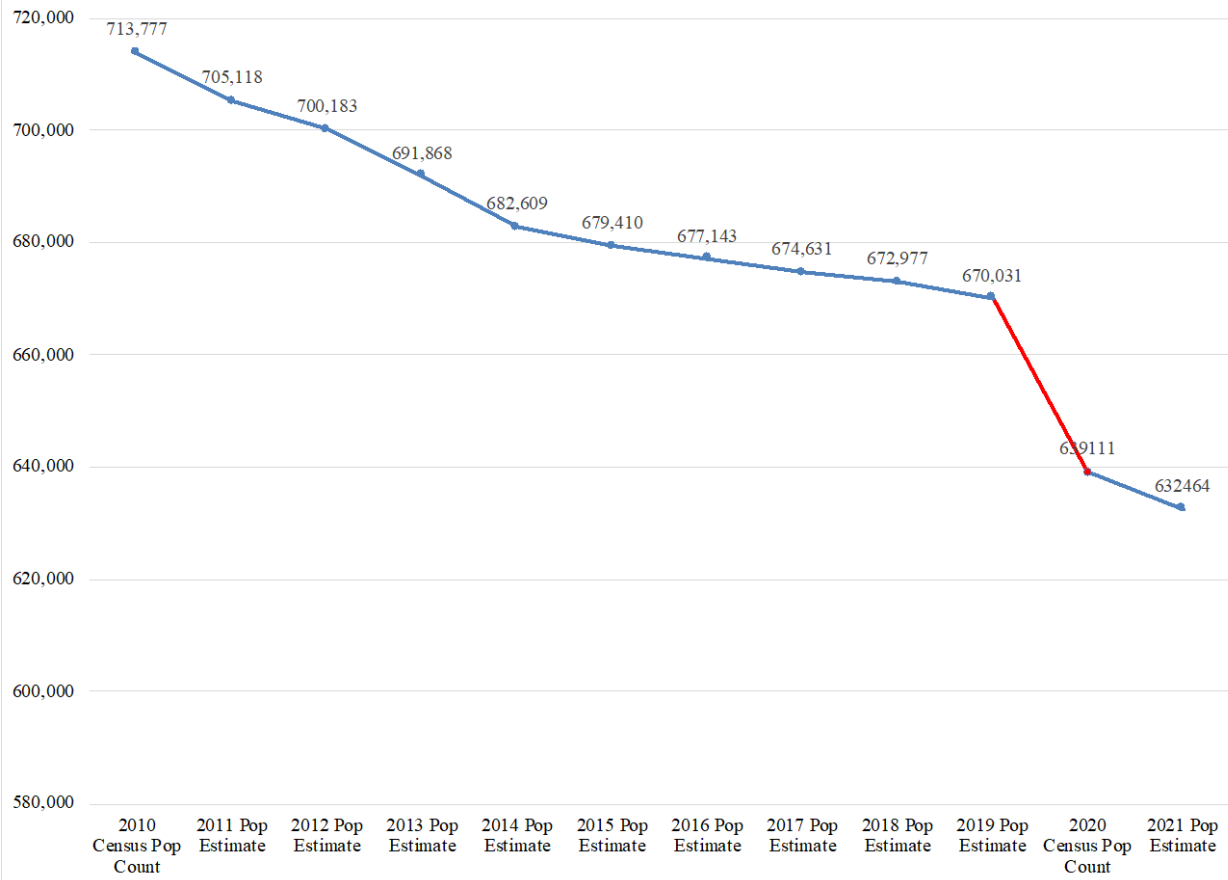


Figure 2. 2020 Census Population Count as % of 2019 Population Estimate for 50 Largest U.S. Cities

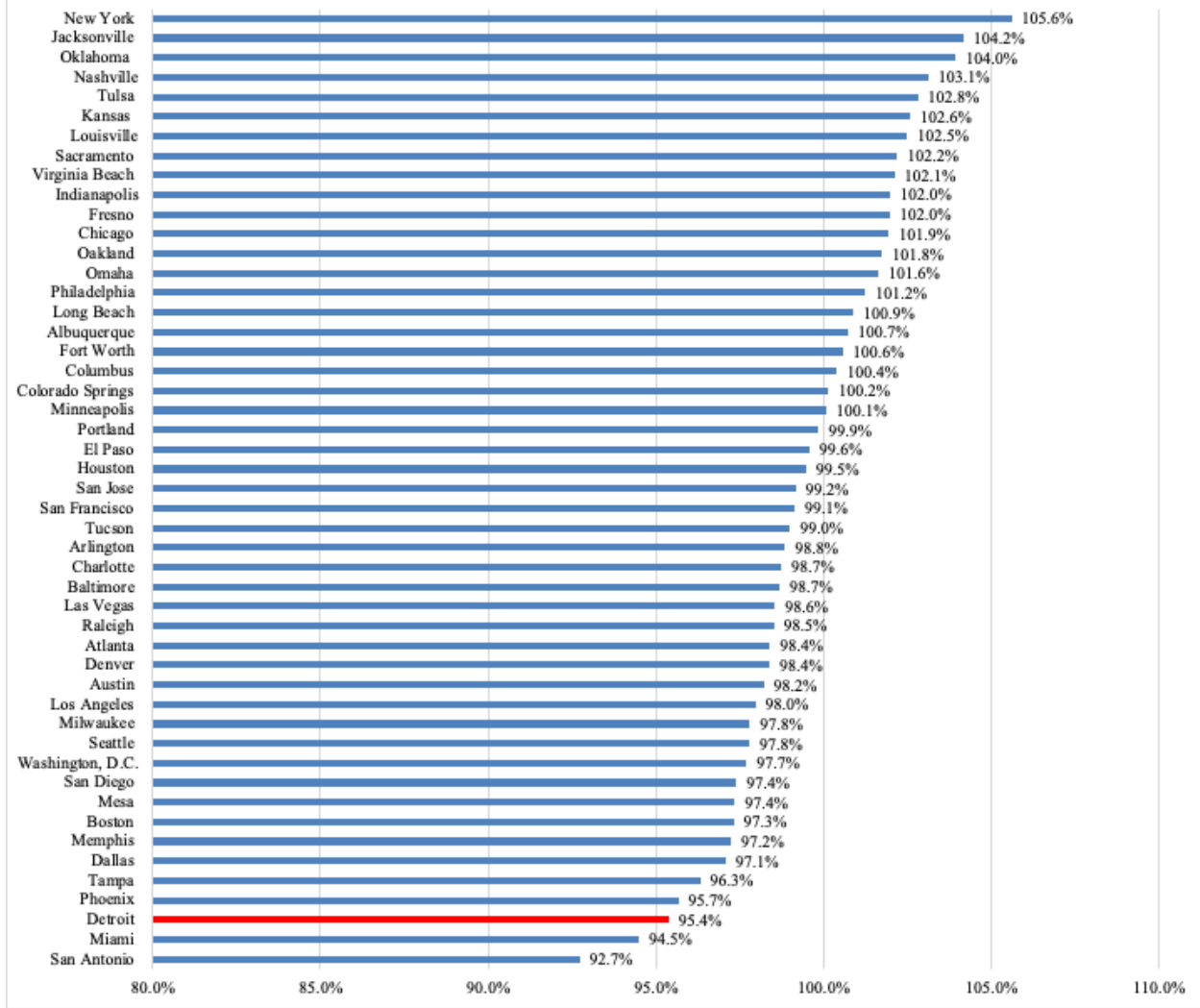


Figure 3. Decennial Census Housing Unit Counts and American Community Survey Housing Unit Estimates for Detroit: 2010 to 2020

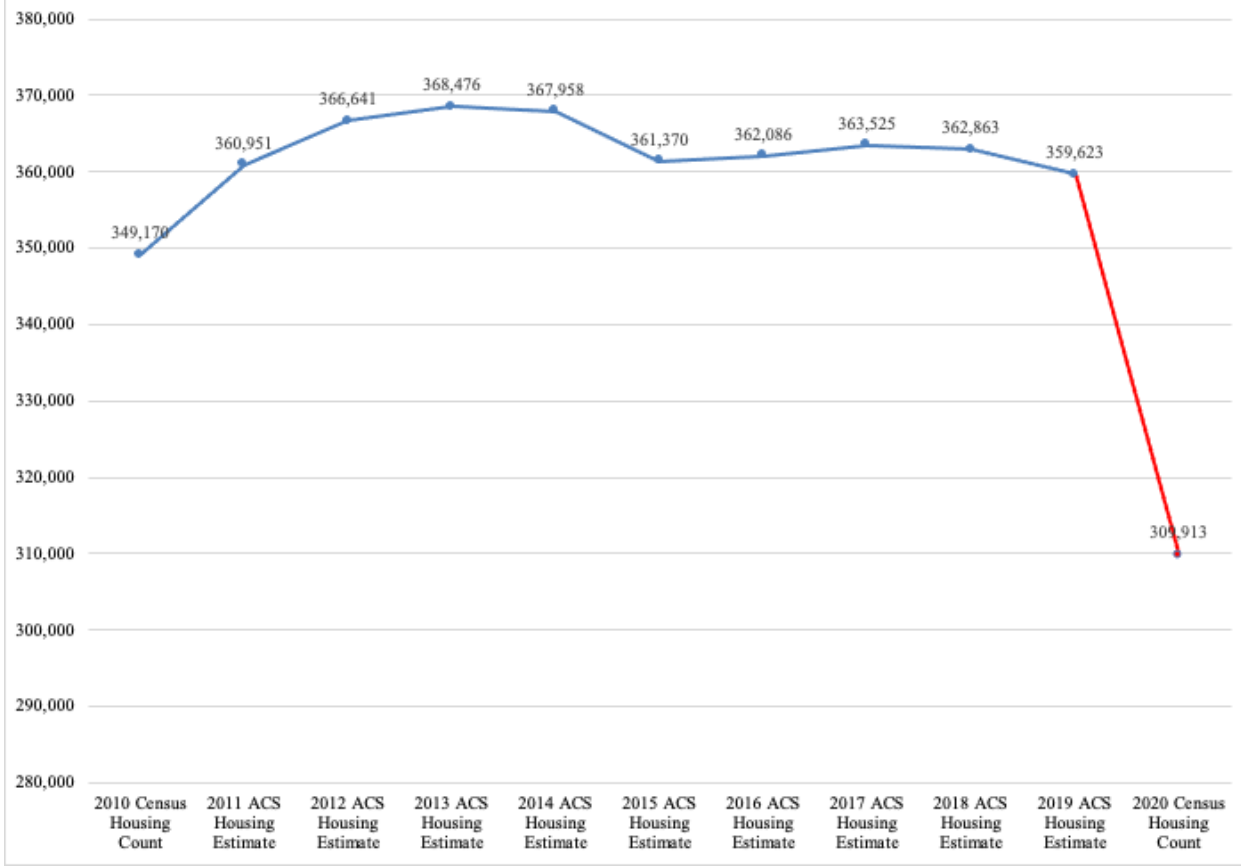


Figure 4. 2020 Census Residential Housing Unit Count as % of 2019 ACS Estimate for 50 Largest U.S. Cities

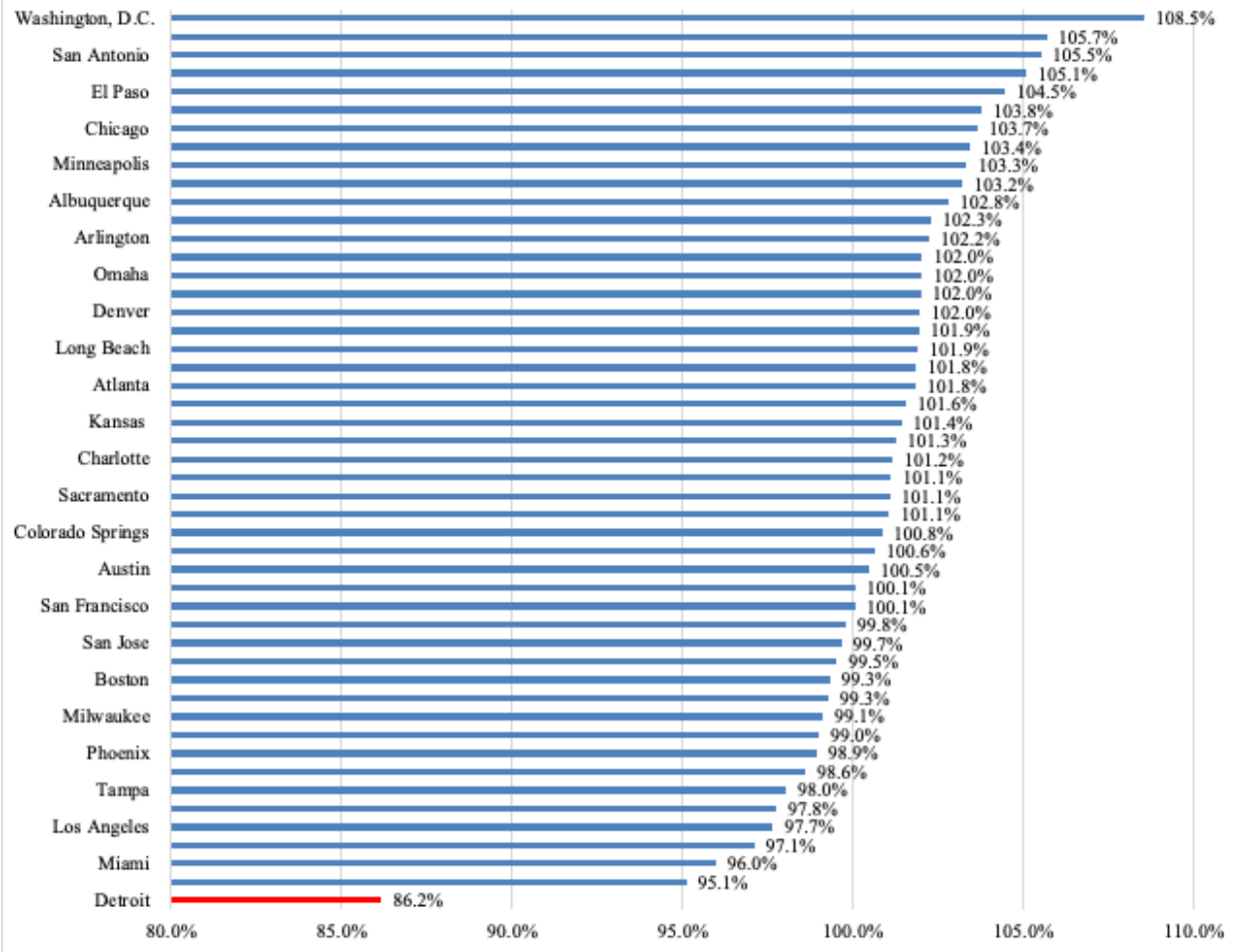
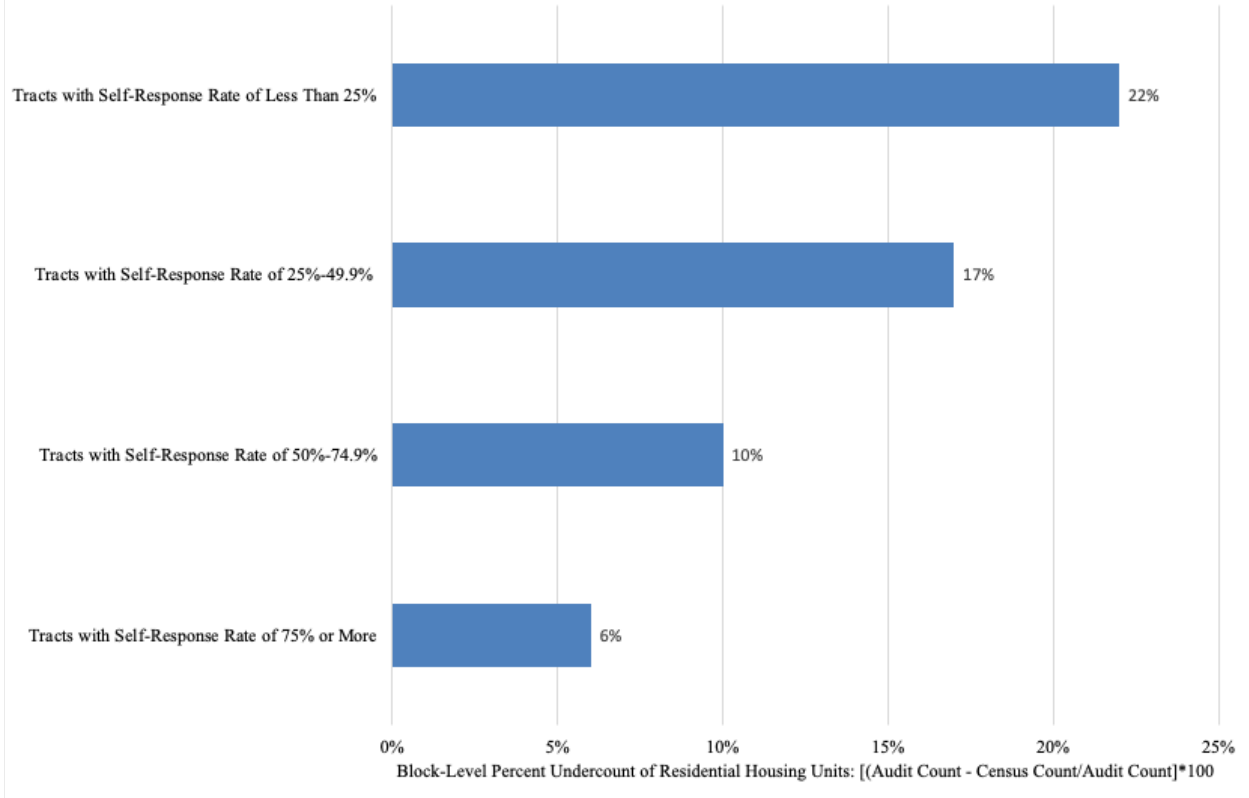


Figure 5. Percent Undercount of Residential Housing Units in Audit Study Was Greater in Tracts with Lower Census Self-Response Rates (n=2,990 Detroit Census Blocks with Validated Housing Undercount)



ENDNOTES

¹ This group of social scientists also included Reynolds Farley, Lisa Neidert, Patrick Cooney, Luke Schaefer, and Elisabeth Gerber from the University of Michigan; Ramona Rodriguez-Washington from the Center for Urban Studies at Wayne State University; and Kurt Metzger, the founder and director emeritus of Data Driven Detroit.

² Each year the Census Bureau releases an official estimate of the residential population of every municipality in the nation. These annual population estimates are based on the previous decennial census count, the number of recorded births and deaths in the prior year, and information about in and out migration. Though the annual population figures are estimates, they are generally quite accurate—indeed, federal funds are distributed to states and localities based on these annual estimates.

³ Census Bureau population estimates from July 1, 2014 and July 1, 2015 show that Detroit lost an estimated 9,259 people, making it Detroit’s largest annual population decline of the decade aside from the change between its 2019 population estimate and the 2020 Census count.

⁴ Frey, William H. (2022, July 11). “Report: Big cities saw historic population losses while suburban growth declined during the pandemic.” Brookings: Washington, D.C. Available at: <https://www.brookings.edu/research/big-cities-saw-historic-population-losses-while-suburban-growth-declined-during-the-pandemic/>

⁵ The difference between the Census Bureau’s estimated population for Detroit on July 1, 2020 and July 1, 2021 is 5,712 people. To be clear, the Census Bureau’s July 1, 2020 population estimate for Detroit (638,176) is slightly different from the April 1, 2020 population count in the 2020 Census (639,111).

⁶ Wang, Hansi Lo (2019, June 4). “2020 Census Could Lead To Worst Undercount of Black, Latinx People In 30 Years,” National Public Radio: Washington, D.C. Available at: <https://www.npr.org/2019/06/04/728034176/2020-census-couldlead-to-worst-undercount-of-black-latinx-people-in-30-years>

⁷ For more comparisons between Detroit and other industrial cities, see Cooney, Patrick, Ren Farley, Samiul Jubaed, Kurt Metzger, Jeffrey Morenoff, Lisa Neidert, and Ramona Rodriguez-Washington (2021, December). “Analysis of the Census 2020 Count in Detroit.” Poverty Solutions, University of Michigan. Available at: <http://sites.fordschool.umich.edu/poverty2021/files/2021/12/PovertySolutions-Census-Undercount-in-Detroit-PolicyBrief-December2021.pdf>

⁸ O’Hare, William P. and Jae June J. Lee (2021, April). “Who Responded in the 2020 Census? Variation in Tract-Level Self-Response Rates in the 2020 U.S. Census.” Washington, D.C.: Georgetown Center on Poverty and Inequality.

⁹ “Worst Connected Cities 2019,” *National Digital Inclusion Alliance*. Available at: <https://www.digitalinclusion.org/worst-connectedcities-2019/>

¹⁰ Khan, Nisa (2020, October 19). “Michigan at 8th place for 2020 Census self-response, but Detroit last for large cities,” *Detroit Free Press*. Available at: <https://www.freep.com/story/news/local/michigan/2020/10/19/michigan-detroit-2020-censusresponse/3710170001/>

¹¹ See O’Hare, William P (2020). “Are Self-Participation Rates Predictive of Accuracy in the U.S. Census?” *International Journal of Social Science Studies* 8. See also 2020 Census Quality Indicators Task Force (2020, October). *2020 Census Quality Indicators: A Report from the American Statistical Association*. Alexandria, VA: American Statistical Association.

¹² National Academies of Sciences, Engineering, and Medicine. (2022). *Understanding the Quality of the 2020 Census: Interim Report*. Washington, DC: The National Academies Press.

¹³ During the LUCA process, the Census Bureau actually added more addresses to the MAF after considering the City’s proposed additions and deletions. The Bureau accepted 23,821 of the City’s 24,008 proposed additions to the MAF but only accepted 6,562 of the City’s 21,715 proposed deletions from the MAF. By the end of the LUCA process, the MAF contained 385,676 addresses, including addresses of both residential housing units and group quarters.

¹⁴ Detroit has experienced many housing demolitions in recent years, but these were accounted for in the LUCA operation so that the MAF would not erroneously maintain records of housing at addresses where structures had been demolished. The City tracks records of completed residential demolitions on its Open Data Portal: <https://data.detroitmi.gov/datasets/detroitmi::completed-residential-demolitions/about>. In 2019 and 2020 combined, there were 4,802 demolitions in Detroit, which does not account for the dramatic decline in housing units between the 2019 ACS estimate and the 2020 Census count of residential housing.

¹⁵ The City submitted a list of 4,350 blocks to the Census Bureau on which its internal data showed that the number of residential housing units exceeded the housing unit count from the 2020 Census. The City’s table of all Detroit addresses was compiled from the United States Postal Service Delivery Point Validation file and the City’s Completed Residential Demolitions data. The City also linked all addresses in its internal data to its building footprint data.

¹⁶ United States Census Bureau (2021, December 1) “2020 Census Count Question Resolution Operation (CQR).” Washington, D.C. Available at: <https://www.census.gov/programs-surveys/decennial-census/decade/2020/planning-management/evaluate/cqr.html>.

¹⁷ For more details on the methodology of this audit, see the City of Detroit’s June 30, 2022 Supplemental CQR submission, attached to Mayor Duggan’s testimony as Exhibit 2.

¹⁸ The census counts where each person was living as of April 1, 2022.

¹⁹ All raters underwent extensive training to ensure they had a uniform understanding of the Census Bureau’s definition of residential housing units. The Bureau’s definition of residential housing units includes all occupied housing units and vacant housing units that are “intended for occupancy.” One of the main criteria that vacant housing units must meet to be counted is that they cannot be “exposed to the elements” (i.e., the roof, walls, windows, and doors must protect the interior of the structure from the elements). For more detail on the census definition of housing units, see the Census Bureau’s “Definitions” document on its Housing Vacancies and Homeownership (CPS/HVS) website: <https://www.census.gov/housing/hvs/definitions.pdf>.

²⁰ When the street view images were inconclusive, our quality control team viewed 360-degree oblique aerial images of properties from April, 2020 that were maintained by the Detroit Office of the Assessor. Also, addresses corresponding to parcels that were coded by the Office of the Assessor as “Mixed-Use” were visited in person by researchers from Wayne State University to assess whether they contained residential housing units.

²¹ The City’s supplemental CQR submission requests that the Census Bureau focus its review of the residential housing count on the 78,887 addresses contained on these 2,990 blocks.

²² O’Hare, William P (2020). “Are Self-Participation Rates Predictive of Accuracy in the U.S. Census?” *International Journal of Social Science Studies* 8.

²³ Hill, Courtney, Krista Heim, Jinhee Hong, and Nam Phan (2022, June). “2020 Census Coverage Estimates for People in the United States by State and Census Operations.” Washington, D.C. Available at: <https://www2.census.gov/programs-surveys/decennial/coverage-measurement/pes/census-coverage-estimates-for-people-in-the-united-states-by-state-and-census-operations.pdf>

²⁴ Cooney, Patrick, Ren Farley, Samiul Jubaed, Kurt Metzger, Jeffrey Morenoff, Lisa Neidert, and Ramona Rodriguez-Washington (2021, December). “Analysis of the Census 2020 Count in Detroit.” Poverty Solutions, University of Michigan. Available at: <http://sites.fordschool.umich.edu/poverty2021/files/2021/12/PovertySolutions-Census-Undercount-in-Detroit-PolicyBrief-December2021.pdf>

²⁵ We sent a team of canvassers to visit all census blocks in these five block groups to count the total number of housing units and determine the occupancy/vacancy status of each housing unit. Canvassers were trained to determine the occupancy status of a housing unit based on physical characteristics of the structure (e.g., car in the driveway, lights on in the home), and, when occupancy status was ambiguous, talk to possible occupants of the housing units and/or neighbors. One issue with comparing data on housing occupancy from the 2021 canvass to the 2020 Census is that housing conditions may have changed in the elapsed time between the Census enumeration and the canvass. To address this limitation, we also analyzed data from the United States Postal Service (USPS) Delivery Sequence File from June 2020, counting only addresses that were verified to be occupied. Whereas the canvas was only conducted on the first set of five block groups, we analyzed USPS data on all 10 block groups.

²⁶ In the first sample of block groups (with higher self-response rates), we documented a 7.6% undercount of occupied housing units, while in the second sample of block groups (with lower self-response rates), we documented a 9.2% undercount.

²⁷ Hill, Courtney, Krista Heim, Jinhee Hong, and Nam Phan. (2022, June). *2020 Post-Enumeration Survey Estimation Report*. U.S. Census Bureau: Washington, D.C. Available at: <https://www2.census.gov/programs-surveys/decennial/coverage-measurement/pes/census-coverage-estimates-for-people-in-the-united-states-by-state-and-census-operations.pdf>

²⁸ O’Hare, William P., Cara Brumfield, and Jae June J. Lee. (2020). “Evaluating the Accuracy of the Decennial Census: A Primer on the Fundamentals of Census Accuracy and Coverage Evaluation.” Georgetown Center on Poverty and Inequality. Available at <https://www.georgetownpoverty.org/issues/evaluating-the-accuracy-of-the-decennial-census/>.

²⁹ National Academies of Sciences, Engineering, and Medicine. (2022). *Understanding the Quality of the 2020 Census: Interim Report*. Washington, DC: The National Academies Press.

³⁰ Ibid.

³¹ Ibid.

³² Ibid.

³³ Salvo, Joseph J. and Arun Peter Lobo. (2013). "Misclassifying New York's Hidden Units as Vacant in 2010: Lessons Gleaned for the 2020 Census." *Population Research and Policy Review* 32: 729-751.

³⁴ Ibid.

³⁵ Ibid.