(The Election Data Book: A Statistical Portrait of Voting in America, 1992 (Bernan Press, 1993)). While we only published the single volume, we have continued to compile an electronic county-level database for each general election since that time, which we sell to numerous institutions and organizations.

12. I personally have been involved in the election administration field for over 40 years. I have worked for federal government clients (Federal Election Commission, Election Administration Commission, GAO, Library of Congress) along with a number of state governments on different aspects of election administration. These include studies on voter registration systems as well as voting equipment.

13. Since 2008, I have been a poll worker in Prince William County, VA where I live. Because the state holds elections every year and due to my interest in all aspects of election administration, I have graduated to now being "chief judge" in the precincts that I have been assigned to work. In 2012, the county experienced long lines at the polls on Election Day, and I was then appointed to a 20-person task force by the County Board of Supervisors to investigate the cause of the problems. Because of my data background, I compiled and analyzed all the data used by the task force, presenting updates at our bi-weekly meetings over the 5-month life of the task force. With the retirement of the County's General Registrar (director of elections for the county), I was asked to take over the 11-person office. While I declined the full time job offer, I did agree to be the Acting General Registrar for four months while the county conducted a search for a full time replacement. I have continued to be actively involved in election administration issues within the county since that time. I have continued to be involved with the county, now serving as chief judge in a number of rotating precincts that need assistance with each election, as well as serving on the County's Historical Commission since 2015 (and elected Chairman twice since 2017).

III. U.S. CONGRESSIONAL REAPPORTIONMENT: BASELINE PROJECTIONS FOR 2020

14. For the past four decades I and Election Data Services have studied and issued yearly reports on the apportionment process using new population estimates released by the Census Bureau and private demographic firms. All our reports can be found at our website: www.electiondataservices.com, under the "Research" tab. We have become a staple for the press and others to cite when looking at the shift that is occurring in population between different states.

15. In the mid-1980s, E.D.S. Inc. developed software to calculate the distribution of congressional districts to the states based on population or other data. Initially developed in the Basic programming language, in the early 1990s, we reprogrammed it as macros for Excel spreadsheets. The program implemented the "method of equal proportions" formula that was adopted by the U.S. Congress in 1941 as the official manner to divide seats in the US House of Representatives among the states. As the Constitution stipulates, each state is provided at least one initial seat in the House of Representatives. The formula is actually used to apportion the remaining 385 districts. The formula works as follows:

> The rest of the seats are handed out based on statistical "priority values" assigned to each additional seat that a state might get. In as close to plain English as the formula will allow, these priority values are calculated in a two-step process that requires dividing a state's population by the square root of the product of the number of seats it's already been assigned and that number plus one. The priority numbers are then rank ordered: "State A" will get an additional seat if its priority value for that seat is greater than any other state's. The seats are disbursed to states based on these rankings until all 435 have been awarded.[1]

[1] Greg Giroux, "Before Redistricting, That Other 'R' Word," CQ Weekly (Nov. 30, 2009); *see also* Kristin D. Burnett, "Congressional Apportionment: 2010 Census Briefs," U.S. Census Bureau (Nov. 2011), https://www.census.gov/prod/cen2010/briefs/c2010br-08.pdf.

16. Our reapportionment program calculates not only how many seats each state would receive based on the population or other numbers put into the formula, but it also calculates and reports the number of people a state gained its last seat by or lost the next seat by. It reports the last seat number that is given to a state, as well as what number seat the next district would be if the calculations continued past the 435 seat cut-off. The program also allows the user to change the maximum number of seats to be calculated. Finally, the program calculates the ideal district size for each state, by taking the state's total population and dividing it by the number of seats that the state has been awarded.

17. On at least a yearly basis, we have utilized the apportionment program to analyze the Census Bureau's annual state population estimates, which are usually released in late December each year. Our resulting studies and press releases have been consistently referenced by the media and scholars. Our studies are usually released the same day the Census Bureau estimates are unveiled and can be found on our website (www.electiondataservices.com). All of our historical studies (back to when we started them in 1994) and press releases are also kept on our website, available for all to see. The same tables have also been generated from the final decennial population numbers each decade back to 1940. Our website also has a historical table, that we have continued to update, showing the number of seats given to each state each decade back to the nation's founding in 1789.

18. We can utilize the annual estimates from the Bureau to create reliable projections of what the population, by state, might be at the time of the next decennial census (April 1 of the year ending in "0") and test those estimates on the anticipated deviations that will result. We do this projection each year and report the results in our press releases. A copy of our most recent study, released December 30, 2019, is attached to this report as **Exhibit 2**. For the purposes of studying the 2019 population estimates released by the Census Bureau in December 2019, E.D.S. Inc. created a series of estimates for possible 2020 population projections based upon

various amounts of change that were apparent in the Bureau's data. The three trend models used various time factors that the change would be calculated upon.

19. While our most recent study also reported on a "short-term change", a "mid-term change" and a "long-term change" model, at this point in the decade (when the Census is currently ongoing) it is logical to focus on just the "short-term change" model.

20. Using the 2019 population estimates, I am able to calculate a projected allocation of seats in the House of Representatives. I calculate the number of seats to be apportioned to each State based upon the so-called "method of equal proportions." As discussed above, under this formula, the population of each state is multiplied by a constant that is mathematically determined to test the priority of each state for an additional seat in the House. The only variable entered into the formula is the population of the states, as reported in the decennial Census. Any variation in the population will modify the priority ranking of the states and can cause a state to lose, or to fail to gain, an additional seat.

21. As we reported repeatedly in our 2019 report, and have continued to stress in press interviews, speeches, and conversations, the apportionment formula is very susceptible to slight changes in state's individual populations and how they relate to other states' populations. We always demonstrate this vulnerability by looking at the states that fall close to the magic 435 cut-off for seats.

2019 Reapportionment Analysis

2020 Projections (using 2018-2019 short-term trend)

	Last Five Seats	Margin of Gain		Next Seats	Margin of Loss
431	Illinois (17th)	126,052	436	Alabama (17th)	10,072
432	New York (26th)	61,279	437	Minnesota (8th)	21,992
433	Texas (39th)	79,742	438	Ohio (16th)	74,135
434	Montana (2nd)	2,402	439	California (53rd)	344,367
435	Florida (29th)	44,285	440	Rhode Island (2nd)	14,539

22. All of the above states are very possible to change their ranking, and therefore their allocation of seats, when the final population numbers are published at the end of this year.

23. We've seen this happen in past decades, as we always note in our studies, when circumstances like weather events have affected apportionment. The Census Bureau's estimated populations released for 2005 showed **Louisiana** would keep all their congressional districts that decade. Even the Bureau's own projections for 2010 released that same year showed **Louisiana** staying the same. Then hurricane Katrina hit **Louisiana** at the end of August 2005 (after the date of the population estimates). Devastation and population loss impacted New Orleans in a major way, and when the Bureau's 2006 population estimates were released **Louisiana** was looking at losing a congressional seat. That was ultimately confirmed when the 2010 Census was taken, and state data was released at the end of that year. Just last week, when Hurricane Laura came ashore in the Gulf Coast, I was called by several media and a Louisiana State Senator wondering about the likely impact on 2020. The current hurricane season, wild fires, and the ongoing COVID-19 pandemic make it more likely that undercounts will be exacerbated, particularly if Census operations are truncated.

24. A changed practice on how to count the military overseas could also change the final apportionment when it is announced December 31, 2020. For the 2020 Census the Census Bureau has changed the "residency rules" for counting the military by creating a distinction between personnel who are *deployed* overseas (usually for short periods of time) compared to those who are *stationed* or *assigned* overseas (frequently for longer periods of time). The Bureau will use DOD's administrative records to count *deployed* personnel at their usual residence in the US for both apportionment and redistricting purposes (they will be embedded within the state's resident population counts). On the other hand, personnel who are *stationed* or *assigned* overseas will be counted to their "home state of record" for apportionment purposes only and will show up as part of a state's total "overseas count" when the Bureau releases the final and

official apportionment data by December, 31, 2020. Military sources have told the Census Bureau that of all overseas military, approximately 15% are *deployed* personnel and 85% are *stationed* or *assigned* overseas. Overseas military personnel have been a factor in the apportionment formula for the past several decades, including the switching of the final district in 2000 that went from **Utah** to **North Carolina**.

25. These numbers are likely to also be significantly impacted by how well the Commerce Department and Census Bureau conducts the census, how well the American public responds to this decennial exercise, the first Census where major components will be conducted via the internet, and whether the discussion on a Census citizenship question over the past year will cause some groups to avoid participating. With these complications and policies described above, the truncation of the 2020 Census field operations and post-processing is likely to prevent enumeration of people in hard to count communities and increase the differential undercount.

26. As I noted in EDS's report from last year's we cautioned users that even though there is a very short time before the Census, the population projections are still subject to change. "We are now at a place where the rubber meets the road," I said. "How well does the Census Bureau and the Trump administration put on the greatest mobilization of government resources outside of war time? How well will the public respond and answer the Census, given the competing focuses of everyday life and the need to utilize the internet? Will the fear of foreign intervention also impact the census?" I noted. "Having worked with Census data and estimates since the 1970s, it is important to remember that major events like Katrina and the 2008 recession each changed population growth patterns and that impacted and changed the next apportionment," I said.

27. The ore apparent with the low response rates still being identified across the country. Because the Census Bureau has had to react to the pandemic that appeared right when the counting process was beginning, they initially requested a delay of four months in the reporting

requirements in proposed language to Congress. Yet, in the last month the Trump administration has pulled back that delay, and instead reinstituted the original reporting requirements of December 31, 2020 for the apportionment numbers. As a result, the Bureau has shortened the time to find people who have not responded to the census, thinned down the time to process the census questionnaires, and cut various procedural processes to check whether the counting process is correct.

28. Just this morning, the Bureau's website was showing a nationwide response rate of just 64.9% as of Saturday evening, August 29th, 2020, their latest estimates. Additionally, they note another 16.9% have been enumerated in the follow-up procedure called Non-Response Follow Up (NRFU), for a total nationwide enumerated rate of 81.7%.

29. But these "enumerated rates" vary greatly by state. Idaho is currently at the highest rate of 96.5%, helped greatly from the 27.8% that were found in the NRFU program. The state of New Mexico is at the bottom of the list, showing a self-response rate of 55.6%, an enumerated in Nonresponse rate of 15.6%, and a total enumerated rate of 71.2%.

30. Looking at four of the five states where the last five seats are expected to be allocated, those states are also all below the average self-response rate for the nation, which is 64.9 % as of August 29, 2020. For example, New York has a self-response rate of 61.0 %, Florida has a self-response rate of 61.5%, and Texas has a self-response rate of 60.2%. If the final population counts of these three states, that are currently projected to gain one of the last congressional seats, are undercounted, by even tens of thousands of people, those states will lose a congressional seat to a different state.

31. **Exhibit 3** in this report is a table of these response rates reported this morning where I have sorted the states by the overall enumerated rates. At the bottom of the list are the mostly southern states of New Mexico, Georgia, Puerto Rico, Arizona, Alabama, Montana, South Carolina, Mississippi, North Carolina, Louisiana, Florida and Texas (listed in order of least

enumerated rate to higher). Except for Montana, all of these listed states have higher than average concentration of minority racial groups in their population.

32. Clearly minority racial groups are being negatively affected disproportionately by the challenges of this Census. When one uses the Bureau's same reporting system to look down at the tract level, one can find the lowest self-response rates in areas heavily populated by African-Americans (including inner cities), Hispanics (including colonias), and Native America communities (reservations). On the other hand, the best self-response rates are in suburban communities. Unfortunately, the Bureau does not report the NRFU numbers at the tract level, so it is unknown whether that process is successful or not.

33. The Bureau's changes to the timeline for the counting and post-count process will likely result in a greater undercount than experienced in prior censuses. Based on my experience and knowledge, this will likely have a significant effect on the accuracy of the census, meaning more individuals will be missed in certain underperforming states and in hard to count communities. There is also a strong potential to impact a number of states in the apportionment process if the period for counting and post-processing is truncated to September 30. Furthermore, states use Census data in their state legislative redistricting processes, and undercounts of hard to count communities can result in the loss of state and local legislative seats for the undercounted areas.

I declare under penalty of perjury that the foregoing is true and correct.

Kimball W. Brace

Kimball W. Brace

Executed on August 31, 2020 at Manassas, Virginia.

APPENDIX 1

(Exhibit 1 to Declaration of Kimball W. Brace)

VITA

KIMBALL WILLIAM BRACE

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Kimball Brace is the president of Election Data Services Inc., a consulting firm that specializes in redistricting, election administration, and the analysis and presentation of census and political data. Mr. Brace graduated from the American University in Washington, D.C., (B.A., Political Science) in 1974 and founded Election Data Services in 1977.

Redistricting Consulting

Activities include software development; construction of geographic, demographic, or election databases; development and analysis of alternative redistricting plans; general consulting, and onsite technical assistance with redistricting operations.

Congressional and Legislative Redistricting

Arizona Independent Redistricting Commission: Election database, 2001

Arizona Legislature, Legislative Council: Election database, 2001

Colorado General Assembly, Legislative Council: Geographic, demographic, and election databases, 1990–91

Connecticut General Assembly
- Joint Committee on Legislative Management: Election database, 2001; and software, databases, general consulting, and onsite technical assistance, 1990–91
- Senate and House Democratic Caucuses: Demographic database and consulting, 2001

Florida Legislature, House of Rep.: Geographic, demographic, and election databases, 1989–92

Illinois General Assembly
- Speaker of House and Senate Minority Leader: Software, databases, general consulting, and onsite technical assistance, 2000–02,
- Speaker of House and President of Senate: Software, databases, general consulting, and onsite technical assistance, 2018-current, 2009-2012, 1990–92, and 1981-82

Iowa General Assembly, Legislative Service Bureau and Legislative Council: Software, databases, general consulting, and onsite technical assistance, 2000–01 and 1990–91

Kansas Legislature: Databases and plan development (state senate and house districts), 1989

Massachusetts General Court
- Senate Democratic caucus: Election database and general consulting, 2001–02
- Joint Reapportionment Committees: Databases and plan development (cong,, state senate, and state house districts), 1991–93, 2010-2012

(Redistricting Consulting, cont.)

Michigan Legislature: Geographic, demographic, and election databases, 1990–92; databases and plan development (cong., state senate, and state house districts), 1981-82

Missouri Redistricting Commission: General consulting, 1991–92

Commonwealth of Pennsylvania: General consulting, 1992

Rhode Island General Assembly and Reapportionment Commissions

- Software, databases, plan development, and onsite assistance (cong., state senate, and state house districts), 2016- current, 2010-2012, 2001–02 and 1991–92
- Databases and plan development (state senate districts), 1982-83

State of South Carolina: Plan development and analysis (senate), U.S. Dept. of Justice, 1983–84

Local Government Redistricting

Orange County, Calif.: Plan development (county board), 1991–92

City of Bridgeport, Conn.: Databases and plan development (city council), 2011-2012 and 2002–03

Cook County, Ill.: Software, databases, and general consulting (county board), 2010-2012, 2001–02, 1992–1993, and 1989

Lake County, Ill.: Databases and plan development (county board), 2011 and 1981

City of Chicago, Ill.: Software, databases, general consulting, and onsite technical assistance (city wards), 2010-2012, 2001–02 and 1991–92

City of North Chicago, Ill.: Databases and plan development (city council), 1991 and 1983

City of Annapolis, Md.: Databases and plan development (city council), 1984

City of Boston, Mass.: Databases and plan development (city council), 2011-2012, 2001-2002, and 1993

City of New Rochelle, N.Y.: Databases and plan development (city council), 1991–92

City of New York, N.Y.: Databases and plan development (city council), 1990–91

Cities of Pawtucket, Providence, East Providence, and Warwick, and town of North Providence, R.I.: Databases and plan development (city wards and voting districts), 2011-2012, 2002

City of Woonsocket and towns of Charlestown, Johnston, Lincoln, Scituate and Westerly, R.I.: Databases and plan development (voting districts), 2011-2012, 2002; also Westerly 1993

City of Houston, Tex.: Databases and plan development (city council), 1979 — recommended by U.S. Department of Justice

City of Norfolk, Va.: Databases and plan development (city council), 1983–84 — for Lawyers' Committee for Civil Rights

Virginia Beach, Va.: Databases and plan development (city council), 2011-2012, 2001–02, 1995, and 1993

Other Activities

International Foundation for Electoral Systems (IFES) and U.S. Department of State: redistricting seminar, Almaty, Kazakhstan, 1995

Library of Congress, Congressional Research Service: Consulting on reapportionment, redistricting, voting behavior and election administration

National Conference of State Legislatures (NCSL): Numerous presentations on variety of redistricting and election administration topics, 1980 - current

Election Administration Consulting

Activities include seminars on election administration topics and studies on voting behavior, voting equipment, and voter registration systems.

Prince William County, VA:
2013 – Appointed by Board of County Supervisors to 15 member Task Force on Long Lines following 2012 election. Asked and appointed by County's Electoral Board to be Acting General Registrar for 5-month period between full-time Registrars.
2008 - current – poll worker and now chief judge for various precincts in county

U.S. Election Assistance Commission (EAC): Served as subcontractor to prime contractors who compiled survey results from 2008 and 2010 Election Administration and Voting Survey.

U.S. Election Assistance Commission (EAC): Compile, analyze, and report the results of a survey distributed to state election directors during FY–2007. Survey results were presented in the following reports of the EAC: *The Impact of the National Voter Registration Act of 1993 on the Administration of Elections for Federal Office, 2005–2006, A Report to the 110th Congress,* June 30, 2007; *Uniformed and Overseas Citizens Absentee Voting Act (UOCAVA), Survey Report Findings,* September, 2007; and *The 2006 Election Administration and Voting Survey, A Summary of Key Findings,* December, 2007.

U.S. Election Assistance Commission (EAC): Compile, analyze, and report the results of three surveys distributed to state election directors during FY–2005: Election Day, Military and Overseas Absentee Ballot (UOCAVA), and Voter Registration (NVRA) Surveys. Survey results were presented in the following reports: *Final Report of the 2004 Election Day Survey,* by Kimball W. Brace and Dr. Michael P. McDonald, September 27, 2005; and *Impact of the National Voter Registration Act of 1993 on the Administration of Elections for Federal Office, 2003–2004, A Report to the 109th Congress,* June 30, 2005.

Rhode Island Secretary of State: Verification of precinct and district assignment codes in municipal registered voter files and production of street files for a statewide voter registration database, on-going maintenance of street file, 2004-2006, 2008-2014, 2016-2017.

Rhode Island Secretary of State, State Board of Elections & all cities & towns: production of precinct maps statewide, 2012, 2002, 1992

District of Columbia, Board of Elections and Ethics (DCBOEE): Verification of election ward, Advisory Neighborhood Commission (ANC), and Single-Member District (SMD) boundaries and production of a new street locator, 2003. Similar project, 1993.

Harris County, Tex.: Analysis of census demographics to identify precincts with language minority populations requiring bilingual assistance, 2002–03

(Election Administration Consulting, cont.)

Cook County, Ill., Election Department and Chicago Board of Election Commissioners:
- Analysis of census demographics to identify precincts with language minority populations requiring bilingual assistance, 2019, 2010-2013, 2002–03
- Study on voting equipment usage and evaluation of punch card voting system, 1997

Chicago Board of Election Commissioners: Worked with Executive Director & staff in Mapping Dept. to redraw citywide precincts, eliminate over 600 to save costs, 2011-12

Library of Congress, Congressional Research Service: Nationwide, biannual studies on voter registration and turnout rates, 1978–2002

U.S. General Accounting Office (GAO), U.S. Dept. of Justice, and numerous voting equipment vendors and media: Data on voting equipment usage throughout the United States, 1980–present

Needs assessments and systems requirement analyses for the development of statewide voter registration systems:
- Illinois State Board of Elections: 1997
- North Carolina State Board of Elections, 1995
- Secretary of Commonwealth of Pennsylvania, 1996

Federal Election Commission, Office of Election Administration:
- Study on integrating local voter registration databases into statewide systems, 1995
- Nationwide workshops on election administration topics, 1979–80
- Study on use of statistics by local election offices, 1978–79

Cuyahoga County, Ohio, Board of Elections: Feasibility study on voting equipment, 1979

Winograd Commission, Democratic National Committee: Analysis of voting patterns, voter registration and turnout rates, and campaign expenditures from 1976 primary elections

Mapping and GIS

Activities include mapping and GIS software development (geographic information systems) for election administration and updating TIGER/Line files for the decennial census.

2000 Census Transportation Planning Package (CTPP), 1998–99: GIS software for the U.S. Department of Transportation to distribute to 400 metropolitan planning organizations (MPOs) and state transportation departments for mapping traffic analysis zones (TAZs) for the 2000 census; provided technical software support to MPOs

Census 2000, 2010 and 2020 Redistricting Data Program, Block Boundary Suggestion Project (Phase 1) and Voting District Project (Phase 2), 1995–99: GIS software and provided software, databases, and technical software support to the following program participants:
- Alaska Department of Labor
- Connecticut Joint Committee on Legislative Management
- Illinois State Board of Elections
- Indiana Legislative Services Agency
- Iowa Legislative Service Bureau

(Mapping & GIS Support, cont.)

- New Mexico Legislative Council Service
- Rhode Island General Assembly
- Virginia Division of Legislative Services

Developed PRECIS® Precinct Information System—GIS software to delineate voting precinct boundaries—and delivered software, databases, and technical software support to the following state and local election organizations (with date of installation):

- Cook County, Ill., Department of Elections (1993)
- Marion County, Fla., Supervisor of Elections (1995)
- Berks County Clerk, Penn. (1995)
- Hamilton County, Ohio, Board of Elections (1997)
- Brevard County, Fla., Supervisor of Elections (1999)
- Osceola County, Fla., Supervisor of Elections (1999)
- Multnomah County, Ore, Elections Division (1999)
- Chatham County, Ga., Board of Elections (2000)
- City of Chicago, Ill., Board of Election Commissioners (2000)
- Mahoning County, Ohio, Board of Elections (2000)
- Iowa Secretary of State, Election and Voter Registrations Divisions (2001)
- Woodbury County, Iowa, Elections Department (2001)
- Franklin County, Ohio, Board of Elections (2001)
- Cobb County, Ga., Board of Elections and Voter Registration (2002)

Illinois State Board of Elections, Chicago Board of Election Commissioners, and Cook County Election Department: Detailed maps of congressional, legislative, judicial districts, 1992

Associated Press: Development of election night mapping system, 1994

Litigation Support

Activities include data analysis, preparation of court documents and expert witness testimony. Areas of expertise include the census, demographic databases, district compactness and contiguity, racial bloc voting, communities of interest, and voting systems. Redistricting litigation activities also include database construction and the preparation of substitute plans.

State of Alabama vs. US Department of Commerce, et al (2019-2020) apportionment & citizenship data

NAACP vs. Denise Merrill, CT Secretary of State, et al (2019-2020) state legislative redistricting and prisoner populations

Latasha Holloway, et al. v. City of Virginia Beach, VA (2019) city council redistricting

Joseph V. Aguirre vs. City of Placentia, CA (2018-2019), city council redistricting

Davidson, et al & ACLU of Rhode Island vs. City of Cranston, RI (2014-16), city council & school committee redistricting with prisoner populations.

Navaho Nation v. San Juan County, UT (2014-17) county commissioner & school board districts.

Michael Puyana vs. State of Rhode Island (2012) state legislature redistricting

(Litigation Support, cont.)

United States of America v. Osceola County, Florida, (2006), county commissioner districts.

Deeds vs McDonnell (2005), Va. Attorney General Recount

Indiana Democratic Party, et al., v. Todd Rokita, et al. (2005), voter identification.

Linda Shade v. Maryland State Board of Elections (2004), electronic voting systems

Gongaley v. City of Aurora, Ill. (2003), city council districts

State of Indiana v. Sadler (2003), ballot design (city of Indianapolis-Marion County, Ind.)

Peterson v. Borst (2002–03), city-council districts (city of Indianapolis-Marion County, Ind.)

New Rochelle Voter Defense Fund v. City of New Rochelle, City Council of New Rochelle, and Westchester County Board Of Elections (2003), city council districts (New York)

Charles Daniels and Eric Torres v. City of Milwaukee Common Council (2003), council districts (Wisconsin)

The Louisiana House of Representatives v. Ashcroft (2002–03), state house districts

Camacho v. Galvin and *Black Political Caucus v. Galvin* (2002–03), state house districts (Massachusetts)

Latino Voting Rights Committee of Rhode Island, et al., v. Edward S. Inman, III, et al. (2002–03), state senate districts

Metts, v. Harmon, Almond, and Harwood, et al. (2002–03), state senate districts (Rhode Island)

Joseph F. Parella, et al. v. William Irons, et al. (2002–03), state senate districts (Rhode Island)

Jackson v. County of Kankakee (2001–02), county commissioner districts (Illinois)

Corbett, et al., v. Sullivan, et al. (2002), commissioner districts (St Louis County, Missouri)

Harold Frank, et al., v. Forest County, et al. (2001–02), county commissioner districts (Wisc.)

Albert Gore, Jr., et al., v. Katherine Harris as Secretary of State, State of Florida, et al., and The Miami Dade County Canvassing Board, et al., and The Nassau County Canvassing Board, et al., and The Palm Beach County Canvassing Board, et al., and George W. Bush, et al (2000), voting equipment design — Leon County, Fla., Circuit Court hearing, December 2, 2000, on disputed ballots in Broward, Volusia, Miami-Dade, and Palm Beach counties from the November 7, 2000, presidential election.

Barnett v. Daley/PACI v. Daley/Bonilla v. Chicago City Council (1992–98), city wards

Donald Moon, et al. v. M. Bruce Meadows, etc and Curtis W. Harris, et al. (1996–98), congressional districts (Virginia)

Melvin R. Simpson, et al. v. City of Hampton, et al. (1996–97), city council districts (Va.)

Vera vs. Bush (1996), Texas redistricting

In the Matter of the Redistricting of Shawnee County Kansas and Kingman, et al. v. Board of County Commissioners of Shawnee County, Kansas (1996), commissioner districts

Vecinos de Barrio Uno v. City of Holyoke (1992–96), city council districts (Massachusetts)

(Litigation Support, cont.)

Torres v. Cuomo (1992–95), congressional districts (New York)

DeGrandy v. Wetherell (1992–94), congressional, senate, and house districts (Florida)

Johnson v. Miller (1994), congressional districts (Georgia)

Jackson, et al v Nassau County Board of Supervisors (1993), form of government (N.Y.)

Gonzalez v. Monterey County, California (1992), county board districts

LaPaille v. Illinois Legislative Redistricting Commission (1992), senate and house districts

Black Political Task Force v. Connolly (1992), senate and house districts (Massachusetts)

Nash v. Blunt (1992), house districts (Missouri)

Fund for Accurate and Informed Representation v. Weprin (1992), assembly districts (N.Y.)

Mellow v. Mitchell (1992), congressional districts (Pennsylvania)

Phillip Langsdon v. Milsaps (1992), house districts (Tennessee)

Smith v. Board of Supervisors of Brunswick County (1992), supervisor districts (Virginia)

People of the State of Illinois ex. rel. Burris v. Ryan (1991–92), senate and house districts

Good v. Austin (1991–92), congressional districts (Michigan)

Neff v. Austin (1991–92), senate and house districts (Michigan)

Hastert v. Illinois State Board of Elections (1991), congressional districts

Republican Party of Virginia et al. v. Wilder (1991), senate and house districts

Jamerson et al. v. Anderson (1991), senate districts (Virginia)

Ralph Brown v. Iowa Legislative Services Bureau (1991), redistricting database access

Williams, et al. v. State Board of Election (1989), judicial districts (Cook County, Ill.)

Fifth Ward Precinct 1A Coalition and Progressive Association v. Jefferson Parish School Board (1988–89), school board districts (Louisiana)

Michael V. Roberts v. Jerry Wamser (1987–89), St. Louis, Mo., voting equipment

Brown v. Board of Commissioners of the City of Chattanooga, Tenn. (1988), county commissioner districts

Business Records Corporation v. Ransom F. Shoup & Co., Inc. (1988), voting equip. patent

East Jefferson Coalition for Leadership v. The Parish of Jefferson (1987–88), parish council districts (Louisiana)

Buckanaga v. Sisseton School District (1987–88), school board districts (South Dakota)

Griffin v. City of Providence (1986–87), city council districts (Rhode Island)

United States of America v. City of Los Angeles (1986), city council districts

Latino Political Action Committee v. City of Boston (1984–85), city council districts

Ketchum v. Byrne (1982–85), city council districts (Chicago, Ill.)

(Litigation Support, cont.)

State of South Carolina v. United States (1983–84), senate districts — U.S. Dept. of Justice

Collins v. City of Norfolk (1983–84), city council districts (Virginia) — for Lawyers' Committee for Civil Rights

Rybicki v. State Board of Elections (1981–83), senate and house districts (Illinois)

Licht v. State of Rhode Island (1982–83), senate districts (Rhode Island)

Agerstrand v. Austin (1982), congressional districts (Michigan)

Farnum v. State of Rhode Island (1982), senate districts (Rhode Island)

In Re Illinois Congressional District Reapportionment Cases (1981), congressional districts

Publications

"EAC Survey Sheds Light on Election Administration", *Roll Call*, October 27, 2005 (with Michael McDonald)

Developing a Statewide Voter Registration Database: Procedures, Alternatives, and General Models, by Kimball W. Brace and M. Glenn Newkirk, edited by William Kimberling, (Washington, D.C.: Federal Election Commission, Office of Election Administration, Autumn 1997).

The Election Data Book: A Statistical Portrait of Voting in America, 1992, Kimball W. Brace, ed., (Bernan Press, 1993)

"Geographic Compactness and Redistricting: Have We Gone Too Far?", presented to Midwestern Political Science Association, April 1993 (with D. Chapin and R. Niemi)

"Whose Data is it Anyway: Conflicts between Freedom of Information and Trade Secret Protection in Redistricting", *Stetson University Law Review*, Spring 1992 (with D. Chapin and W. Arden)

"Numbers, Colors, and Shapes in Redistricting," *State Government News*, December 1991 (with D. Chapin)

"Redistricting Roulette," *Campaigns and Elections*, March 1991 (with D. Chapin)

"Redistricting Guidelines: A Summary", presented to the Reapportionment Task Force, National Conference on State Legislatures, November 9, 1990 (with D. Chapin and J. Waliszewski)

"The 65 Percent Rule in Legislative Districting for Racial Minorities: The Mathematics of Minority Voting Equality," *Law and Policy*, January 1988 (with B. Grofman, L. Handley, and R. Niemi)

"Does Redistricting Aimed to Help Blacks Necessarily Help Republicans?" *Journal of Politics*, February 1987 (with B. Grofman and L. Handley)

"New Census Tools," *American Demographics*, July/August 1980

Professional Activities

Member, Task Force on Long Lines in 2012 Election, Prince William County, VA

Member, 2010 Census Advisory Committee, a 20-member panel advising the Director of the Census on the planning and administration of the 2010 census.

Delegate, Second Trilateral Conference on Electoral Systems (Canada, Mexico, and United States), Ontario, Canada, 1995; and Third Trilateral Conference on Electoral Systems, Washington, D.C., 1996

Member, American Association of Political Consultants

Member, American Association for Public Opinion Research

Member, American Political Science Association

Member, Association of American Geographers, Census Advisory Committee

Member Board of Directors, Association of Public Data Users

Member, National Center for Policy Alternatives, Voter Participation Advisory Committee

Member, Urban and Regional Information Systems Association

Historical Activities

Member, Manassas Battlefield Trust Board Member, 2018 -- current

Member, Historical Commission, Prince William County, VA., 2015 – current. Elected Chairman in 2017, re-elected 2018

Member of Executive Committee & head of GIS Committee, Bull Run Civil War Round Table, Centerville, VA. 2015 – current

Member, Washington Capitals Fan Club, Executive Board 2017 -- current

February, 2020

APPENDIX 2

(Exhibit 2 to Declaration of Kimball W. Brace)

Election Data Services

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FOR IMMEDIATE RELEASE

Date: December 30, 2019
Contact: Kimball W. Brace
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Website: www.electiondataservices.com

Montana Gains California's Seat With New 2019 Census Estimates; But Alabama & Ohio to also lose by 2020

New Census Bureau population estimates for 2019 released today shows a change of one more seat between two states from last year's study generated by Election Data Services, Inc. on which states would gain or lose congressional seats if the current estimate numbers were used for apportionment in 2019. But projecting these numbers to 2020, using several different methods, leads to more states being impacted by the decennial census scheduled to take place in just four months. These numbers could also be majorly impacted by how well the Commerce Department and Census Bureau conducts the census, how well the American public responds to this decennial exercise, the first where major components will be conducted via the internet, and whether the discussion on citizenship over the past year will cause some groups to avoid participating. A changed practice on how to count the military overseas could also change the final apportionment when it is announced December 31, 2020.

The Bureau's 2019 total population estimates show that now 15 states will be impacted by changes in their congressional delegation if these new numbers were used for apportionment today. The state of **Montana** joins the previously indicated states of **Arizona, Colorado, Florida**, **North Carolina**, and **Oregon** to each gain a single seat while the state of **Texas** is now shown to gain a second seat with the new data. The state of **California** joins the states of **Illinois**, **Michigan**, **Minnesota, New York, Pennsylvania, Rhode Island,** and **West Virginia** to lose a seat in Congress using the new data. A map of the 2019 numbers is attached.

The new numbers, however, reflect subtle changes taking place across the nation in birth and death rates and resulting total population numbers that become magnified when the information is projected forward to coincide with the taking of the Census on April 1, 2020. Election Data Services created a variety of different methodologies to project the 2019 data forward nine months (from the July1, 2019 date of the Census estimates) to April 1, 2020 (several short-term projection methods for the trend occurring in 2018-2019, and 2017-2019, a middle term methodology using the 2015-2019 trend, and a long-term projection for 2011-2019). The different methodologies benefit some states and disadvantage others in the "musical-chairs" effort of allocating 435 seats to the 50 states. All the methods would add a second seat for **Florida** and a third seat for **Texas,** to the list of states noted above that will gain one or more seats by 2020. The list of losing states will expand to also include **Alabama** and **Ohio**, by the time the Census is taken in 2020. A map showing the 2020 projected apportionment using the 2018-2019 trend is attached. Because all the projection models produce the same state overall results in seats as the 2018-2019 trend map, only the tables of the calculations for the different projection models are attached so that how close states are to changes can be observed.

The new 2019 data and all projections forward to 2020 now confirms that **California** will lose a congressional district in 2020. Our 2018 study first picked up the possibility that **California** could lose a congressional district for the first time in their nearly 160-year history. The new 2019 numbers from the Bureau indicate the state would lose that seat by 98,709 people but projecting the data forward to 2020 shows the state further away from potentially keeping that seat, losing it by over 300,000 people in 2020.

While the 2019 Census estimate numbers show **Alabama** keeping their seventh seat by a slim margin of just 18,516 people, projecting the data forward to 2020 would find the state losing the seventh seat by only 10,072 to 19,074 people, depending on the projection model utilized. All of the projection models find **Alabama** just missing the last seat to be apportioned, coming in at seat #436 when there are only 435 seats to hand out (a cut-off mark established in 1910).

The state of **Montana** is just barely able to reverse previous decades of population shifts when it went from two seats down to one in 1990. For 2020 the state is projected to go back to having two seats, but that gain of a second seat is because the state occupies the dubious distinction of obtaining seat #435, the last one to be apportioned. Election Data Services calculations show **Montana** getting that additional seat by only between 2,402 and 4,163 people to spare; a very close margin.

Rhode Island is also a state with an extremely close margin. For most of the decade our studies have projected that **Rhode Island** would lose their second seat by the end of the decade and the new numbers confirm that projection. But their margin has gotten tighter with the new data. For the past several years we saw that **Rhode Island** would lose that second seat by more than 25,000 people. But this new data shows the state missing the seat by only 14,539 residents.

Previous Election Data Services studies have hinted that the states of **Illinois** and **New York** might be in a position to each lose a second seat by 2020. However, these new Census numbers seem to indicate this will not be the case, with both states just losing a single seat each.

The state of **Minnesota** is also close to the margin of likely losing a seat in Congress. All of the projections place the state at position #437, having lost their last seat (their 8th) by between 6,740 people (the 2019 estimate) to around 21,000 people. **Minnesota**'s state demographer has indicated that recent influx of people to the state has boosted their numbers and it is likely to have had an impact on reapportionment.

Using any methodology, the population projections points toward a ten (10) seat change over 17 states across the nation by year 2020. States that will gain single seats include **Arizona**, **Colorado**, **Montana**, **North Carolina**, and **Oregon**, while **Florida** is set to gain two congressional districts and **Texas** would gain three seats. Single seat losses will again occur in the Midwest and Northeast sections of the nation, where **Alabama**, **California, Illinois, Michigan**, **Minnesota, New York**, **Ohio**, **Pennsylvania, Rhode Island** and **West Virginia** would each lose a seat. All other states would keep the same number of representatives they were awarded in December 2010 when the official 2010 Census numbers were released.

In table form, the gainers and losers are:

States Gaining Districts (7)	States Losing Districts (10)
Arizona +1 (from 9 to 10)	**Alabama** -1 (from 7 to 6)
Colorado +1 (from 7 to 8)	**California** -1 (from 53 to 52)
Florida +2 (from 27 to 29)	**Illinois** -1 (from 18 to 17)
Montana +1 (from At-large to 2)	**Michigan** -1 (from 14 to 13)
North Carolina +1 (from 13 to 14)	**Minnesota** -1 (from 8 to 7)
Oregon +1 (from 5 to 6)	**New York** -1 (from 27 to 26)
Texas +3 (from 36 to 39)	**Ohio** -1 (from 16 to 15)
	Pennsylvania -1 (from 18 to 17)
	Rhode Island -1 (from 2 to 1)
	West Virginia -1 (from 3 to 2)

With only four months until Census Day, many states have appropriated funds to help send a message to their constituents about the importance of participating in the Census[i]. Many of these states are on the edge of gaining or losing a seat in the apportionment process, but there are some notable exceptions. For example, Texas has not appropriated any funds for Complete Count efforts, and yet whether they stand to gain only two or maybe three additional seats may depend on how good the counting is conducted in the state. This could also be impacted by the reaction to the citizenship issue that has become more of a focus in the past year. Florida has also failed to appropriate any funds for Complete Count efforts in 2020, but they are more firm in the projection of receiving two additional seats in 2020. Thus, the two largest gaining states in number of seats are those that didn't spend their own money to help the counting process.

Since 1941, by law the number of seats in the U.S. House of Representatives has been capped at 435. As a result, there has always been interest in finding which states are close to that magic bubble, either just gaining their last seat, or just missing their next seat. The following table shows the results of the 2019 population estimates, as well as one of the short-term trend methodology calculations (2018-2019) for the seats within five positions of the 435 cut off.

2019 Reapportionment Analysis

2019 Population Estimates			2020 Projections (using 2018-2019 short-term trend)		
Last Five Seats		**Margin of Gain**	**Last Five Seats**		**Margin of Gain**
431	Arizona (10th)	128,294	431	Illinois (17th))	126,052
432	New York (26th)	237,376	432	New York (26th)	61,279
433	Alabama(7th)	18,516	433	Texas (39th)	79,742
434	Montana (2nd)	2,856	434	Montana (2nd)	2,402
435	Ohio (16th)	12,508	435	Florida (29th)	44,285

2019 Reapportionment Analysis

2019 Population Estimates			2020 Projections (using 2018-2019 short-term trend)		
Next Seats		**Margin of Loss**	**Next Seats**		**Margin of Loss**
436	Florida (29th)	23,006	436	Alabama (7th)	10,072
437	Minnesota (8th)	6,740	437	Minnesota (8th))	21,992
438	Texas (39th)	51,004	438	Ohio (16th)	74,135
439	California (53rd)	98,709	439	California (53rd)	344,367
440	Rhode Island (2nd)	7,703	440	Rhode Island (2nd)	14,539

The Census Bureau's yearly release of population estimates also results in a revision of previous year estimates. While Election Data Services has traditionally reflected those revisions in our projection methodology, we have created a new apportionment table that shows the apportionment results for each year in the decade based upon those revised numbers. The table, entitled "2020 Apportionment Calculations based on different trend lines coming from the 2019 Census Bureau Estimates" is attached to this press release. The table shows consistent gains and losses of seats over the entire decade with the new data. The table also includes a chart of where seats # 430 through # 440 would be assigned to states in each projection.

Kimball Brace, President of Election Data Services, Inc. cautioned users that even though there is a very short time before the Census, the population projections are still subject to change. "We are now at a place where the rubber meets the road. How well does the Census Bureau and the Trump administration put on the greatest mobilization of government resources outside of war time? How well will the public respond and answer the Census, given the competing focuses of everyday life and the need to utilize the internet? Will the fear of foreign intervention also impact the census?" Brace noted. "Having worked with Census data and estimates since the 1970s, it is important to remember that major events like Katrina and the 2008 recession each changed population growth patterns and that impacted and changed the next apportionment," he said.

Brace also noted that major changes in the counting process are in the works for 2020 and that reduced budget funding could impact those plans. "History can also be a guide, recalling that the 1920 apportionment was cancelled because the numbers showed for the first time that more people resided in urban areas than rural areas" said Brace. "I have had my share of nightmares that a failed Census process could lead to unreliable numbers and a repeat of 1920."

Because congressional apportionment also impacts the Electoral College and the vote for President, Election Data Services took the 2020 projections for each state and applied the Presidential election results from the past five Presidential contests to determine the Electoral College outcomes in the past 16 years. The study shows that none of the presidential contests would have elected a different presidential candidate using the new apportionment counts but they would have been more Republican in nature. For example, in 2016 President Trump would have gained two additional electoral college votes under the new apportionment projections. In 2012 President Obama would still have won the Electoral College, but with four less votes (328 vs 332) than he won at the time of the voting. The biggest change would have occurred in the 2000 presidential election where George Bush would have gained an additional 20 electoral votes had the new 2020 apportionment projections determined the number of congressional seats in each state.

The 2016 Electoral College was muddled because 7 electors voted for a different candidate than what they had pledged based on the vote totals. As a result, the overall change in candidate votes based on the new apportionment numbers shows just two vote difference in the bottom line results. President elect Trump's ability to carry states that will be losing congressional seats in 2020 also contributed to a reversal of the pattern depicted in previous elections.

It should be noted that the 2020 Presidential election and resulting Electoral College will occur before the results of the 2020 Census are released by December 31, 2020. Therefore, the Electoral College results in 2020 will be governed by the state's apportionment allocation as they exist today, having been first determined in 2011. The first time the new 2020 apportionment results will be utilized will be the 2024 Presidential election. Election Data Services, Inc. has also worked with the website 270ToWin, who has built an interactive map of the these new apportionment results where users can adjust state outcomes to discover Electoral College outcomes for the presidential elections back to 2000.

Major weather events have also affected apportionment. The Census Bureau's estimated populations released for 2005 showed **Louisiana** would keep all their congressional districts that decade. Even the Bureau's own projections for 2010 released that same year showed **Louisiana** staying the same. Then hurricane Katrina hit **Louisiana** at the end of August 2005 (after the date of the population estimates). Devastation and population loss impacted New Orleans in a major way, and when the Bureau's 2006 population estimates were released **Louisiana** was looking at losing a congressional seat. That was ultimately confirmed when the 2010 Census was taken, and state data was released at the end of that year.

As Election Data Services, Inc. noted last year in the 2017 study, the year of 2017 saw 18 hurricanes and tropical storms, three of which had a potential of impact on population movements in the United States. Two of these storms: Irma (impacting Miami and the Florida Gulf Coast), and Maria (which devastated Puerto Rico)) affected **Florida** and the new population estimates reflect that fact. Last years study showed **Florida** was 366,735 people away from gaining a third seat.

The 2019 data shows the state is only 172,169 people away from a third additional seat, an improvement of nearly 200,000 people.

The 2019 population estimates have not been statistically adjusted for any known undercount that may take place when the Census is conducted. In addition, no estimates were provided for U.S. military personnel overseas. This component has in the past been counted by the Census Bureau and allocated to the states based on administrative records retained by the military. Overseas military personnel have been a factor in the apportionment formula for the past several decades, including the switching of the final district in 2000 that went from **Utah** to **North Carolina**.

For 2020 the Census Bureau has changed the "residency rules" for counting the military by creating a distinction between personnel who are *deployed* overseas (usually for short periods of time) compared to those who are *stationed* or *assigned* overseas (frequently for longer periods of time). The Bureau will use DOD's administrative records to count *deployed* personnel at their usual residence in the US for both apportionment and redistricting purposes (they will be embedded within the state's resident population counts). On the other hand, personnel who are *stationed* or *assigned* overseas will be counted to their "home state of record" for apportionment purposes only and will show up as part of a state's total "overseas count" when the Bureau releases the final and official apportionment data by December, 31, 2020. Military sources have told the Census Bureau that of all overseas military, approximately 15% are *deployed* personnel and 85% are *stationed* or *assigned* overseas.

Past apportionment studies by Election Data Services, Inc. can be found at https://www.electiondataservices.com/reapportionment-studies/. A historical chart on the number of districts each state received each decade from 1789 to current is also available at this web address and linkable at https://www.electiondataservices.com/wp-content/uploads/2014/10/CD-apportionment-1789-2010.pdf.

Election Data Services Inc. is a political consulting firm that specializes in redistricting, election administration, and the analysis of census and political data. Election Data Services, Inc. conducts the congressional apportionment analyses with each annual release of the census population estimates. For more information about the reapportionment analysis, contact Kimball Brace (703-580-7267 or 202-789-2004 or (b) (6) [redacted]

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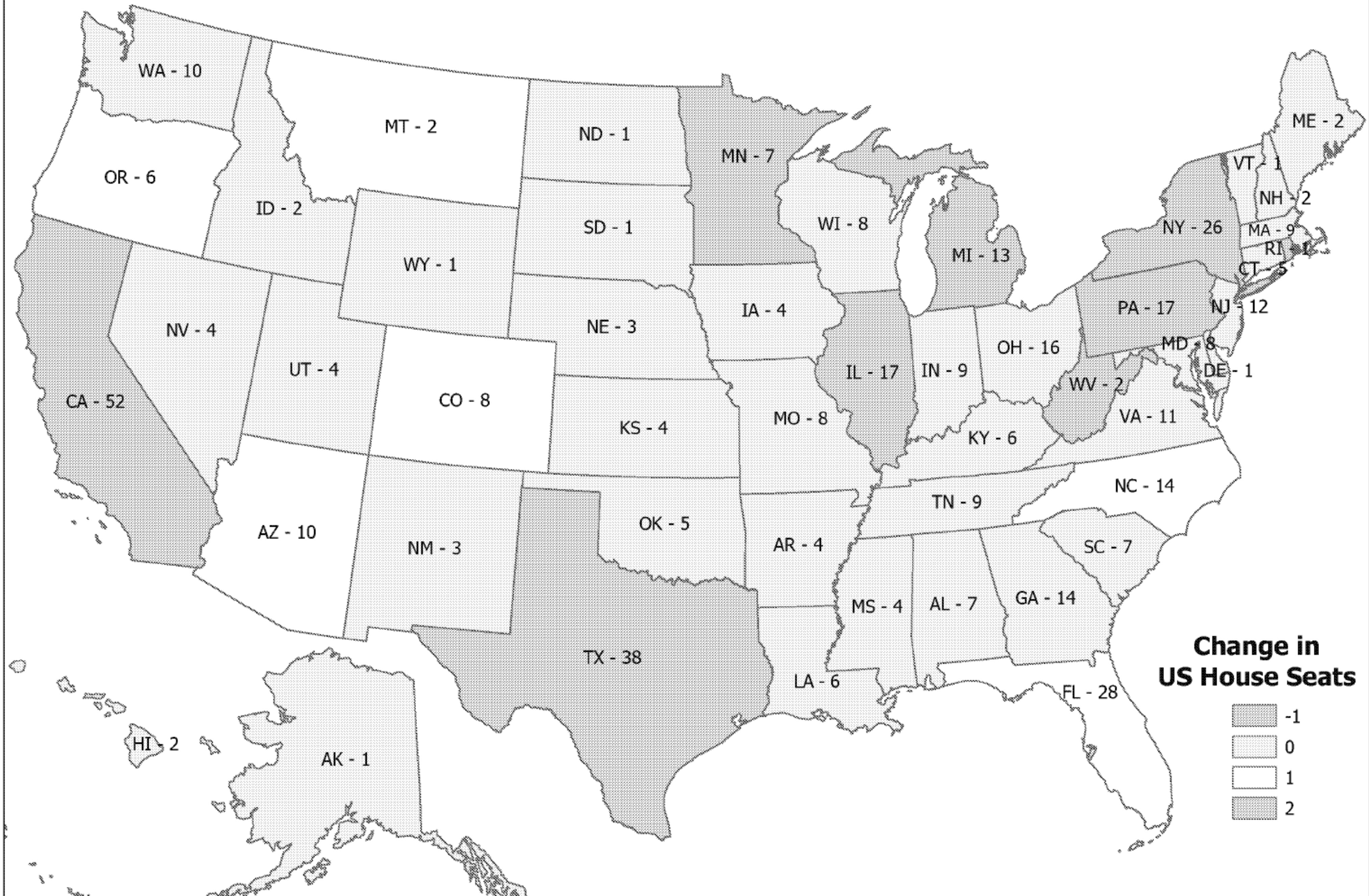
[i] National Conference of State Legislatures reports 26 states have appropriated funds for Census counting. http://www.ncsl.org/research/redistricting/2020-census-resources-and-legislation.aspx

2019 Population Estimates, Generated by Census Bureau 12/30/2019										
State	**Population**	**Compare To**	**Seats**	**Change**	**Gain a Seat**	**Lose a Seat**	**Last Seat Given**	**Next Seat At**	**Average Size**	**Size Rank**
Alabama	4,903,185	7	7	0	743,187	18,516	433	502	700,455	43
Alaska	731,545	1	1	0			at large	637	731,545	34
Arizona	7,278,717	9	10	1	634,842	128,294	431	472	727,872	37
Arkansas	3,017,804	4	4	0	356,549	406,839	378	490	754,451	24
California	39,512,223	53	52	-1	98,709	697,431	430	439	759,850	20
Colorado	5,758,736	7	8	1	643,648	118,406	428	487	719,842	39
Connecticut	3,565,287	5	5	0	567,434	194,546	413	507	713,057	40
Delaware	973,764	1	1	0			at large	477	973,764	2
Florida	21,477,737	27	28	1	23,006	753,842	421	436	767,062	15
Georgia	10,617,423	14	14	0	316,729	449,174	419	446	758,387	22
Hawaii	1,415,872	2	2	0	432,337	349,950	330	565	707,936	41
Idaho	1,787,065	2	2	0	61,144	721,143	262	449	893,533	4
Illinois	12,671,821	18	17	-1	527,032	241,139	429	454	745,401	29
Indiana	6,732,219	9	9	0	425,864	336,686	417	465	748,024	28
Iowa	3,155,070	4	4	0	219,283	544,105	362	468	788,768	9
Kansas	2,913,314	4	4	0	461,039	302,349	393	505	728,329	36
Kentucky	4,467,673	6	6	0	422,229	339,375	402	474	744,612	30
Louisiana	4,648,794	6	6	0	241,108	520,496	390	459	774,799	11
Maine	1,344,212	2	2	0	503,997	278,290	344	597	672,106	46
Maryland	6,045,680	8	8	0	356,704	405,350	407	462	755,710	23
Massachusetts	6,892,503	9	9	0	265,580	496,970	405	451	765,834	16
Michigan	9,986,857	14	13	-1	192,285	572,888	411	442	768,220	13
Minnesota	5,639,632	8	7	-1	6,740	754,963	379	437	805,662	6
Mississippi	2,976,149	4	4	0	398,204	365,184	385	493	744,037	31
Missouri	6,137,428	8	8	0	264,956	497,098	399	456	767,179	14
Montana	1,068,778	1	2	1	779,431	2,856	434	734	534,389	50
Nebraska	1,934,408	3	3	0	679,355	88,177	418	586	644,803	47
Nevada	3,080,156	4	4	0	294,197	469,191	371	476	770,039	12
New Hampshire	1,359,711	2	2	0	488,498	293,789	339	589	679,856	45
New Jersey	8,882,190	12	12	0	541,864	222,598	426	464	740,183	32
New Mexico	2,096,829	3	3	0	516,934	250,598	387	542	698,943	44
New York	19,453,561	27	26	-1	537,876	237,376	432	444	748,214	27
North Carolina	10,488,084	13	14	1	446,068	319,835	423	455	749,149	26
North Dakota	762,062	1	1	0			at large	613	762,062	18
Ohio	11,689,100	16	16	0	754,898	12,508	435	466	730,569	35
Oklahoma	3,956,971	5	5	0	175,750	586,230	374	457	791,394	8
Oregon	4,217,737	5	6	1	672,165	89,439	427	508	702,956	42
Pennsylvania	12,801,989	18	17	-1	396,864	371,307	424	447	753,058	25
Rhode Island	1,059,361	2	1	-1			at large	440	1,059,361	1
South Carolina	5,148,714	7	7	0	497,658	264,045	415	478	735,531	33
South Dakota	884,659	1	1	0			at large	524	884,659	5
Tennessee	6,829,174	9	9	0	328,909	433,641	409	458	758,797	21
Texas	28,995,881	36	38	2	51,004	733,864	425	438	763,050	17
Utah	3,205,958	4	4	0	168,395	594,993	355	460	801,490	7
Vermont	623,989	1	1	0			at large	729	623,989	48
Virginia	8,535,519	11	11	0	133,350	630,429	404	441	775,956	10
Washington	7,614,893	10	10	0	298,666	464,470	410	452	761,489	19
West Virginia	1,792,147	3	2	-1	56,062	726,225	261	448	896,074	3
Wisconsin	5,822,434	8	8	0	579,950	182,104	422	480	727,804	38
Wyoming	578,759	1	1	0			at large	781	578,759	49
Washington DC	705,749	*0*								
	328,239,523		435					Median =	751,104	
Other Inputs:	Seats to Apportion							Min =	534,389	
435	Max Seats to Calculate							Max =	1,059,361	
75	States									
50										
Include										

Anticipated Gains/Losses in Reapportionment

2019 Population Estimates



State numbers reflect number of congressional house seats after change put into effect.

BC-DOC-CEN-2020-001602-003573

Election Data Services

Based on Census Bureau estimates released 12/30/2019

APPENDIX Main

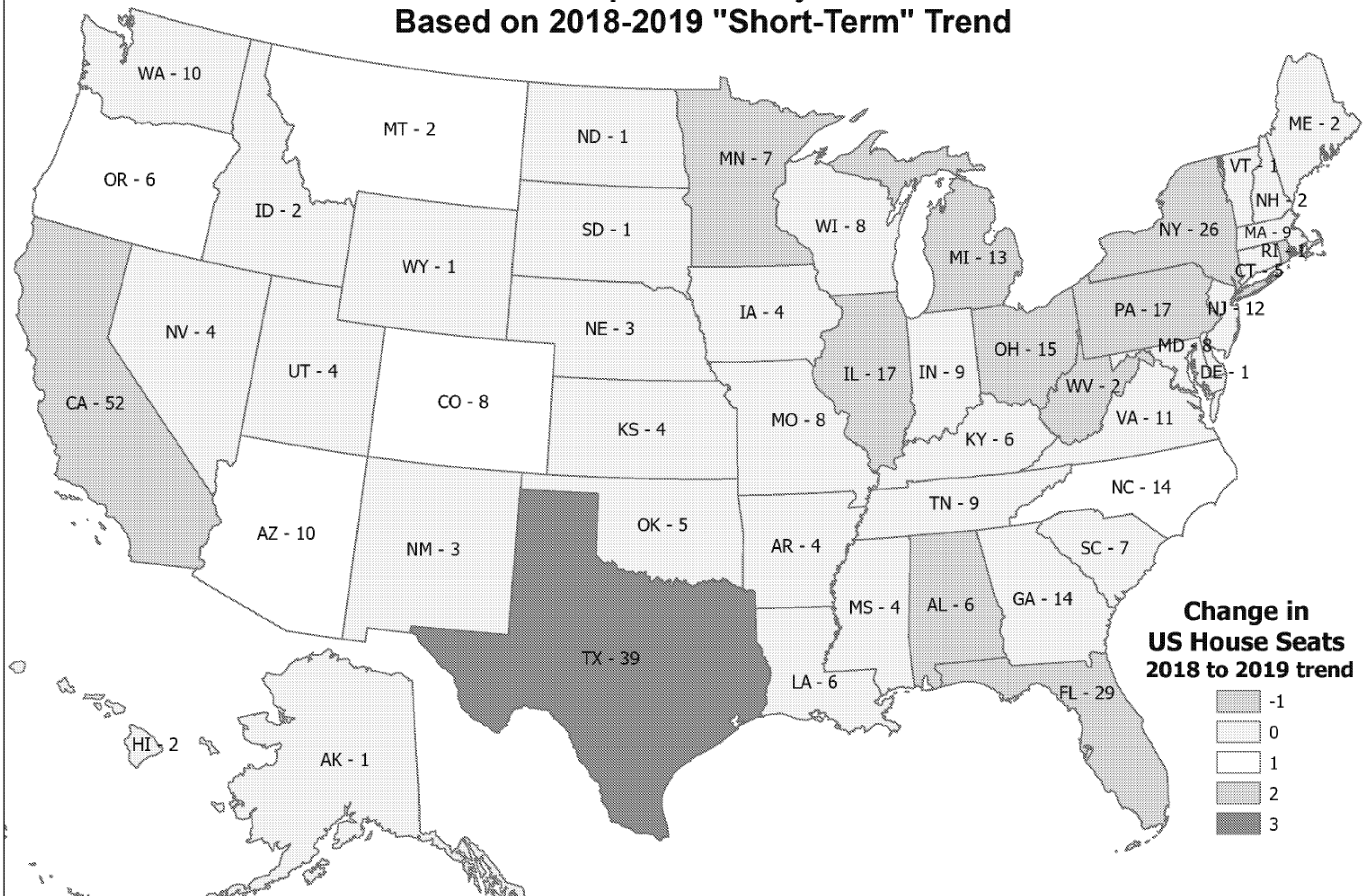
2020 Population Projections and Apportionment

2020 Projections (short term 2018-2019 change) based on 2019 Population Estimates, Generated by Census Bureau 12/30/2019

State	Population	Compare To	Seats	Change	Gain a Seat	Lose a Seat	Last Seat Given	Next Seat At	Average Size	Size Rank
Alabama	4,914,850	7	6	-1	10,072	761,044	371	436	819,142	6
Alaska	728,863	1	1	0			at large	640	728,863	38
Arizona	7,370,763	9	10	1	599,470	176,160	425	471	737,076	36
Arkansas	3,023,873	4	4	0	374,646	396,776	379	489	755,968	24
California	39,550,248	53	52	-1	344,367	495,632	430	439	760,582	22
Colorado	5,809,922	7	8	1	638,314	134,743	426	485	726,240	40
Connecticut	3,560,620	5	5	0	601,698	169,052	416	508	712,124	41
Delaware	980,031	1	1	0			at large	475	980,031	2
Florida	21,654,726	27	29	2	760,045	44,285	435	447	746,715	29
Georgia	10,697,948	14	14	0	314,512	466,873	417	446	764,139	20
Hawaii	1,412,343	2	2	0	449,103	339,835	334	572	706,172	43
Idaho	1,815,033	2	2	0	46,412	742,526	261	443	907,517	3
Illinois	12,633,538	18	17	-1	659,841	126,052	431	460	743,149	32
Indiana	6,759,912	9	9	0	449,436	324,863	415	464	751,101	27
Iowa	3,159,919	4	4	0	238,600	532,822	362	468	789,980	10
Kansas	2,914,781	4	4	0	483,738	287,684	395	507	728,695	39
Kentucky	4,472,570	6	6	0	452,352	318,764	402	478	745,428	31
Louisiana	4,640,641	6	6	0	284,281	486,835	392	461	773,440	14
Maine	1,348,093	2	2	0	513,353	275,585	342	596	674,047	46
Maryland	6,053,101	8	8	0	395,136	377,921	409	462	756,638	23
Massachusetts	6,899,915	9	9	0	309,433	464,866	406	453	766,657	18
Michigan	9,988,946	14	13	-1	263,096	516,811	413	444	768,380	17
Minnesota	5,664,818	8	7	-1	21,992	749,969	377	437	809,260	8
Mississippi	2,972,502	4	4	0	426,017	345,404	386	497	743,125	33
Missouri	6,149,312	8	8	0	298,924	474,133	400	457	768,664	15
Montana	1,074,909	1	2	1	786,537	2,402	434	735	537,455	50
Nebraska	1,941,034	3	3	0	691,448	83,395	418	587	647,011	47
Nevada	3,120,458	4	4	0	278,061	493,361	369	473	780,115	11
New Hampshire	1,364,417	2	2	0	497,029	291,909	339	589	682,209	45
New Jersey	8,879,315	12	12	0	612,232	166,218	429	465	739,943	35
New Mexico	2,099,901	3	3	0	532,581	242,263	387	542	699,967	44
New York	19,396,195	27	26	-1	738,416	61,279	432	449	746,007	30
North Carolina	10,568,755	13	14	1	443,705	337,679	421	451	754,911	25
North Dakota	765,064	1	1	0			at large	612	765,064	19
Ohio	11,698,680	16	15	-1	74,135	708,742	410	438	779,912	12
Oklahoma	3,969,576	5	5	0	192,743	578,008	374	456	793,915	9
Oregon	4,244,856	5	6	1	680,066	91,050	428	505	707,476	42
Pennsylvania	12,802,789	18	17	-1	490,590	295,303	427	450	753,105	26
Rhode Island	1,060,167	2	1	-1			at large	440	1,060,167	1
South Carolina	5,197,747	7	7	0	489,063	282,898	412	474	742,535	34
South Dakota	889,160	1	1	0			at large	525	889,160	5
Tennessee	6,872,698	9	9	0	336,649	437,649	408	458	763,633	21
Texas	29,274,825	36	39	3	740,080	79,742	433	442	750,637	28
Utah	3,245,917	4	4	0	152,602	618,820	350	454	811,479	7
Vermont	623,712	1	1	0			at large	731	623,712	48
Virginia	8,561,297	11	11	0	169,656	607,364	403	441	778,300	13
Washington	7,683,987	10	10	0	286,246	489,384	407	448	768,399	16
West Virginia	1,783,100	3	2	-1	78,346	710,593	264	452	891,550	4
Wisconsin	5,833,734	8	8	0	614,502	158,555	424	483	729,217	37
Wyoming	579,629	1	1	0			at large	782	579,629	49
Washington DC	708,919	*0*								
	329,418,113		435					Median =	754,008	
Other Inputs:	Seats to Apportion							Min =	537,455	
435	Max Seats to Calculate							Max =	1,060,167	
75	States									
50										
☐ Include										

Anticipated Gains/Losses in Reapportionment

2020 Population Projections
Based on 2018-2019 "Short-Term" Trend



State numbers reflect number of congressional house seats after change put into effect.

BC-DOC-CEN-2020-001602-003575

Election Data Services

Based on Census Bureau estimates released 12/30/2019

2020 Population Projections and Apportionment

2020 Projections (short term 2017-2019 change) based on 2019 Population Estimates, Generated by Census Bureau 12/30/2019

State	Population	Compare To	Seats	Change	Gain a Seat	Lose a Seat	Last Seat Given	Next Seat At	Average Size	Size Rank
Alabama	4,914,010	7	6	-1	12,184	760,914	372	436	819,002	6
Alaska	728,521	1	1	0			at large	640	728,521	39
Arizona	7,369,666	9	10	1	602,627	176,291	426	471	736,967	36
Arkansas	3,024,010	4	4	0	375,387	397,361	379	490	756,002	24
California	39,570,095	53	52	-1	334,826	522,150	430	439	760,963	22
Colorado	5,815,246	7	8	1	634,656	141,036	425	485	726,906	40
Connecticut	3,562,290	5	5	0	601,104	171,301	416	508	712,458	41
Delaware	980,229	1	1	0			at large	475	980,229	2
Florida	21,675,262	27	29	2	745,300	68,512	433	447	747,423	29
Georgia	10,696,628	14	14	0	318,677	467,300	417	446	764,045	20
Hawaii	1,412,696	2	2	0	449,231	340,371	334	572	706,348	43
Idaho	1,814,121	2	2	0	47,806	741,797	261	444	907,061	3
Illinois	12,632,029	18	17	-1	664,784	126,679	431	460	743,061	32
Indiana	6,760,331	9	9	0	450,878	326,382	415	464	751,148	27
Iowa	3,160,162	4	4	0	239,235	533,513	362	468	790,040	10
Kansas	2,915,040	4	4	0	484,357	288,392	395	507	728,760	38
Kentucky	4,473,470	6	6	0	452,724	320,373	402	478	745,578	31
Louisiana	4,640,670	6	6	0	285,525	487,573	392	461	773,445	14
Maine	1,347,838	2	2	0	514,089	275,513	343	597	673,919	46
Maryland	6,053,889	8	8	0	396,013	379,679	409	462	756,736	23
Massachusetts	6,904,829	9	9	0	306,381	470,880	406	453	767,203	18
Michigan	9,992,018	14	13	-1	262,673	521,500	413	443	768,617	17
Minnesota	5,667,521	8	7	-1	20,758	753,511	377	437	809,646	8
Mississippi	2,971,533	4	4	0	427,864	344,884	386	497	742,883	33
Missouri	6,149,020	8	8	0	300,882	474,810	400	457	768,628	16
Montana	1,074,984	1	2	1	786,943	2,659	435	735	537,492	50
Nebraska	1,941,398	3	3	0	691,764	84,077	418	587	647,133	47
Nevada	3,123,035	4	4	0	276,362	496,386	368	473	780,759	11
New Hampshire	1,363,841	2	2	0	498,086	291,516	339	589	681,920	45
New Jersey	8,880,940	12	12	0	613,059	169,331	429	465	740,078	35
New Mexico	2,098,725	3	3	0	534,436	241,405	387	543	699,575	44
New York	19,402,911	27	26	-1	736,901	71,298	432	449	746,266	30
North Carolina	10,572,293	13	14	1	443,011	342,965	421	451	755,164	25
North Dakota	764,757	1	1	0			at large	612	764,757	19
Ohio	11,700,172	16	15	-1	75,684	712,111	410	438	780,011	12
Oklahoma	3,966,654	5	5	0	196,740	575,666	374	458	793,331	9
Oregon	4,246,026	5	6	1	680,168	92,930	428	505	707,671	42
Pennsylvania	12,807,376	18	17	-1	489,438	302,025	427	450	753,375	26
Rhode Island	1,060,749	2	1	-1			at large	440	1,060,749	1
South Carolina	5,197,719	7	7	0	490,560	283,709	411	474	742,531	34
South Dakota	889,140	1	1	0			at large	525	889,140	5
Tennessee	6,875,125	9	9	0	336,085	441,175	408	456	763,903	21
Texas	29,265,114	36	39	3	757,545	75,018	434	442	750,388	28
Utah	3,246,633	4	4	0	152,765	619,984	350	455	811,658	7
Vermont	623,856	1	1	0			at large	731	623,856	48
Virginia	8,562,723	11	11	0	170,486	610,148	403	441	778,429	13
Washington	7,688,570	10	10	0	283,722	495,196	407	448	768,857	15
West Virginia	1,782,953	3	2	-1	78,974	710,629	264	452	891,477	4
Wisconsin	5,834,594	8	8	0	615,308	160,384	424	483	729,324	37
Wyoming	578,695	1	1	0			at large	783	578,695	49
Washington DC	709,879	*0*								
	329,489,985		435					Median =	754,269	
Other Inputs:	Seats to Apportion							Min =	537,492	
435	Max Seats to Calculate							Max =	1,060,749	
75	States									
50										
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2020 Population Projections and Apportionment

2020 Projections (mid- term 2015-2019 change) based on 2019 Population Estimates, Generated by Census Bureau 12/30/2019										
State	**Population**	**Compare To**	**Seats**	**Change**	**Gain a Seat**	**Lose a Seat**	**Last Seat Given**	**Next Seat At**	**Average Size**	**Size Rank**
Alabama	4,912,817	7	6	-1	19,074	760,729	372	436	818,803	6
Alaska	730,438	1	1	0			at large	638	730,438	37
Arizona	7,368,448	9	10	1	613,064	176,821	427	471	736,845	36
Arkansas	3,025,358	4	4	0	377,971	399,347	379	490	756,339	24
California	39,625,332	53	52	-1	325,736	586,871	430	439	762,026	22
Colorado	5,819,773	7	8	1	637,588	146,941	425	485	727,472	40
Connecticut	3,561,218	5	5	0	606,991	171,053	415	508	712,244	41
Delaware	980,071	1	1	0			at large	475	980,071	2
Florida	21,730,551	27	29	2	715,938	129,049	432	447	749,329	29
Georgia	10,703,281	14	14	0	324,762	476,437	417	446	764,520	19
Hawaii	1,414,718	2	2	0	449,362	342,654	334	570	707,359	43
Idaho	1,814,667	2	2	0	49,413	742,603	261	444	907,333	3
Illinois	12,637,252	18	17	-1	674,939	134,938	431	460	743,368	33
Indiana	6,755,866	9	9	0	463,683	323,479	416	465	750,652	28
Iowa	3,161,536	4	4	0	241,793	535,525	362	468	790,384	10
Kansas	2,914,122	4	4	0	489,206	288,111	395	507	728,531	39
Kentucky	4,475,565	6	6	0	456,326	323,477	402	478	745,927	31
Louisiana	4,645,835	6	6	0	286,056	493,748	392	461	774,306	14
Maine	1,347,239	2	2	0	516,841	275,174	344	598	673,619	46
Maryland	6,057,065	8	8	0	400,296	384,233	409	463	757,133	23
Massachusetts	6,911,196	9	9	0	308,353	478,809	406	452	767,911	18
Michigan	9,997,254	14	13	-1	269,296	529,036	414	443	769,020	16
Minnesota	5,670,032	8	7	-1	24,826	757,215	377	437	810,005	8
Mississippi	2,973,848	4	4	0	429,480	347,838	386	497	743,462	32
Missouri	6,149,879	8	8	0	307,482	477,047	400	456	768,735	17
Montana	1,076,227	1	2	1	787,853	4,163	435	735	538,113	50
Nebraska	1,942,679	3	3	0	693,527	85,810	418	587	647,560	47
Nevada	3,123,107	4	4	0	280,221	497,097	369	473	780,777	11
New Hampshire	1,364,168	2	2	0	499,912	292,104	340	589	682,084	45
New Jersey	8,884,864	12	12	0	620,113	175,371	429	466	740,405	35
New Mexico	2,098,247	3	3	0	537,959	241,378	388	543	699,416	44
New York	19,416,240	27	26	-1	746,863	89,321	433	449	746,778	30
North Carolina	10,577,560	13	14	1	450,483	350,716	422	451	755,540	25
North Dakota	763,577	1	1	0			at large	614	763,577	21
Ohio	11,702,603	16	15	-1	86,871	717,210	410	438	780,174	12
Oklahoma	3,965,980	5	5	0	202,229	575,815	375	458	793,196	9
Oregon	4,257,506	5	6	1	674,385	105,418	426	502	709,584	42
Pennsylvania	12,805,211	18	17	-1	506,979	302,898	428	450	753,248	26
Rhode Island	1,059,981	2	1	-1			at large	440	1,059,981	1
South Carolina	5,199,387	7	7	0	495,471	286,570	412	474	742,770	34
South Dakota	890,616	1	1	0			at large	526	890,616	5
Tennessee	6,875,411	9	9	0	344,138	443,024	408	457	763,935	20
Texas	29,297,864	36	39	3	759,514	114,857	434	442	751,227	27
Utah	3,251,140	4	4	0	152,189	625,129	350	455	812,785	7
Vermont	623,759	1	1	0			at large	731	623,759	48
Virginia	8,568,766	11	11	0	174,542	618,123	404	441	778,979	13
Washington	7,704,829	10	10	0	276,683	513,202	407	448	770,483	15
West Virginia	1,783,044	3	2	-1	81,036	710,980	266	453	891,522	4
Wisconsin	5,834,087	8	8	0	623,274	161,255	424	483	729,261	38
Wyoming	577,489	1	1	0			at large	785	577,489	49
Washington DC	711,695	*0*								
	329,739,397		435					Median =	754,394	
Other Inputs:	Seats to Apportion							Min =	538,113	
435	Max Seats to Calculate							Max =	1,059,981	
75	States									
50										
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APPENDIX Main

2020 Population Projections and Apportionment

2020 Projections (long- term 2011-2019 change) based on 2019 Population Estimates, Generated by Census Bureau 12/30/2019										
State	**Population**	**Compare To**	**Seats**	**Change**	**Gain a Seat**	**Lose a Seat**	**Last Seat Given**	**Next Seat At**	**Average Size**	**Size Rank**
Alabama	4,913,158	7	6	-1	17,500	760,782	372	436	818,860	6
Alaska	732,439	1	1	0			at large	637	732,439	37
Arizona	7,363,698	9	10	1	615,818	171,572	428	472	736,370	36
Arkansas	3,025,225	4	4	0	377,252	399,033	379	490	756,306	24
California	39,696,643	53	52	-1	244,435	655,474	430	438	763,397	22
Colorado	5,825,957	7	8	1	629,790	152,731	425	485	728,245	40
Connecticut	3,563,145	5	5	0	604,021	172,745	415	508	712,629	41
Delaware	980,443	1	1	0			at large	475	980,443	2
Florida	21,733,957	27	29	2	706,919	130,957	433	447	749,447	29
Georgia	10,700,181	14	14	0	325,104	472,628	419	445	764,299	20
Hawaii	1,419,389	2	2	0	444,225	347,250	333	568	709,694	42
Idaho	1,808,554	2	2	0	55,060	736,415	261	446	904,277	3
Illinois	12,653,759	18	17	-1	655,102	150,579	431	460	744,339	32
Indiana	6,753,109	9	9	0	464,634	320,276	416	465	750,345	28
Iowa	3,163,630	4	4	0	238,848	537,437	362	468	790,907	10
Kansas	2,917,511	4	4	0	484,966	291,318	395	507	729,378	38
Kentucky	4,477,052	6	6	0	453,606	324,676	404	477	746,175	31
Louisiana	4,655,763	6	6	0	274,894	503,388	392	461	775,961	14
Maine	1,345,723	2	2	0	517,891	273,585	344	599	672,862	46
Maryland	6,065,700	8	8	0	390,046	392,475	408	463	758,212	23
Massachusetts	6,919,755	9	9	0	297,989	486,922	406	452	768,862	18
Michigan	9,996,752	14	13	-1	267,230	527,878	414	444	768,981	17
Minnesota	5,668,657	8	7	-1	24,776	755,500	378	437	809,808	8
Mississippi	2,975,907	4	4	0	426,570	349,714	386	497	743,977	33
Missouri	6,149,601	8	8	0	306,145	476,376	400	458	768,700	19
Montana	1,075,958	1	2	1	787,656	3,819	435	735	537,979	50
Nebraska	1,943,643	3	3	0	691,904	86,645	418	587	647,881	47
Nevada	3,119,268	4	4	0	283,209	493,075	369	473	779,817	13
New Hampshire	1,363,526	2	2	0	500,088	291,387	340	589	681,763	45
New Jersey	8,887,290	12	12	0	615,310	177,193	429	466	740,608	35
New Mexico	2,098,377	3	3	0	537,171	241,378	388	544	699,459	44
New York	19,449,289	27	26	-1	708,771	121,030	432	448	748,050	30
North Carolina	10,572,638	13	14	1	452,647	345,085	422	451	755,188	25
North Dakota	770,073	1	1	0			at large	608	770,073	15
Ohio	11,702,810	16	15	-1	83,715	716,656	410	439	780,187	11
Oklahoma	3,973,480	5	5	0	193,687	583,080	374	456	794,696	9
Oregon	4,253,040	5	6	1	677,618	100,664	427	504	708,840	43
Pennsylvania	12,807,279	18	17	-1	501,583	304,098	426	450	753,369	26
Rhode Island	1,059,899	2	1	-1			at large	440	1,059,899	1
South Carolina	5,197,967	7	7	0	495,466	284,810	412	474	742,567	34
South Dakota	890,810	1	1	0			at large	526	890,810	5
Tennessee	6,872,183	9	9	0	345,561	439,350	409	459	763,576	21
Texas	29,350,998	36	39	3	698,863	165,968	434	442	752,590	27
Utah	3,247,776	4	4	0	154,702	621,583	351	455	811,944	7
Vermont	623,704	1	1	0			at large	732	623,704	48
Virginia	8,578,424	11	11	0	162,697	627,230	403	441	779,857	12
Washington	7,697,326	10	10	0	282,190	505,200	407	449	769,733	16
West Virginia	1,786,340	3	2	-1	77,273	714,202	265	453	893,170	4
Wisconsin	5,833,642	8	8	0	622,104	160,417	424	483	729,205	39
Wyoming	579,855	1	1	0			at large	782	579,855	49
Washington DC	714,924	*0*								
	329,956,225		435					Median =	754,279	
Other Inputs:	Seats to Apportion							Min =	537,979	
435	Max Seats to Calculate							Max =	1,059,899	
75	States									
50										
☐ Include										

		2020 Apportionment Calculations based on different trend lines coming from the 2019 Census Bureau Estimates																	
		2010-2019 Trend		2011-2019 Trend		2012-2019 Trend		2013-2019 Trend		2014-2019 Trend		2015-2019 Trend		2016-2019 Trend		2017-2019 Trend		2018-2019 Trend	
State	Compare To	Seats	Change	Seats	Change	Seats	Change	Seats	Change	Seats	Change	Seats	Change	Seats	Change	Seats	Change	Seats	Change
Alabama	7	6	-1	6	-1	6	-1	6	-1	6	-1	6	-1	6	-1	6	-1	6	-1
Alaska	1	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0
Arizona	9	10	1	10	1	10	1	10	1	10	1	10	1	10	1	10	1	10	1
Arkansas	4	4	0	4	0	4	0	4	0	4	0	4	0	4	0	4	0	4	0
California	53	52	-1	52	-1	52	-1	52	-1	52	-1	52	-1	52	-1	52	-1	52	-1
Colorado	7	8	1	8	1	8	1	8	1	8	1	8	1	8	1	8	1	8	1
Connecticut	5	5	0	5	0	5	0	5	0	5	0	5	0	5	0	5	0	5	0
Delaware	1	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0
Florida	27	29	2	29	2	29	2	29	2	29	2	29	2	29	2	29	2	29	2
Georgia	14	14	0	14	0	14	0	14	0	14	0	14	0	14	0	14	0	14	0
Hawaii	2	2	0	2	0	2	0	2	0	2	0	2	0	2	0	2	0	2	0
Idaho	2	2	0	2	0	2	0	2	0	2	0	2	0	2	0	2	0	2	0
Illinois	18	17	-1	17	-1	17	-1	17	-1	17	-1	17	-1	17	-1	17	-1	17	-1
Indiana	9	9	0	9	0	9	0	9	0	9	0	9	0	9	0	9	0	9	0
Iowa	4	4	0	4	0	4	0	4	0	4	0	4	0	4	0	4	0	4	0
Kansas	4	4	0	4	0	4	0	4	0	4	0	4	0	4	0	4	0	4	0
Kentucky	6	6	0	6	0	6	0	6	0	6	0	6	0	6	0	6	0	6	0
Louisiana	6	6	0	6	0	6	0	6	0	6	0	6	0	6	0	6	0	6	0
Maine	2	2	0	2	0	2	0	2	0	2	0	2	0	2	0	2	0	2	0
Maryland	8	8	0	8	0	8	0	8	0	8	0	8	0	8	0	8	0	8	0
Massachusetts	9	9	0	9	0	9	0	9	0	9	0	9	0	9	0	9	0	9	0
Michigan	14	13	-1	13	-1	13	-1	13	-1	13	-1	13	-1	13	-1	13	-1	13	-1
Minnesota	8	7	-1	7	-1	7	-1	7	-1	7	-1	7	-1	7	-1	7	-1	7	-1
Mississippi	4	4	0	4	0	4	0	4	0	4	0	4	0	4	0	4	0	4	0
Missouri	8	8	0	8	0	8	0	8	0	8	0	8	0	8	0	8	0	8	0
Montana	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1
Nebraska	3	3	0	3	0	3	0	3	0	3	0	3	0	3	0	3	0	3	0
Nevada	4	4	0	4	0	4	0	4	0	4	0	4	0	4	0	4	0	4	0
New Hampshire	2	2	0	2	0	2	0	2	0	2	0	2	0	2	0	2	0	2	0
New Jersey	12	12	0	12	0	12	0	12	0	12	0	12	0	12	0	12	0	12	0
New Mexico	3	3	0	3	0	3	0	3	0	3	0	3	0	3	0	3	0	3	0
New York	27	26	-1	26	-1	26	-1	26	-1	26	-1	26	-1	26	-1	26	-1	26	-1
North Carolina	13	14	1	14	1	14	1	14	1	14	1	14	1	14	1	14	1	14	1
North Dakota	1	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0
Ohio	16	15	-1	15	-1	15	-1	15	-1	15	-1	15	-1	15	-1	15	-1	15	-1
Oklahoma	5	5	0	5	0	5	0	5	0	5	0	5	0	5	0	5	0	5	0
Oregon	5	6	1	6	1	6	1	6	1	6	1	6	1	6	1	6	1	6	1
Pennsylvania	18	17	-1	17	-1	17	-1	17	-1	17	-1	17	-1	17	-1	17	-1	17	-1
Rhode Island	2	1	-1	1	-1	1	-1	1	-1	1	-1	1	-1	1	-1	1	-1	1	-1
South Carolina	7	7	0	7	0	7	0	7	0	7	0	7	0	7	0	7	0	7	0
South Dakota	1	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0
Tennessee	9	9	0	9	0	9	0	9	0	9	0	9	0	9	0	9	0	9	0
Texas	36	39	3	39	3	39	3	39	3	39	3	39	3	39	3	39	3	39	3
Utah	4	4	0	4	0	4	0	4	0	4	0	4	0	4	0	4	0	4	0
Vermont	1	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0
Virginia	11	11	0	11	0	11	0	11	0	11	0	11	0	11	0	11	0	11	0
Washington	10	10	0	10	0	10	0	10	0	10	0	10	0	10	0	10	0	10	0
West Virginia	3	2	-1	2	-1	2	-1	2	-1	2	-1	2	-1	2	-1	2	-1	2	-1
Wisconsin	8	8	0	8	0	8	0	8	0	8	0	8	0	8	0	8	0	8	0
Wyoming	1	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0
Washington DC	*0*																		
		435		435		435		435		435		435		435		435		435	
		State	Seat	State	Seat	State	Seat	State	Seat	State	Seat	State	Seat	State	Seat	State	Seat	State	Seat
	430	California	52	California	52	California	52	California	52	California	52	California	52	California	52	California	52	California	52
	431	Illinois	17	Illinois	17	Illinois	17	Illinois	17	Illinois	17	Illinois	17	Illinois	17	Illinois	17	Illinois	17
	432	New York	26	New York	26	Florida	29	Florida	29	Florida	29	Florida	29	Florida	29	New York	26	New York	26
	433	Texas	39	Florida	29	New York	26	New York	26	New York	26	New York	26	New York	26	Florida	29	Texas	39
	434	Florida	29	Texas	39	Texas	39	Texas	39	Texas	39	Texas	39	Montana	2	Texas	39	Montana	2
	435	Montana	2	Montana	2	Montana	2	Montana	2	Montana	2	Montana	2	Texas	39	Montana	2	Florida	29
	436	Alabama	7	Alabama	7	Alabama	7	Alabama	7	Alabama	7	Alabama	7	Alabama	7	Alabama	7	Alabama	7
	437	Minnesota	8	Minnesota	8	Minnesota	8	Minnesota	8	Minnesota	8	Minnesota	8	Minnesota	8	Minnesota	8	Minnesota	8
	438	California	53	California	53	California	53	California	53	Ohio	16	Ohio	16	Ohio	16	Ohio	16	Ohio	16
	439	Ohio	16	Ohio	16	Ohio	16	Ohio	16	California	53	California	53	California	53	California	53	California	53
	440	Rhode Island	2	Rhode Island	2	Rhode Island	2	Rhode Island	2	Rhode Island	2	Rhode Island	2	Rhode Island	2	Rhode Island	2	Rhode Island	2

					2016 Presidential Election				
State	New Apportionment Count (2018-2019 Trend)	New Electoral College Count	2010s Electoral College Count	2000s Electoral College Count	2016 Presidentia l Victor	Electoral Votes For Clinton (D)	Electorial Votes For Trump (Rep)	Revised Electoral Votes For Clinton (D)	Revised Electorial Votes For Trump (Rep)
Alabama	6	8	9	9	Trump	0	9	0	8
Alaska	1	3	3	3	Trump	0	3	0	3
Arizona	10	12	11	10	Trump	0	11	0	12
Arkansas	4	6	6	6	Trump	0	6	0	6
California	52	54	55	55	Clinton	55	0	54	0
Colorado	8	10	9	9	Clinton	9	0	10	0
Connecticut	5	7	7	7	Clinton	7	0	7	0
Delaware	1	3	3	3	Clinton	3	0	3	0
Florida	29	31	29	27	Trump	0	29	0	31
Georgia	14	16	16	15	Trump	0	16	0	16
Hawaii	2	4	4	4	Clinton*	3	0	3	0
Idaho	2	4	4	4	Trump	0	4	0	4
Illinois	17	19	20	21	Clinton	20	0	19	0
Indiana	9	11	11	11	Trump	0	11	0	11
Iowa	4	6	6	7	Trump	0	6	0	6
Kansas	4	6	6	6	Trump	0	6	0	6
Kentucky	6	8	8	8	Trump	0	8	0	8
Louisiana	6	8	8	9	Trump	0	8	0	8
Maine	2	4	4	4	*Clinton*	3	1	4	0
Maryland	8	10	10	10	Clinton	10	0	10	0
Massachusetts	9	11	11	12	Clinton	11	0	11	0
Michigan	13	15	16	17	Trump	0	16	0	15
Minnesota	7	9	10	10	Clinton	10	0	9	0
Mississippi	4	6	6	6	Trump	0	6	0	6
Missouri	8	10	10	11	Trump	0	10	0	10
Montana	2	4	3	3	Trump	0	3	0	4
Nebraska	3	5	5	5	Trump	0	5	0	5
Nevada	4	6	6	5	Clinton	6	0	6	0
New Hampshire	2	4	4	4	Clinton	4	0	4	0
New Jersey	12	14	14	15	Clinton	14	0	14	0
New Mexico	3	5	5	5	Clinton	5	0	5	0
New York	26	28	29	31	Clinton	29	0	28	0
North Carolina	14	16	15	15	Trump	0	15	0	16
North Dakota	1	3	3	3	Trump	0	3	0	3
Ohio	15	17	18	20	Trump	0	18	0	17
Oklahoma	5	7	7	7	Trump	0	7	0	7
Oregon	6	8	7	7	Clinton	7	0	8	0
Pennsylvania	17	19	20	21	Trump	0	20	0	19
Rhode Island	1	3	4	4	Clinton	4	0	3	0
South Carolina	7	9	9	8	Trump	0	9	0	9
South Dakota	1	3	3	3	Trump	0	3	0	3
Tennessee	9	11	11	11	Trump	0	11	0	11
Texas	39	41	38	34	Trump#	0	36	0	39
Utah	4	6	6	5	Trump	0	6	0	6
Vermont	1	3	3	3	Clinton	3	0	3	0
Virginia	11	13	13	13	Clinton	13	0	13	0
Washington	10	12	12	11	Clinton&	8	0	8	0
West Virginia	2	4	5	5	Trump	0	5	0	4
Wisconsin	8	10	10	10	Trump	0	10	0	10
Wyoming	1	3	3	3	Trump	0	3	0	3
Washington DC	*1*	3	3	3	Clinton	3	0	3	0
						227	304	225	306
								-2	2
					#One elector voted for John Kasich for President				
					#One elector voted for Ron Paul for President				
					&Three electors voted for Colin Powell for President				
					&One elector voted for Faith Spotted Eagle				
					*One elector voted for Bernie Sanders				

2012 Presidential Election					2008 Presidential Election				
2012 Presidential Victor	Electoral Votes For Obama (D)	Electorial Votes For Romney (Rep)	Revised Electoral Votes For Obama (D)	Revised Electorial Votes For Romney (Rep)	2008 Presidential Victor	Electoral Votes For Obama (D)	Electorial Votes For McCain (Rep)	Revised Electoral Votes For Obama (D)	Revised Electorial Votes For McCain (Rep)
Romney	0	9	0	8	McCain	0	9	0	8
Romney	0	3	0	3	McCain	0	3	0	3
Romney	0	11	0	12	McCain	0	10	0	12
Romney	0	6	0	6	McCain	0	6	0	6
Obama	55	0	54	0	Obama	55	0	54	0
Obama	9	0	10	0	Obama	9	0	10	0
Obama	7	0	7	0	Obama	7	0	7	0
Obama	3	0	3	0	Obama	3	0	3	0
Obama	29	0	31	0	Obama	27	0	31	0
Romney	0	16	0	16	McCain	0	15	0	16
Obama	4	0	4	0	Obama	4	0	4	0
Romney	0	4	0	4	McCain	0	4	0	4
Obama	20	0	19	0	Obama	21	0	19	0
Romney	0	11	0	11	Obama	11	0	11	0
Obama	6	0	6	0	Obama	7	0	6	0
Romney	0	6	0	6	McCain	0	6	0	6
Romney	0	8	0	8	McCain	0	8	0	8
Romney	0	8	0	8	McCain	0	9	0	8
Obama	4	0	4	0	Obama	4	0	4	0
Obama	10	0	10	0	Obama	10	0	10	0
Obama	11	0	11	0	Obama	12	0	11	0
Obama	16	0	15	0	Obama	17	0	15	0
Obama	10	0	9	0	Obama	10	0	9	0
Romney	0	6	0	6	McCain	0	6	0	6
Romney	0	10	0	10	McCain	0	11	0	10
Romney	0	3	0	4	McCain	0	3	0	4
Romney	0	5	0	5	McCain	1	4	1	4
Obama	6	0	6	0	Obama	5	0	6	0
Obama	4	0	4	0	Obama	4	0	4	0
Obama	14	0	14	0	Obama	15	0	14	0
Obama	5	0	5	0	Obama	5	0	5	0
Obama	29	0	28	0	Obama	31	0	28	0
Romney	0	15	0	16	Obama	15	0	16	0
Romney	0	3	0	3	McCain	0	3	0	3
Obama	18	0	17	0	Obama	20	0	17	0
Romney	0	7	0	7	McCain	0	7	0	7
Obama	7	0	8	0	Obama	7	0	8	0
Obama	20	0	19	0	Obama	21	0	19	0
Obama	4	0	3	0	Obama	4	0	3	0
Romney	0	9	0	9	McCain	0	8	0	9
Romney	0	3	0	3	McCain	0	3	0	3
Romney	0	11	0	11	McCain	0	11	0	11
Romney	0	38	0	41	McCain	0	34	0	41
Romney	0	6	0	6	McCain	0	5	0	6
Obama	3	0	3	0	Obama	3	0	3	0
Obama	13	0	13	0	Obama	13	0	13	0
Obama	12	0	12	0	Obama	11	0	12	0
Romney	0	5	0	4	McCain	0	5	0	4
Obama	10	0	10	0	Obama	10	0	10	0
Romney	0	3	0	3	McCain	0	3	0	3
Obama	3	0	3	0	Obama	3	0	3	0
	332	206	328	210		365	173	356	182
			-4	4				-9	9

2004 Presidential Election					2000 Presidential Election				
2004 Presidential Victor	Electoral Votes For Kerry (D)	Electorial Votes For Bush (Rep)	Revised Electoral Votes For Kerry (D)	Revised Electorial Votes For Bush (Rep)	2000 Presidential Victor	Electoral Votes For Gore (D)	Electorial Votes For Bush (Rep)	Revised Electoral Votes For Gore (D)	Revised Electorial Votes For Bush (Rep)
Bush	0	9	0	8	Bush	0	9	0	8
Bush	0	3	0	3	Bush	0	3	0	3
Bush	0	10	0	12	Bush	0	8	0	12
Bush	0	6	0	6	Bush	0	6	0	6
Kerry	55	0	54	0	Gore	54	0	54	0
Bush	0	9	0	10	Bush	0	8	0	10
Kerry	7	0	7	0	Gore	8	0	7	0
Kerry	3	0	3	0	Gore	3	0	3	0
Bush	0	27	0	31	Bush	0	25	0	31
Bush	0	15	0	16	Bush	0	13	0	16
Kerry	4	0	4	0	Gore	4	0	4	0
Bush	0	4	0	4	Bush	0	4	0	4
Kerry	21	0	19	0	Gore	22	0	19	0
Bush	0	11	0	11	Bush	0	12	0	11
Bush	0	7	0	6	Gore	7	0	6	0
Bush	0	6	0	6	Bush	0	6	0	6
Bush	0	8	0	8	Bush	0	8	0	8
Bush	0	9	0	8	Bush	0	9	0	8
Kerry	4	0	4	0	Gore	4	0	4	0
Kerry	10	0	10	0	Gore	10	0	10	0
Kerry	12	0	11	0	Gore	12	0	11	0
Kerry	17	0	15	0	Gore	18	0	15	0
Kerry	9	0	8	0	Gore	10	0	9	0
Bush	0	6	0	6	Bush	0	7	0	6
Bush	0	11	0	10	Bush	0	11	0	10
Bush	0	3	0	4	Bush	0	3	0	4
Bush	0	5	0	5	Bush	0	5	0	5
Bush	0	5	0	6	Bush	0	4	0	6
Kerry	4	0	4	0	Bush	0	4	0	4
Kerry	15	0	14	0	Gore	15	0	14	0
Bush	0	5	0	5	Gore	5	0	5	0
Kerry	31	0	28	0	Gore	33	0	28	0
Bush	0	15	0	16	Bush	0	14	0	16
Bush	0	3	0	3	Bush	0	3	0	3
Bush	0	20	0	17	Bush	0	21	0	17
Bush	0	7	0	7	Bush	0	8	0	7
Kerry	7	0	8	0	Gore	7	0	8	0
Kerry	21	0	19	0	Gore	23	0	19	0
Kerry	4	0	3	0	Gore	4	0	3	0
Bush	0	8	0	9	Bush	0	8	0	9
Bush	0	3	0	3	Bush	0	3	0	3
Bush	0	11	0	11	Bush	0	11	0	11
Bush	0	34	0	41	Bush	0	32	0	41
Bush	0	5	0	6	Bush	0	5	0	6
Kerry	3	0	3	0	Gore	3	0	3	0
Bush	0	13	0	13	Bush	0	13	0	13
Kerry	11	0	12	0	Gore	11	0	12	0
Bush	0	5	0	4	Bush	0	5	0	4
Kerry	10	0	10	0	Gore	11	0	10	0
Bush	0	3	0	3	Bush	0	3	0	3
Kerry	3	0	3	0	Gore	2	0	2	0
	251	286	239	298		266	271	246	291
			-12	12				-20	20

APPENDIX 3

(Exhibit 3 to Declaration of Kimball W. Brace)

Report Date: 8/30/2020
As of 8/29/2020, percentage of housing units:

State	Self-Responded	Enumerated in Nonresponse	Enumerated
U.S. Total	**64.9**	**16.9**	**81.7**
Idaho	68.6	27.8	96.5
West Virginia	55.6	37.3	92.9
Washington	71.1	20.5	91.5
Kansas	68.6	22.4	91.0
Connecticut	69.0	21.0	90.0
Oregon	67.7	22.3	90.0
Maine	57.0	32.9	89.8
Wisconsin	71.1	18.7	89.8
Hawaii	61.7	28.0	89.7
Indiana	69.0	20.6	89.6
Minnesota	73.8	14.0	87.9
Illinois	69.6	18.1	87.7
Maryland	69.2	17.3	86.5
Missouri	64.6	22.0	86.5
California	67.1	18.8	85.9
Massachusetts	67.3	18.7	85.9
Alaska	52.8	32.3	85.1
Utah	69.3	15.8	85.1
Pennsylvania	67.7	17.4	85.0
Ohio	69.0	15.9	84.9
North Dakota	63.9	20.2	84.1
Nebraska	70.4	13.6	84.0
Virginia	69.4	14.2	83.7
Colorado	68.2	15.3	83.5
Arkansas	59.3	23.7	83.0
Tennessee	64.2	18.1	82.2
Michigan	69.9	11.9	81.8
Rhode Island	62.8	19.0	81.8
New Jersey	66.9	14.1	81.0
Vermont	58.7	22.1	80.8
New Hampshire	64.9	15.8	80.7
Kentucky	67.0	13.4	80.4
South Dakota	65.5	14.5	80.0
District of Columbia	61.3	18.5	79.7
New York	61.0	17.9	78.8
Delaware	62.4	16.1	78.5
Iowa	69.7	08.8	78.5
Nevada	64.1	14.3	78.5
Oklahoma	59.2	19.3	78.5
Wyoming	59.2	19.1	78.3
Texas	60.2	17.5	77.7
Florida	61.5	13.3	74.8
Louisiana	58.3	16.2	74.4
North Carolina	60.7	13.6	74.3
Mississippi	58.9	14.8	73.7
South Carolina	58.7	14.7	73.4
Montana	58.1	15.2	73.3
Alabama	61.8	11.2	73.0
Arizona	61.3	11.5	72.9
Puerto Rico	32.2	40.6	72.8
Georgia	60.2	12.5	72.7
New Mexico	55.6	15.6	71.2

EXHIBIT D

UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF MARYLAND

LA UNIÓN DEL PUEBLO ENTERO, et al., *Plaintiffs*, v. DONALD J. TRUMP, sued in his official capacity as President of the United States, et al., *Defendants*.	Civil Action No. 8:19-CV-02710-PX

DECLARATION OF AMY O'HARA

I. QUALIFICATIONS

1. I am a Research Professor in the Massive Data Institute at the McCourt School of Public Policy at Georgetown University and Executive Director of Georgetown's Federal Statistical Research Data Center. I have been in this role at Georgetown since 2018, where I focus on the secure and responsible use of administrative data for research and statistical purposes. I lead a team that develops governance models, data access protocols, and research methods to advance ethical and privacy preserving data uses. I have a Ph.D. in economics from the University of Notre Dame. A copy of my CV is attached to this declaration.

2. Prior to entering academia, I worked at the U.S. Census Bureau for fourteen years. I am the former chief of the Center for Administrative Records Research and Applications (CARRA), where I designed and led the data acquisition, linkage, and research activities using federal, state, and local administrative data. As the senior executive over administrative data, I negotiated access and uses of data from dozens of agencies, and oversaw the data processing to enable matching across files. I designed and led the work on administrative records during the 2020 Research and Testing Program through 2012, and led negotiations to obtain administrative data for decennial census planning and operations through 2017. I have received the Department

of Commerce Gold Award for negotiating access to tax data for the 2020 census, and Census Bureau Bronze Award for work with administrative data. I was also awarded the 2012 Arthur S. Flemming Award for my leadership in expanding the use of administrative data in federal statistics.

3. I was retained by the plaintiffs in *La Unión del Pueblo Entero, et al., v. Trump, et al.*, No. 8:19-CV-02710 (D. Md.), to provide my expert opinion on the policies and procedures involving administrative records at the U.S. Census Bureau, and on the extent to which the Commerce Department and Census Bureau policies and protocols affect the accuracy of the 2020 Census.

4. I am being compensated at a rate of $150 per hour.

II. SUMMARY AND CONCLUSIONS

5. Based on my experience and knowledge, the decision by the Census Bureau to end field operations and compress post data collection activities (referred to herein as "post-processing") to deliver apportionment data by December 31, 2020 will require excessive reliance on administrative data and imputation methods that are very likely to produce undercounts through failure to enumerate individuals.

6. Based on my experience and knowledge of administrative data sources and quality, it is my opinion that truncating field operations and post-processing will strain currently developed methods and processes that are used to fill-in missing data and will reduce the accuracy of census counts and characteristics in the following ways:

a. Shorter fieldwork may reduce the number of in-person or proxy responses obtained; this will then require more imputation.

b. The administrative data sources currently planned for count imputation use have insufficient coverage for low-income and highly mobile households.

c. Reduced fieldwork cannot be remedied by using administrative data.

III. PLANNED USES OF ADMINISTRATIVE RECORDS

7. The Census Bureau acquired administrative records from 2010 onwards, for research and testing, in order to determine how to assess quality and a source's fitness for use (e.g., different data are valuable for different uses, like filling in missing age or sex, or to help determine whether a unit is vacant). Data sources were identified, then data sharing agreements were negotiated between the Census Bureau and the relevant agency. Files were delivered, reviewed, and assessed to see how complete and accurate their data were. A set of data from federal, state, and commercial sources were built into an operational database for the 2020 census. These records were harmonized, or uniformly processed and ready to plug into census operations. The system was developed and tested over the past several years, and at the start of 2020 the system was expected to receive updates from its component sources during the year. The scale of data preparation was unprecedented for census operations, requiring billions of records to be normalized and readied for multiple uses. A typical census schedule required the parallel development of the MAF and field operations, but 2020 innovations also required coordination of the administrative data system and online response system. This was a huge and complex undertaking that received less testing than originally planned and had system integration challenges.

8. The pandemic rattled this undertaking. COVID-19 altered the economy, society, and census. Shifts in residential patterns, school closings, community lockdowns, and disruption of government programs and services were just a few of the factors that affected data streams

and census plans. Some families moved away from viral hotspots, families decided how to cohabitate to care for children and elders, higher education institutions sent students home, and many aspects of life shifted online as non-essential businesses were ordered closed in many places. Many government agencies and departments limited services, allowing extensions on everything from income tax filings to driver's license renewals. The economic shutdown caused a crush of filers and applicants for unemployment benefits and food assistance programs. All of this affected the both the data landscape and the enumeration itself. The Census Bureau faced uncertainty and delay over how the census fieldwork could occur, and has not released updated plans on how administrative data will be used. Based on my experience and knowledge, the policy setting and decision-making processes at the Census Bureau are unable to adapt quickly to address the effects of the pandemic.

9. According to Census Bureau plans, they hoped to have a self-response of 60% by mid-May, then send more than 420,000 field staff to conduct NRFU over a 15-week period from mid-May to mid-August 2020. That would have allowed the Census Bureau approximately twenty weeks (mid-August to December) to process the data to prepare the apportionment counts by December 31, 2020.

10. The Census Bureau announced it will end fieldwork on September 30, 2020, yet the counts are still due December 31, 2020 and the Census Bureau has hired far fewer enumerators than planned.

IV. AFFECT OF THE PANDEMIC ON THE INTENDED USE OF ADMINISTRATIVE RECORDS

11. Administrative data cannot fix all the issues created by the pandemic and the truncated schedule. Adhering to the end of year deadline compresses not only the fieldwork, but

also reduces the post-processing time. These two issues compound the risk of an inaccurate count. The goal of fieldwork is to obtain a count for each housing unit that has not yet responded. By limiting the number of weeks in the field, the Census Bureau risks its ability to visit housing units to assess whether they are vacant or occupied, and to arrange visits to obtain proxy responses from building managers in multi-unit buildings. If there are sections of cities or rural communities that fail to receive in-person visits, the Census Bureau will need to fill in missing data during post-processing in a time period of only about 13 weeks (October to December) to meet a December 31, 2020 apportionment count deadline. To recap, the Census Bureau was supposed to have 15 weeks in the field and will now have seven. They were supposed to have 20 weeks of post-processing and will now have 13.

12. After fieldwork is done, the Census Bureau needs to deal with missing data: If there is no self-response (from internet, phone, paper, or fieldwork) or proxy response for a housing unit, the Census Bureau will need to assess whether a non-responding unit was vacant or occupied. A number of administrative and commercial data sources are prepared for this assignment, but they have never been tested for the large volume of cases that will need to be processed. This brings a risk of using uneven USPS "vacant" designations from across the country and from differing types of addresses (e.g., non-city style addresses, apartment buildings with mail drops), and IRS data that may non-representative of the full population, undercounting minority groups.

13. Several of the administrative data sources tested for this use have had COVID challenges. The Census Bureau plan for count imputation is highly reliant on individual income tax data from the Internal Revenue Service (IRS). IRS data have substantial coverage of the U.S. population – hundreds of millions of records reflect person-address data on W-2s, information

returns about interest, mortgages, student loans, Social Security benefits, and contracting income. IRS income tax returns, filed on Form 1040s, often list an entire family or household and on-time returns are typically filed in early April, lining up well with Census Day of April 1. The pandemic affected timely filing, with business closures limiting the number of low-income filers who could visit retail tax preparers (or volunteer tax preparers at local libraries) in person. IRS offered a filing extension through July 15, 2020, though many individuals filed earlier to obtain their refunds or the economic stimulus payment that was administered through the tax system this spring. This stimulus payment may have increased the value of IRS records for the 2020 census, provided they arrive in time. The economic stimulus rebate administered during the last recession induced filing of millions of additional returns. However, IRS processing was disrupted due to the pandemic. A lack of transparency into the volume, coverage, and timeliness of administrative data like the IRS returns prompt questions over Census's possible expanded reliance on such sources.

14. The bulk of the tax records were expected in May and June. If the records come in late, post-processing will suffer delays and disruption. This calls into question whether the Census Bureau has adopted policies to address changes to administrative data delivery, content, or composition, and whether they can do all this work by December 31, 2020.

15. The Census Bureau invested in administrative data and methods expecting a much smaller workload to designate vacant, occupied, or delete status since they planned on being in the field for complete Non-Response Follow-Up operations. Given that the fieldwork will be cut short, the volume of addresses for which vacant/delete status must be identified will be greater.

V. ALTERNATIVE APPROACHES TO RESPOND TO THE PANDEMIC

16. The Census could use administrative data as planned to fill in missing data, but there are significant concerns about data availability. For example, as noted above, the Census Bureau's plans rely on heavy use of tax data, which does not include all households or children. With a larger than expected amount of missing data, this will result in biased responses and undercounts.

17. In order to maximize use of the administrative data, the Census Bureau would need to review the existing policies, assumptions, and rules of thumb embedded in their decisions. The Census Bureau has acquired, harmonized, and readied dozens of source files; many were evaluated during the decade and tested against 2010 or survey data, but were not deemed as highest quality by decennial planners. The 30+ administrative data sources ready for production[1] were assembled to support different operations. For example, some sources were tested and readied for vacant/delete checks, others were prepared for count imputation, and still other sources were best for characteristic imputation (e.g., where a household responds with a count but does not complete information on household member age or race). Operational tests had required the presence of two corroborating data points from the same or different data sources for inclusion in imputation processing.

18. Thus, it is possible that expanded administrative data use to fill in missing data could occur before traditional hot deck imputation. Hot deck imputation assigns a missing value (whether a household count, age, or sex) from another census record with similar characteristics. The "hot deck" is a set of records with similar variables such as age, race, and sex that provide

[1] "Intended Administrative Data Use in the 2020 Census," Karen D. Deaver, U.S. Census Bureau, May 1, 2020, https://www2.census.gov/programs-surveys/decennial/2020/program-management/planning-docs/administrative-data-use-2020-census.pdf.

the donor records for assignment. The Census Bureau has not released details on the characteristics of respondents or detailed geography of response patterns to demonstrate that available responses to act as donor households are sufficient for an increased use of imputation. In past censuses, the Census Bureau has imputed whole households, though at very low rates in any geography. Hot deck imputation at a greater level than previously applied could be risky during this census, especially with truncated fieldwork. This is because households who completed the census may not be representative of households who did not respond.

19. The 2020 census has been atypical in its conduct, timeline, response patterns, and underlying residential stability due to the pandemic. Based on my experience and knowledge, I do not believe that combining self-reported, proxy, and administrative data information was tested by the Census Bureau for imputation. The lack of uniform quality across sources, when census data were collected, the reference dates for administrative data, and lack of transparency about post-processing applied, leads to questionable overall data quality across the country and within population groups. Given these issues with administrative records, the lack of testing, and a drastically compressed schedule, based on my experience and knowledge, I do not believe maximizing administrative records use will be possible without serious risk to conducting an actual enumeration in the 2020 Census.

VI. CONCERNS WITH AVAILABLE ADMINISTRATIVE RECORDS

20. Census memos and publications have not described how the sources that have been prepared for operational use reflect the diverse population in the U.S. This calls into question the Census Bureau's ability to impute all ethnicity and race groups, and all age groups for every geography.

21. Earlier studies reveal that administrative data have lower coverage of groups including non-white and high mobility young adults.[2] An array of sources is needed to reflect the U.S. population, or you risk the results found in the 2010 Census Match Study[3] that I designed and conducted with Sonya Porter and my staff in CARRA at the Census Bureau. That study, the first national assessment of how close an administrative data census could come to a traditional enumeration, revealed that administrative data were useful but the combination used in that study did not result in population totals that were consistent with a traditional census. The combination of commercial and federal administrative data sources provided low coverage of Hispanics, Native Hawaiian or Other Pacific Islander, and American Indian or Alaska Native race groups. These groups were also challenging to match across sources due to the Census Bureau's approach to person validation and linkage. A 2014 study noted that young children, minorities, residents of group quarters, immigrants, recent movers, low-income individuals, and non-employed individuals were less likely to receive a validated person linkage identifier.[4] This is the same methodology being used for person validation and linkage for the 2020 census.

22. After the 2010 Census Match Study, the Census Bureau made efforts to improve administrative data coverage of the population, and to find sources of administrative data where earlier studies had revealed weaknesses. The composition of the records needs to be understood by age, sex, race, and Hispanic origin. Tax data misses many individuals who are not in the labor force, and will miss children in many households. This is why the now-dismantled Center for

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[2] *See* Brittany Bond, J. David Brown, Adela Luque, Amy O'Hara, The Nature of the Bias When Studying Only Linkable Person Records: Evidence from the American Community Survey, U.S. Census Bureau (April 22, 2014), https://www.census.gov/content/dam/Census/library/working-papers/2014/adrm/carra-wp-2014-08.pdf.
[3] "2010 Census Match Study," Sonya Rastogi and Amy O'Hara, U.S. Census Bureau, November 16, 2012, https://www.census.gov/2010census/pdf/2010_Census_Match_Study_Report.pdf.
[4] Brittany Bond, J. David Brown, Adela Luque, Amy O'Hara, The Nature of the Bias When Studying Only Linkable Person Records: Evidence from the American Community Survey, U.S. Census Bureau (April 22, 2014), https://www.census.gov/content/dam/Census/library/working-papers/2014/adrm/carra-wp-2014-08.pdf.

Administrative Records Research and Applications pursued state health and human services program data. Dozens of datasets from state Supplemental Nutrition Assistance Programs, Women, Infant, and Children programs, and Temporary Assistance for Needy Families programs were accessed and harmonized. But according to its May 2020 memo, the Census Bureau does not plan to use any of these files for 2020 count imputation.

23. Increased reliance on administrative data in the post-processing period would require careful combination of sources and sufficient time to do it right. With the truncated schedule, there is not sufficient time. How administrative data would be summed when household members appear in multiple program files would need to be resolved. Adding sources together to get a total count may be appropriate in some households, but could erroneously reflect household size and composition in others. For example, a multigenerational household may have multiple tax returns, Medicare, and Housing and Urban Development mortgage administrative data, all reflecting a family under one roof. If the Census Bureau only counts one or two of these sources, family members would be missed and administrative data business rules would exacerbate an undercount. Research from Pew Research Center indicates that many multi-generational households are households with Hispanic, Black, and Asian heads, as well as immigrant households.[5] Based on my knowledge and experience, it is unlikely that the Census Bureau has developed business rules or algorithms that properly blend sources together to accurately reflect household rosters. Such business rules and algorithms were not in place when I left in 2017 and have not been publicly shared since.

[5] Paul Taylor, et al., Fighting Poverty in a Tough Economy, Americans Move in with Their Relatives, Pew Research Center, Chapter 3: Demographics of Multi-Generational Households (Oct. 3, 2-11), https://www.pewsocialtrends.org/2011/10/03/chapter-3-demographics-of-multi-generational-households/.

VII. CONCLUSION

24. Because of insufficient quality administrative records available to address the various shortcomings resulting from a truncation of field operations and post-processing, based on my experience and knowledge, the Census Bureau must adhere to the requested plan extending statutory deadlines. Based on my knowledge and experience, the truncated schedule does not provide adequate time to meet these challenges, particularly given that career professionals at the Census Bureau said they needed until April 30, 2021, and the result of adhering to the truncated schedule will be a failure to conduct an actual enumeration of the population.

I declare under penalty of perjury that the foregoing is true and correct.

Amy O'Hara

Executed on August 31, 2020 at Silver Spring, Maryland.

APPENDIX 1

August 2019

AMY O'HARA

Curriculum Vitae

Massive Data Institute
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EMPLOYMENT

Georgetown University

Research Professor, Massive Data Institute, 2018 - present
Director, Federal Statistical Research Data Center, 2018 - present

Stanford University

Senior Research Scholar, Stanford Institute for Economic Policy Research, 2017- 2018
Associate Director for Data, Stanford Center for Population Health Sciences, 2017-2018

U.S. Census Bureau

Chief, Center for Administrative Records Research and Applications, 2014-2017
Acting Chief, Center for Administrative Records Research and Applications, 2011-2014
Economist and Statistician, 2004-2011

EDUCATION

University of Notre Dame

Ph.D. in economics, 2003
M.A. in economics, 1998

State University of New York College at Buffalo

B.S. in economics, 1996

PUBLICATIONS

Medalia, Carla, Bruce Meyer, Amy O'Hara, and Derek Wu. 2019. "Linking Survey and Administrative Data to Measure Income, Inequality, and Mobility." *International Journal of Population Data Science*, 4(1):1-8.

Massey, Catherine, Katie Genadek, J. Trent Alexander, Todd Gardner, and Amy O'Hara. 2018. "Linking the 1940 U.S. Census with Modern Data." *Historical Methods: A Journal of Quantitative and Interdisciplinary History,* 51(4):246-257.

O'Hara, Amy, and Carla Medalia. 2018. "Data Sharing in the Federal Statistical System: Impediments and Possibilities." *The ANNALS of the American Academy of Political and Social Science,* 675(1):138-150.

Culbertson, Adam, Satyender Goel, Amy O'Hara et al. 2017. "The Building Blocks of Interoperability: A Multisite Analysis of Patient Demographic Attributes Available for Matching." *Applied Clinical Informatics* 8(2):322-336.

O'Hara, Amy, Rachel Shattuck, and Robert Goerge. 2017. "Linking Federal Surveys with Administrative Data to Improve Research on Families." *The ANNALS of the American Academy of Political and Social Science* 669(1):63-74.

Jarmin, Ron, and Amy O'Hara. 2016. "Big Data and the Transformation of Public Policy Analysis" and "Counterpoint to 'Big Data For Public Policy: The Quadruple Helix. " *Journal of Policy Analysis and Management* 35(3): 715-721 and 725-727.

Jones, Maggie, and Amy O'Hara. 2016. "Do Doubled-Up Families Minimize Household-Level Tax Burden?" *National Tax Journal* 69(3): 613-640.

Johnson, David, Catherine Massey, and Amy O'Hara. 2014. "The Opportunities and Challenges of Using Administrative Data Linkages to Evaluate Mobility." *The ANNALS of the American Academy of Political and Social Science* 657(1): 247-264.

WORKS IN PROGRESS

Fidler, Fiona, Simine Vazire, Alexander Etz, Gary Klein, Richard Lempert, Arthur Lupia, Amy O'Hara et al. "Developing, Validating, and Obtaining Stakeholder Buy-in for Criteria for Applying Social Science to Policymaking." OSF Preprints.

O'Hara, Amy. "Administrative Data Censuses in US States." In preparation.
O'Hara, Amy and Quentin Brummet. "The Differential Privacy Corner: What Has the US Backed Itself Into?" In preparation.

O'Hara, Amy. "Observing and Linking Household Relationships Across US Data Sources." In preparation. Uses decennial census, IRS 1040, Medicare, and Social Security Administration data.

REPORTS AND PERMANENT WORKING PAPERS

Postsecondary Data Infrastructure: What is Possible Today. Institute for Higher Education Policy. June 2019.

Developing, Validating, and Obtaining Stakeholder Buy-in for Criteria for Applying Social Science to Policymaking. With Fiona Fidler, Simine Vazire, Alexander Etz, Gary Klein, Richard Lempert, and Arthur Lupia. OSF Preprints. November 2018.

Preliminary Research for Replacing or Supplementing the Income Question on the American Community Survey with Administrative Records. With C. Adam Bee and Joshua Mitchell. 2016. American Community Survey Research and Evaluation Report Memorandum Series #ACS16-RER-6.

Using the Census to Evaluate Administrative Records and Vice Versa. With J. David Brown and Jennifer H. Childs. 2015. Proceedings of the 2015 Federal Committee on Statistical Methodology Research Conference.

Challenges to Evidence-Based Policy Making in the Decentralized U.S. Statistical System. With Nancy Potok and Ron Jarmin. 2014. Invited Paper for the Ninth International Conference on Teaching Statistics.

Person Matching in Historical Files using the Census Bureau's Person Validation System. With Catherine G. Massey. 2014. Center for Administrative Records Research and Applications Working Paper No. 2014-11.

The Nature of the Bias When Studying Only Linkable Person Records: Evidence from the American Community Survey. With Brittany J. Bond, J. David Brown, and Adela Luque. 2014. Center for Administrative Records Research and Applications Working Paper No. 2014-08.

2010 Census Match Study. With Sonya Rastogi. 2012. 2010 Census Program of Evaluations and Experiments, 2010 Census Planning Memoranda Series No. 247.

Taking Account of Housing in Measures of Household Income. With Kathleen Short and Scott Susin. 2007. Social, Economics, and Household Statistics Division Working Paper No. 2007-02.

The Effects of Taxes and Transfers on Income and Poverty in the United States: 2005. With Joseph Dalaker. 2007. P-60 Census Bureau Report.

Allocated Values in Linked Files. 2007. Proceedings of the 2007 Federal Committee on Statistical Methodology Research Conference.
Tax Variable Imputation in the Current Population Survey. 2006. Proceedings of the 2006 IRS Research Conference.

Evaluation of CPS Tax Simulation Using Administrative IRS Data. 2005. Proceedings of the 2005 Federal Committee on Statistical Methodology Research Conference.

New Methods for Simulating CPS Taxes. 2004. Census Bureau Working Paper.

ORIGINAL DATA RESOURCES
Census Longitudinal Infrastructure Project (CLIP), Preliminary Release. U.S. Census Bureau. 2015. Co-founded CLIP to provide linked microdata from three decennial censuses, two household surveys (Current Population Survey and American Community Survey), and administrative records files from seven federal programs for researchers.

Parent-Child Pointer File (Census Kidlink), Preliminary Release. U.S. Census Bureau. 2013. The Census Kidlink file consists of parent-child linkages observed in Social Security card application data validated with IRS 1040 data. Census Bureau linkage keys are appended to mother-child and father-child relationships. The data are currently used in research projects, survey operations, and decennial census operations.

INVITED PRESENTATIONS

How Might Government Data be Leveraged for the Public Good? Brown Policy Lab, Rhode Island Office of Management and Budget. June 2019.

Supporting Data Access Within and Across Agencies. Committee for National Statistics. National Statistics for Public Policy Seminar. May 2019.

Implementation Issues for Secure Multiparty Computation. Will Secure Multiparty Computation Reshape Data Privacy? Open Technology Institute. April 2018.

Merging "Organic" and Administrative Data with Traditional Social Science Data. National Science Foundation Directorate for Social, Behavioral, and Economic Sciences Advisory Committee Meeting. October 2017.

The New Multiple Data Sources Paradigm for Federal Statistics: Progress and Prospects. Joint Statistical Meetings. August 2017.

The U.S. Census Bureau's Linkage Infrastructure: Overview and New Challenges. Data Linkage: Techniques, Challenges, and Applications, Newton Institute for Mathematical Sciences. September 2016.

The Opportunities and Challenges of Using and Linking Data. White House Office of Social Innovation Workshop. September 2016.

The Census Bureau Linkage Infrastructure. Joint Statistical Meetings. August 2016.

The Census Bureau Linkage Infrastructure. Pay for Success Convening, U.S. Department of Education. June 2016.

Use of Administrative Records to Reduce Burden and Improve Quality. Workshop on Respondent Burden in the American Community Survey. March 2016.

Census Bureau Efforts to Utilize and Share Data. The Promises and Challenges of Administrative Data in Social Policy Research, Department of Health and Human Services. October 2015.

Person Identification Validation System: the 2010 Census and the Coverage of Administrative Records. Inter-American Development Bank Conference on the Statistical Use of Administrative Registers. September 2015.

American Community Survey Administrative Records Research, Association of Public Data Users. September 2015.

Help Wanted. Keynote for Federal Computer Assisted Survey Information Collection Workshop. March 2015.

Data Integration to Evaluate Food Security Programs. Staff briefing for House Agriculture Committee. March 2015.

Data Access for Statistical Use of the National Directory of New Hires. Staff briefing for Senate Finance Committee. May 2015.

Information is Driving Innovation: How the Census Bureau is Integrating Administrative Records in the 2020 Census and Beyond. Staff briefing for House Appropriations Committee. March 2015.

Census Bureau Uses of New Data Sources. Privacy Working Group. February 2014.

Acquiring and Protecting Administrative Records: Current Programs and the Future. Future of Privacy Forum. September 2014.

GRANTS AND INSTITUTIONAL AWARDS

State Population Estimate Benchmarking (Co-Principal Investigator), funding by the Alfred P. Sloan Foundation, 2019-2021, $600,000

Administrative Data Research Institute (Principal Investigator), funded by the Alfred P. Sloan Foundation, 2018-2020, $1.7 million

2013 Gold Medal, U.S. Department of Commerce
2012 Arthur S. Flemming Award for Leadership and Management in Government Service
2010 Bronze Medal, U.S. Department of Commerce

PROFESSIONAL SERVICE

Invited Member, Health and Retirement Survey Data Monitoring Committee, 2019-2021
Invited Member, Evaluation Advisory Group, Future Skills Centre, 2019-2024
Canadian Future Skills Centre Evaluation Advisory Committee, 2019-present
Dutch Open Data Infrastructure for Social Science and Economic Innovations Advisory Board, 2020-2024
Invited Member, Panel on Improving Consumer Data for Food and Nutrition Policy Research for the Economic Research Service, 2018-present
Member, National Bureau of Economic Research Conference on Research in Income and Wealth
Invited Member, Panel on Modernizing the Nation's Crime Statistics, National Academies of Science, Engineering, and Medicine, 2013-2018
Criminal Justice Administrative Records System Board of Directors, University of Michigan, 2016-present
Manuscript reviewer for Journal of Human Resources, International Journal of Population and Data Science, Journal of Research on Educational Effectiveness, and Statistics and Public Policy

EXHIBIT C

UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF MARYLAND

LA UNIÓN DEL PUEBLO ENTERO, et al., *Plaintiffs*, v. DONALD J. TRUMP, sued in his official capacity as President of the United States, et al., *Defendants*.	Civil Action No. 8:19-CV-02710-PX

EXPERT DECLARATION OF DR. WILLIAM P. O'HARE

Overview

1. This report makes six key points:

a. Over the past several U.S. Censuses, the empirical evidence shows that groups with lower self-response rates have higher net undercounts and omission rates. This indicates that states and groups with lower self-response rates in the 2020 Census are likely to have higher net undercount and omission rates.

b. Census tracts where Hispanics and Blacks are the plurality of the population have lower self-response rates in the 2020 Census than tracts where Non-Hispanic Whites are the plurality of the population in the 2020 Census. This indicates Hispanics and Blacks are likely to have higher net undercounts and omissions rates than Non-Hispanic Whites in the 2020 Census.

c. Census tracts where the foreign-born population is a disproportionately high share of the tract population have lower self-response rates in the 2020 Census and are likely to have higher net undercounts and omissions rates than the native-born population in the 2020 census.

d. Based on data from the 2010 and 2020 Census, households that respond later in the Census data collection period are disproportionately Hispanic, Asian, and Black rather than Non-Hispanic White. This means changes at or near the end of the data collection period are likely to have bigger impact on Hispanics, Asians, and Blacks.

e. Net undercounts and omissions in the U.S. Census have important implications for the groups missed at the highest rates.

f. Changing the end date of data collection in the 2020 Census from October 31, 2020 to September 30, 2020, will negatively impact the enumeration of Hispanic, Asians, and Blacks more than Non-Hispanic Whites.

Background

2. I have more than forty years of experience using Census data in a variety of professional settings, including experience in non-profits, philanthropy, state government, and university settings. Since 1987, I have worked at the Population Reference Bureau, the University of Louisville, and the Annie E. Casey Foundation.

3. I have a Bachelor of Science Degree from Michigan State University in Multi-Disciplinary Social Science. I have a master's degree from Michigan State University in Multi-disciplinary Social Science, I have a Ph.D. from Michigan State University in Sociology.

4. I have published many articles in scientific journals and written many books and book chapters based on Census Bureau data. I have authored more than a dozen monographs on subjects such as the well-being of children, poverty, and minorities in America. I have also made many presentations using Census data at professional conferences. While serving as the Director of the KIDS COUNT project within the Annie E. Casey Foundation from 1993 to 2006, I supervised the use of Census data related to measuring and reporting on the well-being of children.

5. I have been a member of the Population Association of America, the Southern Demographic Association, and the American Statistical Association since the 1970s.

6. I served on the Board of Directors and was President of the Southern Demographic Association. I was a founding member of the International Society of Child Indicators, and served on their Board of Directors for many years.

7. From 1995 to 2001, I was a representative from the American Statistical Association on the Census Bureau's Professional Advisory Committee. From 2008 to 2011, I was a representative from the Association of Public Data Users on the Census Bureau's 2010 Census Advisory Committee.

8. I was awarded a National Science Foundation/American Statistical Association/Census Bureau Research Fellowship to do research on census undercounts at the Census Bureau from 2011 to 2013.

9. In 1980, I was awarded a Fulbright Scholarship to teach demographic and social science research methods at the University of San Carlos in the Philippines during their 1980-81 school year.

10. I have been retained by Plaintiffs in *La Unión del Pueblo Entero v. Trump et al.*, Case No. 8-19-cv-02710 (D. Md.). I was asked to assess the impact of truncating the schedule for the 2020 Census, including moving the end date for 2020 Census data collection from October 31, 2020 to September 30, 2020.

11. I am being compensated at a rate of $100 per hour.

I. The Link Between Self-Response Rates and Census Accuracy.

1.1 Key Concepts and Terms

12. Before presenting the analysis and results in this section of my report, it is important to define some key concepts and terms used in this report. The descriptions in this section of the report focus on census operations prior to the 2020 Census. Analysis in this section focuses on the relationship between census self-response and census accuracy. In the next sections, I focus on the 2020 Census.

1.1.2 Self-Response Rates

13. Briefly, the U.S. decennial Census can be thought of as having two major data collection phases: 1) a self-response phase and 2) a non-response followup (NRFU) phase. The self-response phase consists of households returning the questionnaire that was mailed to them from the Census Bureau. In the 2020 Census for the first time in the history of the decennial census, major modes of self-response operation will include internet and telephone responses

along with mail responses.[1] According to the U.S Census Bureau, (2020d) as of August 16, 2020, 80 percent of the responses submitted have been by Internet, 18.5 percent by paper, and 1.5 percent by telephone.

14. Several weeks after Census day (April 1) the second phase of the Census begins, and households that did not return a completed Census questionnaire are visited by a Census enumerator to gather the information needed for the Census. This is referred to as Nonresponse Followup ((NRFU) operation or phase by the Census Bureau.[2] A few people belatedly self-respond during the NRFU phase. There are also other Census operations (like update leave and update enumerate)[3] that are outside of these two operations, but the vast majority of Census respondents are captured in the self-response and NRFU operations of the Census.

15. Self-response rates reflect the percent of households that return a completed Census questionnaire. In my analysis of the 1990, 2000 and 2010 Decennial Censuses, self-response is measured by two closely related indicators: mail return rates and mail response rates (because historically mail has been the primary mode of self-response). Detailed descriptions of mail return rates and the mail response rates are provided by the Census Bureau (2014b, page 61). In simple terms, the mail return rate is the percentage of occupied households that return competed Census questionnaires. Mail response rates are the percentages of Census questionnaires that were returned from all households whether they were occupied or not.

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[1] In the 2010 Census, there were a very small number of people who were able to respond on the internet, but the internet option was not widely available

[2] The NRFU operational design in the 2020 Census will also use administrative records and third-party data to enumerate occupied housing units. *See* U.S. Census Bureau, *2020 Census Detailed Operational Plan: 18.* Nonresponse Followup Operation (NRFU), April 2018 at 9, *available at* https://www2.census.gov/programs-surveys/decennial/2020/program-management/planning-docs/NRFU-detailed-operational-plan.pdf.

[3] The Update/Leave operation is conducted in places without regular mail delivery. A census enumerator verifies a housing unit at the address and leaves a paper questionnaire for the household to complete. The Update/Enumerate operation is conducted in very remote areas.

Where available, my analysis uses mail return rate to measure self-response rates. However, the mail return rate was not available in the 1990 Census, so I use the mail response rate to reflect the self-response rate in 1990. As stated earlier, in the 2020 Census, other self-response modes, such as the internet and telephone, are available.

16. The mail return rates, and the mail response rates are calculated by the Census Bureau and these rates have been used by data analysts at the Census Bureau. The mail return rate was used by U.S. Census Bureau (2018d) to measure self-response in a study of the impact of a citizenship question on the 2020 Census questionnaire. In another Census Bureau analysis of the impact of a potential citizenship question on the 2020 Census, (2018b) Census Bureau staff also used self-response for both the 2010 and 2000 Census for which mail was the only self-response option, and for the American Community Survey (ACS) for which mail and internet self-responses were options.

1.3 <u>Net Undercounts and Omissions</u>

17. Net undercount and omissions rates are both measures of Census accuracy, but they capture different parts of Census accuracy (O'Hare 2019b).

18. The net undercount is a balance between people missed (omissions), those included erroneously (meaning those double counted and those inappropriately included in the census, like foreign tourists), and those imputed.[4] If the number of omissions is higher than the number of erroneous inclusions and whole person imputations, there is a net undercount. If the number of erroneous inclusions and whole person imputations is larger than the number of omissions, there is a net overcount.

[4] Imputations are people added to the Census count based on some evidence they exist. For example, if a housing unit looks occupied, but there is no self-response, and no one responds to an enumerator, the Census Bureau may impute people into the Census count.

19. In the 2010 Census there were 10,042,000 erroneous enumerations, 5,993,000 whole person imputations, and 15,999,000 omissions (U.S. Census Bureau 2012b, Table 3).

20. Omissions capture the number and share of a population that are missed in the Census and are defined by the Census Bureau (2012b, page 12), "omissions are people who should have been enumerated in the United States Census but were not." In some ways omissions are a better reflection than net undercount rates of who is missed in the Census. For example, if 10 percent of Hispanics in a state are missed, while an equal number of Non-Hispanic Whites are double counted, the net undercount would be zero, but that does not reflect the fact that a large number of Hispanics were missed. The net undercount for a state can mask important differences in the accuracy of the census data across geographic subunits (like cities and counties) of the state.

21. It is important to understand the net undercount does not tell you how many people were missed in the Census and it is worth noting that even when a net undercount for a group is zero, there are often omissions. For example, the net undercount of Asians in the 2010 Census was essentially zero, but there was an omissions rate of over 5 percent for Asians in the 2010 Census. The net undercount for young children in the 2010 Census was 4.6 percent, but the omissions rate was 10.3 percent (O'Hare 2019a).

22. Undercounts have sometimes been reported as a negative number by the Census Bureau (Velkoff 2011; King et al. 2018; Jensen et al. 2018) and sometimes as a positive number by the U.S. Census Bureau (2012b). In this report, net undercounts are reported as a positive number and net overcounts as a negative number. Measuring net undercounts here as a positive number makes the correlations and the figures easier to interpret.

1.1.4 Correlations

23. Much of the analysis in this report relies on correlation coefficients to show relationships between two variables such as self-response rates and net undercount rates. More specifically, I use the Pearson Product-Moment Correlation Coefficient (Blalock 1972, page 376). This is probably the most widely used correlation calculation.

24. There are three dimensions of correlation coefficients: direction, magnitude, and statistical significance. Direction is indicated by a positive or a negative sign. A positive correlation indicates a higher value on one variable is associated with a higher value in the other variable. The relationship between height and weight reflects a positive correlation, i.e., taller people usually weigh more. A negative sign indicates that a higher value on one variable is associated with a lower value in the other variable. For example, the relationship between exercise and obesity reflects a negative correlation, i.e., people who exercise more are less likely to be obese.

25. The magnitude of a correlation coefficient varies from 0 to 1. A magnitude of zero means no relationship between the two variables and a value of 1 means a perfect correlation between the two variables. The higher the magnitude or value of the correlation coefficient the stronger the relationship between the two measures being examined. When you put direction and magnitude together the value can range from a -1 to +1, and the closer the correlation coefficient is to -1 or +1, the higher the correlation.

26. Statistical significance testing is done to assess how likely the observed results are due to chance. Researchers use different levels of statistical significance depending on the analysis. In this report, all the correlation coefficients deemed statistically significant are significant at the 0.10 level or higher (higher level of significance). This is a commonly used benchmark in social science research and the same level that the Census Bureau typically uses.

The standard used by the Census Bureau in its publications (U.S. Census Bureau 2017b, page 2) and on its website (U.S. Census Bureau 2018a, page 22) is 0.10, which means if something is statistically significant the results would occur by chance alone less than one time out of ten.[5] Another way of saying this is that with a 0.10 level of significance we can be ninety percent confident the results reflect a real or true relationship between two measures. If the observed results are statistically significant, they are unlikely to be due to chance, and it is highly likely that a correlation coefficient that is statistically significant at the 0.10 level reflects a real relationship, and these are not random results. Most of the correlations in this report are statistically significant at a much higher level than 0.10

27. Since the key element of information needed for my analysis is to determine if a correlation coefficient is negative and statistically significant, a one-tailed test of significance is used. A one-tailed test implies we are only interested in seeing if the correlation is negative and statistically different from zero. This contrasts to a two-tailed test which would tell us if the correlation was statistically different from zero in either direction, that is positive or negative.

28. The statistical significance is largely determined by the size of the correlation and the number of observations upon which the correlation is based. Higher magnitude and more observations lead to a higher-level statistical significance.

1.2. Self-Response and Census Accuracy

29. In this section, I examine the relationship between self-response rates and Census accuracy, as measured by net undercount and omissions rates. The 1990, 2000, and 2010 Census

[5] ACS "uses the Census Bureau's standard 90% confidence level." *See* American Community Survey Statistical Testing Tool, *available at* https://www.census.gov/programs-surveys/acs/guidance/statistical-testing-tool.html. "The Census Bureau uses 90 percent confidence intervals and 0.10 levels of significance to determine statistical validity." Sources and Accuracy Estimates for Income and Poverty in the United States: 2016 and Health Insurance Coverage in the United States: 2016, *available at* https://www2.census.gov/library/publications/2017/demo/p60-259sa.pdf.

provide statistical data that can be used to examine this relationship from an empirical perspective. Relationships are shown graphically as well as statistically, as it may be easier to grasp a relationship from a visual presentation.

1.2.1 Examination of Data from the 2010 Census

30. Table 1.1 shows the self-response rates and net undercount rates for eight demographic groups defined by race, Hispanic origin, and tenure (i.e., owner or renter). These are the only demographic groups for which I could find all three measures (self-response, net undercount, and omissions rates) in consistently classified groups.

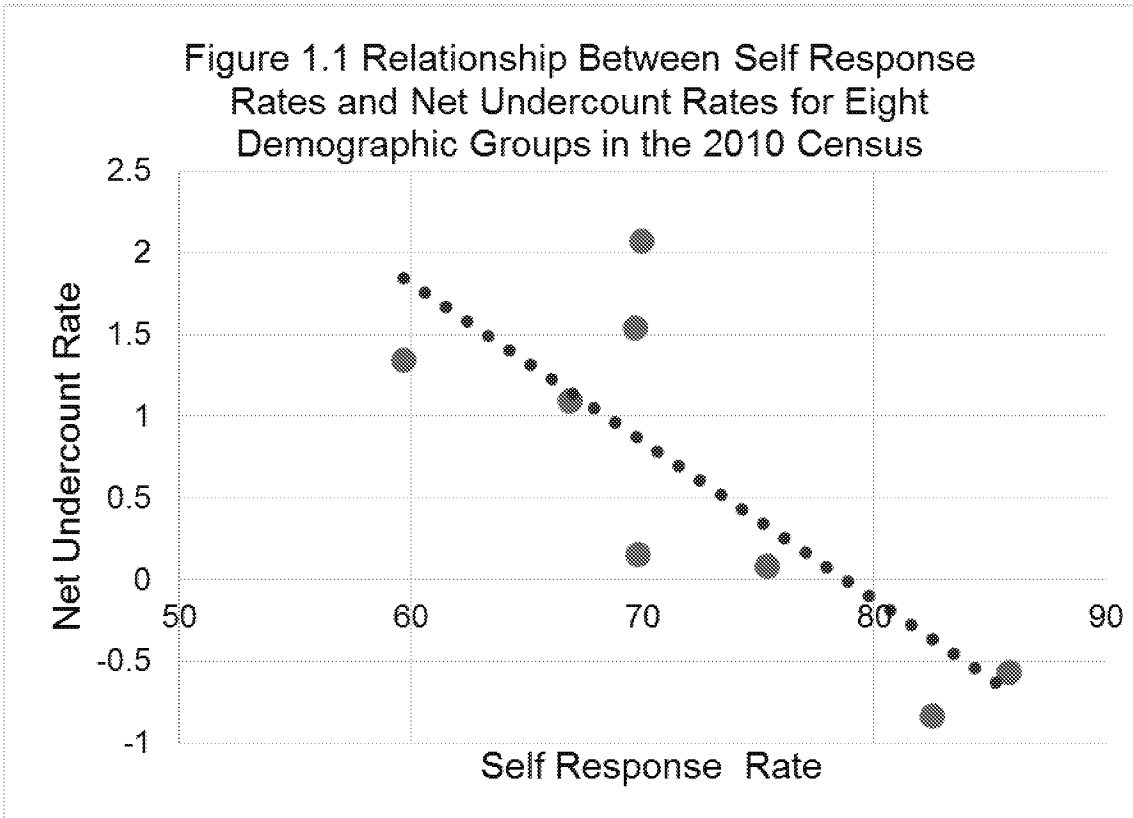
31. The correlation coefficient between the self-response rate and the net undercount rate for the eight groups shown in Table 1.1 is -0.78. This correlation is statistically significantly different than zero at a 90 percent confidence level. This correlation means groups with lower self-response rates have higher net undercount rates.

32. The data in Table 1.1 are very consistent. All the demographic groups that have higher than average self-response rates have net overcounts and all groups with lower than average self-response rates have net undercounts.[6]

[6] Asians essentially have self-response rates the same as the total population and essentially have a net undercount rate of zero.

Table 1.1 Self-Reponses Rates and Net Undercount Rates for Eight Demographic Groups in the 2010 Census		
	Self-Response Rates (Mail Return Rates*)	Net Undercount Rates**
Total	79.3	-0.01
White Alone***	82.5	-0.84
Black Alone	70.0	2.07
American Indian and Alaskan Native Alone	69.8	0.15
Asian Alone	75.4	-0.08
Native Hawaiian or Pacific Islander Alone	59.7	1.34
Hispanic	69.7	1.54
Population in Owner-Occupied Housing Units	85.8	-0.57
Population in Renter- Occupied Housing Units	66.9	1.09
* Source; U.S. Census Bureau (2012) 2010 Census Mail Response/Return Rates Assessment Report. 2010 Census Planning Memorandum Series, No. 198, Tables 10 and 12 (Race groups are Non-Hispanic)		
** This is the net undercount as a percent of the population. Source: U.S. Census Bureau (2012) 2010 Census Coverage Measurement Estimation Report: Summary of Estimates of Coverage for Persons in the United States. , DSSD 2010 CENSUS COVERAGE MEASUREMENT MEMORANDUM SERIES #2010-G-01 Tables 7 and 10 (Net Undercounts shown as a positive number)		
*** for the Net Undercount Rates, this is Non-Hispanic White Alone		

33. The relationship is shown graphically in Figure 1.1. Figure 1.1 shows that groups with lower self-response rates have higher net undercount rates.



34. The red dotted line shown in Figure 1.1 (and all other figures) is the trend line that reflects the statistical relationship between the two measures shown in the Figure. The closer the points are to the line, the higher the correlation.

35. Table 1.2 shows 2010 Census self-response rates and omissions rates for the same eight demographic groups shown in Table 1.1. The correlation coefficient between the self-response rates and the omissions rates for the eight groups in Table 1.2 is -0.86 and it is statistically significantly different from zero at a 90 percent confidence level. The correlation means groups with lower self-response rates have higher omissions rates.

Table 1.2 Self-Reponses Rates and Omission Rates for Demographic Groups in the 2010 Census

	Self-Response Rates (Mail Return Rates*)	Omission rates**
Total	75.8	5.3
White Alone***	82.5	3.8
Black Alone	70.0	9.3
American Indian and Alaskan Native Alone	69.8	7.6
Asian Alone	75.4	5.3
Native Hawaiian or Pacific Islander Alone	59.7	7.9
Hispanic	69.7	7.7
Population in Owner-Occupied Housing Units	85.8	3.7
Population in Renter- Occupied Housing Units	66.9	8.5

* Source; U.S. Census Bureau (2012) 2010 Census Mail Response/Return Rates Assessment Report. 2010 Census Planning Memorandum Series, No. 198, Tables 10 and 12

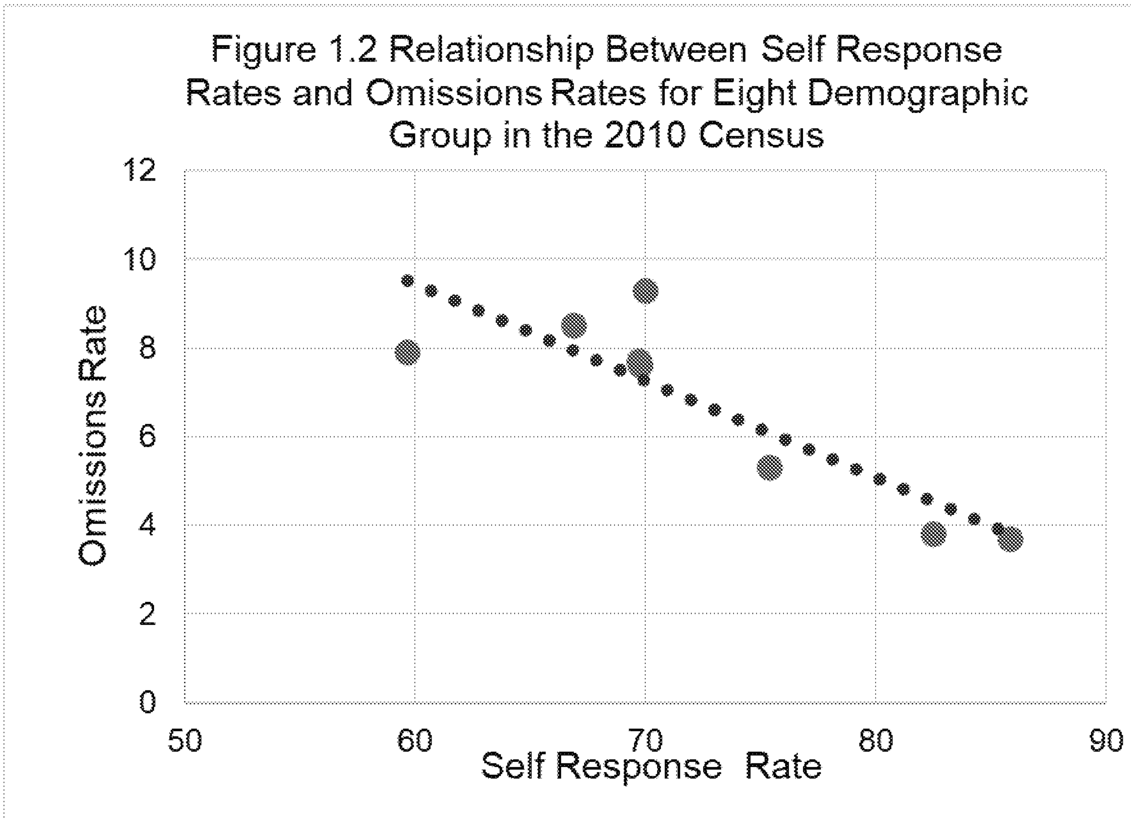
** This is the number of people missed as a percent of the total population. Source: U.S. Census Bureau (2012) 2010 Components of Census Coverage for Race Groups and Hispanic Origin by Age, Sex and Tenure in the United States, DSSD 2010 CENSUS COVERAGE MEASUREMENT MEMORANDUM SERIES #2010-E-51, Tables A and B

*** for the Omissions Rates, this is Non-Hispanic White Alone

36. All the groups that have a higher than average self-response rates have below average omissions rates and all the groups with lower than average self-response rates have higher than average omissions rates as shown in Table 1.2.[7]

37. The correlation can be seen graphically in Figure 1.2. This figure shows that groups with lower self-response rates have higher omissions rates.

[7] Asians essentially have self-response rates that are the same as that total population and have an omissions rate exactly equal to the total population.



38. Table 1.3 shows the self-response rates and net undercount rates for states along with the District of Columbia. Note that none of the net undercount rates in Table 1.3 are statistically significantly different from zero (U.S. Census Bureau 2012c, Table 5). This indicates that the net undercount from state to state was roughly equal in 2010.

39. Given the lack of measurable variation in the state-level net undercount rates in the 2010 Census, correlation with self-response rates is expected to be low. Indeed, the correlation between self-response rates and net undercount rates across the states is 0.06, which is not statistically significantly different from zero. Given the low correlation between self-response rates and net undercount rates for states, the data are not shown graphically so there is no Figure 1.3.

Table 1.3. 2010 Census Self-response Rates and Net Undercount Rates by State

State	Self Response Rates (Mail Return Rate*)	Net Undercount Rate**		State	Self Response Rates (Mail Return Rate*)	Net Undercount Rate**
Alabama	78.4	0.13		Montana	80.4	-0.65
Alaska	74.8	-0.85		Nebraska	82.5	-0.54
Arizona	77.6	-0.42		Nevada	76.3	-0.04
Arkansas	77.0	-0.41		New Hampshire	79.4	0.6
California	76.9	0.26		New Jersey	78.1	-0.36
Colorado	79.1	-0.29		New Mexico	73.8	-0.16
Connecticut	79.1	-0.45		New York	75.8	-0.79
Delaware	80.0	0.55		North Carolina	80.7	0.52
District of Columbia	78.3	2.23		North Dakota	83.1	0.09
Florida	80.2	0.45		Ohio	80.8	-0.83
Georgia	77.2	0.91		Oklahoma	75.5	-1.08
Hawaii	76.8	-0.44		Oregon	79.8	0.02
Idaho	82.6	-0.03		Pennsylvania	82.3	0.14
Illinois	80.7	-0.48		Rhode Island	77.7	-0.81
Indiana	82.2	-0.67		South Carolina	81.4	0.41
Iowa	83.3	-0.28		South Dakota	82.7	0.1
Kansas	81.2	-0.67		Tennessee	80.3	0.12
Kentucky	81.0	-0.13		Texas	76.5	0.97
Louisiana	74.5	-0.38		Utah	80.4	-0.48
Maine	81.1	0.65		Vermont	79.7	1.29
Maryland	80.3	0.94		Virginia	80.8	0.57
Massachusetts	78.9	-0.52		Washington	79.9	-0.1
Michigan	83.7	-0.66		West Virginia	75.6	-1.43
Minnesota	85.6	-0.56		Wisconsin	85.1	-0.17
Mississippi	76.4	0.24		Wyoming	79.9	-0.51
Missouri	81.1	-0.66		**Total**	**79.3**	**-0.01**

* Source: U.S. Census Bureau, State Mail Return Rates 2010 Census downloaded on August 21 at https://www2.census.gov/dssd/2010_census_public_rates/excel/

** Net undercount as a percent of the total population. Source: U.S. Census Bureau (2012)." 2010 Census Coverage Measurement Estimation Report: Summary of Estimates of Coverage for Persons in the United States," DSSD 2010 Census Coverage Measurement Memorandum Series #2010-G-01. U.S. Census Bureau, Washington, DC. G-01 Table 14 (Net undercounts are shown as a positive number)

40. Table 1.4 shows self-response rates and omissions rates for states and the District of Columbia in the 2010 Census. The correlation between self-response rates and omissions rates is -0.63, and it is statistically significantly different from zero at a 90 percent confidence level. States that have lower self-response rates have higher omissions rates.

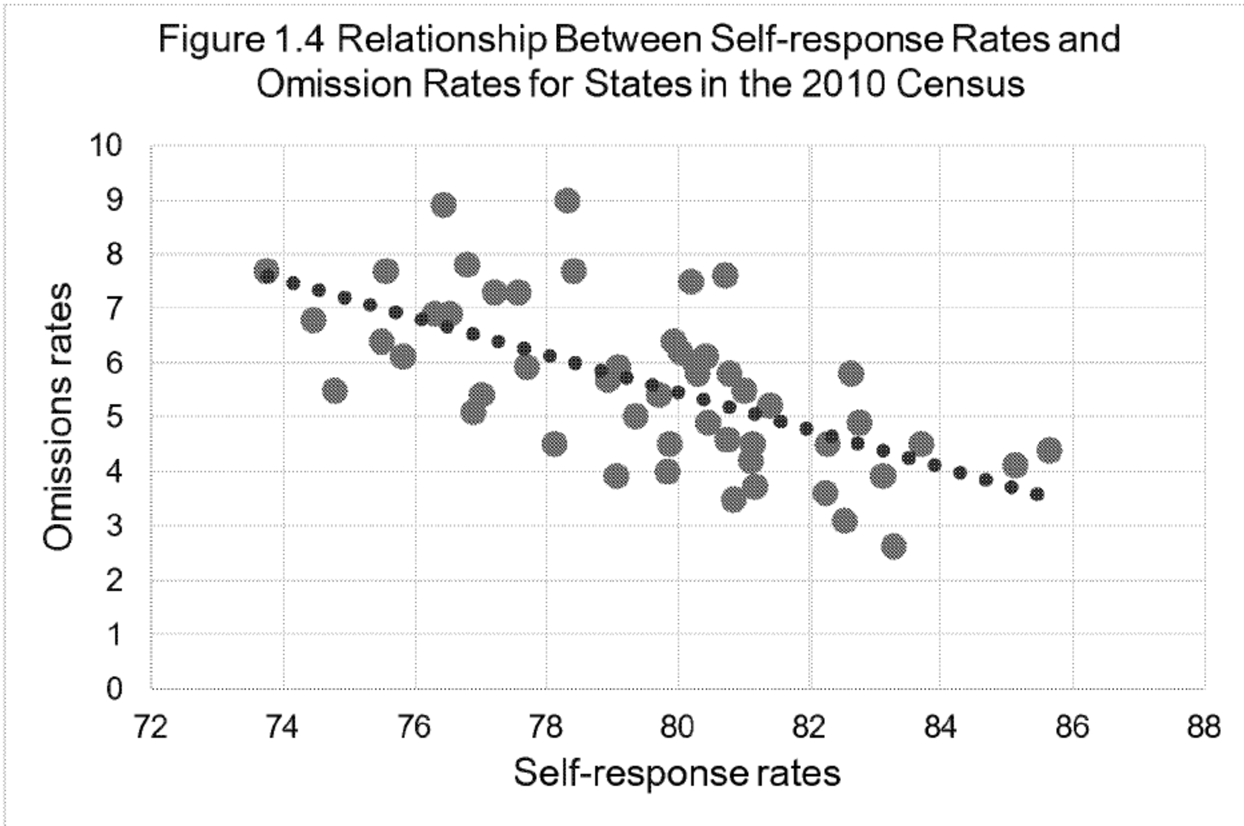
Table 1.4. 2010 Census Self-response Rates and Omissions Rates by State

State	Self Response Rates (Mail Return Rate*)	Omissions Rate**		State	Self Response Rates (Mail Return Rate*)	Omissions Rate**
Alabama	78.4	7.7		Montana	80.4	6.1
Alaska	74.8	5.5		Nebraska	82.5	3.1
Arizona	77.6	7.3		Nevada	76.3	6.9
Arkansas	77.0	5.4		New Hampshire	79.4	5.0
California	76.9	5.1		New Jersey	78.1	4.5
Colorado	79.1	5.9		New Mexico	73.8	7.7
Connecticut	79.1	3.9		New York	75.8	6.1
Delaware	80.0	6.2		North Carolina	80.7	7.6
District of Columbia	78.3	9.0		North Dakota	83.1	3.9
Florida	80.2	7.5		Ohio	80.8	3.5
Georgia	77.2	7.3		Oklahoma	75.5	6.4
Hawaii	76.8	7.8		Oregon	79.8	4.0
Idaho	82.6	5.8		Pennsylvania	82.3	4.5
Illinois	80.7	4.6		Rhode Island	77.7	5.9
Indiana	82.2	3.6		South Carolina	81.4	5.2
Iowa	83.3	2.6		South Dakota	82.7	4.9
Kansas	81.2	3.7		Tennessee	80.3	5.8
Kentucky	81.0	5.5		Texas	76.5	6.9
Louisiana	74.5	6.8		Utah	80.4	4.9
Maine	81.1	4.2		Vermont	79.7	5.4
Maryland	80.3	6.0		Virginia	80.8	5.8
Massachusetts	78.9	5.7		Washington	79.9	4.5
Michigan	83.7	4.5		West Virginia	75.6	7.7
Minnesota	85.6	4.4		Wisconsin	85.1	4.1
Mississippi	76.4	8.9		Wyoming	79.9	6.4
Missouri	81.1	4.5		**Total**	**79.3**	**5.3**

* Source: U.S. Census Bureau, State Mail Return Rates 2010 Census downloaded on August 21 at https://www2.census.gov/dssd/2010_census_public_rates/excel/

** Number of people missed as a percent of total population. Source: U.S. Census Bureau (2012)." 2010 Census Coverage Measurement Estimation Report: Summary of Estimates of Coverage for Persons in the United States," DSSD 2010 Census Coverage Measurement Memorandum Series #2010-G-01. U.S. Census Bureau, Washington, DC. G-01 Table 14 Net undercounts are shown as a positive number)

41. Figure 1.4 shows the relationship between self-response rates and omissions rates for states in the 2010 Census graphically. Figure 1.4 shows that states with lower self-response rates have higher omissions rates.



1.2.2 Examination of Data from the 2000 Census

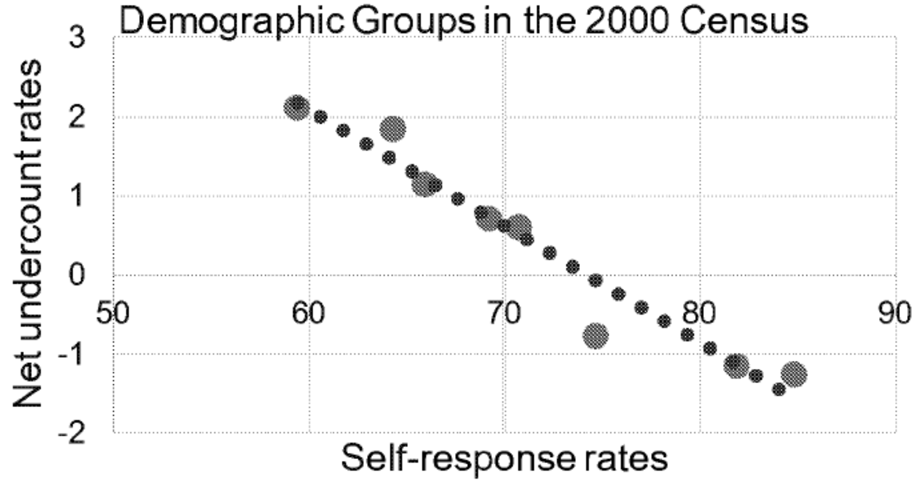
42. Table 1.5 shows self-response rates and net undercount rates from the 2000 Census for eight demographic groups. Note that the racial groups are not defined exactly the same in the two Census Bureau reports from which the data were taken but they are very similar. This is a minor point and unlikely to impact the correlation.

43. The correlation coefficient between self-response rates and net undercount rates in Table 1.5 is -0.97, which is extremely high and statistically significantly different from zero at a 90 percent confidence level. This means that demographic groups that have low self-response rates have high net undercount rates.

Table 1.5 Self-Response Rates and Net Undercount Rates in the 2000 Census for Eight Demographic Groups				
Groups	Self Response Rates (Mail Return Rate)*		Groups	Net Undercount Rates (A.C.E. Revision II)**
White Alone	81.8		Non-Hispanic White	-1.13
Black Alone	64.3		Non-Hispanic Black	1.84
Asian Alone	74.6		non-Hispanic Asian	-0.75
Pacific Islander Alone	59.4		Hawaiian or Pacific Islander	2.12
Hispanic	69.2		Hispanic	0.71
American Indian Alone	70.7		AIAN Off Reservations	0.62
Owner-Occupied	84.8		Homeowner	-1.25
Renter-Occupied	65.9		Renter	1.14
* Source: U.S. Census Bureau (2003) Census 2000 Mail Return Rates, Census 2000 Evaluation A.7.b, Herbert Stackhouse and Sarah Brady, January 30, Tables 10 , 12 and 16				
**Source: Net undercount as a percent of the total population.U.S. Census Bureau : DSSD A.C.E. REVISION II MEMORANDUM SERIES #PP-54, Table 1. (Net undercounts are shown as positive numbers)				

44. The relationship between self-response rates and net undercount rates is shown graphically in Figure 1.5. This figure shows that groups that have lower self-response rates have higher net undercount rates.

Figure 1.5 Relationship Between Self-response Rates and Net Undercount Rates for Eight Demographic Groups in the 2000 Census



45. Table 1.6 shows the self-response rates and net undercount rates for states and the District of Columbia in the 2000 Census. State omissions rates were not available in 2000. The correlation between self-response rates and net undercount rates across the states is -0.66, which is statistically significantly different from zero at a 90 percent confidence level. States with low self-response rates have high net undercount rates.

Table 1.6 Census 2000 Self-Response Rates and Undercount Rates for States

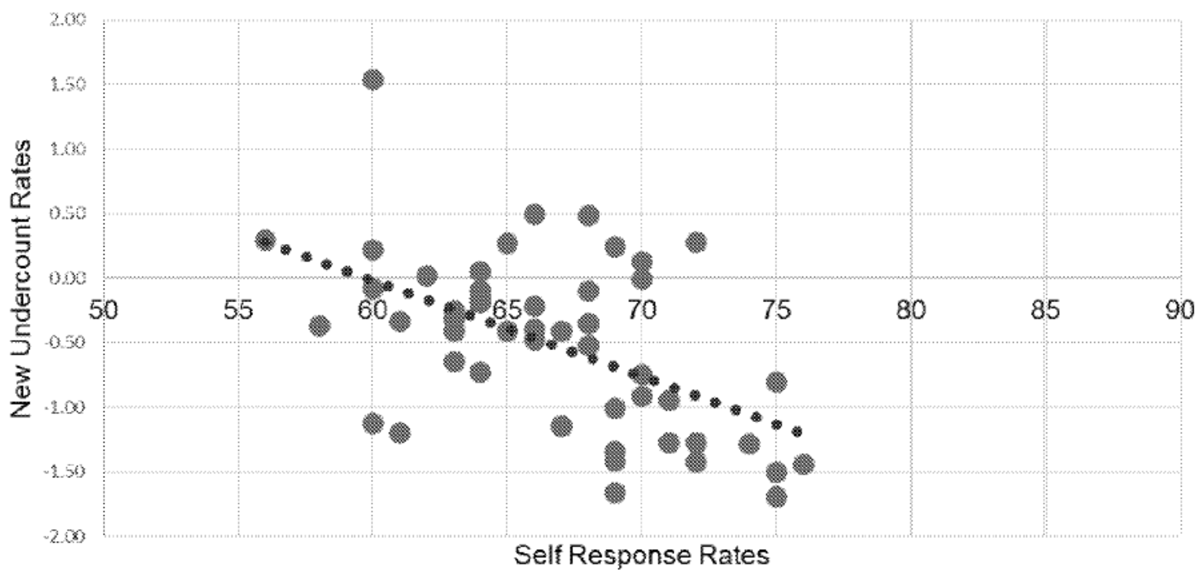
State	Self-Response Rates (Mail Return Rates)*	Net Undercount Rates**		State	Response Rates (Mail Return)	Net Undercount Rates
Alabama	76.9	-0.34		Montana	83.2	0.49
Alaska	76.1	0.29		Nebraska	84.6	-0.81
Arizona	76.9	-0.32		Nevada	75.0	0.50
Arkansas	79.0	-0.09		New Hampshire	80.5	-1.15
California	78.6	0.13		New Jersey	78.7	-0.52
Colorado	80.8	-0.01		New Mexico	78.1	0.02
Connecticut	80.2	-0.75		New York	75.2	-0.25
Delaware	78.0	-0.32		North Carolina	78.3	-0.15
District of Columbia	72.1	1.54		North Dakota	85.4	-1.43
Florida	77.8	-0.64		Ohio	82.1	-1.27
Georgia	79.1	0.27		Oklahoma	77.9	-0.20
Hawaii	75.7	0.22		Oregon	81.1	-0.35
Idaho	83.5	-0.41		Pennsylvania	82.4	-0.91
Illinois	80.2	-1.42		Rhode Island	76.9	-1.14
Indiana	81.6	-1.66		South Carolina	76.5	-0.36
Iowa	85.6	-1.44		South Dakota	86.8	-1.28
Kansas	81.8	-1.28		Tennessee	77.1	-0.41
Kentucky	79.9	-0.48		Texas	75.3	0.05
Louisiana	75.2	-0.09		Utah	79.6	-0.10
Maine	80.1	-1.20		Vermont	81.1	-1.12
Maryland	79.3	0.25		Virginia	81.3	0.27
Massachusetts	79.0	-1.00		Washington	78.6	-0.21
Michigan	83.7	-0.95		West Virginia	80.7	-0.73
Minnesota	86.1	-1.70		Wisconsin	87.3	-1.50
Mississippi	78.3	-0.41		Wyoming	83.6	-0.39
Missouri	82.2	-1.35		United States	78.4	0.48

*Source: U.S. Census Bureau, State Mail Return Rates 2010 Census downloaded on August 21 at https://www.2.census.gov/dssd/2010_census_public_rates/excel/

**Net undercount as a percent of the total population. Source: U.S. Census Bureau (2003) A.C.E. Revision II- Adjusted Data for States, Counties, and Places, DSSD A.C.E. REVISION II MEMORANDUM SERIES #PP 60, Table 1 (Net Undercounts Shown as a positive number)

46. This relationship is shown graphically in Figure 1.6. This figure shows that states that have lower self-response rates have higher net undercount rates.

Figure 1.6 Relationship Between Self Response Rates and Net Undercount Rates for States in the 2000 Census



1.2.3. Examination of Data from the 1990 Census

47. The only self-response rates available for states in the 1990 Census were mail response rates. Mail response rates are slightly different than the mail return rates (as explained in Section 1.1), but both are measures of self-response used by the Census Bureau.

48. Table 1.7 shows self-response rates and net undercount rates in the 1990 Census for seven demographic groups. The correlation between the self-response rates and the net undercount rates is -0.60, which is statistically significantly different from zero at a 90 percent confidence level. The direction of the correlation indicates that groups with lower self-response rates have higher net undercount rates.

Table 1.7 1990 Census Self Response Rates and Net Undercount Rates for Seven Demographic Groups

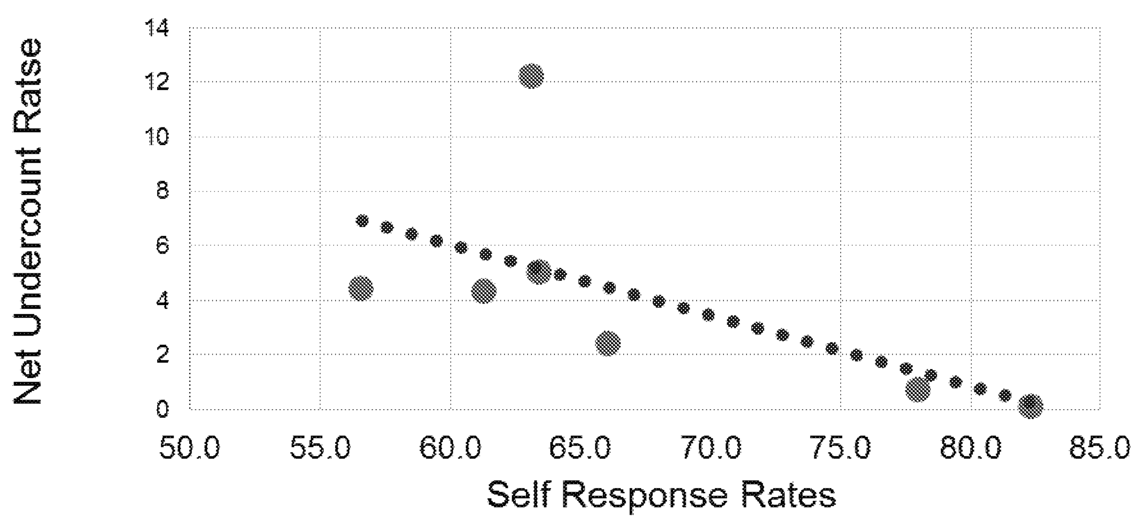
	Self Response Rates (Mail Reponses Rates)*			Net Undercount Rate **
Non-Hispanic White	78.0		Non-Hispanic White	0.7
Black	56.6		Black	4.4
American Indians, Eskimo and Aleut	63.1		American Indian, Eskimo and Aleut	12.2
Asian and Pacific Islanders	66.1		Asians and Pacific Islander	2.4
Hispanic Origin	63.4		Hispanic Origin	5.0
Owners	82.3		Owners	0.1
Renters	61.3		Renters	4.3

*Source: Derived from Word, D.L., (1997) "Who Responds ? Who Doesn't?: Analyzing Variation in Mail Response Rates During the 1990 Census, Population Division Working Paper No . 19, Table 2.0

**Net undercount as a percent of the total population. Source: Hogan, H. and Robinson G., (1993) What the Census Bureau's Coverage Evaluation Programs tell Us About Differential Undercounts ; Paper Delivered at the 1993 Research Conference on Undercounted Ethnic Populations, May 5-7, Richmond VA. , Table 3 (net undercounts shown as a positive number)

49. This relationship is shown graphically in Figure 1.7. This figure shows that groups that have low self-response rates have higher net undercount rates.

Figure 1.7 Relationship Between Self Rsponse Rates and Net Undercount Rates for Seven Demographic Groups in the 1990 Census



50. Table 1.8 shows 1990 Census self-response rates and net undercount rates for states and the District of Columbia. Omissions rates were not available in 1990. The correlation coefficient between self-response rates and net undercount rates, shown in Table 1.8, is -0.56, which is statistically significantly different from zero at a 90 percent confidence level. This means that states with lower self-response rates have higher net undercount rates.

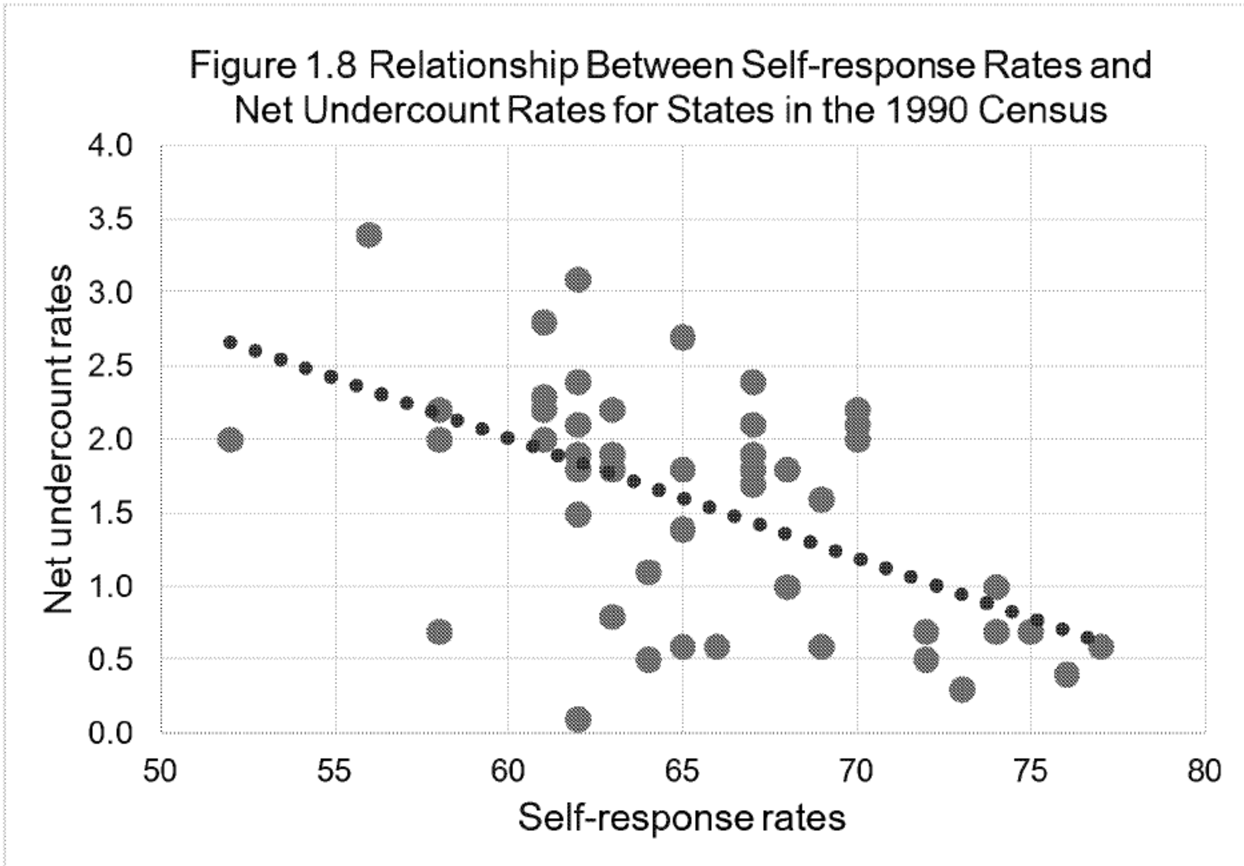
Table 1.8 1990 Census Self-response Rates and Net Undercount Rates for States

state	Self Response Rates (Mail Response Rates)*	1990 Net Undercount of Persons**		state	Self Response Rates (Mail Response Rates)*	1990 Net Undercount of Persons**
Alabama	62.0	1.8		Montana	67.0	2.4
Alaska	52.0	2.0		Nebraska	74.0	0.7
Arizona	62.0	2.4		Nevada	61.0	2.3
Arkansas	65.0	1.8		New Hampshire	63.0	0.8
California	65.0	2.7		New Jersey	65.0	0.6
Colorado	67.0	2.1		New Mexico	62.0	3.1
Connecticut	66.0	0.6		New York	62.0	1.5
Delaware	68.0	1.8		North Carolina	63.0	1.9
District of Columbia	56.0	3.4		North Dakota	72.0	0.7
Florida	61.0	2.0		Ohio	75.0	0.7
Georgia	63.0	2.2		Oklahoma	63.0	1.8
Hawaii	62.0	1.9		Oregon	67.0	1.9
Idaho	70.0	2.2		Pennsylvania	73.0	0.3
Illinois	68.0	1.0		Rhode Island	62.0	0.1
Indiana	72.0	0.5		South Carolina	58.0	2.0
Iowa	76.0	0.4		South Dakota	74.0	1.0
Kansas	72.0	0.7		Tennessee	65.0	1.8
Kentucky	69.0	1.6		Texas	61.0	2.8
Louisiana	58.0	2.2		Utah	67.0	1.7
Maine	58.0	0.7		Vermont	64.0	1.1
Maryland	70.0	2.1		Virginia	70.0	2.0
Massachusetts	64.0	0.5		Washington	67.0	1.8
Michigan	72.0	0.7		West Virginia	65.0	1.4
Minnesota	76.0	0.4		Wisconsin	77.0	0.6
Mississippi	62.0	2.1		Wyoming	61.0	2.2
Missouri	69.0	0.6		U.S. Total		1.6

* Source: U.S. Census Bureau 1990 Census Page (/main/www.cen1990.html) 1990 Mail Response rates by 1990 Geography Boundaries.

**Net undercount as a percent of the total population. Source: U.S. Census Bureau https://www.census.gov/dmd/www/pdf/understate.pdf (Net undercount shown as a positive number)

51. Figure 1.8 shows the relationship between state 1990 mail response rates and net undercount rates graphically. This figure shows that states that have lower self-response rates have higher net undercount rates.



1.2.4 Summary of Relationship between Self-response Rates and Census Accuracy.

52. Table 1.9 summarizes the correlations between self-response rates and census accuracy for the 1990, 2000 and 2010 Decennial Censuses. Of the eight correlations shown in Table 1.9, all but one of the correlations were in the predicted direction and statistically significant. Based on my 40 plus years of experience as a professional data analyst I would call the correlations coefficients in Table 1.9 (except for 0.06) moderate to high by social science standards.

Table 1.9 Summary of Statistical Relationships between Census Self-Response Rates and Census Accuracy (Net Undercount Rates and Omissions Rates)	
Correlation between Self-Response Rates and:	Correlation Coefficient
2010 Eight Demographic Groups Net Undercount	**-0.78**
2010 Eight Demographic Groups Omissions	**-0.86**
2010 States Net Undercount Rates	0.06
2010 States Omissions Rates	**-0.63**
2000 Eight Demographic Groups	**-0.97**
2000 States Net Undercount Rates	**-0.66**
1990 Seven Demographic Groups	**-0.61**
1990 States Net Undercount Rates	**-0.56**
Note correlations in **BOLD** are statistically significant at the .10 level or higher.	

53. Using this analysis to predict the exact increase in net undercounts and omissions based on self-response rates would depend on which correlation in Table 1.9 one relies on. But exact predictions are unnecessary. The preponderance of evidence clearly shows there will be an increase in net undercounts and omissions if there are lower self-response rates in the 2020 Census. The magnitude of the correlations varies from one Census to the next, but they are consistent in showing a negative correlation between self-response rates and census accuracy, which means states and groups with lower self-response rates have higher net undercounts and omission rates.

54. The empirical relationship between self-response rates and census accuracy (net undercounts and omissions) has been recognized by the Census Bureau. The Census Bureau Task Force on the Undercount of Young Children (U.S. Census Bureau 2014a, page ii) concluded, "Research suggests that areas with lowest levels of cooperation have higher levels of coverage and nonresponse error." A Census Bureau Working Paper (Word 1997, page 1) notes that "response rates and net undercount rates may be causally linked . . .."

55. The connection between self-response rates and census accuracy is underscored by the Census Bureau's decision to use a self-response related measure to identify Hard-to-Count areas in the 2020 Census. The Low-Response Score developed by Erdman and Bates (2017) is based on the mail return rates in the 2010 Census. In describing the Low-Response Score the Census Bureau (2014b, page 4) states, "This score identifies Block Groups and Tracts whose characteristics predict low Census Mail Return Rate and are highly correlated (negatively) with Census and survey participation." The implicit association here is that areas where self-response rates are low are more difficult to enumerate. Several characteristics of the kinds of populations and places where it is difficult to get an accurate enumeration are provided by O'Hare (2019a, page 46). This is not a complete list, but some of the characteristics include racial and ethnic minority populations, communities where there are high levels of poverty and unemployment, high levels of renter households and multi-unit structures, and large numbers of undocumented or recent immigrants.

56. It is easy to understand why the relationship between low self-response rates and lower census accuracy exists. Households that do not self-respond end up in the non-response followup (NFRU) universe where the Census Bureau must send out an enumerator to get information from a nonresponding household. Data collected in the NRFU phase of the Census

is more likely to omit a person than data gathered in the self-response phase. In the 2010 Census, 88 percent of the NRFU responses were correct, compared to 97 percent of self-responses (author's calculation from U.S. Census Bureau 2012b, Table 14).

57. In addition, NRFU responses may have to rely on a proxy response. A proxy response is when the information for a housing unit is provided by someone not living in that housing unit, such as a neighbor or landlord. A U.S. Census Bureau paper (2018d, page 42) shows that the responses from the self-response portion of the Census are much more accurate than responses from the NRFU proxy response portion (U.S. Census Bureau 2018d, Table 12). This data showed that 97.3 percent of the responses from the Mailout/Mail back portion of the Census were correct, as compared to just 70.2 percent of those from the NRFU proxy responses. Some of the NRFU proxy response errors are people who are not counted in the Census when they should have been counted.

58. Social scientists typically look for four elements to show causation. First, that the causal agent (referred to as the independent variable by scientists) occurs prior in time to the thing that it is causing (referred to as the dependent variable by scientists); second, that there is an association or correlation between the causal agent and the thing being caused; third, that intervening mechanisms linking the independent variable and the dependent variable can be clearly specified; and finally that other potential explanations have been controlled.

59. My analysis satisfies three out of four of these elements. Self-response occurs prior in time to net undercounting, the self-response rate is moderately to highly correlated with net undercounting, and the intervening mechanism is the fact that groups with lower self-response rates have a higher share of their population counted in the NRFU operation which generates less accurate data, including higher rates of net undercounts and omissions. The only

element my analysis does not address is the need to control for all other potential explanations. The inability to control for all other potential explanations is common in social science research because there are legal and ethical restrictions on how much people can be manipulated for research purposes. The way to control for all other possible explanations is through a randomized control trial ("RCT"). However, the Census Bureau, which is best positioned to conduct an RCT, has not conducted any such RCT measuring the relationship between self-response and undercounting. My analysis evaluates the relationship between self-response rates and census accuracy with best available data, and shows there is a strong robust relationship between self-response and Census accuracy; namely groups that have lower self-response rates have higher net undercount and omissions rates.

60. The magnitude of the correlations varies from one Census to the next, but they are consistent in showing a negative correlation between self-response rates and census accuracy, which means states and groups with lower self-response rates have higher net undercounts and omission rates.

61. The consistency of the correlation (7 out of 8 observations) across multiple Censuses, demographic groups, and states is illustrative of a consistent relationship over time. The analysis demonstrates a clear pattern in the relationship between self-response and undercount rates. While there is some uncertainty in these data (as with all data), uncertainty typically reduces the likelihood of finding a correlation. But here, my analysis demonstrates a correlation despite measurement uncertainty, providing further proof that the relationship is real.

62. The empirical relationship between self-participation rates and census accuracy has been recognized by the Courts. *See New York v. Dep't of Commerce*, 351 F.Supp.3d 502, 591 (S.D.N.Y. 2019) ("The Court concludes just that: Dr. O'Hare's testimony provides

affirmative evidence that self-response declines among specific subpopulations directly cause net undercounts of those subpopulations. For the purposes of this litigation, a preponderance of the evidence supports that conclusion."); *see also Kravitz v. Dep't of Commerce*, 366 F.Supp.3d 681, 717 (D.Md. 2019) ("Thus, the Court is comfortable finding that Plaintiffs have demonstrated a causal relationship between decreased Census participation and an increased likelihood of net undercounting by a preponderance of the evidence.").

63. It is my conclusion, that over the past several U.S. Censuses the empirical evidence shows groups with lower self-response rates have higher net undercounts and omission rates. This relationship is important in understanding the significance of self-response rates in the 2020 Census. Furthermore, groups with lower self-response rates in the 2020 Census would benefit disproportionately if the end of the data collection period was October 31, 2020 instead of September 30, 2020, as the Census Bureau had planned a couple of months ago. Conversely, truncation of the data collection period in the 2020 Census will result in greater omissions and net undercounts in groups with lower self-response rates.

2) Self-Reporting Rates in the 2020 Census Indicate Same Patterns as the Past

64. In the following sections, I focus on differences between the largest racial and ethnic minority groups (Hispanics, Blacks, and Asians) in comparison to Whites and Non-Hispanic Whites. These are the groups for which the data are most reliable. States also show wide variations in self-response rates based on currently available data, explained below.

65. The primary measures of 2020 census accuracy (net undercounts and omissions) will not be available until 2021. One metric of census quality that is available now is self-response rates (O'Hare et al. 2020). Self-response rates reflect the extent to which households complete and return the Census questionnaires before they are visited by a census enumerator in

the NRFU operation. In the 2010 Census, when mailing back a completed census questionnaire was the only option for self-response, these were called mail return rates. In the 2020 Census, the self-response could be online, by phone, or by mail.

66. The predictive value of self-response rates was shown in the previous section where empirical evidence linked variations in self-response rates for groups with variations in census accuracy for those groups; namely groups with low self-response rates have higher net undercount and omissions rates.

67. Other demographers have also noted the importance of self-response rates. In the context of the U. S. Census, Swanson (2019, page 6) indicates self-response rates are a key indicator of census success. New York City Demographer Joe Salvo (2020, page 1) also links self-response rates to Census accuracy when he states, “If an area has a low self-response rate, it means:

- More census enumerators will need to knock on doors to count residents in persons: and,
- It is more likely people in the area may be missed or counted inaccurately.”

68. In the 2010 Census, the Census Bureau stopped soliciting self-responses when it started the Nonresponse Followup (NRFU) operation in early May. For the 2020 Census, the Census Bureau is continuing to allow people to self-respond during the NRFU period. However, most of the 2020 Census self-response data shown here is from the 2020 Census data collection period prior to the start of the NRFU operation in early August.

69. Since March 20, 2020, the Census Bureau has been producing 2020 Census self-response rates for many geographic areas including census tracts (U.S. Census Bureau 2020a). A census tract is defined by the Census Bureau (2020b) as “small, relatively permanent statistical

subdivisions of a county," each with a unique numeric code, and an average of about 4,000 inhabitants, but between a minimum population of 1,200 and maximum population of 8,000. In the 2020 Census there are about 84,000 census tracts in the country.

70. At this point in the 2020 Census cycle there are no publicly available data on self-response rates by the race or Hispanic Origin of the householder but response rates have been developed related to the race and Hispanic composition of census tracts. The staff at Center for Urban Research at the Graduate Center, City University of New York (CUNY) have downloaded and analyzed response rates provided by the Census Bureau and combined them with other information from the Census Bureau about the racial and Hispanic composition of the census tract. Through regular briefings they have made analysis of that information available to the public (Census Funders Initiative 2020).

71. Staff at the Center for Urban Research at the Graduate Center, City University of New York determined the plurality of the population in each census tract by race and Hispanic Origin.[8] The plurality of the population in a census tract is the largest race or Hispanic Origin population in the census tract. [9]

72. The racial compositions of populations in the tracts are based on the U.S. Census Bureau's 2014-2018 American Community Survey (ACS). Since the ACS data are produced from a sample of the population, they include sampling error. ACS sampling error for individual tracts indicate large potential errors for these estimates, but when tracts are used collectively, like they are here, sample error is minimal. This is the best data we currently have for calculating the racial/Hispanic composition of the Census tracts in the 2020 Census.

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[8] A small number of census tracts, where were less than 100 people, were not included.
[9] If one used only tracts where a single race or Hispanic Origin group were the majority rather than the plurality, it would greatly limit the number of tracts available for analysis. By using the plurality, nearly every census tract in the country is included in the analysis.

73. Race and Hispanic Origin are measured in the U.S. Census as dictated by U.S. Office of Management and Budget (1997). Race and Hispanic Origin are two separate concepts in the definitions used by the federal government. In the Census, respondents are first asked if they are Hispanic or not, then they are asked about what race group(s) they identify with. Starting in 1997, people have been allowed to mark as many race groups as they feel apply. For people who mark only one race, this is referred to as "race alone," for example Black Alone or Asian Alone. For people who mark more than one race they fall into categories labeled "Alone or in Combination" for example, "Black Alone or in Combination." In this construction, people can be in more than one group. Someone who marked both Black and White would be included in both Black alone or in combination and the White alone or in combination. Slightly different racial definitions are used in different tables in this report based on what was made available by the Census Bureau. For example, sometimes the Census Bureau reports data for Non-Hispanic White population and sometimes for the White population.

74. In general, these differences are not particularly important in terms of understanding the results of my analysis, but there are couple of clarifications I want to offer. The way the Census Bureau classifies people by race and Hispanic Origin has two key implications for the data reported in the next three sections. Sometimes data were available for all the people who selected the "White" race and sometimes the data was available for Non-Hispanic Whites. Since some Hispanics select the White race, data for all Whites includes some Hispanics. Using data for Non-Hispanic Whites in comparison to minorities is preferable to using data for Whites, but sometimes that was not possible. The distinction between race alone and race alone or in combination is of little significance for the racial groups analyzed here (White, Asian, and Black).

75. Analysis of 2020 Census self-response rates through August 2020 indicates that many of the self-participation patterns from past Censuses are being seen again in the 2020 Census. This suggests that differential census accuracy in the 2020 Census is likely to follow patterns seen in the past censuses and that groups with low self-response rates are likely to experience greater rates of omissions and undercount.

76. Data shown in Table 2.1 indicate the mean self-response rates for Black and Hispanics plurality census tracts are substantially lower than the mean self-response rate for tracts where Non-Hispanic Whites are the largest population of the tract.[10] The self-response rates for Non-Hispanic White plurality tracts (66.6 percent) is 9.7 percentage points higher than that for Hispanic plurality tracts (56.9 percent), and 13 percentage points higher than Black plurality tracts (53.6 percent). The mean response rate for tracts where Asians are the plurality of the population (67.6 percent) is one percentage point higher than that of tracts where Non-Hispanic Whites are the plurality of the population.

77. Since lower self-response rates are related to higher net undercounts and omissions, as shown in Section 1 of this report, the lower self-response rates in the 2020 Census for Hispanics and Blacks shown in Table 2.1 indicate those groups are on course to have higher net undercount and omissions rates in the 2020 Census. If efforts to improve the accuracy of the 2020 Census are reduced by early termination of the data collection period, it is likely to have a disproportionately negative impact on Hispanics and Blacks who have lower self-participation rates.

[10] Table 2.1 shows data released by the Center for Urban Research at the Graduate Center, City University of New York based on self-response rates through August 20, 2020.

Table 2.1. Mean 2020 Census Tract-Level Self-Response Rates by the Plurality of the Population by Race and Hispanic Origin	
Puraility of the Population in the Tract*	Mean Self-Response Rates for Census Tracts by Plurality of Population by Race and Hispanic Origin (through August 20, 2020)
Non-Hispanic White	66.6
Hispanic	56.9
Non-Hispanic Black	53.6
Non-Hispanic Asian	67.6
Source: Obtained from Steve Romalewski, CUNY	
* tract where this population was there largest race or Hispanic Origin group.	

78. Note that the response data shown in Table 2.1 are for census tracts rather than individual households. Nonetheless, it is reasonable to assume an association between the largest population in a census tract and self-response rates in those tracts. In addition, the pattern seen in 2020 is like that seen in previous censuses.

79. While Table 2.1 shows that Asian plurality census tracts have a slightly higher self-response rates than Non-Hispanic White plurality tracts, it is important to recognize that the Asian population is highly diverse and response rates for the overall Asian population are likely to mask big differences among subgroups (U.S. Census Bureau 2012e). One recent report on the Asian population (Lopez, et al. 2017) states, "The U.S. Asian population is diverse. A record 20 million Asian Americans trace their roots to more than 20 countries in East and Southeast Asia and the Indian subcontinent, each with unique histories, cultures, languages and other characteristics." Some of these differences among Asian subgroups have implications for how the groups interact with census-taking operations (O'Hare 2017 & 2020c: Population Bureau References). Data for the overall Asian population masks important differences for subgroups. For example, poverty is one variable associated with census undercounts and O'Hare (2020c)

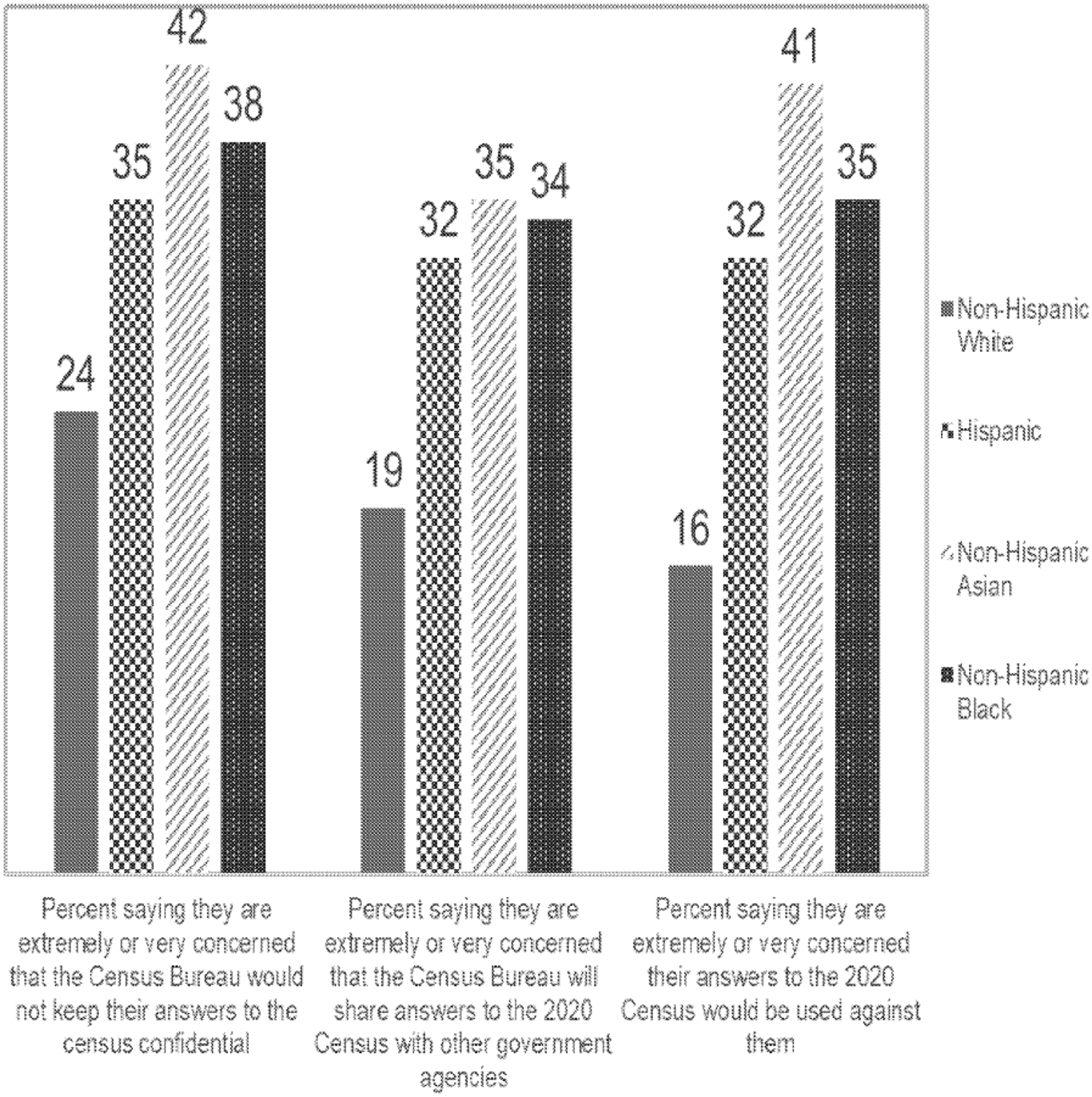
shows the young child (age 0 to 9) poverty rates among Asian subgroups vary from a low of 5 percent for Asian Indians to 30 percent in the Hmong population. Consequently, the data for Asians shown in Table 2.1 may not reflect the experiences of many Asian subgroups.

80. One example of this is revealed by noting that Asian plurality tracts in the largest cities of metropolitan areas (over 1 million) have a mean self-response rate (58.8 percent) well below the national response rate (64 percent) and the mean self-response rates for Asian plurality tracts in rural areas (56.9 percent) is well below the national average. On the other hand, Asian plurality tracts in medium-sized cities in metropolitan areas have a mean response rate (71.1 percent) well above the national average. If efforts to improve the accuracy of the 2020 Census are reduced by early termination of the data collection period, it is likely to have a disproportionately negative impact on Asian Americans in the largest cities of metropolitan areas and in rural areas, who have lower self-participation rates. This data is from Center for Urban Research at the Graduate Center, City University of New York.

81. Figure 2.1 shows data from a Census Bureau report (U.S. Census Bureau 2019) indicating the level of concern about the 2020 Census expressed by race and Hispanic Origin groups. Asians, Hispanics, and Blacks express much more concern about the 2020 Census than do Non-Hispanic Whites. These concerns help explain the relatively low self-response rates for

Hispanic and Blacks seen in Table 2.1.

Figure 2.1. Concerns About the 2020 Census by Race and Hispanic Origin



82. The U.S. Census Bureau (2019) Census Barriers and Motivator Survey (CBAMS) survey found 53 percent of respondents thought census data was used "[t]o locate people living in the country without documentation." And 63 percent thought the Census was used "to help

police and FBI keep track of people who break the law." Moreover, 28 percent of the CBAMS respondents thought the Census Bureau would not keep answers confidential and 24 percent thought the Census Bureau would share answers with other government agencies. People with this level of distrust in the Census were unlikely to self-respond and resist responding to an enumerator in the NRFU process.

83. With respect to the 2020 Census it is important to note that the foreign-born population and people living in households with foreign-born people are particularly vulnerable to being missed. It is also noteworthy that 34 percent of the people born outside the U.S. are extremely or very concerned that the data they provide in the 2020 Census will be used against them compared to 20 percent of people born in the U.S. (U.S. Census Bureau 2019).

84. Census tracts where the foreign-born population are a disproportionately large share of the total population have lower self-response rates. Data from the Center for Urban Research at the Graduate Center, City University of New York (CUNY) indicates that census tracts where the foreign-born population is more than one-third of the total population had a mean response rate of 59.4 percent on August 20, 2020, compared to a national response rates of 64 percent.[11]

85. Table 2.2 shows the distribution of the foreign-born population by race and Hispanic Origin. The data in Table 2.2 show that Asians and Hispanics make up the majority (71.4 percent) of the foreign-born population. So, difficulties in getting a complete and accurate

[11] The one-third cutoff point for tracts in this analysis was used because it was high enough to make sure the foreign-born was a clearly significant portion of the census tract population but low enough to make sure there were enough tracts meeting the criterion to provide a reliable estimate. Tracts where the foreign-born population was 50 percent or more of the population had even lower mean self-response rates

count of the foreign-born population will affect Hispanics and Asians more than others.

Table 2.2. Foreign-Born Population in the U.S. by Race and Hispanic Origin: 2018	
	Percent of the Foreign-Born Population in 2018
Non-Hispanic White*	17.7
Black*	9.5
Asian*	27.1
Hispanic	44.3
Source: U.S. Census Bureau, 2018 American Community Survey Table S0501, retrieved from Data.census.gov on August 4 2020	
* Race Alone, Hispanic may be included in appropriate race categories	
Total number of foreign-born people	44,728,721

86. The difficulties in getting complete and accurate count of people in immigrant communities is partly due to a fear of interacting with the federal government. The climate of fear among immigrants has greatly escalated since 2010. Even before there were discussions about adding a citizenship question to the 2020 Census, Census Bureau researchers (Meyer and Goerman 2018; U.S. Census Bureau 2017c and 2017d) found respondents less willing to cooperate given the growing climate of fear and mistrust. After careful review, Meyers and Goerman (2018 Slide 24) conclude, “During multilingual pretesting studies conducted in 2017 and 2018, respondents expressed concerns about participating in the Census Bureau surveys because of fears about their confidentiality.”

87. Based on a series of interactions with interviewees and reports from Census Bureau field staff, the Census Bureau (2017c, page 7) concluded, “Overall, these findings, in various languages from respondents, Field Representatives, and Field Supervisors across the country who have participated in recent projects are raising concerns with CSM regarding potential barriers to respondents participation in the 2020 Census, as well as other Census Bureau surveys.”

88. In a series of focus groups among Latino adults regarding the 2020 Census conducted by National Association of Latino Elected Officials (2018, slide 4), the study, which included a potential citizenship question, concluded, "Hesitation, fear and cynicism arose among focus group participants when they saw a version of the questionnaire." Data from a recent National Association of Latino Elected Officials survey (2020) indicate nearly half of all Hispanics thought the citizenship question was still on the 2020 Census questionnaire.

89. In addition to low self-response rates, the difficulty in getting a complete and accurate count of Hispanics and Blacks in the 2020 Census is also reflected in the population composition of census tracts with the lowest self-response rates. Table 2.3 shows the composition of the 20 percent of census tracts with the lowest self-response rates as of August 6, 2020. Hispanics and Blacks are over-represented in these hard-to-count tracts meaning it will be a particularly difficult task to get a complete count of these groups compared to Non-Hispanic Whites.

Table 2.3. Racial and Hispanic Origin Composition of the 20 Percent of Census Tracts with the Lowest Response Rates Compared to U.S. Population

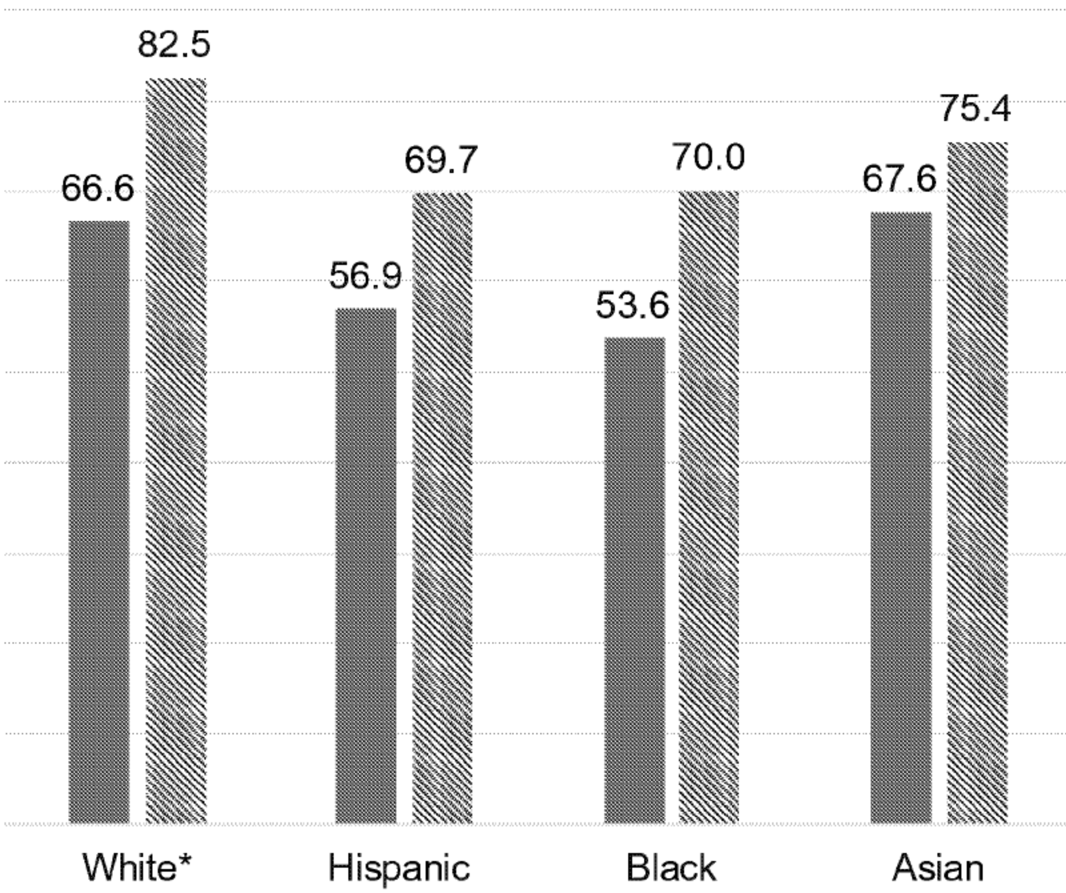
	Race and Hispanic Origin in the 20% of the Tracts with the lowest self-response rates as of August 6	Race and Hispanic Origin in U.S. Population
Non-Hispanic Whites	44.1	60.2
Hispanics	25.8	18.3
Non-Hispanic Asians	3.5	6.0
Non-Hispanic Black	22.2	12.3

Source: Funders Census Initiative 2020, (August 6 presentation)

90. Figure 2.2 shows the 2020 Census tract-level self-response rates and the 2010 mail return rates by race and Hispanic Origin. Self-response rates and mail return rates are both measures of census participation. Data for 2010 reflect the race of the householder while data for 2020 reflect the plurality of the population in a census tract.

91. Data in Figure 2.2 show that the pattern of participation in the 2020 Census is similar to that in the 2010 Census with respect to race and Hispanic Origin status. In both the 2010 and 2020 Census, the participation rate for Whites is the highest while the rates for Hispanics and Blacks are lower in both years. This underscores the extent to which patterns and relationships seen in past censuses are being repeated thus far in the 2020 Census. It is reasonable to believe the differential response rates seen so far in the 2020 Census are likely to lead to higher net undercounts and omissions for groups with low self-response rates like they have in past censuses. Furthermore, it is reasonable to believe that early truncation of census data collection in the 2020 Census means there will be less time to gather more census responses and the households that are missed, are likely to be disproportionately Hispanic and Black.

Figure 2.2. Self-Response Rates in the 2020 Census and the 2010 Census by Race and Hispanic Origin



* All Whites in 2010 and but only Non-Hispanic Whites in 2020

Source: Table 2.1 and U.S. Census Bureau 2012d

92. The data in Tables 2.1, 2.2, and 2.3 focus on demographic groups, but there are also large variations in the self-response rates by geography. Self-response rate variations by state and counties are addressed below.

93. There is a lot of variation in self-response rates across the states. Data released by the Census Bureau (2020e) on August 27, 2020, show 12 states (Alaska, Arkansas, Louisiana, Maine, Mississippi, Montana, New Mexico, Oklahoma, South Carolina, Vermont, West Virginia,

and Wyoming) have self-response rates below 60 percent. On the other hand, there are 4 states (Minnesota, Nebraska, Washington, and Wisconsin) with self-response rates at 70 percent or above. Some of the variation across states is related to the share of their population that is meant to be captured in Update/leave operation rather than the self-response operation. The Update/Leave operation was delayed because of the COVID-19 pandemic.

94. Given the connection between self-response rates and census accuracy based on data from the 1990, 2000 and 2010 Censuses (shown in Section 1) the states with lower self-response rates in 2020 are likely to have higher net undercount and omissions rates. The remaining part of the 2020 Census data collection process is particularly important for states with low self-response rates.

95. For example, Texas is one of the states where self-response rates in the 2020 Census are well below the national average. U.S. Census Bureau (2020e) data from August 27, 2020, shows the self-response rate for Texas is 60 percent compared to 64.6 percent for the nation as a whole. An undercount because of low self-response rates could cost Texas a congressional seat in the re-apportionment process and their fair share of federal funding.

96. New York is another state with below-average self-response rates in the 2020 Census. The 2020 Census self-response rate on August 27, 2020, was 60.7 percent for New York. A high net undercount in the 2020 Census due to low self-response rates in New York could impact the Congressional seats they get in 2020 Census reapportionment, as well as their share of federal funding.

97. It is worth noting that a lower self-response rate and a higher undercount rate in a large state like Texas or New York, will result in a larger number of people missed in the Census

than the same self-response and undercount rates in a small state. In other words, a high net undercount rate in a large state harms more people than the same rate in a small state.

98. In early August, the Census Bureau started the NRFU operation nationwide. But that has not erased differences across the states. Of the fifty states, 12 have enumerated (including self-response and NFRU) less than 75 percent of the population as of August 27, 2020. If the end of the data collection period remains September 30, 2020, this means they must still enumerate more than 25 percent of the households in their state with slightly more than one month remaining. These states captured less than 75 percent of their population in the first 24 weeks of the 2020 Census data collection period but must capture more than 25 percent in about five weeks.

99. It is important to recognize that substate areas vary even more than states in self-response rates. Data retrieved from the Census Bureau (2020e) on August 21, 2020, shows there are 25 counties where the self-response rate is 80 percent or more and 12 counties where the self-response rates is under 20 percent. The connection between self-response rates and census accuracy discussed in Section 1 of this report indicates that variation in self-response rates among geographic areas makes it more likely that some areas will have net undercounts and omissions in the 2020 Census. States rely on census data to draw state legislative districts and census undercounts result in seats shifting away from regions in which people are undercounted. Communities that suffer high net undercounts due to low self-response rates are unlikely to get their fair share of political power in the redistricting process which takes place after every census, and their fair share of federal funding.

100. It is my conclusion that as of August 24, 2020, Census tracts where Hispanics and Blacks are the plurality of the population have lower self-response rates in the 2020 Census than

tracts where Non-Hispanic Whites are the plurality of the population. This indicates Hispanics and Blacks are on a trajectory to have higher net undercounts and omissions rates in the 2020 Census. Ending the 2020 Census data collection period on September 30, 2020, instead of October 31, 2020, means there will be less time available to address data collection improvements for the demographic groups, such as Hispanics and Blacks, with the lowest self-response rates, and will result greater in omissions and undercounts for these demographic groups. If states and groups with low self-response rates had more time for data collection, there would be more time to recover from the racial and Hispanic and state differentials in data collection that we see so far in the data collection process.

<u>3) Reduction in Differentials in 2010 Census and 2020 Census Self-Response Over the Census Data Collection Period</u>

101. Data from the 2010 Census show Hispanic, Asians, and Blacks were a larger share of the population responding later in the data collection period than those responding in the earlier portion of the data collection period. Consequently, changes to the end of the data collection period impact Hispanics, Asians, and Blacks more than Non-Hispanic Whites.

102. A U.S. Census Bureau (2012d) report provides mail return rates for a date around the middle of the 2010 Census self-response period (April 19, 2010) and at the end of the self-response period (September 7, 2010) by race and Hispanic Origin status. The April 19, 2010 date was used by the Census Bureau because that is when the Census Bureau determined which housing units they would follow up with a visit from a census enumerator. They call this the NRFU universe. The September 7, 2010 date reflects all self-responses in the 2010 Census.

103. The indicator of census participation used in Table 3.1 is the mail return rate. According to the Census Bureau (2012d, page vi) "Mail Return Rates reflect the percentage of

occupied housing unit that returned their questionnaire in time to avoid enumeration in Nonresponse Followup."

104. Data in Table 3.1 show that between April 19, 2010 and the end of the data collection on September 7, 2010 the mail return rates for Whites increased by 3.2 percent points compared to 4.6 percent for the Black population, 4.5 percentage points for the Hispanic population, and 4.4 percent for the Asian population. In other words, Blacks, Hispanics, and Asians were responding at a higher rate than Whites during the latter part of the data collection period (April 19, 2010 to September 7, 2010). Hispanics, Asians, and Blacks were a disproportionately high share of those responding between April 19, 2010 and the end of data collection period than they were between the start of data collection and April 19, 2010. Given the higher response rates of Hispanics, Asians, and Blacks near the end of the data collection process, changes in the collection process near the end of the data collection process are more likely to impact those groups.

Table 3.1 Percentage Point Difference Between the Middle and the End of Self-Response Phase of the 2010 Census by Race and Hispanic Origin

	Mail Return Rates*			
	as of April 19, 2010	as of September 7, 2010		Percentage Point Changes from April 19 to September 7 2010
White* Alone	79.3	82.5		3.2
Black Alone	65.4	70.0		4.6
Asian Alone	71.0	75.4		4.4
Hispanic	65.2	69.7		4.5

* Source;: U.S. Census Bureau (2012). "2010 Census Mail Response Rate/Return Rates Assessment Report," 2010 CENSUS PLANNING MEMORANDUM SERIES, No. 198, U.S. Census Bureau, Washington DC.

* Data for Non-Hispanic Whites not available

105. There is another way of looking at this data that leads to the same conclusion. Table 3.2 shows the percentage point gap between the mail return rates of Whites and minorities

(Hispanic, Asians and Blacks) around the middle of the 2010 Census data collection period (April 19, 2010) and at the end of that period (September 7, 2010). For Hispanics, Asians and Blacks, the gaps between their self-response rates and those of Whites are smaller at the end of the data collection period than it was at the middle of the data collection period. This suggests that the longer the data collection period lasts, the smaller the gap between self-response rates of minorities and Whites.

Table 3.2 Percentage Point Difference Between Middle and End of Self-Response Phase of the 2010 Census by Race* and Hispanic Origin of the Householder

	Mail Return Rates			Percentage Point Difference Between White and Minorities April 19, and September 7, 2010 (Minority-White)	
	as of April 19, 2020	as of September 7, 2020		as of April 19, 2020	as of September 7, 2020
White Alone*	79.3	82.5			
Black Alone	65.4	70.0		-13.9	-12.5
Asian Alone	71.0	75.4		-8.3	-7.1
Hispanic	65.2	69.7		-14.1	-12.8

Source: U.S. Census Bureau (2012). " 2010 Census Mail Response Rate/Return Rates Assessment Report," 2010 CENSUS PLANNING MEMORANDUM SERIES, No. 198, U.S. Census Bureau, Washington DC.

* Data for Non-Hispanic White not available

106. The Census Bureau data for 2010 Census mail return rates are not available for Non-Hispanic Whites, only for Whites. This is important because some Hispanics are counted in the White race category but are not included in the Non-Hispanic White category. Since Hispanics have lower self-response rates than Whites, including some Hispanics in the White category depresses the White rate and leads to false comparison between minorities and the majority population. Since the data for “Whites” include data for some Hispanics these figures do not reflect the real difference between minorities and Non-Hispanic Whites. The difference

between Whites and minorities shown in Table 3.1 and 3.2 would undoubtedly be larger if we had data for Non-Hispanic Whites.

107. Data from the 2020 Census show a similar pattern to the 2010 Census with respect to a larger share of the population responding later in the data collection period being Hispanic, Asian, and Black. Table 3.3 shows the mean response rates on April 30, 2020, and August 20, 2020, for tracts by the race and Hispanic Origin plurality of the population in the tract. From April 30, 2020, to August 20, 2020, the percentage point increase in the mean response rates for Hispanic plurality tracts, Asian plurality tracts, and Black plurality tracts was larger than for Non-Hispanic White plurality tracts. The increase was 7.4 percentage points for tracts where Non-Hispanic Whites were the plurality of the tract, compared to 9.6 percentage points for Hispanic plurality tracts, 10.3 percentage points for Asian plurality tracts, and 8.3 percent for Black plurality tracts.

Table 3.3. 2020 Census Self-Response Rates by Race and Hispanic Origin Plurality of Tracts by Date			
	Self-Response Rates		Percentage Point Change May 1, 2020 to August 20, 2020
	as of April 30, 2020	as of August 20, 2020	
Plurality of Population In Tract			
Non-Hispanic White*	59.2	66.6	7.4
Hispanic	47.3	56.9	9.6
Non-Hispanic Asian*	57.3	67.6	10.3
Non-Hispanic Black*	45.3	53.6	8.3
Source: Data from April 30, 2020 Funders Census Initiative 2020 and data for August 20, 2020 obtained from Steve Romalewski at CUNY			
*Race Alone or in Combination			

108. Table 3.4 shows differences between Whites and minorities (Hispanic, Asians and Blacks) in terms of 2010 Census mail return rates, net undercount rates, and omission rates. The

intervening census operation that occurs after mail return rates and the calculation of census accuracy measures (net undercount and omission) is the NRFU operation. The fact that the differences between Whites and minorities are smaller for net undercounts and omission than for mail return rates, means minorities were a disproportionately large part of the population counted in NRFU. Meaning Blacks, Hispanics and Asians were a disproportionately large share of the population counted later in the data collection period (i.e. during NRFU) rather than earlier in the data collection period. This suggests that a shorter data collection period in 2020 will be more harmful to Blacks, Hispanics, and Asians than for Non-Hispanic Whites.

Table 3.4. Differences in Mail Return Rates, Net Undercounts, and Omissions in the 2010 Census By Race and Hispanic Origin

	2010 Census Mail Return Rates (September 7)	Net Undercount Rates	Omissions Rates	Percentage Point Difference Between Minorities and Whites in Mail Return Rates (September 7, 2020) Minority Rate Minus White Rate	Percentage Point Difference Between Minorities and Whites in Net Undercount Rates Minority Rate Minus White Rate	Percentage Point Difference Between Minorities and Whites in Omissions Rates Minority rate Minus White Rate
White*	82.5	-0.84	3.8			
Black Alone	70	2.07	9.3	-12.5	2.9	5.5
Asian Alone	75.4	-0.08	5.3	-7.1	0.8	1.5
Hispanic	69.7	1.54	7.7	-12.8	2.4	3.9

Source: Data for Mail Return Rates is from U.S. Census Bureau (2012d) and source for net undercounts and omissions is O'Hare (2019_)

* Data for Non-Hispanic White not available for Mail Return Rates, but Net Undercount and Omissions Rates reflect non-Hispanic Whites.

109. In addition to the lower self-response rates, data analysis by Center for Urban Research at the Graduate Center, City University of New York indicate minority populations are over-represented in the census tracts that are hardest to count. As of August 6, 2020, analysis by the Center for Urban Research at the Graduate Center, City University of New York show the population in the hardest to count census tracts (i.e. those in the bottom 20 percent of self-response rates) was only 44.1 percent Non-Hispanic White even though Non-Hispanic Whites are 60.2 percent of the total population of the U.S. Thus, 65.9 percent of the population in the

hardest to count tracts were minorities (i.e. those other than Non-Hispanic Whites) even though they are only 39.8 percent of the population. In other words, racial and Hispanic minorities are a disproportionately high share of the population in the hardest to count census tracts as of early August 2020.

110. There is a consistent pattern of responses over the data collection period in the 2010 and 2020 Censuses. Non-Hispanic Whites are a disproportionately large share of the responses early in the data collection period, and Hispanics, Asians and Blacks are a disproportionately large share of the responses near the end of data collection period. This means the end of the data collection period contributes more to the final census count of Blacks, Hispanics, and Asians than for Non-Hispanic Whites.

111. It is my conclusion based on data from the 2010 and 2020 Censuses that households responding later in the Census data collection period are disproportionately Hispanic, Asian, and Black rather than Non-Hispanic White. Early truncation of census data collection in the 2020 Census means there will be less time to gather more census responses and the households that are missed are likely to be disproportionately Hispanic, Asian, and Black. Thus, truncating data collection and NRFU operations one month early is likely to result in a failure to enumerate households that would have been captured if the data collection period and NRFU continued through the end of October, and that will increase the undercount of minorities more than the undercount of Non-Hispanic Whites.

4) Impact of NRFU Truncation on Count of Hispanics Asians and Blacks in the 2020 Census

112. Collecting data in the NRFU operation is different than collecting data in the self-response operation. The portion of the population that is most willing to respond to the Census typically does so early in the self-response phase. The population less willing to respond to the

census is concentrated in the NRFU population. This means data collection in NRFU is typically more difficult than in the self-response phase. With respect to the NRFU process relative to the self-reporting operation in the 2020 Census, former Census Bureau Director Kenneth Prewitt (2020) stated, "The census self-reporting phase successfully reached 62 percent of the population. An achievement to applaud. But the next phase is orders of magnitude more difficult. We're in the NRFU/Hard-to-count territory."

113. One indicator of the difficulty in getting data from the final segment of households is reflected in the 2010 Census NFRU evaluation (U.S. Census Bureau 2012a, Table 18) which shows there were about 8 million households that required four or more contact attempts in the 2010 Census.

114. Another reflection of the difficulty in getting respondents to participate in the NRFU operation is the large share of responses that are "proxy" responses. Proxy responses involve someone other than a household member providing data for the household. According to the U.S. Census Bureau (2012a, page 66), "Information we collected for more than half of all NRFU housing units by proxy respondent – either someone who moved in after April 1, or a neighbor or other proxy (landlord, property manager, etc.)". In the 2010 Census NRFU process, data was collected from a household member only 47 percent of the time. Data collected by proxies is less accurate than data collected from a household member. Ending the NFRU operation a month earlier than previously planned is likely to increase reliance on proxy responses in the 2020 Census and thus result in less accurate data with more omissions and counting higher net undercount.

115. The 2010 Census NRFU workload was an estimated 48 million housing units (U.S. Census Bureau 2012a) and it was conducted in about ten weeks. In describing the 2010

NRFU operation, the U. S. Census Bureau (2012a) stated, "The first Nonresponse Followup operation in the field was Nonresponse Followup and officially began on May 1, although a few areas began work before that date. All but one of 494 local census offices reported finishing Nonresponse Followup by July 9th."

116. As of August 6, 2020, there were approximately 56 million non-responding housing units in the 2020 Census. In the 2020 Census, the U.S. Census Bureau (2020d) says they are now planning on only 7 weeks for NRFU (August 11 to September 30). Truncation of the data collection and NRFU operations in 2020 means the Census Bureau will try to visit and enumerate 8 million more homes than in 2010, in 7 weeks instead of 10. The number of housing units to visit increased by 8 million while the number of weeks devoted to the NRFU process was shortened by 3 weeks. The truncation of the data collection period means the Census Bureau has less time to do more work.

117. The Census Bureau is allowing people to self-respond through the end of the data collection period. The self-response rate only increased by 0.6 of a percentage point from August 19 to 27, 2020. This indicates that the vast majority of census responses in the remaining data collection period will come from NRFU.

118. In addition to the possible early truncation of the NRFU operation in the 2020 Census, there are several reasons why one might expect the 2020 Census NRFU operation to be more difficult than the NRFU operation in the 2010 Census.

119. It is widely acknowledged that the COVID-19 pandemic has made census data collection more difficult. The pandemic has resulted in delayed census data collection and has complicated getting responses from household ln personal visits. The pandemic has also negatively affected census hiring.

120. Natural disasters such as hurricanes and forest fires have also made 2020 census data collection more problematic. When hundreds of thousands of people leave their homes when a hurricane hits or threatens, they are not available to respond to a census enumerator. In addition, some housing units that were occupied on April 1 no longer exist after a hurricane. It is easy to understand how this complicates a complete and accurate census. Typically, the decennial census data collection is over before the heart of the hurricane seasons hits. Shortening the amount of time for data collection will compound these problems and produce higher net undercounts and omission rates. The U.S. Census Bureau's truncation of data collection in the 2020 Census from October 31, 2020, to September 30, 2020 is likely to impact the NRFU operation more than the self-response operation (U.S. Census Bureau 2020d). This change shortens the NRFU period by about one third (one month out of three) but it only shortens the self-response phase by about one-sixth (one month out of six).

121. The NRFU operation is always challenging and reducing the time available to collect data will make a difficult situation worse. Since Hispanics, Asians, and Blacks are more dependent on the NRFU process this change will likely result in higher net undercount and omission rates for those groups. Shortening the NRFU period by a month, is also likely to have a disproportionate negative impact on the foreign-born population by reducing the number of those who are counted in the Census.

5) Implications of Net Undercounts and Omissions in the Census

122. According to the U.S. Census Bureau, data from the Decennial Census (U.S. Census Bureau 2017e) is used for:

- Allocating political representation
- Distribution of federal funds through funding formulas

- Civil rights enforcement
- Business applications
- Post-Census population estimates and projections
- Providing weights for sample surveys
- Denominators for rates
- Community planning
- Economic and social science research

123. In particular, it is noteworthy that communities that experience a census undercount do not get their fair share of political representation and federal dollars distributed through funding formulas dependent on the Census counts (O'Hare 2019, Chapter 2). They also miss getting their fair share of dollars distributed by state governments based on census population counts (O'Hare 2020). According to Reamer (2019) there are 316 federal programs that distribute funds on the basis of census-related data, and they distributed more the $1.5 trillion in Fiscal Year 2016. In addition, there are more than 10,000 single member political districts which are drawn on the basis of census data (O'Hare, 2019). Often it is the communities most in need of assistance that do not get their fair share of help because they are undercounted in the census.

124. Census undercounts and omissions are likely to have multiple negative ramifications for states and localities. Communities that are undercounted do not get their fair share of government resources such as political representation and money, and they are often overlooked in private sector decision-making as well.

6) Conclusion

125. The preponderance of empirical evidence from the 2010, 2000 and 1990 Census shows lower self-participation rates leads to higher net undercount rates and omissions rates. The differential self-response rates in the 2020 Census by race and Hispanic Origin suggests that differential undercount patterns by race and Hispanic Origin seen in the past are likely to be repeated in the 2020 Census. Thus, Hispanics and Blacks are on track to have higher net undercount rates and omissions rates that Non-Hispanic Whites in the 2020 Census.

126. Evidence indicates Hispanics, Asians and Blacks are a disproportionately large share of the population counted at the end of the data collection period. Consequently, reducing data collection efforts at or near the end of the data collection period will result in greater omissions and undercounts for Hispanics, Asians, and Blacks compared to Non-Hispanic Whites.

127. Given the facts laid out above, it is my conclusion that changing the end of the 2020 Census data collection period from October 31, 2020, to September 30, 2020, will result in greater omissions and undercounts for Hispanics, Blacks, and Asians compared to Non-Hispanic Whites (and exacerbate differential net undercounts among these groups) in the 2020 Census. States with lower self-response rates will result in higher net undercounts and omissions compared to state with higher self-response rates in the 2020 Census.

Executed on August 9, 2020 at Cape Charles, Virginia.

I declare under penalty of perjury that the foregoing is true and correct.

[signature]

William P. O'Hare

APPENDIX 1

References

Blalock, H. M., (1972) Social Statistics; McGraw-Hill Book Company, New York.

Erdman, C., and Bates, N., (2017). "THE LOW RESPONSE SCORE (LRS) A METRIC TO LOCATE, PREDICT, AND MANAGE HARD-TO-SURVEY POPULATIONS," *Public Opinion Quarterly,* Vol 81, No. 1, pages 144-156.

Funders Census Initiative (2020). Self-Response Analysis Webinars, https://docs.google.com/document/d/1cCz8hzqN6dosbdT50qBgz1NlMraf-d-BVPZaqqr0Yos/edit

Jensen, E. Benetsky, M., and Knapp, A., (2018). "A Sensitivity Analysis of the Net Undercount for Young Hispanic Children in the 2010 Census," Poster presented at the Population Association of America annual Conference, Denver, CO. April

King H., Ihrke, D., and Jensen, E. (2018). "Subnational Estimates of Net Coverage Error for the Population Aged 0 to 4 in the 2010 Census." Paper presented at the Population Association of America annual Conference, Denver, CO. April

Lopez, G. Ruiz, N.G. and Patten, E. (2017). "Key Facts about Asian Americans, a diverse and growing population," FACTTANK: New in the Numbers, Pew research Center Washington DC. https://www.pewresearch.org/fact-tank/2017/09/08/key-facts-about-asian-americans/

Meyers, M. and Goerman, P. (2018). "Respondents Confidentiality Concerns in Multilingual Pretesting Studies and Possible Effects on Response Rates and Data Quality for the 2020 Census." Paper delivered at the annual Conference of the American Association of Public Opinion Research, Denver CO., May 16-19, 2018

National Association of Latino Elected Officials (2018). "Census 2020: Research and Messaging," Power points from presentation on Sept 12.

National Association of Latino Elected Officials (2020). Countdown to Census 2020: New Data on Latino Perception, February 10, https://naleo.org/COMMS/PRA/NEF%20Census%202020%20_2_10_FINAL.pdf

O'Hare, W.P. (2017). *Counting all Californians in the 2020 Cens*us, The Census Project, https://censusproject.files.wordpress.com/2017/10/calif-report-10-16-2017_format-final.pdf

O'Hare, W.P. (2019a). ***Differential Undercounts in the U.S. Census; Who is Missing?*** " Springer Publisher. https://www.springer.com/gp/book/9783030109721

O'Hare, W.P. (2019b). "Understanding Who Was Missed in the 2010 Census," Population Reference Bureau, Washington, DC. https://www.prb.org/understanding-who-was-missed-in-the-2010-census/

O'Hare, W.P. (2020c). "Big Differences Among Young Children in Asian Subgroups Means Some are More at Risk of Being Missed in the 2020 U.S. Census, Asian Americans Advancing Justice (AAAJ) website. https://www.countusin2020.org/blog

O'Hare, W.P., C. Brumfield, and Lee, J.J.J. (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, Georgetown University, Washington DC. August 26
https://www.georgetownpoverty.org/issues/evaluating-the-accuracy-of-the-decennial-census/

Prewitt, K. (2020). Oral Presentation before the House Committee on Oversight and Reform, U.S. House of Representatives, July 29.
https://oversight.house.gov/sites/democrats.oversight.house.gov/files/documents/Testimony%20Prewitt.pdf

Reamer, A (2018). "Census-Guided Federal Assistance to Rural America, Report #3, Counting for Dollars 2020: The Role of the Decennial Census in the Geographic Distribution of Federal Funds," August 24, https://gwipp.gwu.edu/counting-dollars-2020-role-decennial-census-geographic-distribution-federal-funds

Salvo, J. (2020). "Weekly, Report on 2020 Census Self-Response Rates issued on May 14," New York city Department of City Planning – Population Division
file:///C:/Users/Owner/Documents/Bills%20Folder/RESPONSE%20RATES/Self-Response%20May%2014%20(1).pdf

Swanson, D. A, (2019). "THE END OF THE CENSUS," Population Association of America Affairs, Fall 2019, http://www.populationassociation.org/wp-content/uploads/PAA-Fall19.pdf

U.S Census Bureau (2012a). "2010 Census Nonresponse Followup Operations Assessment Report" 2010 CENSUS PLANNING MEMORANDA SERIES, No. 190 , Subject: Report ," April 30, 2012
https://www.census.gov/2010census/pdf/2010_Census_NRFU_Operations_Assessment.pdf

U.S. Census Bureau (2012b). 2010 Census Coverage Measurement Estimation Report: Summary of Estimates of Coverage for Persons in the United States, DSSD 2010 Census Coverage Measurement Memorandum Series #2010-G-01, U.S. Census Bureau, Washington, DC.
https://www2.census.gov/programs-surveys/decennial/2010/technical-documentation/methodology/g-series/g01.pdf

U.S. Census Bureau (2012c). 2010 Census Coverage Measurement Estimation Report: Components of Census Coverage for the Household Population in the United States, DSSD 2010

Census Coverage Measurement Memorandum Series #2010-G-04. U.S.
, Washington, DC.
http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.463.6916&rep=rep1&type=pdf

U.S. Census Bureau (2012d). "2010 Mail Response/Return Rates Assessment Report, 2010 CENSUS PLANNING MEMORANDA SERIES, No 198, U.S Census Bureau, Washington DC. https://www.census.gov/2010census/pdf/2010_Census_Mail_Response_Return_Rates_Assessment.pdf

U.S. Census Bureau (2012e). The Asian Population:2010 Census Briefs, C20188-11, U.S. Census Bureau, Washington DC, March, https://www.census.gov/prod/cen2010/briefs/c2010br-11.pdf

U. S. Census Bureau (2014a). "Final Task Force Report: Task Force on the Undercount of Young Children," Memorandum for Frank A. Vitrano, U.S. Census Bureau, Washington, DC. February 2.

U.S. Census Bureau (2014b). 2014 Planning Data Base, U.S. Census Bureau, Washington, DC https://www.census.gov/research/data/planning_database/2014/docs/PDB_Block_2014-11-20a.pdf

U.S. Census Bureau (2017a). "Investigating the 2010 Undercount of Young Children –Analysis of Census Coverage Measurement Results," U.S. Census Bureau, Washington, DC. January **https://www2.census.gov/programs-surveys/decennial/2020/program-management/final-analysis-reports/2020-2017_04-undercount-children-analysis-coverage.pdf**

U.S. Census Bureau (2017b). "Income and Poverty in the United States: 2016" Current Population Reports, P60-259, Semega, J.L, Fontenot, K.R, and Kollar, M.A. U.S. Census Bureau, Washington DC.

U.S Census Bureau (2017c). "Respondent Confidentiality Concerns, MEMORANDUM FOR Associate Directorate for Research and Methodology (ADRM) Sept . https://www2.census.gov/cac/nac/meetings/2017-11/Memo-Regarding-Respondent-Confidentiality-Concerns.pdf

U.S. Census Bureau (2017d), "Respondent Confidentially Concerns and Possible Effects on Response Rates and Data Quality for the 2020 Census," presentation by Mikelyn Meyers at the Census Bureau National Advisory Committee Meeting, November 2, 2017.

U.S. Census Bureau (2017e). "2020 census operational plan: A new design for the 21st Century," Version 3.0, Washington DC. https://www2.census.gov/programs-surveys/decennial/2020/program-management/planning-docs/2020-oper-plan3.pdf

U.S. Census Bureau (2018a), "American Community Survey: Accuracy of the Data (2017)". U.S. Census Bureau, Washington, DC.

U.S. Census Bureau (2018b). "Technical Review of the Department of Justice Request to Add citizenship status Question to the 2020 Census," Abowd, J. M, Memorandum for Wilbur L. Ross Jr., January 19, 2018.

U.S. Census Bureau (2018c) Allocation Rates in the ACS available at https://www.census.gov/acs/www/methodology/sample-size-and-data-quality/item-allocation-rates/ downloaded October 2, 2018.

U.S. Census Bureau (2018d) "Understanding the Quality of Alternative Citizenship Data Sources for the 2020 Census, Brown, J.D., Heggeness, M. L, Dorinskii, S.M, Warren, L. and Yi, M (U.S. Census Bureau White Paper, August 6.

U.S. Census Bureau (2019). 2020 Census Barriers, Attitudes and Motivators Study Survey Report: version 2.0 January 24, U.S. Census Bureau 2020a) Response Rates, https://2020census.gov/en/response-rates.html

U.S. Census Bureau (2020a). 2020 Census Response Rate Map Preview Now Available, MARCH 02, 2020 RELEASE NUMBER CB20-CN.19,

https://www.census.gov/newsroom/press-releases/2020/2020-response-rate-map-preview.html

U.S. Census Bureau (2020b). "Glossary: Census Tract." U.S. Census Bureau. Retrieved August 23, Available at https://www.census.gov/programs-surveys/geography/about/glossary.html#par_textimage_13

U.S. Census Bureau (2020c). "2020 Census Housing Unit Enumeration Progress by State, Report dated 8/19/2020." U.S. Census Bureau, Washington DC. https://2020census.gov/content/dam/2020census/interior-pages/daily-nrfu-rates/nrfu%20rates%20report%20date%208-19-rev(tagged).pdf

U.S. Census Burearu (2020d). "Review of 2020 Operational Plan Schedule August 17, 2020", Albert E. Fontenot, Jr., and Timothy P. Olson https://2020census.gov/content/dam/2020census/materials/news/2020-operational-plan-schedule-review.pdf

U.S. Census Bureau (2020e). Census Bureau Response Map, data retrieved August https://public.tableau.com/profile/us.census.bureau#!/vizhome/2020CensusSelf-ResponseRankings/RankingsDashboard

U.S. Office of Management and Budget (1997) Revisions to the standards for the classification of federal data on race and ethnicity, Statistical Policy Directive 15, Federal Register Notice, October 30

Velkoff, V., (2011). *Demographic Evaluation of the 2010 Census*, Paper presented at the 2011 Population Association of America Annual Conference, Washington, DC, March.

Word, D. L. (1997). *Who Responds/ Who Doesn't? Analyzing Variation in Mail Response Rates During the 1990 Census*, Population Division Working Paper No. 19,

EXHIBIT B

UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF MARYLAND

LA UNIÓN DEL PUEBLO ENTERO, PROMISE ARIZONA, LYDIA CAMARILLO, JUANITA VALDEZ-COX, ROGENE GEE CALVERT; ZEENAT NISHA HASAN; CANDY L. GUTIERREZ; EUGENE WU, DEBORAH CHEN, ORGANIZATION OF CHINESE AMERICANS-GREATER HOUSTON, DAVID CHIU, PHILLIP TING, ALBERT MURATSUCHI, KENNY CHU, YICHENG WU, CYNTHIA CHOI, VINCENT PAN, JOHN PARK, JEFFREY D. HSI, JACINTA TITIALII ABBOTT, VENGHAN TANG, RAJ MUKHERJI, SHARON TOMIKO SANTOS, MIA GREGERSON, JENNIFER REYES, RAYMOND SANCHEZ, MARICELA LECHUGA, MARTY RAMIREZ, FELIPE CRUZ, ALEXANDRA ROSY PALOMO-PUJOL, MARCO ABARCA, COALITION FOR HUMANE IMMIGRANT RIGHTS OF LOS ANGELES, RALPH CARMONA, and JAVIER GASTON-GREENBERG,

Plaintiffs,

v.

DONALD J. TRUMP, sued in his official capacity as President of the United States,

WILBUR L. ROSS, sued in his official capacity as U.S. Secretary of Commerce,

STEVEN DILLINGHAM, sued in his official capacity as Director of the U.S. Census Bureau,

U.S. DEPARTMENT OF COMMERCE, and

U.S. CENSUS BUREAU,

Defendants.

Civil Action No. 8:19-CV-02710-PX

SWORN EXPERT DECLARATION OF HOWARD HOGAN

I. QUALIFICATIONS

1. I am currently retired from the U.S. Census Bureau, where I worked for 39 years in positions of increasing responsibility. During my career I have worked on and studied all aspects of the census process, including coverage and content. This work has included responsibility for key aspects of post data collection processing. I am a recognized expert in how coverage errors occur, their impact on census accuracy, and how post data collection processing can address them. I have supervised a large software development operation.

2. My most recent position at the Census Bureau was as its Chief Demographer, where I served as the Census Bureau's senior scientist on technical and statistical demography. I served as principal consultant to Census Bureau staff on methodological problems, and as a liaison to academic and other outside demographers.

3. Previously as Associate Director for Demographic Programs, I led the Census Bureau's programs that provide demographic, social and economic data about the nation's population and households and led the statistical programs that produce population projections and estimates. I supervised the Population Division where Count Review was redesigned and implemented. I was also responsible for the International Programs Center, the Housing and Household Economic Statistics Division, the Demographic Statistical Methods Division, and the Data Integration Division.

4. Earlier as Chief of the Economic Statistical Method and Programming Division, I managed the development of software for the Census Bureau's economic programs including monthly indicator surveys, annual surveys, and the economic census, successfully moving towards adopting modern software development processes. I provided leadership to all

mathematical statisticians working in the Economic Directorate.

5. During the 2000 Census, I served as Chief, Decennial Statistical Studies Division. I led the group of mathematical statisticians and programmers who were responsible for the statistical design of Census 2000, including statistical quality control design, coverage improvement activities, software quality control, count imputation, content sampling, undercount measurement, and census adjustment. I assisted three U.S. Solicitors General, and provided expert testimony cited in Supreme Court Case: *Utah v. Evans*.

6. Earlier, as Chief of the Undercount Research Staff, Statistical Research Division, I led the Census Bureau's effort to research, develop and implement methods to correct the 1990 Census for undercount. This multiyear research program included developing a research plan to address all issues concerning coverage measurement and adjustment for the 1990 Census. I designed and managed a large and complex survey, the 1990 Post Enumeration Survey, including questionnaire design, processing plan, matching process design, imputation, post-stratification plan, estimation design, and census adjustment.

7. I hold a Ph.D. from Princeton University, studying at its Office of Population Research, and a Master of Public Affairs degree from its Woodrow Wilson School. I have been a Professorial Lecturer at the Department of Statistics of The George Washington University. I served as Chair of the Survey Research Methods Section of the American Statistical Association (ASA), and also served as Chair of its Committee on Professional Ethics. I am an elected Fellow of the ASA, a designation that recognizes an individual's outstanding service to and leadership in the field of statistical science. Each year, ASA's Committee on Fellows, a peer group, can only elect one-third of one percent of the total membership as Fellows. I have consulted with the statistical offices of the UK, India, Sweden, Mauritius, Morocco and Canada, and led a United

Nations task force on demographic statistics.

II. SUMMARY AND CONCLUSION

8. The purpose of this declaration is to describe the grave risks to an accurate enumeration caused by the shortened schedule for post data collection processing. Specifically, the currently proposed schedule, based on my knowledge and experience, will not allow the Census Bureau to meet its stated goal: "The goal of the 2020 Census is to count everyone once, only once, and in the right place."[1]

9. Furthermore, these risks will have a disproportional impact on the poor, the rural, and ethnic and racial minorities. This will result in what is known as a 'differential undercount,' that is, the undercount of some, primarily minority, groups is larger than that of the other groups. For example, the Census Bureau has documented over the decades that the undercount for Blacks, Asians, Latinos (also referred to by the Census Bureau as "Hispanics"), and Native Americans is larger than that for non-Hispanic Whites.[2] Although a differential undercount has been measured in all recent U.S. censuses, the compressed schedule for post data collection processing carries a grave risk of a greatly increased differential undercount.

10. Post data collection processing refers specifically to those activities that take place after the completion of Census field work that are necessary to deliver accurate statistical results. In this declaration, I focus on the Apportionment Counts. These are the total population by state,

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[1] U.S. Census Bureau, *2020 Census Operational Plan: A New Design for the 21st Century*, Version 4.0 (Dec. 2018) https://www2.census.gov/programs-surveys/decennial/2020/program-management/planning-docs/2020-oper-plan4.pdf (hereinafter "2020 Census Operational Plan v. 4.0").

[2] *See, e.g.*, Hogan, *The 1990 Post-Enumeration Survey: Operations and Results*, 88 J AM. STAT. ASS'N 423, 1047-60 (Sept. 1993) http://links.jstor.org/sici?sici=0162-1459%28199309%2988%3A423%3C1047%3ATIPSOA%3E2.0.CO%3B2-8; and Howard Hogan, Patrick J. Cantwell, Jason Devine, Vincent T. Mule Jr. and Vitoria Velkoff, *Quality and the 2010 Census*, 32 POPULATION RES. POL'Y REV. 637 (2013) https://link.springer.com/article/10.1007/s11113-013-9278-5?shared-article-renderer#citeas.

including the overseas federally affiliated population, necessary to allocate the 435 Congressional seats to the 50 individual states.

11. The Census Bureau itself has implicitly admitted that its current schedule is insufficient to conduct the Census with its usual statistical standards. This can be seen in their three different proposed schedules for post data collection processing:

a. *Original Schedule*: five months (August 1 through December 31)

b. *Previous Revised Schedule*: six months (November 1 through April 31)

c. *Current Schedule*: three months (October 1 through December 31)

12. The original schedule was based on decades of experience and years of planning and testing. This schedule was developed to allow five months for post data collection processing before the delivery of the Apportionment Counts. When COVID-19 hit and Census field and processing operations were suspended, the Census Bureau proposed a revised schedule asking for six months; that is, an additional month for post data collection processing. The Census Bureau did not announce its reasons for this additional month, but a reasonable inference is that the special challenges caused by COVID-19 would require extra care in post data collection processing. Thus the current three month schedule allows only half the time that the Census Bureau publicly stated that it needed. Rather than allowing more time to deal with the unique problems and additional challenges of COVID-19, the current schedule gives less time than the Census Bureau planned for before the pandemic.

13. Schematically, post data collection processing needed to produce the Apportionment Counts includes the following activities:

a. Scanning in paper questionnaires.

b. Checking for completeness: e.g. returned blank questionnaires or questionnaires with insufficient data.

c. Merging the files: internet returns, telephone, paper and results from field enumeration.

d. Processing census responses not directly tied to a census identification number, known as "non-ID Processing." This includes people who took advantage of the opportunity to self-respond even though they did not know their census ID. It also includes people interviewed at locations other than their usual residence, but who provided their usual residence address.

e. Unduplicating multiple responses for the same housing unit: for example from a mailed-back questionnaire and the result of a field visit. This activity is known as the Primary Selection Algorithm (PSA).

f. Unduplicating multiple enumerations for the same person at two or more locations, as necessary: for example college students sent home before April 1 or people who may have left their urban residence for a rural second home.

g. Supplementing response data with administrative records for those cases that had been identified by administrative data as occupied, but for which a nonresponse follow-up attempt was unsuccessful and no subsequent self-response was received.

h. Imputing for missing values, specifically any housing unit where the number of residents was not previously determined, called count imputations.

i. Processing of Group Quarters (GQ) enumerations (college dormitories, nursing homes, etc.).

j. Review of Group Quarters results by state demographers, to identify new or misallocated group quarters or if a GQ reports an improbable number of residents, known as GQ Count Review.

k. Preliminary tabulations, necessary for review steps. In fact, this is done several times for multiple reviews.

l. Review of the aggregate results by trained demographers to identify "systematic or large anomalies." These are, for example, where the preliminary census population greatly exceeds or greatly falls short of what other sources show.

m. Merging of the overseas federally affiliated population, such as military personnel.

n. Tabulation of the 50 state population totals.

o. Computation, as a courtesy, of the Congressional Apportionment, using the method known as 'Equal Proportions'

p. Submitting the results to the President.

14. Each of these steps is necessary to produce accurate Apportionment Counts. Skipping or rushing one step can impact the next. For example, failure to properly handle non-ID cases can impact the need for the use of administrative records. Failure to implement the administrative records process can lead to higher count imputations. Failure of any of these steps can lead to systematic errors, which the review is designed to catch. Failure to carry out these processes risks not just an undercount, but an undercount that disproportionally affect areas with minority populations. Not only is a particular logical order implied, but also a pre-specified operational order. That is, systems, including software systems, and processes have been developed and tested for a particular order. Skipping steps to save time means running an untested system, with all the inherent risks.

15. In this Declaration, I will focus on those steps with the greatest risk to mis-counting the poor, rural, and racial and ethnic populations. I enumerate problems and risks occurring with this compressed time schedule and the probable impact upon the Black, Latino, Asian, Pacific Islander and Native American populations.

16. The Census Bureau has not fully explained and documented it plans to meet the current truncated schedule, even though OMB Statistical Policy Directive 4 mandates: "Information to help users interpret data accurately, including transparent descriptions of the sources and methodologies used to produce the data, must be equitably available for Federal statistical products."[3] Because of this lack of transparency in current plans, it is impossible at this time to know what steps the Census Bureau will be forced to skip and which steps will be merely rushed. The Census Bureau leadership talks only of "Streamlining backend processing to deliver apportionment counts by the statutory deadline of December 31, 2020."[4] What is clear is that the professionals at the Census Bureau will not have the time to properly carry out the processes that they have deemed necessary for meeting their goal of an accurate enumeration of the U.S. population. And, as mentioned above, on-the-fly "streamlining" of a tested system raises a grave risk of a fatally flawed and failed census.

17. The Census Bureau has an experienced, skilled and dedicated staff, fully capable of addressing these problems if they are given adequate time. Each step takes time and care, with a limited number of staff on-board and trained to accomplish it. Unlike field work, it is not

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[3] Statistical Policy Directive No. 4: Release and Dissemination of Statistical Products Produced by Federal Statistical Agencies, 73 Fed. Reg. 12622, 12625 (Mar. 7, 2008), https://www.govinfo.gov/content/pkg/FR-2008-03-07/pdf/E8-4570.pdf.

[4] Albert E. Fontenot Jr. & Timothy P. Olson, *Review of 2020 Operational Plan Schedule*, U.S. Census Bureau, p. 9 (Aug. 17, 2020) https://www.census.gov/content/dam/Census/newsroom/press-kits/2020/2020-operational-plan-schedule-review.pdf.

possible to bring on additional demographers, statisticians and software engineers in order to speed the post data collection processing. The Census Bureau had developed a plan and adapted it to the challenges created by COVID-19. What the Census Bureau's professional staff needs is to be allowed to carry out the plan developed and announced in April 2020.

III. NON-ID PROCESSING AND OTHER PRE-PROCESSING

18. Each dwelling unit on the Master Address File (MAF) contains a unique ID. The Census Bureau has worked to make it easy for people to self-respond, even if they have not received, or cannot find, their census ID. The plan was to make it easy for people to respond "anytime, anywhere to increase self-response rates."[5] However, when these non-ID cases are received, a series of steps must be undertaken. This includes determining which census block contains the units ('Geocoding') and seeing if the unit is already listed on the MAF. If the unit is on the MAF, then the response goes into the next step (the Primary Selection Algorithm, or PSA, discussed below). If the unit is not already on the MAF, then the Census Bureau must verify whether the unit exists, and if it does, add it to the MAF. Each of these steps takes time. Not conducting this process can result in not counting people who have responded.

19. Additionally, there are some cases where the census asks for "Usual Residence Elsewhere." For example, people interviewed at a marina or campground are to be counted there if they have no other 'usual residence,' known as 'usual residence elsewhere' or URE. However, if they have a usual residence, they are asked to report it. This then generates a non-ID response which again must be geocoded, unduplicated and fed to the next step.

20. Failure to carry out non-ID processing affects coverage in several ways. If that was the only response received from the person, then they will be missed from the census entirely, in

[5] 2020 Census Operational Plan v. 4.0, at 108.

spite of the Census Bureau's advertising this as a valid way to respond. Additionally, in the case of the UREs, this can create two problems. First, the person will be counted at the campground, which is not the person's usual residence. Secondly, the person may be missed at the usual residence.

21. The "respond anywhere" option is new, but is was designed, in part, to enumerate those people with looser ties to a particular unit. Not properly including these non-ID cases can disadvantage minorities, as these options were designed for people with less conventional living arrangements. Counting people at marinas and campgrounds is likely to advantage the well-off, who can afford boats and RV campers.

22. Many steps are needed to prepare the files for further processing, and different files are produced for different purposes. The most important files for our discussion are:

a. Decennial Response File (DRF): This contains all 2020 Census responses for the final enumeration universe after additional data processing, GQ matching and unduplication and application of the Primary Selection Algorithm (explained below)

b. Census Unedited File (CUF): All person and household records for the 50 states and D.C. including group quarters records. If the number of occupants in a housing unit is missing or contradictory, imputation procedures are required to complete the household enumeration record, using a variety of data inputs and statistical processes. When the final enumeration data are determined for all dwelling unit records considered to be valid, the resulting dataset is the Census Unedited File (CUF). The CUF is the baseline for the total count of people.

c. Census Edited File (CEF): All person and household records for the 50 states and

D.C., including GQ records and characteristics (such as race and ethnicity). The CEF is the result of consistency edits and imputation of characteristics as needed.[6]

23. In fact, each of these files may exist in several versions resulting from different stages of processing and review. Thus, there is both a DRF-1 and DRF-2.

24. The Self-Response Quality Assurance (SRQA) process must perform automated and interactive checks to identify potentially suspicious returns from self-response that require analyst investigation and/or field follow-up to ensure quality. As the data are received, write-in responses (i.e., alpha characters for race and ethnicity responses) are coded for tabulation purposes. Coding is conducted by both automated and computer-assisted manual processes.[7] During DRF processing, edits must be performed to normalize data received from multiple data capture operations (internet, telephone, paper or NRFU). That is, data coming from different processing systems will have different software formats and can use different codes. "Normalizing" data puts the data into a common format, so that, for example, a '2' in position '3' always means 'female." The DRF aggregates response data received from data capture operations.[8] This is necessary to prepare a single file containing all accepted responses in a uniform format. Without this step, there is no single place where all the results can be found and analyzed together.

[6] U.S. Census Bureau, Decennial Census Management Division, *2020 Census Detailed Operational Plan for: 23. Count Review Operation (CRO)*, 11 (July 26, 2019) https://www2.census.gov/programs-surveys/decennial/2020/program-management/planning-docs/CRO-detailed-operational-plan.pdf (hereinafter, "2020 CRO Plan").

[7] 2020 Census Operational Plan v. 4.0, at 133-34.

[8] U.S. Census Bureau, Decennial Census Management Division, *2020 Census Detailed Operational Plan for: 19. Response Processing Operations (RPO)*, Version 2.0, 121 (Nov. 2019) https://www2.census.gov/programs-surveys/decennial/2020/program-management/planning-docs/RPO_detailed_operational_plan-v2.pdf (hereinafter, "2020 RPO Plan v. 2.0").

IV. UNDUPLICATING MULTIPLE RESPONSES FOR THE SAME PERSON

25. It is necessary to address duplicate enumerations of the same person in order to achieve the Census Bureau's stated goal of counting people "only once and in the right place." These have been shown to occur in every census where duplications have been measured.

26. It is important to remember that for many purposes, especially including Congressional Apportionment and redistricting, it is the distributional accuracy of the census that matters. Each state needs to get its 'fair share of the pie.' Because of this, it is not just census omissions that matter. Areas where there are disproportionally more duplicates can gain an improper advantage. Ensuring that everyone is counted "only once, and in the right place," is just as important as ensuring that everyone is counted 'once."

27. One form of potential duplication occurs when more than one return is received for the same dwelling unit. These forms could represent two different families or a single family who sent in two responses, for example one via the internet and one on a paper questionnaire. Perhaps one family member sent in a non-ID response when another member had already responded by telephone. The multiple response options, including the option of a non-ID response, will likely make this more of an issue in 2020. This unduplication is known as the Primary Selection Algorithm (PSA). Given that 2020 Census has greatly increased the range of response options, the PSA will play a central role in post data collection processing. The precise parameters of the PSA are administratively restricted and tightly held. However, the importance of this step has long been recognized in census planning, because without it the same person could be included and counted in a unit more than once or two different families could incorrectly be included together as living in one small unit.[9]

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[9] I do not address in this Declaration the actual rules and operations of the PSA as they are administratively restricted.

28. Additionally, unduplication is necessary because the same person can be enumerated at two different locations. There are several reasons for this to occur. Among the reasons are:

a. College students counted at school and at their parents' home.

b. People who move within the period of enumeration, including people who have two or more residences.

c. People counted in two separate housing units because either the Post Office mis-delivered the Census Questionnaire or because the Census follow-up enumerator went to the wrong address, known as Apartment Mix-ups.

d. Other miscellaneous reasons, including for example children in a joint custody arrangement.

29. The Census Bureau has traditionally been conservative in removing probable duplicate enumerations. This reflects essentially a judgment call that the risk of possibly removing a unique enumeration outweighs the benefit of removing probable duplicates. It also reflects the difficulty in many cases of determining which of the two (or more) enumerations is "in the right place."

30. The importance of taking the time to analyze and understand the level of census duplication during post data collection processing is illustrated by a special procedure carried out for the 2000 Census. During the 2000 Census, analysis during the post data collection processing identified an unexpectantly large number of duplicated households enumerated at different addresses. The Census Bureau took, and had the time to analyze these enumerations and determine which one to delete from the Census counts.[10] This was a special operation, not

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[10] *See* Fay F. Nash, *Overview of the Duplicate Housing Unit Operations*, Census 2000 Information Memorandum No. 78 (Nov. 7, 2000); Susan M. Miskura, *Results of Reinstatement Rules for the Housing Unit Duplication Operations*, Memorandum for Preston J. Waite (Nov. 21, 2000).

originally planned for 2000, but demonstrates an important point. With sufficient time during post data collection processing, the Census staff is able to identify and correct unexpected problems.

31. Rather than *ad hoc*, as it was in 2000, unduplication across records was a planned activity for 2020, as the Response Processing Operation will use "computer-based person matching software to unduplicate multiple responses for the same person across census records. Then, a Primary Selection Algorithm is run to establish the single enumeration record for a case when multiple responses are received."[11]

32. I now address those special issues that make the level of duplicate enumerations a larger issue for this census than in previous censuses, and the need for sufficient time to assess and, as necessary, correct the level of duplication.

33. Missing characteristics can greatly complicate the process of unduplication. A complete response to all items is not necessary for a response to be counted. Although the exact number of reported characteristics is not publicly known for 2020,[12] in earlier censuses full name and date of birth were not necessarily required. This means that the data required to count a response may be less than what is required to determine whether the person has already been counted. It is highly probable that the level of missing reported characteristics, especially of complete names, is especially high in 2020. For example, the issue with the citizenship question, the Presidential Memorandum on "Excluding Illegal Aliens," the protests across the country, and the general issue of border and immigration enforcement will almost certainly increase the number of people

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[11] 2020 Census Operational Plan v. 4.0, at 134.

[12] Albert E. Fontenot Jr. & Timothy P. Olson, *Review of 2020 Operational Plan Schedule*, U.S. Census Bureau (Aug. 17, 2020) https://www.census.gov/content/dam/Census/newsroom/press-kits/2020/2020-operational-plan-schedule-review.pdf.

unwilling to share their name. This will also affect the ability of PSA to be correctly implemented. Carefully understanding these new conditions and their impact on the Census Bureau's ability to 'count everyone only once,' will take extra, not less, time.

College students counted at school and at their parents' home.

34. Since 1950, college students living away to attend school have been counted at their 'college' address. This includes both those living on campus and those living off campus. This makes sense as, even if they are home on break on the Census Reference Date of April 1, they maintain a 'usual' residence at school. Still, even in a 'normal' census, many parents list their college student erroneously with the family at home.

35. However, nothing is usual in 2020. Many schools closed in early March, that is, before the Census Reference Day. Many students, if not most, returned to their parents' home. With colleges failing to re-open for on-site learning, many students are still living at home. Others, no doubt have established independent living arrangements, far from their former college address.

36. The Census Bureau decided to count college students at their college location, essentially where they were living in early March.[13] This modification assumed that the colleges' closure was temporary, and that the college would remain the students 'usual residence' on Census Day, April 1. However, many students left college residences before Census Day, never to return. Others perhaps hoped to return, but established other residences in the months to come. Based on my knowledge and experience, I conclude that these special rules, no longer focused on the residence as of Census Day, April 1, no doubt increased the confusion on the part of many respondents. Again, in my experience many parents' responses ignore the census 'fine print' and

[13] Press Release, U.S. Census Bureau, "Census Bureau Statement on Modifying 2020 Census Operations to Make Sure College Students are Counted (March 15, 2020), https://www.census.gov/newsroom/press-releases/2020/modifying-2020-operations-for-counting-college-students.html

report their family as they conceive it, including their children living away at college. The fact that the student is now semi-permanently living at home can only make the situation worse.

37. Therefore, it seems highly probable that even more parents will include in their Census response, their children as residing permanently at home on April 1. With Non-response Follow-Up (NRFU) restarting five months after the students left college, there is the possibility of significantly increased duplication of these students and former students. These students will have been living away from college for months and, many still not allowed to return. The concept that their old college address remained their 'usual residence' will not be obvious to their parents. Again, in my experience in studying census coverage and residence rules, although the instructions to the respondents and census takers can be clear in the details, respondents often give the answer that most makes sense to them.

38. Besides the general impact on census accuracy, counting these college students twice will tend, obviously, to improperly advantage areas of sufficient resources to send large numbers of their children away to college. This will disadvantage areas comprised of the poor and less educated. Given the structural inequality of American society, this will tend to disadvantage racial and ethnic minorities.

39. Let me note that a large increase in duplicate enumerations included in the final census counts is not inevitable. The Census Bureau has the technology to identify many of these duplicate enumerations. What it will need is the time to study the problem, identify solutions and implement the corrections. It is not enough to simply run the computer programs and go onto the next step. Each census brings unique and unexpected changes to how people respond. Further, this is a new process not previously run on a large scale. It cannot be rushed—if rushed or abandoned, the quality of the census will suffer, particularly for racial and ethnic minorities.

People who move within the period of enumeration

40. Unless, as is done in some countries, the census is conducted all in one day, there will always be some people who move, either individually or as part of a family, during the period of enumeration. This has been shown in every U.S. census where it has been measured. However, there is reason to believe that this problem will be much greater in 2020.

41. For practical purposes, the census began collecting enumerations in early March, when people received a mailer and were asked to respond right away via the internet. Responses came in with a surge before April 1, and slowly levelled off to reach around 64 percent of the eligible households by mid-August.[14] The remaining 36 percent of the 'self-response' universe of housing units is to be contacted during August and September. This creates a five or six month period for people to self-respond at one address, move to a new address, and be contacted by a NRFU enumerator there. This increases the chances of a person or family being counted twice.

42. In addition to true movers, there is the problem of people with two or more residences. A (currently) unknown number of such people will be counted at both their winter and their summer residences. Even though census rules are clear as to which residence is the correct, people do not always follow all the rules. This includes both the respondents and some of the temporary staff hired as census takers.

43. The effect of the double counting of movers on the differential undercount is unclear, although the stretched out schedule in 2020 will increase the problem. The people who are double counted are those who initially respond and move into a housing unit that did not respond. Those who are missed are those who lived in the second unit on April 1. Since initial

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[14] U.S. Census Bureau, Response Rates, https://www.2020census.gov/en/response-rates.html (last visited Aug. 20, 2020).

self-response is differential by race and ethnicity, it is likely that this double counting will disproportionately result in minorities being missed. The effect of double counting of people with two or more residence will obviously advantage those with sufficient resources to maintain two residences. People who had the resources to flee the urban areas for their summer homes because of COVID-19 will make the problem worse.

Apartment mix-ups

44. The post-office will occasionally mis-deliver the census package. The family who receives that incorrect package sometimes fills it out and sends it back or otherwise self-responds, for example through the internet. This response is then associated with one Census ID number. Later, a NRFU census taker will visit the unit and, now, correctly enumerate the family, with a second Census ID number. This results in the family being counted twice. Also, occasionally, the NRFU census taker will go to the wrong unit and collect an interview from a family that has already responded. These are colloquially known as "Apartment Mix-Ups" as these have long been known to frequently occur in small apartment buildings with poor or no obvious identification of the individual units. These may also impact non-ID processing (discussed above).

45. The effect of these Apartment Mix-Ups on the differential undercount is unclear. Often the double-counted will have, approximately, the same racial and ethnic characteristics as the missed family. However, it is not always clear that there were two distinct units. It was from carefully studying this situation in the 2000 census that a larger problem was identified and corrected. Given the current schedule, it is doubtful that there is time for an adequate analysis to verify that the problem is under statistical control.

Other miscellaneous reasons

46. There are a number of other reasons that a person can be mis-counted. Historically, the numbers have been small and the impact on the differential undercount unclear. For example, children in a joint custody arrangement are often counted by both parents. Children born after Census Day should not be included but sometimes are.

47. Two historically small problems may be worsened by COVID-19. First, people, including students, living in a foreign country on April 1 are not to be included. (Federally affiliated personnel are included in the Apportionment Counts, but via a separate process based on administrative records for the relevant agency.) Because of COVID-19, many of these people returned to the United States after April 1. It is likely that some will be counted in NRFU. Second, people who were alive and residing in the U.S. on April 1 are, obviously, to be included. It is probable that many, if not most, of those who die between April 1 and NRFU will be missed. And with COVID-19 disproportionately impacting the Black, Latino, Asian, Pacific Islander and Native American populations, this impact of COVID-19 will differentially undercount racial and ethnic communities.

48. Again, these other miscellaneous reasons for erroneous inclusions may be small and either easily ignored or corrected. However, without sufficient time for the Census Bureau staff to analyze the results, no one will know in time to assess, and as necessary, correct for these errors.

V. COUNT IMPUTATIONS

49. At a basic (schematic) level, the main steps of a modern U.S. Census start with carefully preparing a list of dwelling units, known as the Master Address File or MAF. Each unit on the list is contacted by mail and asked to self-respond. In 2020, self-response could be via the internet, telephone or mail. Then census takers, known as enumerators, are sent to each non-

responding unit (NRFU). Among census takers' job is to determine whether the unit is real and that it was a dwelling unit on April 1, then to determine whether it is occupied and vacant on April 1, and ultimately, to determine the number of occupants, if occupied. Finally, the Census Bureau determines the characteristics (such as race and ethnicity) of the occupants. Given the late and rushed dates for 2020 NRFU and, in many communities, a strong mistrust of any government agent, this is sure to prove harder than ever in 2020.

50. Along the way, mistakes happen. As a result, there is usually a small number of units on the address list for which no response was gathered. At other times, missing or contradictory information occurs during the post data collection processing, for example by errors in scanning a paper questionnaire. In terms of determining the apportionment counts, three situations are especially important:

a. Undetermined Household Size: When Census Bureau records indicated that a housing unit was occupied, but did not show the number of residents. For example, the residents refused to cooperate and all the neighbors would say was that there were people living there.

b. Undetermined Occupancy: When Census Bureau records indicated that a housing unit existed, but not whether it was occupied or vacant. This might occur when the NRFU enumerator sees curtains on the windows but cannot find any respondent or proxy to say whether anyone still lives there.

c. Undetermined Status (referring to housing-unit status): When Census Bureau records demonstrated some evidence of the physical existence of a unit, but conflicting or insufficient information about whether the address represented a valid, non-duplicated housing unit. That is, has the garage been converted into a possibly 'illegal' dwelling unit? Is it still a dwelling unit or now only a garage? Does a separate entrance into the basement indicate a dwelling unit or simply another way into the basement? The housing-unit status "nonexistent" includes more than simply a vacant lot. Other possibilities include buildings used only for business purposes and structures that were not (or not yet) fit for habitation.

51. Each of these situations is more likely to occur in older, poor neighborhoods with unconventional housing and distrustful residents, and so more likely to affect areas with large numbers of rural, immigrant, poor, and racial and ethnic minorities

52. The Census Bureau's plans called for "Supplementing response data with administrative records for those cases that had been identified as [Administrative Record] AdRec Occupied but for which a nonresponse follow-up attempt was unsuccessful and no subsequent self-response was received."[15] Accurately linking census returns with administrative records is a multi-step process, and one new to this census. Linkage must be done in a way to fully protect the protected personal information from the administrative records. It is also dependent on the quality of the identifying information (e.g. name and date of birth) collected in the census. Rushing this step could drive up the number of returns requiring count imputations. That is, if a useable response is not collected in the field, gaining the information from administrative records is the only alternative to Count Imputations. However, a rushed administrative records ("AdRec") supplementation has the potential of including the well-off, stable and connected population, and it could potentially make the differential undercount worse because quality AdRecs are disproportionately unavailable for Latinos, Asian Americans, and immigrants.

53. During Count Imputation a value is statistically assigned to each of these records:

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[15] 2020 CRO Plan, at 32.

a. Status Imputation: if status is missing, a status of valid or deleted is imputed.

b. Occupancy Imputation: if the process has determined or imputed to be a valid record and occupancy is missing, a value of occupied or vacant in imputed.

c. Household size imputation: if the process has determined or imputed the record to be valid and occupied, but household size is missing, the number of Census Day residents is imputed.

54. Count Imputation occurs after the response file is generated, merging the different modes of collection (internet, telephone, paper, NRFU) and the responses are unduplicated through PSA or other processes. If, as mentioned above, administrative records are available and used to account for missing response count data, this must also be done before Count Imputation. Units with missing count data most likely occur in areas with high levels of NRFU and with older, less "conventional" dwelling units. Thus, Count Imputation is vital for minimizing, if not avoiding, a differential undercount. In fact the characteristics (such as race and ethnicity) of some respondents will also be imputed, but this is not relevant to the apportionment counts, which only include the number of people by state and not their characteristics.

55. The 1960 Census was the first to use computers to produce the apportionment count. Not surprisingly, it was also the first census to use count imputation to resolve occasional discrepancies between expected and actual numbers of computer records. Count Imputations have been used ever since. The percent of Count Imputations has fluctuated by decade but has tended to be less than 0.5 percent. Still, Count Imputations have been considered an integral part of census post data collection processing. The Census Bureau has long argued that not statistically imputing a number of residents is equivalent to imputing a housing unit size of zero. The legality and constitutionality of count imputations was reviewed and validated by the

Supreme Court in *Utah v. Evans* (2002).

56. Although no one will know until the Decennial Response File (DRF), that is the merged and unduplicated file of responses including housing units and GQ, is prepared, it is probable that the need for Count Imputations will be higher in 2020 than in earlier censuses. This is because NRFU is taking place months after the Census Reference Date of April 1, 2020.[16]

57. The Census Bureau and its field staff face an enormous if not impossible task to meet their goal of counting everyone "once, only once, and in the right place," that is, the usual residence as of April 1, when visiting a housing unit in August and September. A "garage apartment" that existed in April, may now be just a garage. A separate "Mother-in-Law" apartment may now be just a part of the house. A unit may be vacant now, but was it vacant in April? If someone is living in the unit in September, did they live there in April? If not, who did? If respondents and neighbors are not knowledgeable or not cooperative, the NRFU enumerator can be faced with the choice between simply guessing or not reporting a status. Either way, the accuracy of the census is compromised. Therefore it is necessary to not just conduct Count Imputations but to take the time to review the results.

58. The Census Bureau has announced its goal of "[a]chieving an acceptable level of accuracy and completeness, with a goal of resolving at least 99% of Housing Units in every state, comparable with previous censuses."[17] Since the enumeration of Black, Latino, Asian American and other minority communities is differentially pushed to this delayed NRFU and because cooperation by residents and neighbors can be difficult in these situations (for example, because

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[16] Albert E. Fontenot Jr. & Timothy P. Olson, *Review of 2020 Operational Plan Schedule*, U.S. Census Bureau (Aug. 17, 2020) https://www.census.gov/content/dam/Census/newsroom/press-kits/2020/2020-operational-plan-schedule-review.pdf.

[17] *Id.*

of government distrust and the pandemic), these communities will be differentially affected. Given the difficulty of the task, based on my experience and knowledge, it is hard to see how the Census Bureau will meet this goal.

59. Count Imputations will likely mainly impact areas where the population is poor, rural, non-English speaking or of racial and ethnic minorities. This is because Count Imputations most often arise from problems in NRFU. Areas with a higher NRFU workload are at greater risk of a relatively high number of cases requiring Count Imputations. Also, the census takers will have greater difficulty in resolving a case in areas where distrust of government is high. Given the controversies over the "Citizenship Question" and the Presidential Memorandum to exclude "Illegal Aliens," distrust of the Census may be heightened in areas with a large Latino and Asian American population.[18] This could easily lead to a much higher number of unresolved cases requiring Count Imputations, with a quite skewed distribution disfavoring areas with poor, rural, and racial and ethnic minority populations.

60. The shortened time for post data collection processing will likely mean that Count Imputations cannot be carefully and accurately done or that there may be pressure to skip this step in order to meet the December 31st deadline.

61. If Count Imputations is not done properly, this result will distort both the Apportionment Counts and the statistics needed for redistricting (PL-94-171 files).

VI. COUNT REVIEW

62. Another important part of post data collection processing is the Count Review Operation (CRO). In Count Review, the preliminary results of the census are compared with outside

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[18] U.S. Census Bureau, McGeeney, Kyley et al., *2020 Census Barriers, Attitudes, and Motivators Study Survey Report: A New Design for the 21st Century* (January 24, 2019) https://www2.census.gov/programs-surveys/decennial/2020/program-management/final-analysis-reports/2020-report-cbams-study-survey.pdf.

information to detect anomalies, and if possible correct any large errors that are identified.

63. Post data collection Count Review has two components:

a. In the Census Count and File Review (CCFR), previously known simply as Count Review, Census Bureau demographers review the files for "systematic or large anomalies."[19] This review includes the DRF 1 and 2, Census Unedited File (CUF), and the Census Edited File (CEF). These files are compared against results from the 2000 Census, the 2010 Census, the recent results from the Population Estimates Program and recent results from the American Community Survey.[20]

b. Additionally, Census Bureau demographers were to work with State Demographers to review the results from the Group Quarters Enumeration. The Census Bureau has a long-standing working relationship with state demographers selected by their respective governors. These State Demographers bring an important and unique level of local knowledge to the census. This post data collection review of GQ addresses was designed to identify those GQs that are still potentially missing from the MAF or allocated to the wrong census block, and this was to be done in time for the errors to be corrected.[21]

64. Count Review is an important step in ensuring census accuracy and completeness. As the 2010 Assessment report stated: "The program did improve the accuracy of the census by identifying 73,716 missing housing units and having them counted in the census. It also identified 310 missing group quarters and had them counted in the census. Additionally, 173

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[19] 2020 Census Operational Plan v. 4.0., at 145.

[20] 2020 CRO Plan, at 11.

[21] 2020 Census Operational Plan v. 4.0., at 145.

group quarters misallocated to the wrong collection block were identified and updated."[22] The current plan is for NRFU to run through September 30 compared to the original schedule of ending on July 31 and the first revised schedule proposed by the Census Bureau of October 31. The current schedule has GQ enumeration lasting until September 3 compared to the original date of June 5.

65. The Census Bureau has only a limited number of trained demographers ready to carry out this vital quality check. Similarly, there are only a limited number of State Demographers, who certainly have other commitments as well. It is unclear that GQ Count Review can even be run due to the truncated schedule.

66. Count Review is not a process where one can double the resources and complete in half the time, nor is it a step that can be safely skipped.

VII. OTHER RISKS

67. Any changes to the planned work-flow to postpone steps bring increased risk. Any change to the tested processing flow, such as postponement, curtailment, or abandonment, in order to save time increases risk of a 'failed' census. As mentioned above, the Census Bureau's plans to 'streamline' the process increases the risk not only of errors along the way, but also, by implementing an untested system, catastrophic failure. "There is no such thing as a small software change."

68. Finally, the Census Bureau has traditionally provided not just the population totals but the allocation of Congressional seats to the states. This allocation is done by a complex algorithm known as the "Method of Equal Proportions." Since only whole seats can be allocated, this is

[22] U.S. Census Bureau, 2010 Census Planning Memoranda Series No. 203, Memorandum from Burton Reist on 2010 Census Count Review Program Assessment Report (June 26, 2012) https://www.census.gov/content/dam/Census/library/publications/2012/dec/2010_cpex_203.pdf.

known as an integer problem. As such, it must be carefully programmed and the program is extensively tested. Even small 'rounding' errors can mis-allocate a Congressional seat. The Census Bureau takes great pride and extreme care in this responsibility. As long as the Census Bureau is able to carry out the allocation of Congressional seats using rigorously-tested programs and long established quality checks, there is no reason to believe that it will not be properly done.

69. In this Declaration, I have described the risks of a greatly increased differential undercount and an inaccurate census that arise from the compressed time schedule being forced upon the Census Bureau professionals. These risks are not speculative, but real. Not all risks will result in a failure, but small failures can add up and cascade into a major crisis. If failures occur, the nation will suffer for the decade to come. The Census Bureau staff has worked a decade or more on its original plan, only to see it disrupted by COVID-19 and other developments. The Census Bureau's professional staff has clearly stated that the current schedule is unworkable. It does not take into account the extra challenges caused by COVID-19 and the current climate of distrust of government. The Census Bureau staff have been given three months where they clearly stated that they need six. The consequences for the nation of a badly flawed census are enormous. The consequences for racial and ethnic minorities are graver still. Given sufficient time and independence, the Census Bureau professional staff have a long history of working to produce accurate statistics and to minimize the differential undercount. Unfortunately, based on my knowledge and expertise, the truncated schedule does not provide sufficient time.

I declare under penalty of perjury that the foregoing is true and correct.

Howard Hogan

Executed on August _27___, 2020 at Owings, Maryland.

APPENDIX 1

Howard Hogan

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(301) 907-1460

PROFESSIONAL EXPERIENCE

U.S.CENSUS BUREAU, Washington, DC **1979 – 2018**

Chief Demographer 2011 - 2018

The Chief Demographer served as the Census Bureau's senior scientist on technical and statistical demography. He served as principal consultant to Bureau staff on methodological problems, and as a liaison to academic and other outside demographers. His research included the measurement of population change using the population estimates and the American Community Survey, the classification of race, and the measurement of coverage error. Served as mentor to junior staff.

Associate Director for Demographic Programs 2005 - 2011

As Associate Director, Dr. Hogan led the U.S. Census Bureau's programs that provide demographic, social and economic data about the nation's population and households and leads the statistical programs that produce population projections and estimates. He is responsible for the International Programs Center, the Population Division, the Housing and Household Economic Statistics Division, the Demographic Statistical Methods Division and the Data Integration Division. Under his leadership, important advances were achieved in the small area estimation of poverty, in the production of population estimates, and in the use of administrative records for statistical estimation. As the U.S. Government spokesman for 300 million population event, he dealt effectively with television, radio and print media.

Chief, Economic Statistical Methods and Programming Division 2002 - 2005

Dr. Hogan managed the development of software for the Census Bureau's economic programs including monthly indicator surveys, annual surveys, and the economic census, successfully moved towards adopting modern software development processes. He provided leadership to all mathematical statisticians working in the Economic Directorate. He led the international group that organized the Third International Conference on Establishment Surveys.

Chief, Decennial Statistical Studies Division 1998 - 2001

Dr. Hogan led the group of mathematical statisticians and programmers who are responsible for the statistical design of the Decennial Census, including statistical quality control design, coverage improvement activities, software quality control, content sampling, undercount measurement and census adjustment. He assisted three U.S. Solicitors General, and provided testimony cited in Supreme Court Case: *Utah v. Evans*. He successfully dealt with national print media on sensitive statistical issues, concerning Census methodology.

Assistant Division Chief, Research and Methodology, Business Division 1993 - 1998

He developed a program of research to apply statistical principles and methods to the Census Bureau's surveys of retail trade, wholesale trade, service industries and transportation. He developed methods to eliminate the area sample from the business establishment frame, saving millions annually. He led his team to develop new estimation methods for transportation survey, to revised the sample design for retail and wholesale surveys, and to improve sampling process, reducing the needed time by one year. Additionally, he developed exploratory and graphical methods to improve editing.

Chief, Undercount Research Staff, Statistical Research Division 1983 - 1993

He led the Census Bureau's effort to research, develop and implement methods to correct the 1990 Census for undercount. This multiyear research program included developing a research plan to address all issues concerning coverage measurement and adjustment for the 1990 Census. He designing and managing a large and complex survey, the 1990 Post-Enumeration Survey, including questionnaire design, processing plan, matching process design, imputation, post-stratification plan, estimation design, and census adjustment. He developed innovative methods to measure the uncertainty in demographic analysis estimates of population. He was called on to consult for the Swedish, UK and India statistical offices and to give legal depositions in Federal litigation.

Principal Researcher, Statistical Research Division 1979 - 1983
He developed alternative methods to measure the number of people missed in censuses and surveys, and conducted three statistical projects including an administrative records match and a longitudinal tracing study. He evaluated the population statistics system in Mauritius. He advised the Government of Morocco on census evaluation methods, designed a coverage measurement survey, and aided with the testing and development, with all consulting work was conducted in French.

ACADEMIC EXPERIENCE

GEORGE WASHINGTON UNIVERSITY, Washington, DC 1998 - 2015
Adjunct Professor, Department of Statistics
He teaches survey sampling.

WASHINGTON STATISTICAL SOCIETY, Washington, DC 1997
Instructor
He developed and twice taught a well-attended two day course on "Exploratory Data Analysis Using S-Plus."

GRADUATE SCHOOL, USDA, Washington, DC 1984 - 1996
Instructor
He taught courses on data analysis and on demography.

UNIVERSITY OF NORTH CAROLINA, Chapel Hill, North Carolina 1978 -1979
Visiting Scholar, Department of Biostatistics
He evaluated a family planning research project in Bangladesh on behalf of the Agency for International Development. He collaborated on statistical models in demography.

MACQUARIE UNIVERSITY, North Ryde, NSW, Australia 1978
Visiting Research Associate, Department of Statistics,
He conducted research into standard mortality tables.

UNIVERSITY OF DAR ES SALAAM, Tanzania, East Africa 1976 - 1978
Head, Demographic Unit
He taught courses in demography. He wrote and published articles on the demography of Tanzania. He was demographic advisor to the 1978 Census of Population and Housing.

EDUCATION

Pomona College	BA: Economics/Mathematics
Stockholm University	Certificate: Economics
The Woodrow Wilson School	MPA: Public Affairs
Princeton University	MA: Economics
Princeton University	Ph.D.: Economics (Demography) Dissertation: *Age Patterns of Infant Mortality*

PROFESSIONAL RECOGNITION

Jeanne E. Griffith Mentoring Award (2018): The award recognizes the mentoring of junior staff in the statistical community and is awarded annually based on advising, counseling, and motivating junior staff in their career to development, and serving as a role model through expertise, information and insight. The award is supported by the American Statistical Association Government Statistics and Social Statistics Sections, NORC, The Council of Professional Associations on Federal Statistics, Washington Statistical Society, and the Interagency Council on Statistical Policy.

Chair, Committee on Professional Ethics of the American Statistical Association (2013-2016). Awarded special recognition by the ASA Board for his leadership in the first revision in two decades of the Ethical Guidelines for the Practice of Statistics

Fellow of the American Statistical Association (2001): Citation "For outstanding contributions to census methodology, especially to the understanding of coverage and accuracy measurement critical to the Decennial Census; for statistical communication."

Chair, Survey Research Methods Section, American Statistical Association (2010).

Member, Committee on Populations Statistics, Population Association of America (2006 - 2009)

Country Representative, International Association of Survey Statisticians (2006 – now)

Chair of the Organizing Committee, International Conference on Establishment Surveys (2005 - 2007)

Program Chair, Survey Research Methods Section, American Statistical Association (2003)

Secretary, Julius Shiskin Award Committee (1993 - 2002)

Chairman of Nominating Committee, International Association of Survey Statisticians, (1994)

Representative at Large, Washington Statistical Society, (1993 - 1996)

LANGUAGES

French: He has consulted on technical statistical matters in French.

Swedish: He can read articles and engage in conversation.

Portuguese: He can engage in polite conversation.

Swahili: He is able to ask directions, order food and other basic tasks.

SELECTED PAPERS AND PUBLICATIONS

2019 "Babies no Longer: Projecting the 100+ Population", in Developments in Demography in the 21st Century, J. Singelmann, D. L. Poston, Jr (eds.), The Springer Series on Demographic Methods and Population, Analysis 48, https://doi.org/10.1007/978-3-030-26492-5_7 (with Sandra Leigh Johnson)

2017 "Reporting of Race Among Hispanics: Analysis of ACS Data," in *The Frontiers of Applied Demography*, D.A. Swanson (Ed.)

2017 "The coverage of young children in demographic surveys", Statistical Journal of the IAOS 33 (2017) 321–333 321, IOS Press, DOI 10.3233/SJI-170376 (with Eric B. Jensen)

2015 "Projecting Diversity: The Methods, Results, Assumptions and Limitations of the U.S. Census Bureau's Population Projections," *West Virginia Law Review*, Vol 117, (with J. Ortman and S.L. Colby) (`https://wvlawreview.wvu.edu/files/d/cf719326-445a-40d7-b1d1-ce7cdd32ca13/hogan-print.pdf`)

2014 "Assessing Accuracy in Postcensal Estimates: Statistical Properties of Different Measures," Emerging Techniques in Applied Demography, pp 119-136, (M. Hoque and L.B. Porter, Eds), (with Mary Mulry)

2014 "The Statistical Atlas of the 1870 Census and Other Early Census Visualization," Proceedings of the 2014 Joint Statistical Meetings.

2014, "An Aging Nation: The Older Population in the United States: Population Estimates and Projections," Current Population Reports, Issued May 2014, P25-1140 (with J.M.Ortman and V.A. Velkoff). This paper has been cited over 1,000 times.

2013 "Quality and the 2010 Census", Population Research Policy Review, DOI 10.1007/s11113-013-9278-5 (with Patrick J. Cantwell, Jason Devine, Vincent T. Mule Jr and Victoria Velkoff)

2011 "Do Current Race and Ethnicity Concepts Reflect a Changing America?" *Journal of Race and Social Problems*, forthcoming, (With Karen Humes).

2009 "Measurement of Race and Ethnicity in a Changing, Multicultural America," *Journal of Race and Social Problems*, DOI 10.1007/S12552-009-9011-5 (With Karen Humes).

2008 "Measuring Population Change Using the American Community Survey," *Applied Demography in the 21st Century*," S. Murdock and D. Swanson (eds), The Netherlands: Springer Publications, 13-30.

2004 "The Use of Statistical Methods in the U.S. Census" *The American Statistician*, August 2004, Vol 58, No.3, pp 1-10 (with Patrick Cantwell and Kathleen Styles).

2003 "Software Process Improvement Efforts at the US Census Bureau, Experience of the Economic Directorate," *Survey and Statistical Computing IV: The Impact of Technology on the Survey Process*, edited by R. Banks *et al*, 2003 Association for Survey Computing (with Ellen Soper).

2003 "The Accuracy and Coverage Evaluation: Theory and Design," *Survey Methodology*, December 2003, vol. 29 no. 02.