

Looking Inward: Quality Audits for Demographic Programs at the U.S. Census Bureau

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Abstract

The U.S. Census Bureau collects and disseminates information products about people, businesses and governments. These products range from micro data sets and table packages to methodological papers and analytical reports.

To ensure the information products meet an acceptable quality standard before dissemination, the Bureau has developed and codified statistical quality standards. These standards govern the processes and procedures for preparing the products. And, to ensure the various data programs are adhering to the standards, the agency has developed several internal audit programs. Programs are audited periodically to gauge compliance with the standards.

The audit program for demographic data products was chartered in 2011. As of December 2017, forty-five programs have been audited. This paper will review patterns of compliance and noncompliance among the various programs. Overall, programs most commonly do not meet requirements in the following standards: producing measures and indicators of nonsampling error; releasing information products; reviewing information products; and managing data and documents.

The value of this research lies in identifying areas where programs might need more support in meeting various quality standards.

Key Words: audits, quality standards.

1. Introduction

The U.S. Census Bureau collects and disseminates information products on America's people, places, and economy. These information products range from datasets and tables to analytical reports.

Information products released by the U.S. Census Bureau are required to meet statistical quality standards. This paper focuses on compliance with those standards by the demographic data programs.

1.1 Background

Statistical quality standards for government agencies have been evolving over several decades. The U.S. Office of Management and Budget (OMB) released [Information Quality Guidelines](#) in 2002 (U.S. Office of Management and Budget, 2002) providing procedures to “ensure and maximize the quality, objectivity, utility, and integrity of information prior to dissemination”. All agencies were directed to issue their own implementing guidelines within one year of OMB's release. Thus, later that year, the Census Bureau issued its own [information quality guidelines](#) (U.S. Census Bureau, 2002) based on OMB's directive.

In 2006, OMB released the *2006 Standards and Guidelines for Statistical Surveys* (Office of Management and Budget, 2006). From this, the Census Bureau produced a full set of quality standards in 2010, later revised in 2013. [The Census Bureau Statistical Quality Standards](#), (U.S. Census Bureau, 2013), provide the requirements to be followed by all programs at the Census Bureau. Another revision to these standards is currently underway.

In 2011, the Demographic Directorate piloted its quality audit program. Since then, we have completed over forty-five audits, adjusting our procedures along the way as the program matures. We expect to audit nearly all applicable programs by the end of 2018 for the first cycle.

Audits are conducted in accordance with Generally Accepted Government Auditing Standards, per guidelines in the [Yellow Book](#) (U.S. Government Accountability Office, 2012).

1.2 Audit Process

Per the Generally Accepted Government Auditing Standards, our audit process has five stages:

1. **Notification.** This is a formal notification to the program area being audited. The audit schedule is determined a year in advance in consultation with all applicable programs. We do not single out any particular program for review. Each major program is scheduled for review approximately every five years.

2. **Self-Assessment.** The program area completes a checklist of the 263 ratable requirements applicable for their program. The requirements are based on those in the Quality Standards. Program areas determine compliance and provide evidence for each requirement in the checklist.
3. **Independent Review.** Auditors review the checklist and compare the evidence provided by the program areas against the requirements in the standards to give independent ratings. An audit typically has three to four auditors. The auditors are selected among those working on demographic programs but cannot be working on the program being audited, to retain objectivity. Compliant and noncompliant items are summarized in audit finding documents and presented to the program area being audited.
4. **Program Action Plan.** If a program is not compliant with particular standards, the audited program area produces a program action plan to address these deficiencies.
5. **Follow-up.** The program area has one year from the findings meeting to follow through on their program action plan and correct any noncompliant findings.

1.3 Scope

The demographic products required to adhere to the Statistical Quality Standards include all those released directly to the public, sponsors, joint partners, and other customers. The standards also cover activities generating information products.

1.4 Program Types

Data programs can be categorized in various ways. In a prior assessment of the audit program, the following categories were used (Levy and Scott, 2016). We use these categories for this analysis as well:

1. **Surveys** include operations in which, among other tasks, a questionnaire is developed, a frame is drawn, a sample is selected, data are collected, and estimates and weights are produced, to gather information about the population of interest.
2. **Estimations** include estimates produced from survey, census, or administrative records data.
3. **Value-added products** include tables and reports produced from survey, census, or administrative records data.
4. **Process/participant programs** include data products produced in other areas but where demographic program areas play a supporting role.

2. Audit Results

This section poses four questions to identify and review patterns of compliance and noncompliance among the various programs:

1. Which standards are in scope for which types of programs?
2. Which standards are covered best by the programs?
3. What is the distribution of noncompliant findings among various programs?
4. Which standards have the most noncompliant findings?

Analysis for this paper includes all demographic audits completed since the beginning of the demographic quality audit program (2011) through calendar year 2017.

2.1 Which standards are in scope for which types of programs?

The Demographic Quality Program covers 19 statistical quality standards which encompass the survey life cycle. Not all standards apply to all programs. These standards contain 263 requirements applicable to programs undergoing audit.

Table 1 below identifies the survey life cycle phases, associated standards, number of requirements for each standard, and the number of standards in scope for each type of program. For instance, the standard, *A1. Planning a Data Program*, is in scope for 42 of the 45 programs. Standards concerning data collection, processing and estimation tend to apply more to survey operations, while the standard for administrative records and the standard for producing estimates from models tends to apply more to the estimation program. Standards for planning, review, release, disclosure and documentation apply to virtually all programs.

Table 1: Programs in Scope by Category

Standards	Number of Requirements	Overall (N=45)	Surveys (N=20)	Estimations (N=9)	Value-Added (N=8)	Process/Participant (N=8)
Planning and Development						
A1. Planning a Data Program	30	42	20	9	8	5
A2. Developing Data Collection Instruments	27	21	20	0	0	1
A3. Developing & Implementing a Sample Design	12	16	15	0	0	1
Collecting and Acquiring Data						
B1. Establishing & Implementing Data Collection Methods	11	21	20	0	0	1
B2. Acquiring and Using Administrative Records	5	11	4	7	0	0

Standards	Number of Requirements	Overall (N=45)	Surveys (N=20)	Estimations (N=9)	Value-Added (N=8)	Process/Participant (N=8)
Capturing and Processing Data						
C1. Capturing Data	11	10	8	1	0	1
C2. Editing and Imputing Data	8	30	20	6	1	3
C3. Coding Data	12	16	10	2	2	2
C4. Linking Data Records	11	8	5	2	0	1
Producing Estimates and Measures						
D1. Producing Direct Estimates from Samples	10	24	18	0	4	2
D2. Producing Estimates from Models	18	14	4	9	0	1
D3. Producing Measures and Indicators of Nonsampling Error	24	26	20	3	1	2
Analyzing Data and Reporting Results						
E1. Analyzing Data	10	37	13	9	7	8
E3. Reviewing Information Products	9	44	19	9	8	8
Releasing Information						
F1. Releasing Information Products	43	45	20	9	8	8
F2. Providing Documentation to Support Transparency	7	45	20	9	8	8
F3. Addressing Information Quality Guideline Complaints	5	44	19	9	8	8
Supporting Standards						
S1. Protecting Confidentiality	3	45	20	9	8	8

Standards	Number of Requirements	Overall (N=45)	Surveys (N=20)	Estimations (N=9)	Value-Added (N=8)	Process/Participant (N=8)
S2. Managing Data and Documents	7	45	20	9	8	8
Total	263	544	295	102	71	76

Source: U.S. Census Bureau - Analysis of 2011-2017 data from Demographic Quality Audit Program

2.2 Which standards are covered best by the programs?

To date, audited programs have demonstrated full compliance with six standards:

- A3, Developing & Implementing a Sample Design
- B1, Establishing & Implementing Data Collection Methods
- B2, Acquiring and Using Administrative Records
- C1, Capturing Data
- C4, Linking Data Records
- F3, Addressing Information Quality Guideline Complaints

Notably, these standards include those that tend to have the least programs in scope.

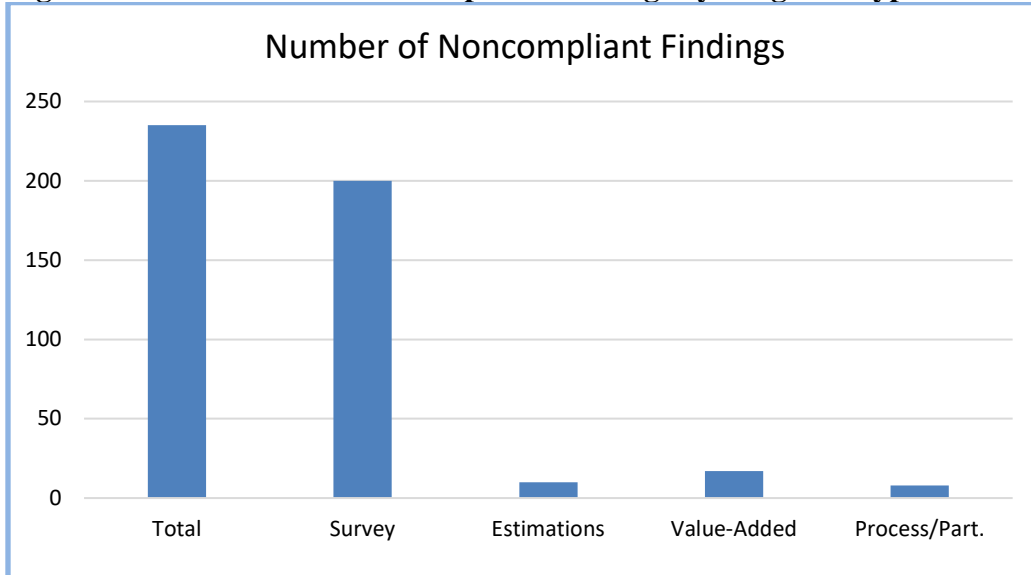
In addition to these standards, the demographic programs perform consistently well in an additional seven standards. These standards have fewer than ten noncompliant findings across all programs:

- C2, Editing and Imputing Data
- C3, Coding Data
- D1, Producing Direct Estimates from Samples
- D2, Producing Estimates from Models
- E1, Analyzing Data
- F2, Providing Documentation to Support Transparency
- S1, Protecting Confidentiality

2.3 What is the distribution of noncompliant findings among various programs?

Overall, programs were 95 percent compliant with the requirements. The combined programs have 235 noncompliant findings out of 4,142 possible findings. Figure 1 below shows the distribution of noncompliant findings by program type. As expected, since surveys have the most requirements in scope, they also have the largest number of noncompliant findings. Still, surveys were overall 93 percent compliant with requirements in scope.

Figure 1: Distribution of Noncompliant Findings by Program Type



Source: U.S. Census Bureau - Analysis of 2011-2017 data from Demographic Quality Audit Program

2.4 Which standards have the most noncompliant findings?

Over 70 percent of all noncompliant findings involve four standards:

- D3, Producing measures and indicators of nonsampling error
- E3, Reviewing information products
- F1, Releasing information products
- S2, Managing data and documentation

Within each standard, the noncompliant findings are spread out among the requirements. However, some requirements were identified as having more noncompliant findings than others. Table 2 below lists the most common noncompliant requirements.

Table 2: Most Common Noncompliant Requirements by Standard

Standard	Requirements
Producing Measures and Indicators of Nonsampling Error	<ul style="list-style-type: none"> • Developing a plan for general measures and indicators of nonsampling error that will be produced. • Developing a plan to evaluate the measures and indicators to guide improvements to the program. • Defining sufficient partial interviews.

Standard	Requirements
	<ul style="list-style-type: none"> Verifying and testing the calculations of measures and indicators of Nonsampling error.
Reviewing Information Products	<ul style="list-style-type: none"> Review by Disclosure Avoidance Officer. Statistical review and approval. Policy and sensitivity review.
Releasing Information Products	<ul style="list-style-type: none"> Releasing information products with restrictions when data quality issues are known.
Managing Data and Documents	<ul style="list-style-type: none"> Developing a plan for data and document management. Knowing, documenting, and adhering to data and document retention schedules.

Source: U.S. Census Bureau - Analysis of 2011-2017 data from Demographic Quality Audit Program

All program types showed some noncompliance in developing a plan for data and document management and in developing and adhering to timetables.

The requirements for Producing Measures and Indicators of Nonsampling Error affect the compliance with the requirements for Releasing Information Products. If certain measures have not been calculated, one cannot determine whether data products can be released without restrictions.

3. Discussion

With only a 5.4 percent noncompliance rate, all program types are doing an excellent job meeting the requirements. Compliance with the standards depends on two factors: knowledge of the standards and the programs.

Knowledge of the Standards

While program areas demonstrate a high level of compliance, program staff may not be explicitly aware of all the standards until the audits. As such, the audit program serves to educate staff about the quality standards.

The hope is that compliance will increase as more staff participate in audits, both as auditors and as auditees. We have already seen evidence of this. Early in the audit program, estimation programs tended to have a disproportionate number of noncompliant findings regarding planning a cost estimate. As understanding of the standards increased, compliance increased. Thus, this standard has been compliant for all programs since early 2013.

The Programs

The audit program has seen cases where older programs had noncompliant findings because they had developed and implemented procedures before the standards had been written, and had not updated their procedures to accommodate the standards. Staff turnover can also hinder the location of evidence, which is correlated with knowledge of the program itself.

The standards describe what is required but they do not specify how to satisfy a requirement. Though explanations and examples are provided in the standards guide, identifying the evidence to meet a standard is ultimately up to the program staff. The final determination on compliance though involves the input of an auditor.

The Auditors

There are three qualifications to becoming an auditor:

- Independence – does not work on the program being audited.
- Competence – familiar with the structure, operations, and programs of the Demographic directorate; general statistical knowledge and analytical skill; familiar with the statistical quality standards.
- Judgment – assess if response and evidence from program area is appropriate and sufficient.

Auditors review the definition and explanation of each ratable standard against the evidence provided and determine if each requirement is met. Reasonable people can disagree on if a standard is met and even if a standard is applicable. Communication between the auditor and the program area is critical in resolving these issues. Auditors are also encouraged to provide sufficient explanations as to their findings, especially when the findings were not clear-cut.

There have been discussions in the past about having a dedicated staff of auditors who become experts on the standards and thus are consistent in the findings across the programs. While this would ease the burden on staff who usually work on other projects, they would also miss out on the developmental opportunities afforded by the audit process.

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