EVALUATION OF THE CENSUS 2000 QUALITY ASSURANCE PHILOSOPHY AND APPROACH USED IN THE ADDRESS LIST DEVELOPMENT AND ENUMERATION OPERATIONS

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1.0 Background

The primary goal of Census 2000 was to determine how many people reside in the United States, precisely where they live, and their demographic characteristics. This mammoth undertaking involved numerous complex phases, such as developing an up-to-date nationwide address list, printing questionnaires, delivering questionnaires to households, enumerating segments of the population directly, and tabulating the results.

To monitor, control, and enhance the quality of the resulting census data, the Census Bureau (a.k.a. Bureau) employed a comprehensive quality assurance (QA) program based on William Edward Deming's management philosophy. Deming stressed prevention and continuous improvement over rectification. To achieve these objectives, he said that it was necessary for workers at all levels of an organization, including management, to be involved in the quality movement.

This paper is derived from an evaluation report being produced by Westat (*still in draft phase*) that examines the effectiveness of the Census Bureau's QA philosophy and approach used in the field operations. It identifies the strengths and weaknesses and offers suggestions, recommendations, and strategies for improvement.

The evaluation focused on eight major field operations and their corresponding QA activities. These operations fell into one of two categories:

Address List Development and *Enumeration*. The former consisted of operations that helped the Bureau develop an up-to-date nationwide address list, used to deliver census questionnaires to approximately 120,000,000 households. The latter was comprised of operations where census enumerators enumerated households directly.

2.0 Summary of Results

A major strength of the Census Bureau's QA program was that QA was present in most of the operations, from start to finish. Westat found that there was a general awareness of quality throughout all levels of the census operations. Preliminary results indicate that QA was successful in detecting listing, mapping, and enumeration errors. Because these errors were corrected, the result was higher quality data.

The Westat report found areas of the Census Bureau's QA program in need of improvement. They cited the Bureau for not widely publicizing its QA program at headquarters, particularly among management. Another deficiency was the lack of real-time data to assist management at headquarters, in the regional offices, and in the local census offices in monitoring the progress of the QA programs. Westat also said that the Bureau had insufficient research and testing of its field QA programs.

3.0 Methodology

3.1 Evaluation Design

To evaluate the Census Bureau's QA philosophy and approach used in Census 2000, the Bureau first had to decide which operations it wanted to include in the evaluation. Initially the Bureau wanted to include all of the major field operations, printing, and the data capture operations. However, due to time and financial constraints the Bureau chose to focus on eight major field operations that as stated previously fell into one of two categories: *Address List Development* or *Enumeration*. The following is a brief description of each operation, by category, followed by a summary of the QA approach:

3.1.1   Address List Development operations:

- Block Canvassing: to update the Bureau's Master Address File (MAF) in areas containing city-style addresses (street name and house number), enumerators canvassed each and every road and street, looking for every place where people live or could live, verifying and updating the address list.

- Local Update of Census Addresses (LUCA): the Census Bureau created partnerships with local and tribal governments to update address lists for their jurisdictions. These local governments reviewed the Bureau's address list and provided corrections and updates. There were two LUCA operations: LUCA 98, which took place in areas containing city-style addresses and LUCA 99 which took place in areas containing non-city-style addresses (rural route and P.O. Box addresses).

3.1.2   Enumeration operations:

- Update/Leave: in areas of the country where most of the addresses were non-city-style (mainly rural areas), census enumerators delivered the questionnaires in person and simultaneously verified/updated the address list and census maps of the area.

- List/Enumerate: in sparsely-populated areas of the country, enumerators canvassed their assigned areas to locate, register (list address and spot it on a map), and fill out a questionnaire for every living quarters found.

- Update/Enumerate: this rural/urban operation took place in areas where there were a high number of seasonal vacants, American Indian Reservations, or Colonias. Enumerators updated the addresses and census maps in their assigned areas and filled out a questionnaire for each household listed.

- Nonresponse Followup (NRFU): a nationwide force of almost 500,000 enumerators traveled to households that did not return a completed census questionnaire and completed one for them.

- Coverage Improvement Followup (CIFU): this operation was a verification of the NRFU housing units classified as vacant and deletes, and an enumeration of newly constructed housing units and housing units that were added to the Bureau's address list too late to have received a questionnaire.

3.2 QA operations/activities

Associated with each of these operations was a comprehensive QA program designed to catch errors early, promote continuous improvement, and to protect against the clustering of performance errors. The Bureau's QA programs included:

- Initial Observations Crew Leaders observed each enumerator at the beginning of his/her assignment to ensure that they understood how to perform their job. The Crew Leaders provided feedback and when necessary, on-the-job training.

- Daily Reviews Crew Leaders reviewed their enumerators' work for completeness and consistency. These reviews were designed to catch errors early and to provide the enumerators continuous feedback on the quality of their work.

- Dependent Checks Crew Leaders inspected a sample of the verified/updated housing units in each assignment area to assess the quality of the work performed in the entire area. If the inspected sample contained too many critical listing/mapping errors, the assignment area

failed this quality check and was recanvassed by a different enumerator.

- Reinterviews office and field staff verified (by re-contacting households) a sample of the questionnaires completed by the enumerators for accuracy and completeness. If an enumerator's work was found to be below the Bureau's standard of quality, the supervisor took appropriate action – retrained the enumerator, replaced the enumerator, or assigned the work to another enumerator.

- Office Reviews clerks in the local census offices performed a completeness and consistency check of the completed address binders and census maps.

- Data Entry Check the summary portion of the checked-in questionnaires underwent an automated edit that checked the entries for completeness and consistency.

3.3 Other QA activities

These QA activities did not comprise the totality of the Bureau's QA efforts. Other activities included:

- Testing workers at the conclusion of training.

- Engaging the trainees in practice fieldwork.

- Checking the contents of the address binders and map pouches (during assignment preparation) for completeness and accuracy.

- Ensuring that the correct number of labeled questionnaires was allocated per assignment area.

3.4 Objectives of study

Among the questions that Westat was asked to answer or attempt to answer were:

- Does Deming's philosophy for achieving quality adapt well to a large, decentralized, and transient operation such as the decennial census?

- Did the Census Bureau achieve its QA objectives?

- What were the major strengths and weaknesses of the QA program?

- What changes should the Bureau implement to improve the 2010 QA program?

3.5 Data Collection

The Census Bureau provided Westat with training manuals, reference manuals, job aids, observation reports, debriefing reports, QA specifications, and an assortment of census reference documents to familiarize them with Census 2000, and the QA program in particular. In addition, Westat conducted several meetings with the Bureau's QA staff to obtain more insight and gather additional information. They also interviewed a host of census employees who were involved in Census 2000.

As part of the evaluation, they were asked to examine the QA programs of a number of other countries with similar census programs to see how they ensured the integrity of their data. To this end, they conducted phone interviews with Statistics Canada, the Office of National Statistics (England), and the Australian Bureau of Statistics to obtain benchmark information.

3.6 Limitations

There were several limitations to the Westat report. The following is a list of the major ones:

- At the time that Westat was conducting their evaluation (late 2001 to early 2002), the Census Bureau had yet to complete its own evaluations for each of the eight operations profiled. Because these evaluations are largely based on the analysis of the operational QA data, they would have provided Westat an objective measure of each program's effectiveness.

- With the exception of one QA operation, the Census Bureau did not debrief workers who conducted or oversaw QA about their experiences. Therefore, Westat had to rely on observation reports produced by the Bureau's QA branch, and limited interviews (mostly with staff at headquarters).

4.0 Findings

The following findings derive from the Westat report, which as of this writing is still in the draft phase. Therefore, the findings are subject to revision.

4.1 Overall Findings

Westat concluded that Deming's QA approach can be adapted to an operation as complex as the census, but emphasized the Bureau's need to provide more timely data to management, both in the field and at headquarters so that management can monitor the progress of the QA programs. In particular, summary data that detail the on-going effectiveness of the individual QA programs are critical. Such data could for example, alert management to trouble spots such as districts where a significant number of the assignment areas fail the dependent check.

Westat commended the Bureau for stressing the importance of quality in most of its training and reference manuals and for implementing QA throughout most of its major operations. Preliminary results from the assessments of some of these programs indicate that they were successful in identifying errors, which were ultimately corrected.

4.2 Recommendations

Westat made the following recommendations for improving the 2010 QA program. At an *early point* in the planning process, the Census Bureau should:

- Establish and publish its QA goals and objectives.

- Assign responsibility for QA effort to someone at the Executive level, so that QA would be a factor in decision-making, both going down and up the chain of command.

- Maintain a dedicated QA staff, but provide it with a clear mandate as to its authority and responsibilities, especially in its interaction with the operating divisions.

- Mandate QA as an integral component of every facet of planning for Census 2010, including budget.

- Implement a program to develop and test suggested QA operations.

- Adopt the two fundamental requirements of the Deming philosophy:

  - QA must be part of management, not separate.

  - QA must be part of the management responsibility at the operating level.

5.0 References

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