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UNITED STATES DISTRICT COURT  
 FOR THE NORTHERN DISTRICT OF CALIFORNIA  
 SAN JOSE DIVISION

NATIONAL URBAN LEAGUE; LEAGUE OF  
 WOMEN VOTERS; BLACK ALLIANCE FOR  
 JUST IMMIGRATION; HARRIS COUNTY,  
 TEXAS; KING COUNTY, WASHINGTON;  
 CITY OF LOS ANGELES, CALIFORNIA;  
 CITY OF SALINAS, CALIFORNIA; CITY OF  
 SAN JOSE, CALIFORNIA; RODNEY ELLIS;  
 and ADRIAN GARCIA,

Plaintiffs,

v.

WILBUR L. ROSS, JR., in his official capacity  
 as Secretary of Commerce; U.S. DEPARTMENT  
 OF COMMERCE; STEVEN DILLINGHAM, in  
 his official capacity as Director of the U.S.  
 Census Bureau; and U.S. CENSUS BUREAU,

Defendants.

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CASE NO. 20-cv-5799-LHK

**DECLARATION OF DR. THOMAS A.  
 LOUIS, PHD IN SUPPORT OF  
 PLAINTIFFS' MOTION FOR STAY  
 AND PRELIMINARY INJUNCTION**

**EXPERT DECLARATION OF DR. THOMAS LOUIS, PHD**

**I. Introduction**

1. On August 3, 2020, the Census Bureau and Commerce Department announced that the Bureau will stop collecting census data on September 30, 2020 and to report the population totals used for congressional apportionment to the President by December 31, 2020. These revised deadlines will severely compromise the quality, accuracy, reliability, and indeed the legitimacy of the 2020 Census numbers used for apportionment, redistricting, and the many other important data products based on them.

2. The importance of a high-quality census goes well beyond apportionment. Quoting the Census Bureau's website, "The 2020 Census will determine congressional representation, inform hundreds of billions in federal funding every year, and provide data that will impact communities for the next decade."<sup>1</sup>

3. I have reviewed the Census Bureau's operational plans for the 2020 Census, the documentation that the Bureau issued describing the actions it is taking in response to the COVID-19 pandemic, its August 3, 2020 press statement announcing its intention to truncate the 2020 Census, its recently issued "2020 Operational Schedule Review," and a variety of other materials that the Bureau has posted to its website. I conclude that the administration's decision to shorten the timelines for data-collection and data-processing in the face of COVID-19 are very likely to negatively affect the accuracy, reliability, and legitimacy of this decade's census count.

**II. Qualifications and Retainer Information**

4. I briefly describe specific aspects of my qualifications and work experience that establish my credentials as an accomplished statistician and an expert on the Census Bureau and the Decennial Census. I have also attached a copy of my CV to this declaration.

5. I have been retained to provide this declaration for a \$1,000 flat fee.

6. From 2013 to 2015, I served as Associate Director for Research and Methodology and Chief Scientist at the Census Bureau, working under an Interagency Personnel Agreement between the Bureau and Johns Hopkins University. I have held professorships in Biostatistics

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<sup>1</sup> <https://2020census.gov/en/census-data.html>.

1 and Mathematics, employment at the Rand Corporation, and have been an active participant in  
 2 professional organization activities concerning both the census and statistical research and  
 3 methodology more generally. As a result of these roles, I have a deep understanding of the skills  
 4 and processes that are necessary to achieve a complete and accurate Decennial Census.

5 7. The Research and Methodology Directorate at the Census Bureau is charged with  
 6 conducting research and technology transfer related to survey design, disclosure avoidance, use  
 7 of administrative records, statistical methods, economics, and survey measurement. The  
 8 Directorate's staff collaborates broadly within and outside the Bureau. In my role as Associate  
 9 Director for Research and Methodology and Chief Scientist at the Census Bureau, I gained deep  
 10 familiarity with many of the statistical processes and standards necessary to generate a high  
 11 quality census. During my tenure, I participated in the weekly management committee meetings  
 12 where policy for the 2020 Decennial Census was set, as well as in advisory committees,  
 13 including the advisory committee for the 2020 Decennial Census. I chaired the Census Bureau's  
 14 data quality standards committee. I also advised and mentored staff in my directorate.  
 15 Additionally, I occasionally represented the Bureau externally. In 2016, though no longer  
 16 associate director, I continued to advise the Bureau on statistical analyses it uses to produce the  
 17 data necessary for making alternative language determinations under Section 203 of the Voting  
 18 Rights Act.

19 8. Since 1973, I have held tenure-track and tenured professorships in biostatistics or  
 20 mathematics. Since 2002, I have been a Full Professor in the Department of Biostatistics, Johns  
 21 Hopkins Bloomberg School of Public Health. In 2018, I became Professor Emeritus in the same  
 22 department.

23 9. In addition to the work experience described above, I am an elected member of  
 24 the International Statistical Institute and a Fellow of the American Statistical Association, the  
 25 American Association for the Advancement of Science (AAAS), and the Institute of  
 26 Mathematical Statistics. I am a National Associate of the National Research Council, an  
 27 Honorary Life Member of the International Biometric Society, and hold an Honorary Doctorate  
 28 from Hasselt University, Belgium. I have served as coordinating editor of the *Journal of the*

1 *American Statistical Association*, co-editor of *Biometrics*, and president of the International  
 2 Biometric Society. I chaired the American Statistical Association's Section on Bayesian  
 3 Statistical Science, and the Statistics Section of the American Association for the Advancement  
 4 of Science. I have served on the National Academy of Science's Committee on National  
 5 Statistics and on a variety of panels including the Panel on Estimates of Poverty for Small  
 6 Geographic Areas. I also chaired the Panel on Formula Allocation of Federal and State Program  
 7 Funds. In 2020, I chaired the committee that reviewed the Joint Program in Survey  
 8 Methodology, a graduate-degree program offered jointly by the University of Maryland and the  
 9 University of Michigan.

10 10. I have been asked by counsel for the Plaintiffs to comment on the effects on data  
 11 quality of the federal government's August 3 decision to end data-collection for the Decennial  
 12 Census on Sept. 30, 2020, and report apportionment data to the President of the United States by  
 13 Dec. 31, 2020. Specifically, I have been asked to address:

- 14 • The Census Bureau's data-processing operations for the Decennial Census.
- 15 • The importance of the Census Bureau's data-processing operations for the quality  
 16 of data products based on the Decennial Census, with specific focus on the state  
 17 population totals used for apportionment and the population counts used for  
 18 redistricting.
- 19 • Any effects that the decision to halt Decennial Census data-collection on Sept. 30  
 20 and truncate data-processing operations will have on the quality of data products  
 21 based on the Decennial Census.

22 11. My opinions and judgments in this declaration are based on the knowledge I have  
 23 gained through my education and experience. They are my own and do not necessarily represent  
 24 those of Johns Hopkins University.

25 12. My declaration will first provide some general background for understanding the  
 26 census operations that are endangered by the new truncated timelines. Then, it will explain how  
 27 the Census Bureau's various data-collection and data-processing operations work together to  
 28 produce a fair, accurate, and legitimate count. From there, the declaration will describe the

1 general consequences that substandard data collection has for census accuracy and how the  
 2 Bureau's new, shortened timeline will have serious negative effects on the adequacy of its data  
 3 collection. Then, I will describe the major components of the census's data-curation and-  
 4 processing operations, explaining along the way how each will be negatively affected by the  
 5 Bureau's new, truncated timelines. Finally, I will describe how inaccuracies in census data will  
 6 affect two of the Bureau's most significant data products: the population totals used to apportion  
 7 the U.S. House of Representatives and the data files that states use to draw electoral districts.

### 8 **III. Background**

9 13. A successful decennial census requires over ten years of advance planning,  
 10 testing, evaluating, innovating, revising, and stress-testing, as well as substantial time developing  
 11 questionnaires, webpages, and hand-held devices.<sup>2</sup> The Census Bureau had to resolve  
 12 management challenges, such as renting and equipping field offices, as well as vetting, hiring,  
 13 and training hundreds of thousands staff, including the enumerators who will travel to housing  
 14 units all around the country to collect their occupants' responses.

15 14. Then, the Bureau must conduct the actual census, first by attempting to encourage  
 16 people to self-respond via the internet, hard copy questionnaires, or telephone hotlines. If every  
 17 household were to respond in one of these ways, the Bureau would have no need for Non-  
 18 Response Follow-Up (NRFU)—the process by which the Bureau, as the term suggests, follows  
 19 up directly with housing units that do not provide their answers to the census questionnaire early  
 20 in the census-taking process. But, at present, only approximately 64% of households have self-  
 21 responded. That leaves about 56 million addresses that hundreds of thousands of census takers  
 22 must visit to collect the required information.

23 15. During and after data collection, the Bureau evaluates the information in its  
 24 databases, replaces missing values with best estimates, corrects anomalies, assesses the quality of  
 25 the resulting data, and improves that data (to the degree possible). Finally, the Bureau judges  
 26 each of its data products to determine whether they are "fit for purpose" and releases only that

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27 <sup>2</sup> See U.S. Census Bureau, *2020 Census Operational Plan*, Version 4.0 (2018),  
 28 [https://www2.census.gov/programs-surveys/decennial/2020/program-management/planning-](https://www2.census.gov/programs-surveys/decennial/2020/program-management/planning-docs/2020-oper-plan4.pdf)  
[docs/2020-oper-plan4.pdf](https://www2.census.gov/programs-surveys/decennial/2020/program-management/planning-docs/2020-oper-plan4.pdf).

1 data that the Bureau concludes is fit. The first bodies of information that the Bureau releases are  
 2 the state population totals that support congressional apportionment, then the population files  
 3 used for redistricting. These two major data releases are followed by a wide variety of data  
 4 products based at least in part on the Decennial Census.<sup>3</sup>

5 16. All the foregoing is very challenging. But the advent of COVID-19 has  
 6 considerably amplified these challenges, and, consequently, the risks to achieving the Census  
 7 Bureau's mission of "counting every person, counting them once, and counting them in the right  
 8 place." For example, as a result of COVID-19, NRFU operations were delayed, the difficulty of  
 9 hiring and training enumerators increased, and the willingness of households to interact with  
 10 enumerators decreased. In this context, truncating or otherwise altering census processes to meet  
 11 the revised deadline of September 30, 2020 to complete NRFU data collection, the December 31,  
 12 2020 deadline for delivering the population counts to be used for apportionment, and the March  
 13 30, 2021 deadline for delivering the population counts to be used for redistricting, will degrade  
 14 the actual and perceived quality of the Decennial Census data, as compared to the data that the  
 15 Bureau would be able to produce if it could continue collecting data until October 31, 2020,  
 16 deliver the apportionment counts in April 2021, and transfer the redistricting data to the states in  
 17 July 2021. These circumstances will also degrade trust in the Decennial Census data.

18 17. The Census Bureau is staffed by skilled and dedicated civil servants, and I believe  
 19 that they will do everything in their power to meet the revised deadlines. But for the Bureau's  
 20 staff to do so, some key operations will need to be eliminated or abridged. In so doing, there will  
 21 be a considerable degradation in census quality and its validity to support policy.

22 18. For more than ten years, the Bureau has been planning, experimenting, and lab-  
 23 and field-testing for the 2020 Census. Along the way, the Bureau has been challenged by funding  
 24 shortfalls and, now, COVID-19. The new deadlines will compromise the quality of collected data  
 25 and considerably increase the need for error correction, imputation, and other "cures" that are

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 27 <sup>3</sup> See U.S. Census Bureau, *2020 Census Detailed Operational Plan for: 19. Response Processing*  
 28 *Operation (RPO)*, Version 2.0 (2019), [https://www2.census.gov/programs-](https://www2.census.gov/programs-surveys/decennial/2020/program-management/planning-docs/RPO_detailed_operational_plan-v2.pdf)  
[surveys/decennial/2020/program-management/planning-docs/RPO\\_detailed\\_operational\\_plan-](https://www2.census.gov/programs-surveys/decennial/2020/program-management/planning-docs/RPO_detailed_operational_plan-v2.pdf)  
[v2.pdf](https://www2.census.gov/programs-surveys/decennial/2020/program-management/planning-docs/RPO_detailed_operational_plan-v2.pdf).

only, at best, partial fixes. Once NRFU is terminated, it will be impossible to go back into the field because field offices will be closed and field staff terminated. Additional time for NRFU would considerably improve the completeness and quality of collected data by helping the Census Bureau avoid lost opportunities.

#### IV. Complex, Integrated Systems

19. Successfully planning, implementing, and completing the 2020 Census is a complex task. This is true for the Decennial Census as a whole, as well as its many component operations and sub-operations, including the operations the Bureau uses to collect the data it receives from well over one-hundred million households and then process it into usable forms. This complexity is well documented in the Bureau's own reports.<sup>4</sup> Figures 1, 2, and 3—which are included at the end of this declaration and which are drawn from the Bureau's own publicly available operational plans—graphically illustrate some of the many operations that must be successful for the census's results to be accurate and reliable. Some of these operations proceed in parallel, others sequentially, many recursively.

20. The Bureau's data-collection and data-curation/processing operations have benefitted from considerable automation, but clerical and expert attention is still needed for many components. The need for personnel time is most obvious for NRFU operations, for which very large numbers of vetted and trained field staff are key. But many components of the post-collection phase also require considerable personnel time and expertise. Importantly, substandard performance on some tasks challenges subsequent tasks and can degrade the overall quality of the census data. This is true both within the data-collection and data-processing operations, as well as between those two operations. Under these circumstances, the federal government's decision to shorten the Bureau's remaining time to complete the 2020 Census will create a cascading chain of consequences. First, shortening the NRFU timeline will result in substandard data collection. Then, such substandard collection will increase the scope of the work that the Bureau will have to perform in the data processing phase. At the same time, degraded data,

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<sup>4</sup> See *2020 Census Detailed Operational Plan for: 19. Response Processing Operation (RPO)*, version 2.0, 2019); *2020 Census Operational Plan*, version 4.0 (2018).



truncated timelines, and labor shortages will significantly constrain the Bureau's ability to correct for any data collection errors it encounters. Together, these conditions will lead to a substantially less accurate, lower quality 2020 Census.

#### **V. Consequences of Substandard Data Collection**

21. The quality, or lack thereof, of the data collection operation, including Non-Response Follow-Up (NRFU), is the most obvious, and likely the most important, example of the cascading consequences of substandard census performance that the Bureau's new timelines will produce. The quality of the data that the Census Bureau collects (a) directly increases with the number of households for which the Bureau has complete data, (b) is aided by the number of households for which the Bureau has partial data, and (c) is degraded by the number of households with no directly-collected information.<sup>5</sup> Information is directly collected if it is obtained by self-response (internet, telephone, or hard-copy) or obtained by field staff during NRFU.

22. There are data quality assessments and enhancements required for all data that the Bureau collects. But, the challenges of assessing and enhancing data are greatest for households that require all or most of their information to be "imputed"—that is, derived from administrative records and other sources because the people whom the data concerns have not responded directly to the census. The Bureau uses modeling to develop imputation models over the pre-census period, but these models always require additional expert inputs in the face of the realities the Bureau encounters in the field when the census begins. Crucially, the less data the Bureau has about housing units in a given geography, the more difficult it becomes for the Bureau to correctly impute households. I discuss this problem at greater length in Section XI below. Ultimately, failure to collect high-quality data during NRFU will seriously impact the Bureau's processing operations. By constraining data collection, the Bureau's new timelines will create significant obstacles for data processing.

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<sup>5</sup> See Joseph J. Salvo, *The Importance of Self-Response in the 2020 Census*, <https://www1.nyc.gov/assets/planning/download/pdf/planning-level/nyc-population/census2020/importance-self-response.pdf> (last visited Aug. 23, 2020); Joseph J. Salvo et al., *Census 2020 Why Increasing Self-Response is Key to a Good Count*, Significance (Jan. 29, 2020), <https://rss.onlinelibrary.wiley.com/doi/10.1111/j.1740-9713.2020.01356.x>.



## VI. Consequences of Substandard Data Collection for Hard-To-Enumerate Populations

23. In addition to the inherent challenge of imputing a large amount of data, the challenge is considerably increased for “hard to count” geographic and demographic groups. The Bureau makes special efforts to obtain self-reported information from these groups, because the quality of administrative records and other information used in imputation models is lower for them.<sup>6</sup> Therefore, NRFU is central to the Bureau’s operational plans to maximize directly-collected information. NRFU must be as high-quality and complete as possible, so that directly collected data can be used with relatively little need for quality enhancement (see Section VIII). A shortened NRFU time reduces the amount and quality of information collected directly from the homeless, minority groups, group quarters (facilities such as nursing homes, prisons, colleges), and other groups. And, because of the relatively poor quality of the data available to impute the members of such hard-to-count groups that the Bureau misses during NRFU, a shortened NRFU period imperils the Bureau’s ability to provide trustworthy data for these groups.

## VII. Additional Impact of Substandard Data Collection

24. Though a principal role of NRFU is to obtain data from households and individuals who have not self-responded, its role is far greater. NRFU can resolve issues that cannot be resolved as well (or at all) in the data processing phase. One example of a problem that NRFU can resolve more easily than later operations is “non-ID response,” that is, census responses that people have submitted through the Bureau’s website without providing a census-issued ID number. Non-ID response may produce an address that is not in the Bureau’s Master Address File (MAF), which the Bureau uses to contact and track every housing unit in the country. When that happens, the Bureau’s field staff must go to the presumed location during NRFU, check the response for validity against the housing unit they locate at that address, and possibly correct the information earlier submitted through the website. Also, many duplications

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<sup>6</sup> See Dave McClure et al., *Administrative Records in the 2020 US Census: Civil Rights Considerations and Opportunities*, Urban Institute (2017), [https://www.urban.org/sites/default/files/publication/90446/census\\_ar\\_report.pdf](https://www.urban.org/sites/default/files/publication/90446/census_ar_report.pdf); Z.H. Seeskin et al., *Constructing a Toolkit to Evaluate Quality of State and Local Administrative Data*, Int’l J. Population Data Sci. (Jan. 2019), <https://ijpds.org/article/view/937/1031>.

1 and vacancies can be resolved in the field. But these problems can only be resolved while field  
 2 operations are active. As these examples reinforce, shortening the time for NRFU, as the  
 3 Administration has declared and the Bureau has implemented, will cause the quality of the data  
 4 that the Bureau will collect to be substantially worse.

### 5 **VIII. Data Processing and Curation**

6 25. As a baseline matter, even if all households, group quarters, and individuals self-  
 7 responded to the census, the Bureau would still have to invest considerable work and time to  
 8 make the data fit for use. Among the many tasks that the Bureau has to perform include:

- 9 • transforming written responses into code that computers can read;
- 10 • checking (and ideally fixing) illogical relations among data items, for example a
- 11 parent who is younger than their child;
- 12 • checking the accuracy of geocoding (location), for example an address in one
- 13 state that is geocoded to another;
- 14 • detecting and remediating over- or under-counts in various domains (such as
- 15 different geographic areas or demographic groups);
- 16 • conducting the census count review; and,
- 17 • generally assessing and upgrading data quality and reliability.

18 26. Some processes are substantially sequential, requiring data to be collected before  
 19 being processed. But many components of data curation are recursive. This means that a  
 20 reviewer must take an initial pass through the data to identify issues, ideally resolve those issues,  
 21 and then revisit the resulting data looking for new or additional issues. Additionally, staff, time,  
 22 and other resources are needed to check that all aspects of the computer programming are  
 23 correct, and some issues only emerge when the actual data are being processed.

24 27. Though many processes are automated, many require expert input, and therefore  
 25 require time. For example, the Bureau has to a large degree automated outlier detection and  
 26 identification. The goal of detection is to identify data items, individuals, or households that have  
 27 values that appear anomalous relative to previously collected information or the predictions of  
 28 the Bureau's statistical models. Examples include the age structure of a housing unit occupied

1 by a family with the same name as in the previous census, that is incompatible with the ten-year  
2 interval; or a number of dependent-aged children that is incompatible with tax records.

3 28. When the Bureau identifies outliers, it must then search for additional information  
4 to correct them. Many of these activities require expert input. As is the case in all data curation  
5 contexts, a computer algorithm cannot do it all. A person reviewing suspected outliers must ask  
6 whether the problematic value is idiosyncratic, or if it is a marker of a more general problem. If  
7 the former, can it be fixed? If the latter, can the more general problem be identified and the data  
8 adjusted? In the census context, an example of a general problem is that an enumerator has  
9 reported a large amount of inaccurate data. If NRFU is still active, some can be corrected in the  
10 field. Another example, one that operates in all contexts, is outliers induced by computer  
11 programming errors. Generally, these can be fixed in the data curation phase. In general, some  
12 error remediation can occur while NRFU is active, some once NRFU is closed, some will be  
13 difficult to resolve completely.

14 29. These are all time-consuming operations that will be made harder by a truncated  
15 NRFU period, both because it will reduce the time available to conduct field corrections of  
16 anomalies, and will also increase the amount of missing data that must be addressed by data  
17 curation, time that hasn't been made available.

## 18 **IX. Impact of Revised Timelines**

19 30. Based on my knowledge and experience, it is my opinion that the Bureau's  
20 revised timelines have forced it to cut corners to meet the December 31, 2020 and March 30,  
21 2021 deadlines. For example, in the Bureau's August 17, 2020 Review of 2020 Operational Plan  
22 Schedule, the Census Count Review Operation is not mentioned.<sup>7</sup> The omission of the Count  
23 Review Operation is a point of significant concern, to the extent that omission reflects the  
24 Bureau's decision either not to conduct it, or to conduct it in a less complete or robust manner.  
25 The Count Review is an important quality control operation. The Count Review Operation helps

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27 <sup>7</sup> See Albert E. Fontenot & Timothy P. Olson, *Review of 2020 Operational Plan Schedule* (Aug.  
28 17, 2020), <https://www.census.gov/content/dam/Census/newsroom/press-kits/2020/2020-operational-plan-schedule-review.pdf>.

1 enhance the accuracy of the 2020 Census by, among other things, “[e]valuating census responses  
2 and subsequent data files at multiple levels of geography for reasonableness and verifying that  
3 edits have been properly applied.”<sup>8</sup>

4 31. This is a very time-consuming and important operation, which the Census Bureau  
5 has previously concluded is essential to an accurate count. Eliminating it will help the Bureau  
6 achieve the December 31, 2020 deadline for delivery of apportionment data, but will do so at a  
7 considerable cost in the quality and credibility of that data.

8 32. The Bureau’s latest schedule highlights additional concerns. For example, the last  
9 item on slide 9 of the August 17, 2020 Review of 2020 Operational Plan Schedule reports,  
10 “Streamlining backend processing to deliver apportionment counts by the statutory deadline of  
11 December 31, 2020.” Inevitably, streamlining will degrade quality, because the systems and  
12 procedures that have been developed and tested over the decade are designed to be both  
13 necessary and sufficient. So, alteration will necessarily depart from these best practices.

14 33. Additionally, slide 17 reports that, “Professional career staffers at the Census  
15 Bureau are evaluating the processes and procedures and incorporating technological  
16 developments, such as the improvements in the quality of the Master Address File, to determine  
17 how to effectively and accurately deliver apportionment counts by the statutory deadline of  
18 December 31, 2020.” The slide contains no information to suggest that the evaluation will reveal  
19 shortcuts that will produce high-quality counts by the deadline. In any event, any shortcut that  
20 the Bureau would identify through this evaluation would require extensive assessment to  
21 determine that it is fit to purpose. The timeframe that the Bureau has now imposed on the process  
22 is unlikely to support that robust and necessary assessment.

23 34. Finally, all of the Bureau’s post-data collection activities are compromised by the  
24 requirement that Bureau personnel dedicate resources to developing population files on the  
25 citizen voting-age population of each state, to comply with an executive order from President  
26 Trump. Even under appropriate timelines for other activities, diversion of resources to this task

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27 <sup>8</sup> U.S. Census Bureau, *2020 Census Detailed Operational Plan for: 23. Count Review Operation*  
28 *(CRO)*, Version 1.0 (2019), <https://www2.census.gov/programs-surveys/decennial/2020/program-management/planning-docs/CRO-detailed-operational-plan.pdf>.

1 would be damaging. But under the shortened deadlines, this diversion of resources will be  
 2 especially damaging.

### 3 **X. Administrative Records**

4 35. Several of the processes outlined above can—under certain circumstances—be  
 5 aided by information in administrative records, even in cases where no data are missing for a  
 6 household. Incomplete or substandard data collection adds the need to impute missing values, as  
 7 well as increases the Bureau’s workloads for error-checking and -adjudication. Figures 2 and 3  
 8 —both of which are drawn from the Bureau’s detailed operational plans—display the  
 9 complexities and dependencies of these processes. In 2020 Census Supporting Statement Part A,  
 10 the Census Bureau indicates that 2020 Census operations and assessments would substantially  
 11 rely on federal administrative records (SSA, IRS, CMMS, HUD, USPS, etc.), state records  
 12 (SNAP, WIC, etc.) and local records (AdRecs), as well as third-party data from commercial  
 13 operations and preexisting Census Bureau information (such as data from previous decennial  
 14 censuses and the American Community Survey). Under the Bureau’s original plans for the 2020  
 15 Census, this information would be used to enumerate or help enumerate or validate (i.e., check to  
 16 see if collected data are compatible with information from other sources) several millions of  
 17 households. It would also be used to reduce the NRFU workload. Decades of researching,  
 18 collecting, and harmonizing this data undergird this integral component of census operations.

19 36. But, while administrative records can increase efficiency and accuracy, their use  
 20 is by no means push-button. For example, state and local records vary in quality, and relations  
 21 amongst data items from different sources can vary by geography.<sup>9</sup> These and other features  
 22 require considerable time and expertise in the data-processing stages to implement correctly.

23 37. Cutting the census timelines short will reduce the quality of the data—that is,  
 24 increase the distance between delivered and actual values.

### 25 **XI. Imputation**

26 38. Along with administrative records, imputation is used to fill in incomplete

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27 <sup>9</sup> See Nat’l Acad. of Sci., Engineering, & Med., *Innovations in Federal Statistics, Combining*  
 28 *Data Sources While Protecting Privacy* (2017), [https://www.nap.edu/catalog/24652/innovations-](https://www.nap.edu/catalog/24652/innovations-in-federal-statistics-combining-data-sources-while-protecting-privacy)  
[in-federal-statistics-combining-data-sources-while-protecting-privacy](https://www.nap.edu/catalog/24652/innovations-in-federal-statistics-combining-data-sources-while-protecting-privacy).

1 response records using data from “similar” households. The validity of any imputation depends  
 2 on sophisticated matching algorithms to identify “similar” units and relevant administrative  
 3 records. Imputed values can, if arrived at carefully and based on high-quality data, have good  
 4 validity. But, of course, the Bureau would very much prefer to have directly collected  
 5 information as a starting point, because directly collected information is higher quality data.<sup>10</sup>

6 39. The need for massive imputation taxes staff time and can tax the pool of donor  
 7 households—that is, households with attributes similar to the one with missing information—  
 8 used to fill in missing information because it may lead to that pool running out of good matches.  
 9 What this means, concretely: A large portion of imputation depends on “borrowing” information  
 10 from other, “similar” households. As the need to impute increases, the relative number of good  
 11 matches decreases. This is especially true for populations such as a small minority group in a  
 12 census block or block group. As for many other data-processing operations, high quality  
 13 imputation takes time. If the time devoted to it is reduced, there will likely be housing units with  
 14 only partially resolved issues, but the Bureau will need to treat them as resolved, resulting in  
 15 poor quality. For example, administrative records or paradata (context information collected by  
 16 field staff) may show that a housing unit is occupied. But, the Bureau might not succeed in  
 17 collecting any data from the unit. Because the unit is occupied, the Bureau will have to use  
 18 imputation to produce a count of the residents. Due to the lower quality of administrative records  
 19 for hard-to-count populations, the imputed values are likely to be less accurate for hard -to- count  
 20 groups than for the relatively easy to count.<sup>11</sup> A situation such as this lays the foundation for  
 21 differential undercounts, including racial and ethnic differential undercounts, and a generally less  
 22 accurate and fair census. Foreshortened NRFU will create many such situations.

## 23 **XII. Undercount and Overcount**

24 40. Under- and over- counting in general biases counts, as do under- and over-

25 \_\_\_\_\_  
 26 <sup>10</sup> See Joseph J. Salvo, *The Importance of Self-Response in the 2020 Census*,  
 27 [https://www1.nyc.gov/assets/planning/download/pdf/planning-level/nyc-](https://www1.nyc.gov/assets/planning/download/pdf/planning-level/nyc-population/census2020/importance-self-response.pdf)  
 28 [population/census2020/importance-self-response.pdf](https://www1.nyc.gov/assets/planning/download/pdf/planning-level/nyc-population/census2020/importance-self-response.pdf) (last visited Aug. 23, 2020)

<sup>11</sup> See Dave McClure et al., *Administrative Records in the 2020 US Census: Civil Rights Considerations and Opportunities*, Urban Institute (2017), [https://www.urban.org/sites/default/files/publication/90446/census\\_ar\\_report.pdf](https://www.urban.org/sites/default/files/publication/90446/census_ar_report.pdf).

counting for specific geographic or demographic groups. The bias can influence apportionment, redistricting, and a variety of other uses of census products. As for most Census operations, the situation is complex. The Bureau's ability to identify and remediate problems with the data depends on previous Decennial Census data and other information, including administrative records. Pre-release record-matching of addresses and names is used to identify and reduce over-counts.

### **XIII. Apportionment**

41. A great deal of curation is necessary before 2020 Census data are fit for use. The challenges depend to a degree on the intended use, and while it is the case that producing accurate state-wide total counts is less challenging than providing counts for smaller geographic or demographic domains, most of the issues and procedures identified in Section VIII must be addressed or deployed before apportionment figures should be delivered to the President and Congress. For example, it is well known that children under 5 years old are under-counted. Because of this systemic undercounting problem, a state's total population count will be lower than the true, underlying value.

42. One aspect of this systemic undercounting issue is key for apportionment. The percentage of children under 5 years old varies by state, as does the age-specific under-count. Consequently, when this undercount manifests, state-specific computed "shares" (percents) of total U. S. population will be different from their true, underlying shares, and congressional apportionment may be different from what would be produced by accurate data. This small example communicates the general idea. But the challenge is by no means small because there are a large number of domains (including, age, race, urban/rural, and citizenship status) where inaccuracy could generate inappropriate apportionment. Whatever the causes, if the deviations from the true, underlying state populations are large enough and spread unequally across states, state-specific shares of the U. S. population will differ from their true, underlying values. To achieve this accuracy goal, curation must be effective, and effectiveness requires considerable time and expertise. Meeting the current December 31, 2020 deadline will severely compromise the effectiveness of these processes and thereby will compromise the success of the



1 apportionment count.

2 **XIV. Redistricting**

3 43. By March 30, 2021, the Bureau plans to send redistricting counts to the states.  
 4 This information is used to redraw legislative districts based on population changes. All of the  
 5 challenges so far identified operate with additional force in developing high-quality, redistricting  
 6 information. Accuracy is required at fine geographic and relatively fine demographic scales.  
 7 Truncating field collection and data curation will severely compromise the quality of the  
 8 redistricting data.

9 **XV. Coda**

10 44. In summary, truncation of the time for field operations and data curation,  
 11 especially in the midst of the COVID-19 pandemic, will severely compromise the quality of the  
 12 census data to be used for apportionment, redistricting, for policy and economic development,  
 13 and for research. All these uses and more are key pillars of our democratic society, and every  
 14 effort should be made to “get it right.” The Bureau will most likely release numbers at the end of  
 15 the census process. But if the quality of those numbers is low, fair apportionment and  
 16 redistricting will be compromised. Widespread perceptions of inaccuracy, for example generated  
 17 by post-release corrections will degrade trust in these numbers specifically, in 2020 decennial  
 18 data more generally, and, likely, in all other Census Bureau produced information. Restoring the  
 19 Spring and Summer 2021 deadlines to deliver curated and processed data will provide the  
 20 Bureau time to substantially improve all of its products.

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## Tables and Figures

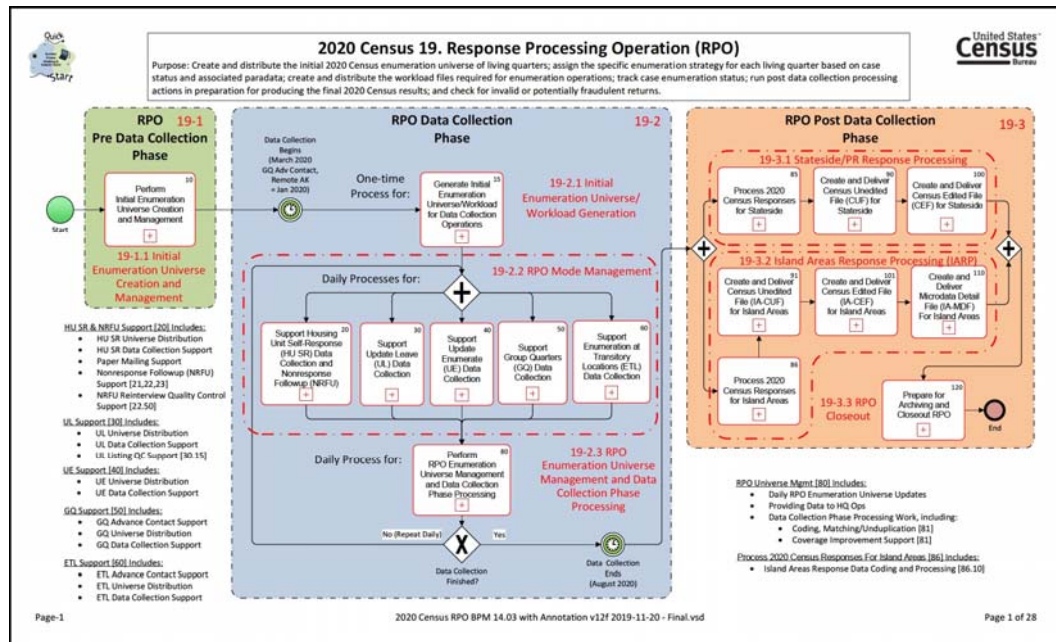


Figure 1: RPO Operational Context Model

**Figure 1:** Top-level business process model, Figure 01 in 2020 Census Detailed Operational Plan for: 19. Response Processing Operation (RPO), version 2.0, 2019.

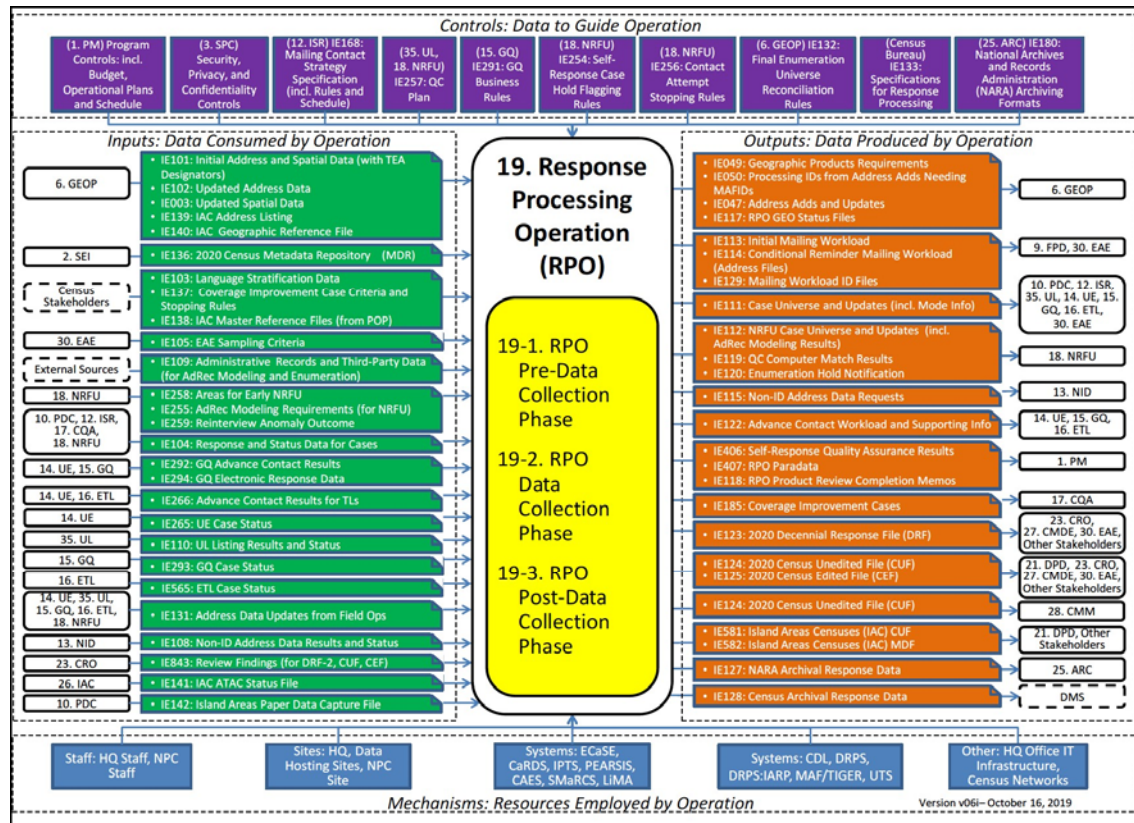


Figure 3: Response Processing Operation (RPO) Context Diagram

**Figure 2:** Context Diagram, Figure 03 in 2020 Census Detailed Operational Plan for: 19. Response Processing Operation (RPO), version 2.0, 2019.

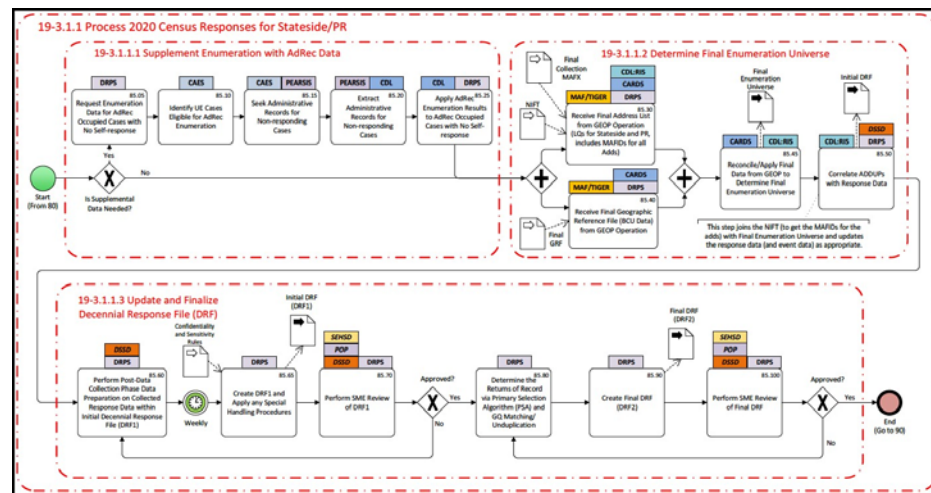
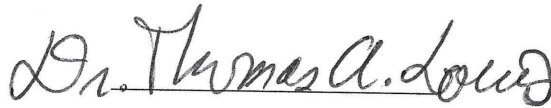


Figure 58: Process 2020 Census Responses for Stateside/PR

**Figure 3:** Constituent activities for processing Stateside and Puerto Rico, Figure 58 in 2020 Census Detailed Operational Plan for: 19. Response Processing Operation (RPO), version 2.0, 2019.

1 Pursuant to 28 U.S.C. § 1746, I declare under penalty of perjury that the foregoing is true  
2 and correct.

3 Executed on August 24, 2020 at St. Michaels, Maryland.  
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7 Dr. Thomas A. Louis, Ph.D.  
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August 15, 2020

## **CURRICULUM VITAE**

### THOMAS A. LOUIS, PhD

#### **Work Address**

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 Professor Emeritus, Department of Biostatistics  
 Johns Hopkins Bloomberg School of Public Health  
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#### **Education**

1966 BA Dartmouth College, with honors in Mathematics  
 1972 PhD Columbia University, Mathematical Statistics

#### **Principal Professional Appointments**

2018– Professor Emeritus of Biostatistics, Johns Hopkins Bloomberg School of Public Health  
 2002–2017 Professor of Biostatistics, Johns Hopkins Bloomberg School of Public Health  
 2013–2015 Associate Director for Research & Methodology and Chief Scientist, U. S. Census Bureau  
 2000–2002 Senior Statistical Scientist, The RAND Corporation  
 1987–2000 Professor of Biostatistics, U of Minnesota School of Public Health  
 1987–1999 Head of Biostatistics, U of Minnesota School of Public Health  
 1987–2000 Professor, U of Minnesota School of Statistics  
 1979–1987 Associate Professor of Biostatistics, Harvard School of Public Health  
 1973–1979 Assistant Professor of Mathematics, Boston University  
 1972–1973 NIH Postdoctoral Fellow, Mathematics, Imperial College, London  
 1971–1972 Lecturer, Department of Mathematical Statistics, Columbia U  
 1970–1971 Consultant, IBM Thomas J. Watson Research Lab., Yorktown Heights, NY  
 1966–1967 Actuarial Trainee, Chubb and Son, New York

#### **Other Professional Appointments**

2018–2020 Expert Statistical Consultant, Center for Drug Evaluation & Research,  
 Food & Drug Administration  
 2018– Affiliate Professor of Statistics, George Mason University  
 2016– Affiliated member, The Johns Hopkins Spatial Science for Public Health Center  
 2016 Distinguished Senior Research Fellow, U. S. Census Bureau  
 2012–2016 Core faculty member, Johns Hopkins Armstrong Institute for Patient Safety and Quality  
 2011 “Summer at Census” Scholar  
 2001–2003 Adjunct Professor, Epidemiology & Biostatistics, George Washington U  
 2000–2002 Adjunct Professor, Biostatistics, Johns Hopkins Bloomberg SPH  
 1999 Visiting Scholar, Committee on National Statistics, National Academy of Sciences  
 1995–1996 Visiting Professor, Afdeling Medische Statistiek, U of Leiden, NL  
 1994–2000 Member, U of Minnesota Cancer Center  
 1991–1998 Adjunct Associate, Hubert H. Humphrey Inst. of Public Affairs, U of Minnesota  
 1991–1996 Adjunct Professor, Biostatistics, Emory University School of Public Health  
 1988 Visiting Professor, Tongji Medical U, Wuhan People’s Republic of China  
 1986 Visiting Scientist, Center for Mathematics and Computer Science, Amsterdam NL  
 1984 Visiting Professor, Biostatistics, U of North Carolina, Summer Term  
 1979–1981 Director, Biostatistics Consulting Laboratory, Harvard School of Public Health  
 1974–1979 Consultant, Boston University Medical School



**Other Professional Appointments** (continued)

- 1974–1979 Member, Boston University Cancer Center  
 1969–1970 Summer Employee, IBM T. J. Watson Research Lab., Yorktown Heights, NY

**HONORS AND AWARDS**

- 1967–1971 Fellow of the Faculty, Columbia University  
 1985 Elected member, International Statistical Institute  
 1988 Fellow of the American Statistical Association (ASA)  
 1988 Delta Omega Honorary Public Health Society  
 1991–1993 President-elect, president, past; Intl. Biometric Soc., Eastern North American Region (ENAR)  
 1996 Fellow of the American Association for the Advancement of Science (AAAS)  
 2003 ENAR President's Invited Address, "Aids to Statistical Navigation"  
 2005–2008 President-elect, President, Past-president; International Biometric Society  
 2010–2013 Chair-elect, Chair, Retiring Chair, AAAS Statistics Section (U)  
 2014 Charles L. Odoroff Memorial Lectureship, University of Rochester  
 2016 Honorary Life Member, International Biometric Society  
 2016 National Associate of the National Research Council  
 2017 Fellow of the Institute of Mathematical Statistics  
 2018 Doctor Honoris Causa, Hasselt University, Belgium

**PROFESSIONAL ACTIVITIES****Memberships**

- American Association for the Advancement of Science  
 American Association of Public Opinion Research  
 American Statistical Association, PStat®  
 Institute of Mathematical Statistics  
 International Biometric Society  
 International Society for Bayesian Analysis  
 International Statistical Institute  
 Royal Statistical Society

**Editorial**

- 2018 Associate Editor, special issue of *The American Statistician* on statistical inference  
 2017– Associate Editor, *Annual Review of Statistics and Its Application*  
 2011–2016 Editorial Committee, *Annual Review of Statistics and Its Application*  
 2009–2011 Co-editor, *Biometrics*  
 2006–2008 Coordinator, IBS Prose Editing Project  
 2004–2008 Editorial Board, *Biostatistics*  
 2003–2008 Editorial Board, *Clinical Trials*  
 2002–2002 Co-editor, Formula Funds Allocation special issue, *Journal of Official Statistics*  
 2001–2003 Editor & coordinating editor, *J. Am. Statist. Assoc., Applications and Case Studies*  
 1999–2002 Editorial Board, *Applied Stochastic Models in Business and Industry*  
 1999–2000 Associate Editor, *Controlled Clinical Trials*  
 1998–2000 Associate Editor, *Statistical Science*  
 1997–2018 Editorial Board, Chapman&Hall Series on Statistics and Applied Probability  
 1996–1999 Associate Editor, *statistica neerlandica*  
 1992–1998 Co-Editor, *Chance*  
 1993–1995 Editorial Board, *ASA-SIAM Series on Statistics and Applied Probability*  
 1989–1994 Editorial Board, *Statistics in Medicine*  
 1988–1991 Associate Editor, *JASA Theory and Methods*  
 1972– Refereeing for statistical, biomedical, epidemiologic and environmental journals

**Professional Organization Administration**

2016-2017 Search Committee, *Biometrics* Executive Editor  
 2011-2013 Chair-elect, chair, past chair, AAAS Section-U, Statistics  
 2010-2012 Local Organizing Committee, IBS International Biometric Conference, Kobe Japan, 2012  
 2009-2015 IBS Editorial Advisory Committee  
 2009-2010 Chair, International Biometric Society, Council of Presidents  
 2009-2010 IBS/ENAR Nominations Committee  
 2008 Outgoing vice-President, International Biometric Society  
 2007 Organizing & Scientific Programme Committee,  
 East Asia Regional Biometric Conference, Tokyo  
 2006-2007 President, International Biometric Society  
 2005-2006 IBS/ENAR Nominations Committee  
 2005 Incoming vice-President, International Biometric Society  
 2004 Executive Committee, ASA Section on Bayesian Statistical Science  
 2002-2003 Chair-elect/chair, ASA Section on Bayesian Statistical Science  
 2002 Member, ENAR Educational Advisory Committee  
 2002 Associate Director, Search Committee, National Institute of Statistical Sciences  
 2002 Chair, Nomination Committee, National Institute of Statistical Sciences  
 2000-2001 Program Committee, Year 2001 International Statistical Institute Conference  
 2001-2002 Program Committee, Year 2002 Intl. Epidemiologic Association Conference  
 2001 ASA-IMS Task Force to select statistical reviewers for Science  
 2001 ENAR management review  
 2000-2001 ENAR Nominating Committee  
 2000-2005 Member, ASA Scientific and Public Affairs Advisory Committee  
 2000-2002 Executive Committee, National Institute of Statistical Sciences  
 1999-2000 Program Committee, Year 2000 International Biometric Conference  
 1998-2000 ENAR Liaison to the ASA  
 1998 ENAR management review  
 1997-2002 Trustee, National Institute of Statistical Sciences (NISS)  
 1997-1989 Chair, Fellow Selection Committee, International Biometric Society  
 1997 ASA search Committee for new *Chance* editor  
 1994-1997 Council, International Biometric Society  
 1993-1996 IMS, Committee on Scientific Policy  
 1993-1996 AAAS Electorate Nominating Committee  
 1993 Chair, ASA Editor search Committee, *JASA Applications and Case Studies*  
 1993 Chair, ASA Sub-committee to Evaluate Health Science Journal Options  
 1993 Steering Committee, Research Synthesis: Social Science Informing Public Policy  
 1992 Nominating Committee, JASA book review editor  
 1992 President, Biometric Society, ENAR  
 1991-1993 Executive Committee, Biometric Society ENAR  
 1991-1992 Committee of Presidents of Statistical Societies  
 1991 Advisory Board, NISS  
 1988 Program Chair, Intl. Biometrics Society-ENAR Spring Meeting, Boston MA  
 1988 Regional Committee, Biometric Society ENAR  
 1978-1978 Co-program chair, Intl. Biometrics Society-ENAR Spring Meeting, Chapel Hill, NC  
 1976-1976 Local arrangements Committee 9th Intl. Biometric Conference, Boston, MA  
 1976-1986 Program Committee, Boston Chapter, ASA



**Advisory**

2020 Chair, Visiting Panel, Joint Program in Survey Methodology, U Maryland & Michigan

2019 Review coordinator, NAS workshop: Using Models to Estimate Hog and Pig Inventories

2019 Review of the Biostatistics Department, University of Miami

2018 Member of the tri-society (American Statistical Assn., American Sociological Assn., Population Assn. of America) group that prepared amicus briefs supporting the lawsuits in, New York, California, and the Supreme Court to block including a citizenship question on the 2020 census

2018 National Academies; National Investment Modeling expert Panel

2017– Advisory Committee, U of Michigan Institute for Social Research, Educational Program on Responsive Survey Design for Efficient Survey Data Collection

2017– Chair, NIDDK DSMB for the ARMMS-T2D study (Alliance of Randomized Trials of Medicine vs Metabolic Surgery in Type 2 Diabetes)

2017–2020 DSMB, NHLBI; Junctional AV Ablation for Permanent Atrial Fibrillation in Patients Undergoing Cardiac Resynchronization Therapy

2016– DSMB, Bristol-Myers Squibb; gastric, lung, and renal cancer trials

2016– DSMB, Minnesota Hearth Health Program–Aspirin Study

2016 Panelist, FDA workshop on, Facilitating Antibacterial Drug Development for Patients with Unmet Need and Developing Antibacterial Drugs That Target a Single Species

2016– International Advisory Board, Interuniversity Institute of Biostatistics and Statistical Bioinformatics Universities of Hasselt & Leuven, Belgium

2016 Chair, external advisory board of the Department of Public Health and Primary Care, Leuven, Belgium

2016 NAS/CNSTAT Expert meetings on Improving the Relevance of Federal Statistics

2016 NIDDK Expert Evaluation Committee of the Alliance of Randomized Trials of Medicine versus Metabolic Surgery in Type 2 Diabetes (ARMMS-T2D) study

2015– Technical Advisory Group, Developing Excellence in Leadership Training and Science Training, Sub-Saharan Africa Consortium for Advanced Biostatistics Training

2015–2016 Advisory Board, Center for Survey Statistics and Methodology, Iowa State U

2015–2016 PCORI/CTAP Post–Award Expert Advisory Subcommittee

2015–2018 CMS Technical Expert Panel: Hospital Inpatient and Outpatient Process and Structural Measure Development and Maintenance

2012– External Evaluation Committee, Type 1 Diabetes TrialNet

2011– Scientific Advisory Board, NIEHS Gulf Long-term Follow-Up (GuLF) Study

1985– Report Review, The National Academies

1975– Proposal review, NSF, NIH and other funding agencies

2015 Health Effects Institute (HEI) ad hoc Review Panel

2015 Clinical Trial Review Panel, NIH/NIDCD, Deafness and Communication Disorders for trial design and analysis in anti-bacterial drug development

2014–2015 DSMB, Flexibility in Duty Hour Requirements for Surgical Training (FIRST) trial

2014 PCORI Methodology Consultation Review Panel

2014–2015 NIA-sponsored NAS meetings on observational studies and causal inference

2013–2014 Panel on Hospital Performance Measure Testing, Mathematica

2012–2014 DSMB, Bangladesh Complementary Food Supplementation Trial

2012 Review of the University of Wisconsin, Biostatistics Training Grant Program

2011–2013 DSMB, Triple re-uptake inhibitor for the treatment of major depressive disorder (BMS)

2009–2013 External Expert Panel for the Hemodialysis Fistula Maturation Cohort Study

2007–2012 Board of Scientific Counselors, NIH-National Institute of Environmental Health Sciences

2006–2011 Scientific Advisory Committee, EPA/Harvard Center on Ambient Particle Health Effects

2004–2012 DSMB, Right Ventricular Pacing Study (Medtronic)

**Advisory** (continued)

- 2011 Chair, Committee of Presidents of Statistical Societies, Committee on Methods for Hospital-specific estimates of quality of care
- 2011 Census Bureau, "Summer at Census" visiting scholar
- 2011 *Ad hoc*, Tenure Review Committee, Columbia University
- 2010–2011 ASA/NISS Panel on ranking graduate programs
- 2010–2011 EPA Science Advisory Board Panel to review draft lead dust technical analyses
- 2010 Nat. Inst. Statist. Sci., Workshop on Assessing the Quality of Graduate Programs
- 2010 Chair, Steering Committee, National Academies workshop on Facilitating Innovation in the Federal Statistical System
- 2006–2010 DSMB, MK-0518 HIV Integrase Phase III Program (Merck)
- 2009 Working Group, the role of the NIH Biostatistical Methods and Research Design study section
- 2009 Proposal review, International Science and Technology Center in the Ukraine
- 2008 NAS Review Coordinator, "Phthalates and Cumulative Risk Assessment: The Tasks Ahead"
- 2008 Consultant, U of Wisconsin chair search, Dept. of Biostatistics and Medical Informatics
- 2007–2009 DSMB, VA Trial of Long-Acting Injectable Risperidone in the Treatment of Schizophrenia
- 2007 Review Panel, Ixabepilone for treatment of metastatic breast cancer (Bristol, Myers, Squibb)
- 2006–2009 NAS Standing Committee on Risk Analysis Issues and Reviews
- 2006–2008 DSMB, Preventing Pregnancy Malaria: Mother Infant outcomes study (NIH-NIAID)
- 2005–2008 NAS Committee on Applied and Theoretical Statistics
- 2005 Selection Committee, JASA Applications and Coordinating Editor for 2007-9
- 2004–2006 NAS Committee to Review the Effects of Changes in EPA's New Source Review Programs for Stationary Sources of Air Pollutants
- 2004 *Ad hoc* consultant, Board of Scientific Councilors review of the NIEHS Biostatistics Branch
- 2004 NIH Clinical Infectious Diseases and Microbiology, Research & Field Studies Special Study Section
- 2003–2004 Advisor, masters program in Biometrics, UMDNJ
- 2003–2004 Drinking Water Committee, EPA Science Advisory Board
- 2003 Input to IOM report, "Measuring What Matters: Allocation, Planning, and Quality Assessment for the Ryan White CARE Act"
- 2003 Review of the MS in Biostatistics, U of Medicine & Dentistry of NJ, SPH
- 2003 Committee to review Biostatistics at the U of Washington
- 2002–2004 NAS, Committee on use of third party toxicity research with human participants
- 2002–2003 Panel to review guidelines for thrombolysis treatment of acute ischemic stroke
- 2002 Chair, Committee to review Biostatistics at Emory U
- 2001–2008 DSMB, Dialysis Access Consortium (NIH-NIDDK)
- 2001–2002 NIH ad hoc group to promote increased funding for training in Biostatistics
- 2001 Committee to propose a statistics editor for Science magazine
- 2001 Advisory Committee, Program in Environmental Statistics, Biostatistics, Harvard SPH
- 2001 Proposal reviewer, VA studies on Persian Gulf Illness
- 2000–2005 Health Effects Institute, Report Review Committee
- 2000–2004 Advisory Committee, Harvard Cardiac Vulnerability Related to Particulate Matter Project
- 2000–2004 Scientific Advisory Committee, EPA/Harvard Center on Ambient Particle Health Effects
- 2000–2003 Advisory Board, Center for Innovation in Clinical Research, M.D. Anderson CC
- 2000–2003 Steering Committee, United States Renal Data System
- 2000–2003 Diesel Emissions Project Committee, Health Effects Institute
- 2000–2002 Chair, NAS panel on Formula Allocation of Federal and State Program Funds
- 2000 Panelist, NIH Consensus Conference on Adjuvant Therapy for Breast Cancer
- 1999 Chair, Review Committee, Dept. of Social and Preventive Medicine, SUNY Buffalo

**Advisory** (continued)

- 1998–2004 Chair, DSMB, Chemoprevention of Skin Cancers with DFMO Clinical Trial
- 1998 NIH Special Emphasis Panel Proposal Review
- 1997–1999 Oversight Committee, HEI, National Morbidity and Mortality Air Pollution Study
- 1997 Chair, NIAID proposal review panel, Statistical Center for the Women's Interagency Health Study
- 1997 Advisory panel, U Chicago Dept. OB/GYN, issues in stopping a clinical trial
- 1997–2003 NAS, Committee on National Statistics
- 1996–2003 Advisory Board, Institute of Medicine (IOM), Medical Follow-up Agency
- 1996–1999 NAS, Panel on Estimates of Poverty for Small Geographic Areas
- 1996 Organizational Review, U of Chicago, Department of Health Studies
- 1995 NCI site visit, Fred Hutchinson Cancer Research Center, Seattle Washington
- 1995 UCLA Visiting Committee on reorganizing statistics at the university
- 1995 Visiting Committee, Cleveland Clinic Dept. of Epidemiology and Biostatistics
- 1994–1996 IOM/MFUA Committee to Review the Health Consequences of Service during the Persian Gulf War
- 1994–1995 Reviewer, EPA Particulate Matter and Mortality Criterion Document
- 1993–1997 DSMB, Long-term outcome of Obesity Treatment in Minority Women Study
- 1991 Reviewer, NIAID/DAIDS, ACTG re-competition
- 1988–1990 AHCPH Health Care Technology Study Section
- 1987–1993 Advisory Committee for Research Synthesis, The Russell Sage Foundation
- 1984–1988 EPA Health Effects Scientific Review Panel
- 1981–1983 Advisory Committee, Kidney Transplant and Histocompatibility Study
- 1975–1983 Site visitor, National Cancer Institute

**UNIVERSITY SERVICE**

*Johns Hopkins University* (Bloomberg School of Public Health unless otherwise indicated)

- 2019–2020 Proposal review, Support for Creative Integrated Basic and Applied Research
- 2019–2020 Biostatistics Faculty Search Committee
- 2015–2016 Biostatistics Faculty Search Committee
- 2014– Committee member, Ross/Royall Fund for Population Inference in Public Health
- 2011–2012 Chair, Biostatistics Faculty Search Committee
- 2010–2011 Search Committee for Chair of Environmental Health Sciences
- 2009–2010 Committee to review the Department of Environmental Health Sciences
- 2008–2012 SPH Committee on Academic Standards
- 2008–2009 HopkinsOne, University-wide Faculty Advisory Committee
- 2008–2009 Medical School Investigative Committee
- 2008–2009 Chair, Biostatistics Faculty Search Committee
- 2007–2008 Strategic Planning Steering Committee
- 2006–2011 Advisory Committee, Environmental Health Sciences, NIEHS Training Program
- 2005–2008 SPH Advisory Board
- 2005–2008 Faculty Senate: President-elect, President, past President
- 2004–2006 Sommer Scholar selection Committee
- 2004–2005 Chair, Faculty Grievance Committee
- 2003–2008 Committee on Appointments and Promotions

2003–2005 Faculty Senator  
 2003–2004 Planning Committee, FDA/Johns Hopkins workshop, “Can Bayesian approaches to studying new treatments improve regulatory decision-making?”  
 2002–2012 Steering Committee, Malaria Research Institute  
 2002–2004 FDA/Hopkins Liaison Development  
 2002–2004 Biostatistics Faculty Search Screening Committee  
 2002–2003 Co-chair, Biostatistics seminar Committee

*University of Minnesota School of Public Health*

2000 Dean Search Committee, School of Public Health  
 1999–2000 Ethics Advisory Committee  
 1998–1999 President’s Distinguished Faculty Mentors Program  
 1997–1998 Academic Health Center faculty research development grants review Committee  
 1996–1997 Search Committee, Health Sciences Chief Information Officer  
 1994–1998 SPH Diversity Committee  
 1994–1995 SPH Diversity Committee, Co-chair  
 1994–1995 Chair, MPH Major in Biostatistics  
 1994 Search Committee, Director, Cancer Center Registry  
 1994 Ad Hoc Committee to investigate misconduct  
 1993–1996 Faculty Advisor, Sailing Club  
 1992–1994 Chair, Search Committee, Head, Center for Environmental Health Policy, SPH  
 1992 Chair, Biostatistician Search Committee, General Clinical Research Center  
 1991 Search Committee, Population Sciences faculty, Humphrey Institute  
 1990–1999 SPH Space Committee  
 1990–1990 Search Committee, SPH Dean  
 1989–1990 Chair, Search Committee, Head of Epidemiology, SPH  
 1988–1993 Academic Advisory Committee, Center for Biomedical Ethics (chair, 1988–1990)  
 1987–2000 Advisory Committee, General Clinical Research Center  
 1987–1999 SPH Policy Council

*Harvard School of Public Health*

1980–1984 Qualifying examination Committee  
 1980–1981 Institutional Review Board

**COMMUNITY SERVICE**

2018– Docent, Chesapeake Bay Maritime Museum  
 2017– Martingham Architecture Review Committee  
 1999–2000 Treasurer, L Harriet Yacht Club  
 1995 Faculty Member, National Breast Cancer Coalition, Project LEAD  
 1992–1995 Institutional Review Board, Allina Health System, Minneapolis, MN  
 1984 Co-chair, School Enrollment Projection & Reorganization Committee, Lexington MA  
 1975–1978 Faculty, Norfolk Prison Education Program, Norfolk MA

**EDUCATIONAL ACTIVITIES**

*Courses:* Probability theory, Statistical theory, Sequential analysis, Analysis of longitudinal data, Hierarchical models, Bayesian methods, Survey methods, Multivariate analysis, Discrete data, Robust methods, Screening and bioassay, Exploratory data analysis.

*Research Advising:* Principal or co-advisor for Biostatistics doctoral and masters students. Member of doctoral and masters Committees in Statistics, Biostatistics, Epidemiology, Environmental Health, Health Services, and Microbiology.

## PUBLICATIONS

(Peer reviewed journal articles & books, Software, Peer reviewed journal discussions, Monographs, Book chapters, Proceedings, Book reviews, Letters & Columns)

### Peer reviewed journal articles & books

1. Flehinger BJ, Louis TA (1971). Sequential treatment allocation in clinical trials. *Biometrika*, 58: 419–426.
2. Flehinger BJ, Louis TA (1972). Sequential medical trials with data-dependent treatment allocation. *Proc. Sixth Berkeley Symposium*, 4: 43–52.
3. Flehinger BJ, Louis TA, Robbins H, Singer B (1972). Reducing the number of inferior treatments in clinical trials. *Proc. Nat. Acad. of Sci. US*, 69: 2993–94.
4. Hsi BP, Louis TA (1975). A modified play-the-winner rule for sequential trials. *J. Am. Statist. Assoc.*, 70: 644–647.
5. Louis TA (1975). Optimal allocation in sequential tests comparing the means of two Gaussian populations. *Biometrika*, 62: 359–369.
6. Louis TA (1977). Sequential allocation in clinical trials comparing two exponential survival curves. *Biometrics*, 33: 627–634.
7. Albert A, Gertman P, Louis TA (1978). Screening for the early detection of cancer I: The temporal natural history of a progressive disease state. *Mathematical Biosciences*, 40: 1–59.
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