

**INNOVATIONS IN THE DECENNIAL CENSUS
OF POPULATION AND HOUSING: 1940-1990**

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INTRODUCTION

This report covers innovations during the period from the planning of the 1940 census to the evaluation, currently in progress, of the 1990 census. The census of 1940 is generally regarded as marking the beginning of the modern era of census taking. Most of the features of present-day census procedures and census content had their origins in the beginning decades of this period.

This report is based in part on my recollections and personal files covering the period 1940 to 1975 when I was a member of the staff of the Bureau of the Census and the subsequent period during which I have remained in fairly close contact with the Bureau, and in greater part on a detailed review of the voluminous (but not entirely complete) materials in the files and archives of the Bureau and interviews with many Bureau staff members and others. I am grateful to the people of the Bureau who were most cooperative and forthcoming in assisting me in my research.

I have arranged the descriptions of the innovations, and of some innovative ideas that were not implemented, into broad categories that may match the interests of some of the readers of this report. Within categories, the items are chronologically ordered, by decennial year, to show change over time. When an innovation is shown for a census year and not for the next one, the intent is to indicate that the innovation continued in use without major changes. Readers of this report, looking at it from various angles of interest, may find apparent inconsistencies in the amount of detail presented for different items. These may reflect my views of the importance or relevance of the items as background for planning for the future, or differences in the amount of documentation available, or my failure to find documentation for an item that I may have wished to describe more fully.

Innovative ideas that were not implemented are less well documented and less well remembered than those that were put into effect. Ideas have come from many sources, not just from the Bureau staff. Many ideas died aborning, and did not merit any historical record. Some, when first broached, were thought to have some possible future feasibility, and may have developed by increments and refinements over a period of several decades. I have tried to trace the growth of these.

Major changes in the census tend to come about by evolution rather than revolution. There are hundreds of changes from one census to the next, but most of them are refinements or expansions. The changes come about as a result of an extensive and intensive evaluation of the preceding census, many

consultations, conferences, and tests, and a great deal of staff work. The census is too large, too complex, too expensive, and too important to risk leaping into big changes without thorough assurance of success. To take one example, the consideration of changes for the 1960 census, by my incomplete count, included 9 field tests, 13 conferences of census users, 12 meetings of the federal population and housing census council, more than 80 meetings of outside advisory committees, a great many ad hoc meetings of various kinds, and a great many person-years of Bureau staff time. For later censuses, with earlier starts on planning, the volume was larger.

Changes in the content of the census, particularly the addition of new questions, are not easily accomplished. Generally, a new question would have to make room for itself by forcing out an already established question. Established questions tend to have a value that is hard for new questions to match, for a number of reasons: (1) questions of fundamental importance would have been earlier recognized and already included in the census (information on age and race has been obtained in every census from the first census in 1790); (2) established questions have built up a user clientele that new questions do not have; (3) historical comparability enhances value--new questions do not measure trends; (4) established questions have been time-tested as to the most meaningful and workable definitions, wording, and processing.

Nomenclatural history: The Sixteenth Decennial Census of the United States in 1940 included the censuses of population, agriculture, irrigation and drainage, manufactures, mineral industries, business, and the newly added census of housing. By 1950, the censuses of manufactures and business had been moved to other years and were no longer part of the decennial census. Agriculture, now considered as including irrigation and drainage, remained as part of the decennial census group. For the next two decennial censuses, the census of agriculture field work was moved from the spring to the preceding fall, considered a better time for collecting information from farmers; thus, there were agriculture censuses labeled 1959 and 1969. Later, the agriculture census was moved to the same quinquennial years to which the censuses of manufactures, mineral industries, and business, as well as the census of governments, had been moved, leaving only population and housing to comprise the decennial census. For 1940, 1950, and 1960 population and housing were identified, by law and in the census publications, as separate censuses, although conducted together. Beginning in 1970, they are considered as one census. The current version of the census law refers to "a census of population, housing, and matters relating to population and housing."*

*Title 13, Section 141(g), reads: "As used in this section, 'census of population' means a census of population, housing, and matters relating to population and housing."

COVERAGE AND CONTENT EVALUATION AND IMPROVEMENT

1940

Research Program

Formal coverage and content research on the decennial census began after the 1940 census. The program is now referred to as the Research, Evaluation, and Experimental Program (REX). It looks back at the preceding census and forward toward the next census. Its purposes are to measure errors so that the limitations of the data can be made known to users, to identify sources of error so that they can be reduced in future censuses, and to plan and conduct experimental programs to identify and develop new methodologies. Among the methods used are reinterviews, record checks, and field tests of experimental designs, as well as gathering ideas from outside the Census Bureau. Because it began in the 1940's looking toward the 1950 census, the program can be considered as an innovation attributed to the 1950 census.

Infant Card

Enumerators were required to fill out a special card for each infant born December 1, 1939 to April 1, 1940. About 700,000 cards were filled out. The cards were subsequently matched against birth records to provide measures of incompleteness in the census coverage and in the birth registration. In that era it was known that birth registration was not complete and it was believed that, in the census, new-born infants were more likely to fail to be reported than other population categories because they might not be considered as persons. In addition to their use for evaluation, it is likely that the infant cards served directly as a coverage improvement device because they reminded the enumerator to ask about infants and they provided an extra-pay incentive for enumerating them. The infant card was used again in 1950.

T-Night

On the night of April 8, a special enumeration was conducted of persons in transient quarters such as hotels, tourist or trailer camps, missions, and flophouses. This procedure, to attempt to find and count mobile persons once and not more than once, has been continued and expanded in subsequent censuses.

1950

Change in Enumeration of College Students

Prior to 1950, college students had been enumerated at their parental homes. Beginning in 1950, college students have been enumerated where they are residing at or in the vicinity of the college. The change was made not only because it was in accord with the "usual place of residence" rule but because it was expected to yield a more complete enumeration. In planning for this revised procedure, the Bureau mailed questionnaires to all large educational institutions early in 1948. This survey disclosed that many of the students did not live on the college campus; therefore educational institutions were not set up as separate enumeration districts.

Experiment With Use of Mail

Although the 1950 census standard enumerative procedure was, like 1940 and all preceding censuses, door-to-door personal interview, there was included a test of a list/leave self-enumeration procedure whereby the enumerators listed addresses and left a questionnaire for households to fill in and mail back to census district offices. The testing thus included also the use of household questionnaires. The success of this and later tests led to the use of mail techniques in parts of the country in 1960.

Missed Persons Form

This was a form that requested persons to fill it out and send it to the census office if they believed they had not been counted in the census. Quantities of the form were printed, distributed in the form of cards, reproduced in newspapers, and announced on radio. Later called "Were You Counted?", the forms have been used in subsequent censuses. In 1980, the forms were credited with adding 67,000 persons to the census count, at an estimated cost of \$267,000. Although the numbers are not very large, the program is relatively cost-effective compared with other wrap-up procedures.

Post-Enumeration Survey

This first PES consisted of two samples, one of areas to measure completeness of coverage of housing units, the other a list sample of enumerated households to measure completeness of coverage of persons within enumerated units and to evaluate content. The probability sample of 3,500 small areas was

re-canvassed and the prelistings compared with the original census listings. The list sample of 22,000 enumerated households was reinterviewed and the reinterviews compared with the original enumerations.

The 1950 PES estimated the gross census undercount to be 3.4 million people and the net undercount to be 2.1 million. Most of the undercount was in dwellings that were themselves missed. According to the PES, the estimated net undercount was 1.4 percent of the enumerated population. The results are biased because people are missed even in the more intensive PES and there is likely to be a high correlation between being missed in the census and being missed in the PES. Demographic analytical studies indicated that the true net undercoverage was substantially greater, amounting to perhaps 5 to 5.5 million people. Post-enumeration surveys in later censuses were improved over this pioneering one, with efforts to increase independence between census and PES. The fundamental problem is not totally overcome.

CPS-Census Match

A matching study was conducted to determine the differences between the information obtained in the monthly Current Population Survey and obtained for the same households in the census. Census schedules selected from 5,000 enumeration districts were microfilmed during the census processing, and the microfilm copy was matched with the April 1950 CPS questionnaires. Response variability and response bias were greater for the census than for the CPS. Labor force participation estimates were significantly higher in the CPS. The CPS-census match was repeated in succeeding censuses.

Access to IRS Records

Presidential executive orders in 1944 and 1961 authorized access to Internal Revenue Service tax return records by the Census Bureau for statistical purposes. Subsequent amendments to the census law (U.S. Code, Title 13) and to the IRS law (Title 26) confirm and supersede the executive orders.

Record Checks

Several record checks were made, on a sample basis, to evaluate the accuracy of selected content items. For example, age reported in the census was checked against birth certificates, against 1920 census records, and against Social Security and Veterans Administration records. Other record checks were on

veteran status matched against VA files, income matched against Internal Revenue Service files, and wage and salary income and industry matched against Social Security records.

Public Announcement of Census Undercount

Several years after the 1950 census, the Bureau made public an estimate of the national net undercount in the census. Later, a retroactive estimate for 1940 was made and estimates have been produced for subsequent censuses. The latest revised consistent estimates, based on demographic analysis, for the national net undercount rates are: 1940: 5.4 percent; 1950: 4.1 percent; 1960: 3.1 percent; 1970: 2.7 percent; 1980: 1.2 percent; and 1990: 1.8 percent.

1960

Self-Enumeration

Experiments and tests beginning in the 1940's, included in the 1950 census, and continuing in the 1950's, produced measures of enumerator variability when enumerators were used to collect the data by interview, and contrasted the variability with that found when self-enumeration was used. There were high rates of enumerator error, often consistent throughout the enumerator's work assignment area, on all but the simplest questions. The findings suggested that the census could be more accurate if the enumerator interviews could be replaced, as much as feasible, by self-enumeration. Nonsampling errors, such as those made by enumerators, were typically greater than sampling errors. This suggested that more accurate statistics could be obtained on a sampling basis than on a 100-percent basis for many questions if the nonsampling errors such as those made by enumerators could be sufficiently reduced, e.g., by using self-enumeration. (See this section, 1970, Use of Mail and Self-Enumeration.)

Transient Coverage

The T-Night procedure previously used to enumerate transients was split into two parts: T-Night enumeration for hotels and motels and a special M-Night enumeration for missions, flophouses, jails, and so forth. Both of these were for establishments with more than 50 rooms. Smaller ones were covered in the regular enumeration. This split, with more specialized attention, was considered a coverage improvement procedure.

Evaluation and Research Program

The individual projects adopted for the 1960 program were decided upon with the advice of the Panel of Statistical Consultants. In addition, a group of nine additional advisers met with the

permanent panel to advise on specific proposals. From the many studies proposed and considered, 22 were eventually selected. They were grouped into eight separate projects:

- A. Measurement of response variability
- B, C. Measurement of coverage error by "reverse record checks"
- D. Reenumerative studies of coverage error
- E. Measurement of content error in data collection
- F. Studies of processing error
- G. Analytical studies
- H. Post office coverage improvement study

With respect to project H, it can be noted that two methods had been under consideration for increasing the completeness of coverage of housing units in 1960: (1) use of post office personnel to examine the listings made by enumerators and to identify omitted housing units; (2) use of crew leaders to make an independent listing of housing units to compare later with the listings made by enumerators. Both methods were rejected because of budgetary considerations. The post office method, however, was tested in a probability sample of areas throughout the United States as part of the 1960 census evaluation program. The test, in which addresses were checked by postal workers after the enumeration was completed, showed the feasibility of improving census coverage through utilization of the local knowledge of postal carriers. The experimentation led to a fully evolved range of postal checks in the 1970 census.

The content evaluation program, similar to 1950, included intensive reinterviews with 5,000 households that were included in the 25-percent sample of the census, a CPS-census match, record checks for selected items, and a post-enumeration study based on an area sample of 2,500 segments containing 25,000 housing units and an independent list sample of 15,000 housing units.

1970

Earlier Planning

Small-scale mail feasibility tests were conducted in 1961 and 1962. A number of committees and task forces were formed in various parts of the Bureau beginning as early as 1961. The 1970 Census Planning Committee of the Bureau held its first formal meeting July 31, 1963.

Research Center

In 1964, the Bureau established a Center for Research in Measurement Methods "to conduct and to support research directed toward obtaining a deeper understanding of the basic problems of social and economic phenomena in censuses and surveys."

Use of Mail and Self-Enumeration

This procedure was adopted after a series of pretests in the 1960's, culminating in two dress rehearsals in 1968. The mail-out/mail-back procedure was used in approximately 60 percent of the households, those located in the larger metropolitan areas and some adjacent counties. The procedure was considered successful and was expanded in scope in succeeding censuses.

Inclusion of Americans Overseas

A number of previous censuses had included some coverage of Americans temporarily residing overseas, typically accomplished through the cooperation of the State Department and the Defense Department. For the first time in 1970, these persons were attributed to their home states and included in the population counts for Congressional apportionment, although not in the regular resident population counts. This was not done in 1980, but was done again in 1990. Massachusetts challenged the 1990 inclusion, which cost it a Congressman, but lost its Supreme Court case.

Vacancy Check

Experience in the 1950 and 1960 censuses and in early 1970 census returns indicated that some housing units were misclassified by enumerators as vacant and their occupants were not enumerated. The 1970 census included a recheck of a sample of 15,000 units initially classified as year-round vacant to see if they should have been classified as occupied. On the basis of the survey results, an estimate was made of the proportion of units misclassified and persons consequently missed. Computer programs were designed to change the occupancy status of a percentage of vacant units and to give occupants imputed for them the characteristics of occupants enumerated in a neighboring unit. Along with the 1970 post-enumeration post office check, this is the only time the Census Bureau has augmented census counts from sample results. About one million persons were added.

Address Registers

In past censuses enumerators were assigned pieces of territory delineated on maps, and instructed to canvass the areas fully. Control on the completeness of their operation was not fully effective. The address-register approach, incorporated in 1966

into the design of the 1970 census, involved giving the enumerator a list of addresses which he or she had to account for. The address registers were added to by information obtained from respondents about additional units and by prec canvasses by enumerators in selected neighborhoods.

Post Office Checks

Following the success of the experiment in 1960 and further testing, a range of post office checks was introduced into the 1970 census: an advance post office check in February 1969, a casing check in March 1970, a time-of-delivery check, and a post-enumeration post office check in 16 southern states with relatively rural populations. The post-enumeration post office check (PEPOC) based on samples in the 16 states added 1.3 percent to the population and 1.4 percent to the housing unit count in those areas. (However, 75 percent of the addresses which the Postal Service reported as missed had actually been enumerated.)

Disability Study

A reinterview sample of 40,000 households was conducted, independently of the evaluation program, to collect more detailed data on disability. The results indicated that the census understated disability by about 30 percent.

No Post-Enumeration Survey for Population Coverage

Because of the inadequacies of the PES coverage evaluation results for 1950 and 1960, no survey was conducted in 1970 specifically to estimate undercoverage in the 1970 census. A study based on the CPS-census match estimated that 3.1 percent of the population was missed in 1970 (1.6 percent in missed units, 0.9 percent in enumerated units, and 0.5 percent in occupied units enumerated as vacant). There were housing unit coverage checks in the mail areas. The study indicated a net coverage error of 1.7 percent for housing units in mail areas. The study also indicated that postal casings in mail areas were helpful in reducing net coverage error. Post-enumeration surveys to measure coverage were conducted in subsequent censuses.

Coverage Improvement Ideas Not Adopted

Other coverage improvement ideas discussed and considered but not adopted:

1. Advance letters to tell respondents when enumerators would call. Pretested, but the precise prior planning required for preannounced calls was considered impractical.
2. Payment of hourly rather than piece rates. Pretested, but did not show promise for coverage improvement. Also considered too risky from the budget view.

3. Change the census date from April 1 to mid-April or early May to have longer evening hours in which enumerators could work. Would have required Congressional approval to change not only the census date but also subsequent reporting deadlines.
4. Enumerating missions, flophouses, and small hotels in the morning rather than the evening, and making two or three calls rather than just one; leaving census forms at stations, terminals, all-night movie houses, and so forth; and listing all rather than just long-term occupants of general hospitals and then checking to see if they had been enumerated elsewhere. Dropped because deemed too expensive.
5. Simplification of questionnaire design, even at the cost of requiring an extra step of transcription to machine-readable documents. This was recommended for self-enumeration use in mail areas. Some format tests were conducted in May 1967, and individual sheets rather than household booklets appeared to improve mail-back rates. However, there were no definitive indications that the alternative format would be worth the extra cost.
6. Contracting out. A number of individuals and firms offered to take the 1970 census in inner-city communities on a contract basis. The suggestion was that hiring, training, and supervising enumerators might better be carried out by local agencies familiar with local conditions and practices. Aside from legal requirements that the census be taken by sworn government agents, there were other considerations: fear that communities might produce upwardly biased counts, questions about the ability of the groups to mount large-scale efforts, and budgetary limitations.

1980

Expansion of Census by Mail

The mail-out/mail-back self-enumeration procedure was expanded from about 60 percent of the population and housing units in 1970 to about 95 percent in 1980. It remained at about 95 percent in 1990; with some modification. However, whereas the response rate (percentage of households in the mail areas that filled out and mailed back their questionnaires) was in the mid-70s in 1960, 1970, and 1980, it fell to about 63 percent in 1990.

Expansion of Coverage Improvement Programs

In 1980, there was a great expansion in the number and magnitude of coverage improvement programs. Major improvements in magnitude included the national vacancy check and the post-enumeration post office check which were on a sample basis in

1970 but in 1980 were carried out on a 100-percent basis. In the 1980 vacancy check, about 10 percent of the 5.8 million units that were revisited were converted to occupied status. About 1.7 million persons were added from this followup activity.

Coverage Improvement Program for American Indians

For 1980, the Bureau made a major effort to improve the coverage of the American Indian population. Working with the Bureau of Indian Affairs and tribal officials, the Bureau compiled a list of 269 reservations, and obtained maps of legally recognized boundaries. Tribal officials were asked to review the maps. A series of meetings with American Indian groups was held around the country. Emphasis was placed also on identifying urban American Indians not on reservations and getting them to properly check the race question on the census schedule.

Minority Checks

To help reduce the differential undercoverage of minority populations, a check against lists of names and addresses from the Immigration and Naturalization Service, the New York City public-assistance files, and departments of motor vehicles in 43 states and the District of Columbia was carried out in urban areas where there were large concentrations of minority groups. An unduplicated list of 6.8 million records was created and distributed among the district offices. It was estimated that 127,000 persons were added through this check, at a cost of \$6.3 million. It had been hoped that a much greater addition, about 10 percent of the total list rather than less than 2 percent, would be added. The program was tested further in the 1986 test census in Los Angeles County. The test indicated that, even with automation, the complexities of operational matching would not be feasibly overcome. The resulting recommendation for 1990 was that such tests be used strictly for coverage measurement after the census as opposed to coverage improvement in the census.

Dependent Roster Check

The dependent roster check was designed to take advantage of an opportunity to improve within-household coverage. It was dependent on occasions when households enumerated in the census needed to be followed up for various reasons, such as having mailed in questionnaires that failed edit. At the time of the interview, respondents were asked to verify whether the roster of persons in the household was complete, or whether any persons had been omitted.

Check on Households With Usual Residence Elsewhere

In previous censuses, households identified as temporary residents with usual residence elsewhere were assumed to have been enumerated at their usual residence. In the 1980 census, a check was made at the address given as the usual residence to make sure that household was enumerated there. If not, it was added to the census at that usual address.

Prelist Recanvass

Approximately 40 percent of the census mail-out addresses were obtained from a pre-census listing procedure. The prelist recanvass was an additional check on the completeness of these address listings in the more rural parts of the prelist area, where past evidence had shown relatively large coverage problems. The recanvass was done during followup operations. In addition to adding units that the census missed, the recanvass also identified and removed duplicate units.

Local Review

The plan prior to the 1980 census was to invite all 39,000 local governmental units to conduct both a precensus and postcensus review. In February 1980, the Bureau decided to cancel the precensus phase and have the postcensus review after the first followup, providing the local officials with preliminary population and housing unit counts down to the enumeration district level but not down to the block level. The changes were necessary because the number of uncoded addresses (without block numbers) was unexpectedly high in the tape address register areas and because not all the maps were ready for earlier use.

About 12,400 of the governmental units participated in the postcensus review program. About 6,500 of them reported finding problems that they felt needed resolution. Rechecking and recanvassing the 2,500 cases that had evidence that the Bureau could check resulted in the addition of 53,000 housing units, deletion of 20,000, and transfer of 28,000 from one enumeration district to another, with a net addition and transfer of over 58,000 persons. The estimated cost of the program was \$4.3 million, of which \$950,000 was for recanvassing.

Experiment in Telephone Followup

The 1980 census included an experiment in which telephone directories organized by address were used to provide telephone numbers for use in followup calls to nonrespondents. The results were compared with the results of personal visits for followup. The consideration of the use of telephones also extended to computer-assisted telephone followup interviewing. For reasons including the high cost of equipment for computer-assisted

interviewing for only a short period of use, telephone followup was not used in 1990. Technological advances may make it feasible for the 2000 census.

Outreach Program

Another phase of the overall efforts to improve coverage was an expanded outreach campaign, with particular emphasis on encouraging minority participation.

Consideration of Adjustment for Undercount

By the 1970's, the Bureau staff was working on techniques for adjusting decennial figures for undercount, should future census outcomes lead to such a possibility and should legal, technical, and other considerations make it feasible. The increasing use of census figures in revenue sharing, in political processes such as reapportionment and redistricting, and in the enforcement of voting rights, led to greater public concern about the validity of the census counts and in turn, to the filing of numerous court suits calling for adjustment. The 1980 census was the most litigious in history. The techniques and the data for adjustment were not very well developed by 1980, and there was the particular problem of lack of any good measurement of the number of illegal aliens in the United States at the time of the census and the number who were counted in the census.

As part of its consideration of adjustment, the Bureau convened a census undercount workshop September 5-8, 1979 at Reston, Virginia and sponsored the Conference on Census Undercount February 25-26, 1980 in Arlington, Virginia. A proceedings volume for the conference, including papers on adjusting the census, was published. The conference was not devoted to questions of how to take the census more accurately and completely, but rather to questions of estimating the undercount and adjusting for it. In December 1980 the Director of the Census Bureau announced that the Bureau would not adjust the census figures for undercount unless ordered by the courts. The Supreme Court subsequently upheld that decision.

1990

Enumerator and Postal Carrier Address Reviews

The 1990 census was the first to have an enumerator review and a postal carrier review of all addresses in the mail-out/mail-back areas.

Recanvass

To improve coverage in specific areas where count review and other research indicated deficient housing unit counts, a recanvass operation was conducted from late July to early October. In each area, it was conducted before the postcensus local review.

Expanded Local Review

In contrast to 1980, there was both a precensus and a postcensus local government review in 1990, with most of the local governmental units participating. Approximately 20,000 governments, those in the areas that were enumerated by mail-out/mail-back, were eligible to participate in the precensus local review, but all 39,000 were eligible to participate in the postcensus review program. Plans called for the eligible governmental units to compare the Bureau's block-by-block counts of housing units and special places in their jurisdiction with their own records before the census began, and then to review the preliminary housing unit counts and group quarters population counts resulting from the enumeration. There was also a precensus local government review of the census maps.

Housing Coverage Check and Housing Unit Coverage Study

The Housing Coverage Check was not part of the original census plan. It was implemented in areas where there were indications, from local review or other sources, of any gross missing of housing units. The areas in question were rechecked. The recheck did not produce very much, but provided some supplement to the postcensus local review program.

The Housing Unit Coverage Check is an evaluation of the 1990 census results. It was based on a sample of half of the Post-Enumeration Survey housing units, with certainty coverage of some problem areas. The results are being analyzed.

A test was made in California before the 1990 census of a separate questionnaire for multi-unit residential structures. It was not used in the 1990 census.

Matching to Administrative Records

For further evaluation of the 1990 census results, and in preparation for possible expanded use of administrative records in future censuses, there are plans for matching 1990 census records to Internal Revenue Service, Social Security, and Medicare data sets, and perhaps other federal sources, as well as to a few selected state and local files.

Parolee/Probationer Check

A special use of administrative records for coverage improvement in the 1990 census, this was an ad hoc program initiated after the census began. The Bureau sent letters to each state and the District of Columbia inviting participation in matching lists of parolees and probationers against the census questionnaires. About 400,000 persons were added to the population count.

Pop One Check

This was conducted in July to October 1990 in 24 district offices. All one-person households that had been enumerated by last resort and closeout procedures were visited again to confirm the count. There was also a reinterview of a sample of 1,000 one-person households enumerated during nonresponse followup in all 447 district offices. In October, a reinterview procedure was conducted. Seven district offices were re-opened in northern New Jersey and 18,000 households (not all one-person) were re-enumerated. This was an area in which there was some doubt about the validity of the completion of the nonresponse followup.

Special Count of Homeless

In addition to the T-Night (transient night) procedure employed in previous censuses, the 1990 census included an S-Night (shelter and street night) enumeration, to count persons in pre-identified public shelters and places of commerce such as bus and train stations, and persons visible on the streets during the early morning hours. Local governments identified locations. The sites also included all pre-identified private emergency shelters, abandoned buildings, hotels and motels costing \$12 a night or less, hotels and motels used entirely to shelter homeless, and pre-identified rooms in hotels and motels. No one enumerated during S-Night was asked about a usual residence elsewhere. The enumeration was conducted before the regular census day, on the night of March 20. The T-Night enumeration was conducted Saturday afternoon and evening, March 31.

Surveys on Census Participation

The Survey of 1990 Census Participation was commissioned by the Census Bureau after the 1990 census. It was conducted by the National Opinion Research Center, and consisted of in-person interviews with a national sample of persons who reported in the survey whether they had or had not received and had or had not returned a census questionnaire.

The Census Bureau conducted, after the census, the 1990 Outreach Evaluation Survey, a nationwide survey in two phases to evaluate the impact of the Bureau's promotional activities, and a

telephone survey in New York City and Cleveland to provide information on why the census response rate had been lower than expected.

Ethnographic Studies

The Census Bureau's Center for Survey Methods Research is conducting an ethnographic evaluation of the 1990 census. There were 29 independent Joint Statistical Agreement projects in various areas which are producing a series of reports on the experiences of the investigators in conducting studies in or related to the census. The most recently completed reports are "Alternative Enumeration of a Heterogeneous Population in a San Francisco Housing Project," "Asian Americans in a Mixed Neighborhood: A Longitudinal Study," and "Ethnography of Alternative Enumeration Among Korean Americans in Queens, New York."

Summary of Additions to Census Count from Coverage Improvement Operations

Project	Time Period 1990	Population Count (millions)
Residential population count at end of primary collection		243.2
Added from coverage improvement operations:		
Vacant/Delete Check "Were You Counted" Campaign	June-August	2.1
Parolees/Probationers Check	June-September	0.2
Recanvass and Postcensus Local Review	September-October	0.4
Miscellaneous (field followup, imputation for occupied units for which there was no person count, etc.)	August-October	0.3
	June-December	2.4
		<hr/> 248.7

SAMPLING

1940

The 1940 census was the first decennial census to use sampling. The proposal to use sampling did not have the unanimous concurrence of the Bureau staff; some officials opposed it. The discussion reverted to the Secretary of Commerce, Harry Hopkins, who decided in favor of sampling. Among the arguments in favor of sampling were that it would allow the inclusion of more questions in the census and would save time and money in data processing.

The Bureau had some prior experience in sampling for population data in connection with the recheck of the 1937 Census of Partial Employment, Unemployment, and Occupations, which was a "post-card census" conducted by the Post Office Department. Serious questions of deficiencies in that undertaking led to the taking of an Enumerative Check Census in late 1937 designed by Census Bureau staff and based on a sample of two out of every hundred postal routes in the nation, with postal employees as canvassers. The results of the so-called Check Census, actually a sample survey, were generally deemed to be more accurate than the supposedly complete-count Unemployment Census, although the survey could not produce much geographic detail.

Sample Design

As in previous censuses, the 1940 questionnaire was a line schedule. The population form had 40 main lines, with members of each household listed immediately following the previous household. Two of each 40 lines were designated as "Suppl. Ques.", comprising a 5-percent sample of persons. Persons entered on the designated lines were asked additional questions located at the bottom of the sheet. To avoid biases of line location, there were five different versions of the sampling pattern, with different sample lines designated. There was no sampling in the 1940 housing census.

Uses of Sampling

Sampling was used for the collection of some of the population data and thus affected also the data processing workload. The 5-percent sample pattern was also used to select a sample of the complete-count punch cards for advance tabulation to make possible early publication of statistics on some of the basic subjects. In addition, there was sample inspection in the verification of some of the data-processing operations, such as card punching.

1950

Expansion of Sampling

Rising costs of data collection, increasing demands for information, and improved techniques were factors in the more intensive use of sampling in 1950. Sample size was increased, and more questions, including housing schedule questions for the first time, were placed on a sample basis. A sample survey, the Survey of Residential Financing, was conducted as a supplement to the housing census.

Sample Design

As in 1940, the basic census questionnaire was a line schedule. For 1950, the format had 30 lines for persons on one side of a sheet for the population census, and space for the housing questions for 12 units on the other side for the housing census. On the population side, every fifth line was labeled "Sample line." Different sheets had different starting numbers for the sample lines. For a few items, data were needed only for large population groups and large areas, so a sample smaller than 20 percent could be used. Persons on the last of the six sample lines on the population side of the schedule were selected for inclusion in a 3 1/3-percent sample and were asked a greater number of additional questions.

The housing 20-percent sample was different. The sample questions were divided into five groups and one group was asked in each household. Thus there were five 20-percent samples.

Sampling Evaluation

Various studies indicated that if most census data were collected on a large sample basis, the effect on the resulting mean square errors would be minimal. The errors resulting from response and enumerator variance tend to dominate the sampling error for most estimates. This finding, plus the experience that the sampling operation worked well in the field, suggested that, in the future, still more questions could be transferred from 100 percent to sample.

1960

Further Expansion of Sampling

More questions were transferred from 100 percent to sample. In the population census only name, age, sex, race, marital status, and relationship to household head were asked of all persons. All other questions were on a sample basis.

Sample Design

The 1960 census was the first in which the majority of the public was asked to fill out a questionnaire. The use of self-enumeration, and some use of mail, called for a household questionnaire rather than a line schedule. Thus, for the first time, the population census sample was a selection of households rather than persons. The sample, for both population and housing, consisted of every fourth household and housing unit. For housing the 25-percent sample was subdivided into 20 percent and 5 percent. Some sample questions appeared on both formats; thus data for sample housing items were collected for 5 percent, 20 percent, or 25 percent of the housing units.

For tabulation and publication, some of the population statistics were based on a subsample of one-fifth of the collected 25-percent sample questionnaires, using a stratified systematic sample design. Some tabulations which included both population and housing items were based on a 1-percent sample or a 4-percent sample. This arrangement arose because some of the persons or households in the population sample were in housing units in the 20-percent housing sample and others were in housing units in the 5-percent housing sample.

Thus there was a great deal of flexibility in the sampling, allowing for economies in cost and time of tabulation, depending on the size of the geographic areas or population and housing categories being tabulated and the degree of reliability needed.

Use of the household as the sampling unit and use of household questionnaires made possible the collection and compilation of better and more extensive household and family statistics.

The overall sampling rate was increased from 20 percent in 1950 to 25 percent in 1960 because the use of the household as the sampling unit rather than the person for the population census introduced somewhat more sampling variance due to an increased clustering effect.

Sampling for Field Quality Control

For 1960 for the first time in a major U.S. census a formal program of quality control was instituted for the field enumeration. It provided supervisors with definite procedures for detecting and, when necessary, rejecting unacceptable work.

1970

Sample Design

The basic sample for 1970 was 20 percent selected from the census listing of housing units and also of individuals in large group

quarters. For smaller group quarters (under 15 persons) the group quarters were the sampling units. The 20-percent sample was subdivided into 15 percent and 5 percent. Two different sample questionnaires were used. Some sample questions, both for population and housing, were on both. Thus there were 100-percent, 20-percent, 15-percent, and 5-percent questions in the 1970 census.

The initial pretests for 1970 had used a single 25-percent sample long form. The desire to add more questions led to two forms. In the 1968 dress rehearsal there was a 20-percent and a 5-percent long form, producing 25-percent, 20-percent, and 5-percent samples for various items. In the census itself, the fractions were reduced to 20 percent, 15 percent, and 5 percent.

1980

Sample Design

The 1980 census continued the use of household schedules and household sampling. Pretests for 1980 used a single long form for 20 percent of the housing units and households. Because of the need for accurate small-area data on income for General Revenue Sharing, a late decision was made to use one long form but to administer it to a larger fraction of the population in smaller jurisdictions. In later pretests, the Bureau experimented with putting an income question on the 100-percent short form, but decided against it for reasons of cost and respondent burden. After the dress rehearsals, the final decision was to use a sampling rate for the long form, which included the income questions, of 50 percent for places of under 2,500 population and 16.7 percent (one in six) in all other places. The overall sampling rate was close to 20 percent.

Subsampling for Processing

Some of the sample questions required clerical coding of written-in responses. After this coding had been underway for two months, it was decided to cut costs by subsampling the sample questionnaires in each work unit and coding only half of the commuting (place of work and travel time) and migration (place of residence five years ago) responses while continuing to code all other written-in responses.

Subsampling was also used to select an Early National Sample to provide data users with early access to sample data on selected social, economic, and housing characteristics for the U.S., each state and D.C., and the 38 metropolitan areas of over one million population. The sample was about 1.5 percent of the housing units and persons in the nation. An advance sample tabulation had been done in 1950.

1990

Sample Design

The Bureau had planned a sample design of a uniform one-in-six rate, similar to that of 1980. This would have produced a total sample of about 16 million households in the Nation. In June 1987, the Bureau sent to the Office of Management and Budget its request for clearance of questionnaires for the 1988 dress rehearsal. OMB, in initially rejecting the clearance request, made suggestions for changes in the 1990 census plans. To reduce reporting burden, it suggested deleting several questions and transferring several from 100-percent to sample coverage, and reducing the sample from 16 million to 10 million households, with variable sample rates to provide adequate sample size for smaller areas. After considerable negotiation, backed up by expressions of concern from the user communities, an agreement was reached on a sampling plan with variable rates by type and size of area, but with an expected total of about 17.7 million households. Most of the suggested question cuts were restored.

QUESTIONNAIRE CONTENT**1940****Housing**

By Act of Congress approved August 11, 1939, authorization was provided for a national census of housing to be taken in conjunction with the population census. Despite the very late authorization and funding, and the lack of prior experience to draw upon, the Census Bureau did devise and conduct a census of housing as of April 1, 1940. Although some housing-related questions had been included in population censuses as far back as 1860 (e.g., tenure, value, whether mortgaged), most of the 1940 questions were new, including questions about occupancy, structural characteristics, plumbing, equipment, fuels, and financial characteristics.

Employment Status

A major innovation in the content of the population schedule was a block of seven questions on current employment status. The so-called unemployment check census in 1937, for which the Bureau was involved in editing, tabulation, and preparation of tables, provided some background for developing the concept and the questions, not only for the census, but for the new WPA monthly survey of unemployment (later to become the Current Population Survey) which began at the same time as the taking of the census, with both the survey and the census using the same questions and the same reference week, March 24-30, 1940.

Previous censuses had inquired about gainful occupations, and several censuses had included a question about unemployment, but the array of questions on specific activity or status during a specified week was a new development. There was also a change in the minimum age for persons to be asked about work status, from 10 years of age in previous censuses to 14 years of age.

Income

Even more innovative was the inclusion for the first time in the population census of questions on income. There were two questions, one asking for amount of wage or salary income earned in 1939, the other a yes-no question on whether the person had received \$50 or more of other income in 1939. Because of public controversy that developed when the plan to ask about income became known, the Bureau sought to minimize the impact. High-paid earners of over \$5,000 were permitted to report simply the figure of \$5,000+; the income questions were placed at the end of the row of questions for each person (but were asked on a 100-percent basis, not the sample); and enumerators were provided with confidential income return forms to give to respondents who

did not wish to give income information to the local enumerator. Despite the controversy about undue invasion of privacy, there was only two percent nonresponse by wage or salary workers to the wage or salary question and only 200,000 confidential report forms were used. It is likely that many of the confidential forms were used not because of refusal to respond to the enumerator but to avoid the necessity of a call-back visit.

Other New Questions

Among new questions in the population census were fertility (number of children ever born to ever-married women), education (highest grade of school completed, to replace a question on illiteracy), migration (place of residence five years ago; earlier censuses could only measure migration by place of birth versus current residence), weeks worked in 1939, social security status (but not social security number), usual occupation (in addition to current occupation for those in the labor force). A new classification scheme was used for coding occupation, based more on socio-economic status. Industry for those in the labor force was coded according to the newly revised Standard Industrial Classification prepared by the Central Statistical Board.

Age Bias

Postcensus analysis of returns to the question on age showed problems with age bias, that is, "heaping" on numbers like 18, 21, 45. The evaluation suggested that in future censuses, the question on age be replaced by a question on date of birth. *(Not done until 1960.)*

1950

Survey of Residential Financing

This was a sample survey conducted as a follow-on to the housing census. It was based on a sample of dwelling units from the census in selected enumeration districts in about 700 counties. Schedules were mailed to owners of residential properties and to mortgage holders. For rental units the names of owners or rental agencies were obtained from occupants. A subsample of owners and lenders who failed to fill the schedules was enumerated in a followup.

Expansion of Income Questions

The income questions were shifted from 100-percent coverage in 1940 to the sample in 1950, but more specific-amount questions were asked on income received in 1949: wages or salary; money earned working in own business, professional practice, or farm; and money received from sources other than earnings.

1960

New Population Questions

More questions were shifted to the sample, and all new questions were put on the sample. The only items collected for 100 percent of the population were relationship to head of household, sex, race, date of birth, and marital status. With self-enumeration for most of the population, the question on race became one of self-identification rather than observation by the enumerator. The question on age in previous censuses was replaced by a question on month and year of birth to reduce the biases in age reporting.

New questions included commuting (place of work and means of transportation to work), length of residence (when person moved into present dwelling), whether school enrolled in was public or private, specific identification of for whom worked (e.g., company name; coders were provided with a company name list and industry classification), date of first marriage (to replace the 1950 question on duration of current marital status). Information was obtained to identify within a household of a family, primary family, secondary family, unrelated individual, primary unrelated individual, and secondary unrelated individual.

New questions considered but not chosen included religion (opposition of religious groups to such a question in a mandatory census and the possibility of delays in the census operation from court cases or lack of cooperation), separate question on income from farming (too costly relative to utility of item), secondary occupation (too costly in coding), medical insurance (too costly in obtaining and classifying the information), wealth (problem in clarifying the concept), blood type (many people do not know), migratory farm workers (problems of identifying them).

New Housing Questions

The definition of unit was made more inclusive and the name was changed from dwelling unit to housing unit. New questions included access to unit and presence of cooking equipment (both of these items were used to define and identify a separate housing unit). New questions on facilities and equipment included water heating fuel, clothes washing machine, clothes dryer, air conditioning, home food freezer, number of bathrooms, source of water, sewage disposal, telephone, and automobiles. New structural item questions included number of bedrooms, basement, elevator, mobility of trailers. Another new question was on duration of vacancy for vacant units.

Many other items were proposed and considered but not chosen. Some were field tested. Major reasons for rejection were lack of sufficient general usefulness relative to their cost and difficulty in obtaining accurate responses.

Survey of Components of Change

Added to the Survey of Residential Financing, which had been innovated in 1950, was a Survey of Components of Change (in the housing inventory). The two constituted a large-scale sample survey conducted in the fall of 1959 and early 1960 as a part of the housing census. This was one of the most complicated surveys even undertaken by the Bureau. There were multiple samples for varying geographic areas, supplementary surveys to improve the reliability of the data, and specialized enumeration techniques. The content of the Survey of Components of Change was somewhat similar to that of the December 1956 National Housing Inventory, the first survey of its kind.

1970

Legislation to Limit Census Content

In 1967 Congressman Jackson E. Betts^(R-Ohio) launched a vigorous campaign to limit the decennial census. In his bill, introduced in June 1967, and in his many public statements, he proposed that the 1970 census have only seven questions, including name and address, on a 100-percent, mandatory basis, that most of the other contemplated questions be deleted, and that any remaining ones be carried on a relatively small sample basis, with voluntary response.

The bill attracted considerable Congressional support. Over a period of more than two years this issue generated much discussion, including hearings before the House Subcommittee on Census and Statistics. The Commerce Department, on behalf of the Census Bureau, opposed the bill, but, in a letter to all members of Congress dated April 18, 1969, announced some changes: a reduction in the number of households to receive the long form, a rewording of the question on shared bathroom (consistently misquoted by Representative Betts as "with whom do you share your shower?"), an agreement to have questions for future censuses submitted to the Congress two years in advance, and a promise by the Secretary to appoint a blue-ribbon committee to look into such matters as sampling and voluntary response.

Despite these concessions, a modified and less drastic version of the Betts bill was passed by the House of Representatives in September 1969. An amendment by Rep. Betts to remove mandatory

authority from all but six questions (he dropped race from his original list of seven mandatory questions) was rejected by the House by a narrow margin. The bill as passed by the House was not acted upon by the Senate and died with the expiration of the 91st Congress.

New Population and Housing Questions

All new questions were covered on a sample basis, nearly all on the 5-percent sample.

New questions included Spanish origin or descent, vocational training completed, activity five years ago, occupation and industry five years ago, citizenship (not new, but not asked since 1950), year of immigration (not asked since 1930), disability (not asked since 1890), ownership of a second home, and presence of dishwasher.

Condition of housing, in previous censuses, was dropped. Studies following the 1960 census indicated that the classification, by enumerator observation, of a housing unit as "sound," "deteriorating," or "dilapidated" was not a reliable indicator of condition, and that classification by self-enumeration was likely to be subjective and inconsistent. For 1970, the Bureau decided that an objective classification would be made on the basis of answers to such questions as plumbing, age of structure, and value or rent.

Questions considered but not chosen included religion, union membership, highest college degree, amount of taxes paid, automobile accidents, ownership of musical instruments, smoking, multiple job holding, facilities included in rent, stock ownership, child spacing, expected family size, number of household pets, whether born on a farm, distance to shopping areas, reason for changing residence, hospitalization during previous year, availability of off-street parking, and social security number.

Census Employment Survey

As parts of the 1970 census, the Bureau conducted three sample surveys: repeats of the Survey of Residential Financing and the survey of Components of Inventory Change, and a new Census Employment Survey, designed to obtain a wide range of detailed socio-economic information on employment-related problems of residents of selected low-income areas. The idea for the survey developed in the fall of 1967 during the final Cabinet-level review of the subject content of the 1970 census, when it became

clear that the census questionnaire could not be expanded to fulfill all of the needs for data to assist in guiding government programs in labor, housing, education, and welfare for certain critical population groups. Planning for the survey was done by an interagency task force.

1980

National Content Test

The National Content Test was a sample survey conducted in July 1978 as part of the preparation for the 1980 census. It was based on a national sample of 28,000 households divided into two panels. Two questionnaires containing variant wordings or formats for some of the census questions were developed for testing. The survey was done by mail-out/mail-back, with followup by personal interviews by the Bureau's regional offices' current survey interviewers. Subsamples of 2,300 households from each panel were selected for content reinterview. Results provided evidence of desirability of making a number of changes in the wording or format of the census questions.

New Population and Housing Questions

New questions included ancestry, current language and English proficiency, travel time to work, condominium identification, year moved into this house, number of light trucks and vans, home owner shelter costs for real estate taxes, fire and hazard insurance, and mortgage, and boarded-up status for vacant units. This was the first time a question on general ancestry was asked, replacing previous questions on country of birth of parents. This was a write-in question, with examples such as American Indian, German-Irish given. The question on veteran status was expanded to cover women.

The concept of "household head" was discarded, affecting the order in which names were listed and the entries for the relationship question. Previous censuses called for listing of household members with "head" listed first and "wife of head" listed second. There was the clear implication that only the husband could be head in a married-couple family. Increased awareness of sexism and changes in household and family structure led the Bureau to drop the term "head" beginning with the 1980 census. The instructions to respondents for the 1980 questionnaire said "Start in this column with the household member (or one of the members) in whose name the house is owned or rented. If there is no such person, start in this column with any adult household member." The instructions for the relationship question then referred to relationship to the "person in column 1."

1990

New Population and Housing Questions

There were few entirely new questions in 1990--years of military service, second mortgage payment, condominium fee, meals included in rent (congregate housing), mobile home costs--but major changes in concept, question wording, instructions, and response categories for a number of questions, including race, Spanish origin, citizenship, educational attainment, veteran status, disability, class of worker, income, plumbing facilities, and second mortgage status.

New questions considered and tested but not chosen included second jobs, number of hours worked at principal job, all means of transportation to work rather than only principal means, time of departure and time of arrival at work, multiple residence, presence and name of spouse and parent in household, place of birth of parents (in previous censuses until 1970), vocational education, separate identification in income questions of child support and alimony, veterans' payments, unemployment compensation, various types of noncash benefits, additional details on disability, housing cooperative status, land tenure for mobile homes, identification of housing with occupancy limited to specific population groups, holes in the floor as an indicator of substandard housing, smoke detector, number of all motorized vehicles, and breakdowns of heating equipment.

A separate questionnaire on multi-unit residential structures was tested in the 1980's for consideration as a part of the 1990 census. It was not included in the 1990 census.

QUESTIONNAIRE DESIGN

1940

Test of Household Schedule

In the special census of St. Joseph and Marshall Counties, Indiana in August 1939, which was the major pretest for the 1940 census, an experiment with household schedules was included. Two alternative population schedules were used in the special census--a conventional line schedule with lines for 100 persons, and a household schedule with space for 12 persons. At that late date before the 1940 census, the experiment could be considered as looking to future censuses beyond 1940.

Tested also in the Indiana special census was a supplementary schedule for each tenth household enumerated, providing the basis for a sample study of information that could not be included on the regular schedule.

The Indiana special census also included a pretest of the Infant Card. The Infant Card was included in the 1940 census.

Checkbox Schedule Format

The 1940 housing schedule featured a precoded checkbox format for nearly all of the questions. The schedule required virtually no coding or editing to prepare it for cardpunching.

1950

Further Testing of Alternative Questionnaire Designs

In tests in the late 1940's, the Bureau made further tests of household schedules, and tests of the use of relatively short questionnaires as compared with longer ones. It also began research on a schedule with position marking to be read by machine. IBM in 1948 notified the Bureau that it could not complete the design and production of equipment in time for the 1950 census.

1960

Separate 100-Percent and Sample Questionnaires

The 100-percent and the sample questions were placed on two separate questionnaires (short form and long form, respectively). The principal reason was to obtain more timely compilation and

publication of the 100-percent statistics. The 100-percent items did not require lengthy coding and editing operations as some of the sample questions did. Also, in areas containing 82 percent of the population and housing units of the nation, the collection of data was in two stages, with the sample data in the second stage.

Machine-Readable Forms

Some of the field forms were designed to be read by FOSDIC (Film Optical Sensing Device for Input to Computers). Enumerators visited households to pick up the 100-percent census form (not FOSDIC) that had been mailed out in advance of the census day. If the advance form was filled out, the enumerator transcribed from it to a FOSDIC form. If the advance form was not filled out, the enumerator asked the questions and entered the answers directly on the FOSDIC form. In the two-stage procedure, for most of the nation, the enumerator left a sample household questionnaire (not FOSDIC) at every fourth household, to be filled out and mailed back, and then transcribed to a FOSDIC form. In the one-stage areas, the enumerator filled out a sample FOSDIC schedule at every fourth household.

1970

Machine-Readable Questionnaires

The basic data-collection questionnaires were all machine-readable (FOSDIC) forms: the short and long forms as used in both the mail-out/mail-back areas and in the "conventional" procedure areas. Most of the questions could be answered by the respondent or enumerator filling in small circles adjacent to the printed questions. These marks could then be read by the new FOSDIC machine. Questions requiring write-in answers were later clerically coded by filling in the appropriate circles.

1980

Further Testing of Alternative Questionnaire Designs

One of the experimental programs prior to the 1980 census tested alternative questionnaire designs. Two sets of experimental questionnaires were designed with different appearances than the standard short-form and long-form household questionnaires. The first set was linear FOSDIC-readable forms with the 100-percent population questions in horizontal rows rather than vertical columns, and with some rearrangement of the long form. The second set was non-FOSDIC forms, prepared by a contractor specializing in document design, intended to be as user-friendly

as possible even though sacrificing machine readability. In a sample of district offices, the various questionnaires were mailed to subsets of a total of 18,000 addresses. Analysis of the results indicated that the length of the questionnaire was a bigger factor in response than the design. All the short-form variants were returned at higher rates than any of the long forms. Both of the experimental short forms were returned at only a slightly higher rate than the standard short form.

1990

Bar Code

Each 1990 questionnaire that was mailed out had a unique bar code (similar to the ones on consumer products in retail stores) that linked the basic geographic codes with the individual record in the address control file.

Alternative Questionnaire Experiment

This was an experiment within the 1990 census. In a national sample of households in the densely populated central city areas (hard-to-enumerate areas), five experimental questionnaire designs were tested against a standard long form to evaluate the effects of layout, question wording, question sequencing, revised coverage questions, and elimination of the requirement to provide names. There was a subsample of 7,000 households for each of the six variants, for a total of 42,000. The significantly higher response rates, compared with Panel 1 (control) were for Panel 4 (booklet format) and Panel 6 (kit-style format as in Panel 5 but with no request for names). The highest rate of return for Panel 6 suggests that there is a confidentiality factor.

Simplified Questionnaire Test

This was a test conducted in March 1992 with a sample of 17,000 households. Half of them were selected from the areas of the 1990 census district offices that had high proportions of black or Hispanic populations; the other half were selected from the rest of the country. Households were sent a prenotice letter, then one of the variant test questionnaires, and then a thank you/reminder card. A replacement questionnaire was sent to those households that did not return the form within a certain period of time. The major findings from the test were (1) asking fewer questions improved response rates overall and in areas with higher response rates in 1990, but not in areas with low response rates in 1990; (2) using a "respondent-friendly" form design improved response rates for areas with low response rates in 1990, but not overall or for areas with higher response rates in

1990; (3) asking for Social Security number lowered response rates overall and for areas with low response rates in 1990, but not for areas with higher response rates in 1990; (4) mailing a replacement questionnaire improved response rates for all areas, for all questionnaire lengths, and for all questionnaire designs. Further study is needed on the implications for cost, coverage, data quality, and ability to meet critical data needs.

GEOGRAPHY

1940

Census Tracts

Census tract statistics from the decennial census were experimental and small-scale until 1940. A few cities worked with the Census Bureau to establish tract boundaries and paid for the tabulations, but the Bureau did not publish them. In 1940, there was a considerable increase, to about 60, in the number of cities with tracts, and the Bureau published tract reports. The 1950 census recognized tracts in 114 cities.

1950

Blocks

Statistics for city blocks were tabulated and published as a new feature of the 1950 census of housing. For 1950, the tabulations were limited to the 209 pre-identified cities of 50,000 population or more, with no block data for the suburbs of the cities, or for smaller cities, and with no population data. A separate bulletin was published for each city.

Unincorporated Places

Because large unincorporated places were becoming increasingly important in the population distribution, the Bureau decided to identify those not within the boundaries of urbanized areas (see below). The technique for delimiting these places was determined in 1947. The newly developed concepts and measurements of unincorporated places and urbanized areas affected the definitions of urban and rural population and housing, converting some from rural to urban. In 1980 the term "unincorporated place" was changed to "census designated place."

Urbanized Areas

In 1950 the Bureau replaced its earlier concept of metropolitan district with a broader concept of urbanized area, mainly to get a better classification of urban and rural. For 1950 the Bureau delineated 157 urbanized districts, each consisting of one or more cities of 50,000 or more population and their closely settled fringes.

Standard Metropolitan Areas

In the 1940's the Census Bureau cooperated with the Budget Bureau (now OMB) and other federal agencies in establishing a set of standard metropolitan areas to replace the variety of definitions

of particular big-city areas that had been used in different government programs. The important features of the standard metropolitan areas were that they were standard, to be used for all statistical purposes by all agencies, and that unlike the Census Bureau's metropolitan districts and urbanized areas which required detailed census geography, they were made up of whole counties (towns in New England) so that any data available by counties could be compiled for standard metropolitan areas.

Census County Divisions

Census county divisions were originated for the 1950 census for Washington State. Twenty more states were added to this program in the two following decades. These are states in which the minor civil divisions, such as election precincts, within counties were not satisfactory units for presenting statistics or were not well known locally. For such states the Census Bureau has promoted the use of these statistically defined subcounty divisions as stable areas for census and other statistics.

1970

Address Coding Guides

During the 1960's the Census Bureau developed a system of collecting information for the decennial census through the mails rather than house-to-house canvassing. Two major parts of the 1970 mail-out/mail-back system were the development of a complete address register that could be used both as a mailing list and as a control list for the returns, and a computer-based system for assigning geographic codes to the returns. The coding permitted the data to be associated with small-area units such as the side of a city block, and to be combined into multiple geographic patterns such as blocks, census tracts, wards, one or both sides of any street, and larger areas.

After pretests in 1965 and 1966, the Bureau decided that updating a commercially produced list and subjecting it to a check by the Post Office would produce a more effective address register than attempting to update the 1960 census address list with administrative records such as building permits and construction orders. Further tests indicated that commercial mailing lists on computer tape would be more useful than lists compiled from city directories.

In 1966 and 1967 the Bureau conducted 60 conferences in various parts of the country at which local persons engaged in updating maps were told about the address coding guide. They were asked to participate in the development of it and were promised free copies of the completed guides for their areas.

After further pretesting and intensive work, the address coding guides were prepared for mail-out/mail-back use in the urban areas of 147 metropolitan areas in the 1970 census. The charges to address coding guide projects for actual costs incurred in fiscal years 1966 through early 1972 amounted to nearly \$7 million.

DIME

Beginning with the 1967 New Haven pretest, development of DIME (Dual Independent Map Encoding) as a system for users of census and other data went along with the work of developing the address coding guide for the Bureau's use in conducting the 1970 census. The Census Use Study staff produced a series of manuals on DIME, "a machine-readable, geographically coded reference file which may be used for automated address coding, special analyses, and computer mapping of socio-economic and demographic data." A series of tests and demonstrations was conducted in various cities and metropolitan areas. Among the added features that DIME possessed, and the address coding guide did not, was grid coordinates, which are the reference points necessary to produce graphic displays or computer-generated maps of geographic areas composed of city blocks. A semi-automatic "coordinate locator" or digitizing machine had been built in the Bureau in January 1967 for assigning coordinates to block centroids. Another machine was built in June 1967, and both were tested extensively for mechanical accuracy. They were found to be accurate to .02 inch along perpendicular axes. Four other machines were completed by July 1970 and were immediately put into production. Between 1969 and 1971, planning agencies in 196 of the then 233 standard metropolitan statistical areas participated with the Bureau in the development of the GBF (Geographic Base File)/DIME files. Further development and expansion of GBF/DIME extended through the 1980 census, to be replaced by TIGER for the 1990 census.

1980

Neighborhoods

The Bureau developed the Neighborhood Statistics Program to assist localities asking for statistics covering recognized subareas. The primary purpose was to provide data for neighborhoods having citizen participation groups; data were provided also for traditionally recognized neighborhoods where no formal citizen participation existed. The program was restricted to areas with census blocks. The neighborhood area was defined in terms of aggregation of census blocks by a local contact person designated by the highest elected official in each requesting jurisdiction. A series of reports containing

population and housing statistics was published in 1983 and 1984. Approximately 75,000 pages on microfiche were published for 27,848 neighborhoods in 1,252 jurisdictions in the states and D.C., plus 439 neighborhoods in 40 jurisdictions in Puerto Rico. Users could also order paper copies of the microfiche. For 1990 there was an expanded User Defined Areas Program, including other locally defined areas, with users paying a fee to cover cost.

1990

TIGER

There are three major tools that provide geographic support for a mail-based census: maps, address reference file (which associates addresses with their geographic location such as a block number), and geographic reference files (which catalog the various geographic areas and define their relationship, such as blocks within a city or a city within a county). For 1980 these were independent operations involving much clerical work. For 1990, they were automated into the TIGER (Topologically Integrated Geographic Encoding and Referencing) system. Among other features, TIGER had such an enhanced ability to produce maps by computer that it was able to produce maps of sufficient detail to be used by the census enumerators.

For the 1980 census, it took four years for the staffs of nearly 200 agencies and a combined workforce of nearly 1,600 people from the Census Bureau and a private contractor to draw 32,000 map sheets, enter the names of all the features they could identify, plot all the geographic boundaries, and assign all 2.5 million census block numbers by hand. For the 1980 and previous censuses, the Bureau depended mostly on local sources to provide the base maps; these maps came in a wide variety of shapes and sizes and showed features in different ways. In contrast, it took fewer than 600 people from 1984 to 1987 to build the TIGER data base, and a much smaller workforce to produce 1,330,000 unique map sheets and other census geographic materials for the 1990 census, including statistical maps for publication.

The Bureau joined forces with the U.S. Geological Survey in 1983 to work toward the common goal of developing a single, integrated geographic data base for the entire nation. The USGS scanned or manually digitized its most current 1:100,000-scale maps and supplied the Census Bureau with computer tape files containing digital descriptions of water and transportation features. The Bureau merged these data into a seamless map data base. Meantime, the Bureau extended and updated the features in the computerized GBF/DIME files. These contained digital descriptions of streets and other map features, address ranges, and ZIP Codes in the urban cores of 345 metropolitan and other highly developed areas. These updated files were joined with the USGS digital data.

TIGER accelerates map production and makes it easier to manipulate, change, and update, in a consistent way, the data base that contains the map-drawing information. The Bureau provides users with the TIGER digital data base. The software for using it can be purchased from a software vendor.

Nationwide Blocking

In 1980, statistics were tabulated for blocks mainly in urbanized areas and incorporated places of 10,000 or more population. For the 1990 census, blocks or block equivalents were delineated for all of the remainder of the territory of the United States, including rural areas. The number of blocks for which statistics were tabulated increased from 2.5 million in 1980 to 7 million in 1990.

FIELD PROCEDURES

Items in other sections of this report, especially the sections on Coverage and Content Evaluation and Improvement and on Geography, also relate to Field Procedures.

1940

Training Movies

Sound motion pictures were made in Washington and distributed to district supervisors for use in training enumerators.

Enumerator Testing

Objective tests were used as a means of selecting enumerators after a period of census training.

Field Tests of Innovative Ideas

Among the innovative experiments that were included in 1940 census pretests were the objective testing of enumerators, which was adopted for 1940; the use of relatively short questionnaires; household questionnaires; self-enumeration; and advance mailing of questionnaires.

1950

Randomization of Enumerator Assignments; Self-Enumeration

After research on enumerator variability, there was some randomizing of enumerator assignments in 1950, to make possible the estimation of enumerator variance under actual census conditions. Further research based on this 1950 application indicated a considerable contribution of enumerator variance to total census error and gave added emphasis to the development of self-enumeration to eliminate the enumerator influence. Experiments in self-enumeration were built into the 1950 census.

1960

Self-Enumeration; Mail

This was the first census of population and housing in which most of the public was asked to fill out the questionnaire, and the first in which mail was used extensively for distributing advance questionnaires and for collecting sample questionnaires. A two-stage list/leave procedure was used in areas comprising 82 percent of the population. The Post Office delivered Advance Census Reports containing the 100-percent questions. Enumerators visited all households and transcribed the 100-percent items to a

FOSDIC form. If the advance form had not been filled out, the enumerator obtained the information and filled out the FOSDIC form. It was estimated that about 60 percent of the advance forms had been filled out before the enumerator's visit. At every fourth household the enumerator left a sample long-form questionnaire to be filled in by the household and mailed back to the census district office. A different set of enumerators followed up for sample questionnaires that were not returned and for vacant units in the sample. The mail response rate for the sample questionnaires was 77 percent.

In the 18-percent remainder of the country a single-stage approach was used. The Post Office delivered unaddressed Advance Census Reports to all households. Enumerators visited each household and obtained the 100-percent information and also asked the sample questions and entered the answers directly on the sample FOSDIC schedule. This procedure was used in rural areas where followup of sample households' nonresponse was thought to be impractical.

The Bureau placed its reliance on self-enumeration because of its encouraging prior procedural tests and because it believed the rising educational level in the United States qualified most of the people to fill out schedules for themselves.

Formal Quality Control

In 1960 for the first time in a major U.S. census a formal program of quality control was instituted for the field enumeration. It provided supervisory personnel with definite procedures for detecting and, when necessary, rejecting unacceptable work. On the basis of the review, each enumerator was instructed to proceed with no further review, or scheduled for another review, or terminated because of more than the acceptable number of errors.

1970

Mail-Out/Mail-Back

Continuing the trend toward more dependence on mail, the Bureau used two-way mail for 60 percent of the population in 1970, for both the short forms and the long forms. The long forms, going to a sample of households, included both the 100-percent questions and the sample questions. For the 40-percent remainder of the population, residing in small towns and rural areas, there was some use of mail. Postal carriers delivered unaddressed short forms to all residential housing units on their routes. There were later picked up by census enumerators, who also then obtained the sample information at designated addresses.

1980

Wider Use of Mail-Out/Mail-Back

The basic field procedures for 1980 were essentially the same as 1970, except that the mail-out/mail-back method was extended from 60 percent of the population in 1970 to 95 percent in 1980, covering areas that in 1970 were felt to be infeasible to cover effectively. The decision to extend was based in part on the results of the Mail Extension Test, an experimental program conducted as part of the 1970 census, and on the high mail return rate for occupied housing units in 1970.

Master Tape Address Register

In 1980 TAR (master tape address register) areas accounted for over 50 percent of all housing units. TAR was based on multiple list sources; in 1970 only one mailing list was purchased.

New Sources for Field Personnel

The Bureau requested, and received, permission from the Department of Health, Education, and Welfare in 1979 to employ welfare recipients as census enumerators without a reduction in their welfare benefits, at the option of state welfare directors. Agreement was obtained from 38 states. Also in 1979 the Bureau obtained a waiver of the requirement that temporary census workers be U.S. citizens, and extended the applicant universe to all qualified legal residents of the United States.

Counting the Military

A new arrangement for counting resident military personnel was tried in a pretest in 1977 and used in 1980. The count had been found to be deficient in 1970. In 1980 "unit control" was used, with a military officer assigned to be responsible for the enumeration of each unit.

Telephone Assistance

A much more highly organized telephone assistance program for respondents was established. Telephone assistance lines were installed in each district office. The telephone numbers were printed on the questionnaire labels, published in newspapers, and announced on television and radio. More than 18 million calls were answered.

Computer Terminals

An innovation that was field tested in the 1970's but not adopted for 1980 was to place computer terminals in each district office as part of the data communications network. In 1970 data entry

terminals had been located only in the regional offices and Bureau headquarters. In experiments in the 1970's, district office terminals were tested for use in transmission of population and housing-unit counts to headquarters for review and aggregation, for preparation of cost and progress reports, for payment of field staff, and for facilitating local review of counts. Results of the tests showed that the proposal was worth pursuing further. The decision was eventually made, however, not to place terminals in the district offices in 1980 because of the cost and the potential difficulty in servicing the equipment.

1990

Mail-Out/Mail-Back

The 1980 experience indicated that for some rural areas there were some problems in achieving delivery in the mail-out procedure. The full-fledged mail-out/mail-back procedure was therefore used for a smaller proportion of the population and a much smaller proportion of the land area in 1990. About 84 percent of the population was enumerated by mail-out/mail-back; of these, 63 percent was in primarily urban areas where a commercial mailing list was available and 37 percent had a mailing list compiled through a prelist operation by Bureau employees. About 10 percent of the population was enumerated by an update/leave procedure, with the census questionnaires to be returned by mail. This procedure was used in mostly rural and seasonal-housing areas in the South, Appalachia, and parts of the Midwest where addresses did not specify housing units precisely enough for mailing-list purposes. For the 6 percent of the population in the most sparsely populated areas, a list/enumerate procedure was used. This procedure covered about 50 percent of the land area.

Master District Offices

Master district offices were opened one year ahead of time, to provide well trained local management in all areas of the country.

Automation of District Offices

Computers were installed in all district offices, linking them in a network with the seven processing centers and Bureau headquarters. A computerized management information system gave much better control of the field work, providing current accurate information so that prompt effective action could be taken. The computers were also used for transmission of data, payrolling, and for preparation of counts for local review.

Experiment With Portable Computers

During the planning for 1990, the Bureau experimented with portable computers in collecting address and related data. The experiment compared enumerator productivity, address list quality, and completeness for a staff of enumerators with laptop computers and a staff using the traditional listing method. The results showed that it was possible to automate address-list preparation without adversely affecting productivity or quality. However, a decision was made not to use the portable computers nationally during the 1990 census, primarily because of the cost of the equipment. It was planned to reevaluate the idea for the 2000 census.

Reminder Card

For the first time, in the 1990 census a reminder card was mailed on March 30 to all households in mail-out/mail-back areas. The cards followed by about week to ten days the mail-out of the census questionnaires.

Further New Sources for Field Personnel

By legislation enacted in 1989, exemptions were allowed for federal civilian and military retirees temporarily hired for the census from any offset in annuities. The Bureau also expanded the scope of its 1980 census agreements for exemptions for welfare recipients, bringing in additional federal programs.

DATA PROCESSING

1940

New Tabulation Machines

The Census Bureau, which had been a leader in the development of automated data processing techniques and devices since the 1880's, continued to update and innovate equipment. Unit counters and gang punches were rebuilt to accommodate to new higher capacity 45-column punchcards. The Bureau designed and built a new adding tabulator. Other new equipment included multiplying punches, reproducers, collators, and printer-tabulators. With the new equipment, the 1940 census was the first to make extensive use of summary punchcards.

Sample Inspection

As noted in the Sampling section of this report, a 1940 innovation was the application of sampling in the verification of data processing, particularly card punching.

Allocation of Unknown Age

An innovation was the development and application of a systematic procedure for assigning, in the course of data processing, a value for an item which had been left blank on the census schedule. The first application was to age; the "age not reported" category was thereby eliminated in the 1940 census tables. The procedure was developed by W. Edwards Deming, then on the Bureau staff. Testing on census returns, in which the age was reported but covered up for the test, gave good results. The "cold deck" procedure gave a selection for the missing age chosen at random from a deck of cards categorized according to whatever relevant information was known about the person.

1950

New Tabulation Machines

The most important new machine for the punchcard tabulations for the 1950 census was the census multi-column sorter. Earlier sorting machines were able to read only one card column at a time. Other new or improved machines developed by the Bureau were the recode machine, gang punch, and unit counter.

Automated Editing and Coding

The clerical assignment of codes for employment status in 1940 was a particularly onerous and expensive task. The block of questions upon which the code depended was difficult for enumerators and respondents to handle, and therefore coders were confronted with millions of cases of incomplete or inconsistent entries. Editors attempted to determine a code by interpretation of what, if anything, was reported in the employment status block and answers to other questions that had some connection with employment. Editing was inconsistent. Even after such imputation, the 1940 published reports carried a figure of two million persons with employment status not reported. For the 1950 census, taking advantage of the ability of the new multi-column sorting machine to sort punchcards by reading the punches in a number of columns, E.D. Goldfield devised a schematic (later called a decision table) which accounted for every combination of entries for the employment status questions and other relevant questions, including inconsistent, improper, and blank entries, and assigned a proper or best-guess employment status code to each of the thousands of combinations. Clerical editing and coding was eliminated. Card punchers punched what was on the schedule. The code was then produced by running the cards through the multi-column sorter, wired according to the scheme.

With the later advent of the computer, automated editing and coding, and imputation, were able to be done for a variety of subject fields and with more sophisticated patterns.

UNIVAC

The development of electronic data processing in the Bureau of the Census began in the mid-1940's. At that time J. Presper Eckert and John Mauchly were completing work on ENIAC (Electronic Numerical Integrator and Computer), a prototype scientific computer for the War Department. Morris Hansen and colleagues at the Census Bureau saw the possibilities of a large-scale computer designed for data processing. The Bureau and the National Bureau of Standards collaborated on planning for such a machine, along with the Eckert-Mauchly Computer Corporation. In 1948 a contract was signed with Eckert-Mauchly for the production of UNIVAC I. The first machine was delivered to the Census Bureau on March 31, 1951, in time to be used for some of the last tabulation work on the 1950 census. For input to the computer, the census punchcards were transferred to magnetic tape through a card-to-tape machine.

Computers are much more versatile, more accurate, and faster than punchcard equipment. Their potential for making consistency checks on the reported data and assigning values where no answers

or inconsistent answers were reported is an additional benefit. Many of the features now incorporated into census data processing could not have been done before the advent of computers.

1960

UNIVAC

The 1960 census was the first decennial census in which most of the data processing was done on high-speed electronic equipment, some of it especially designed and built for utilization in the census. It was the first census in which a special hand count was not necessary to meet the eight-month deadline for submitting final state population counts to the President for congressional apportionment; the first set of regular electronic computer tabulations produced the figures, along with many other figures, in time to meet the deadline.

Improved model 1105 UNIVACs were used for the 1960 census. In developing the computer time schedule early in 1958, it was estimated that 6,400 hours of operating time on 1105 computers would be required for processing the 100-percent data. The actual operating time was 3,200 hours. However, the opposite proved true for processing the sample data plus the census evaluation and research program. The 1958 estimate for the sample data processing was 13,300 computer hours. The total eventually was about twice that, reflecting a more intensive program of editing and of tabulation than had been envisioned when the original calculations were made.

The two electronic high-speed printers at the Bureau were 100-line-a-minute machines manufactured as an auxiliary to the UNIVAC computer. Identical printers at each of two university installations were also used. The printers were programmed to print out the final tables which were then used as publication copy for photo-offset printing of the census reports. There was an increase of 67 percent in the number of printed pages of 1960 census reports compared with 1950.

FOSDIC

Mark sensing was proposed for the 1950 census, but was considered impracticable at that time for a complex and extensive questionnaire. In the 1950's the Census Bureau and the National Bureau of Standards developed FOSDIC (Film Optical Sensing Device for Input to Computers) which transferred data to magnetic tape from a microfilm copy of a properly marked census questionnaire. The intermediate microfilm was adopted partly because the sensing from the transparent spots on the negative microfilm was more

reliable than the sensing of a reflected image from the paper schedule. It proved to be a great advantage, moreover, to have the data for the final process in compact form. The microfilm could be fed through the machine much faster than would have been possible with the original schedules, and had value for later use.

Late in 1953 the first model of FOSDIC was delivered to the Bureau for testing. It was tested on special population censuses, the census of governments, and the National Housing Inventory. This experience led to the development of improved models. Four production models of FOSDIC III were built in time for use in the 1960 census. For the 1950 census, card punching required 200,000 person-days. The microfilm-FOSDIC complex accomplished the job for the 1960 census, with an 18.5 percent larger population, in 28,000 person-days.

Microfilming

In 1958 and early 1959 the Bureau conducted intensive studies to determine the combination of specially designed microfilm camera, type of schedules and enumeration books, intensity of markings and schedules, quality of printing, type of film, and methods of filming operations and film development that would result in a film input to FOSDIC that could be read most clearly and accurately.

In a few years, the electronic computer, with its supporting high-speed automated microfilm cameras, FOSDIC, and high-speed printers, made more progress than the punch card had made in 60 years. The gain was not only in speed and volume but in the tremendous increase in the possibilities for complex cross-classification, checking for consistency, inflation from sample, and adjustment of variant data.

1970

UNIVAC

As the third generation of computers became available in the 1960's, a review by an outside committee led to the decision that the Bureau should shift to the UNIVAC 1107 series. The first 1107 was acquired in 1963 and the closely related higher-speed 1108 was added in 1967. Two 1107's and two 1108's as well as other smaller units were used for the 1970 census. The 1108 was 600 times as fast as the original UNIVAC.

FOSDIC

A much improved version of FOSDIC was developed for 1970. It had solid-state circuitry rather than vacuum tubes, more programming memory, and more speed. It could scan at a rate of up to 750 frames per minute, with an effective rate over a working day of 200 to 300 frames per minute. Six such machines were built for use in the 1970 census.

1980

Computerized Allocation and Imputation

Technological advances and increased computer capacity made possible a more complex match of a person or housing unit having one or more information items missing or inconsistent, against a matrix of similar persons or units, to obtain a value to be imputed, and to make joint allocations where needed.

1990

Automated Coding

Further advances in computer capability and capacity and in software made possible computer coding of even such items as occupation and industry of job and of place of work, traditionally the most tedious tasks of clerical coding.

Optical Mark Recognition

OMR provides direct input of data into a computer, whereas with FOSDIC the questionnaires must be filmed first (although microfilming has its special values as well). OMR might offer more flexibility in decentralizing data processing. It was tested in a 1985 census in Tampa. Based on some of the problems experienced in that test, and on other concerns about cost, timing, and environmental controls, it was decided not to pursue further testing of OMR technology for use in 1990. Later testing is under consideration for possible use in the 2000 census.

Computerized Name Reading

Consideration was given to the possibility of computer capture of each person's name from the questionnaire for the purpose of cross-referencing names to address lists, matching by computer with administrative records, and other purposes. It was not pursued for 1990 because it was not greatly needed and the technology for automated reading of handwritten names was not yet good enough. If the technology for reading handwriting does not

develop adequately, it may still be worthwhile to consider keying the name into the computer record. Some of this was done in 1990, in Post-Enumeration survey areas to provide for automated matching of census and PES records, and in multiple-unit structures such as apartment houses where names were needed to identify the separate units.

PUBLICATION AND DISSEMINATION

1950

Monograph Program

The Bureau planned for a series of monographs to be written following the 1940 census, as had been done following the 1920 census, but wartime conditions caused the program to be canceled. It was reinstated successfully for the 1950 census. The 1950 program was sponsored by the Census Bureau and the Social Science Research Council, and produced a series of 13 books, written by specialists in the fields, on such subjects as the changing population, immigrants, families, housing use, children, labor force, and income. The books were published by John Wiley and Sons, Inc., New York, and Chapman and Hall, Ltd., London.

A monograph program was also carried out after the 1960 census, with a smaller number of books published. There was another program in 1980, and a modified program is in progress for 1990.

Procedural History

For the first time for a decennial census, a detailed procedural history of the planning, preparation, and conduct of the 1950 census was compiled and published by the Bureau. The Bureau has continued this practice, with a procedural history currently being compiled for the 1990 census. A procedural history, in somewhat lesser detail, for the 1940 census was written by Robert M. Jenkins and published in 1985 by the University of Wisconsin Press. One of its purposes is to provide information for users of the public-use microdata sample of the 1940 census.

Preliminary Sample Reports

A subsample of 150,000 persons and 45,000 dwelling units enumerated on sample lines in 14,000 enumeration districts was transcribed in advance of regular processing and tabulated to provide preliminary statistics. This innovative procedure was made obsolete for succeeding censuses by the advent of high-speed electronic data processing equipment, which produced final results as early as preliminary sample results could have been published.

1960

Public-Use Microdata Sample

Public-use samples are samples of the basic census records for individual persons, households, and housing units, with identifying information, such as names, addresses, and detailed geography, removed to preserve confidentiality. These data are made available to the public on computer tapes, so that researchers can make their own special tabulations. The creation of a publicly available sample of basic data was initially proposed by the Bureau's Population Technical Advisory Committee. The resultant project, for the 1960 census, was cosponsored by the Bureau and the Population Council.

The first samples were released on tape and punchcards in 1963. They consisted of a 1-in-1,000 sample of the 1960 census, taken from the 25-percent sample, and a 1-in-10,000 subsample.

In 1968 the Bureau solicited the reactions and suggestions of users of the samples. Response indicated the desirability of greater geographic detail, and a larger sample to permit studies of population subgroups such as minority races. As a result, a new series of public-use samples was prepared from the 1960 and 1970 censuses with identification of smaller geographic areas down to 250,000 population and a sample size of 1-in-100.

The series has been extended forward and backward, to succeeding and preceding censuses. With cooperation from universities and others, samples have been created or are being created for 1880, 1900, 1910, 1940, and 1950.

Summary Tape Files

Summary tapes for public use contain more subject and geographic detail than the printed reports. They are subject to the same confidentiality rules as the printed report data. They were first made available on a small scale after the 1960 census, and greatly expanded in succeeding censuses, for which they constituted a major increase in the Bureau's program to make data available to users.

1970

Microfiche

Approximately 1,600 of the printed reports were made available on microfiche through the Commerce Department's National Technical Information Service. Microfiche is more compact than microfilm

and more easily stored. Reading equipment is reasonable in cost and widely available. By 1980 microfiche had supplanted microfilm as a dissemination medium for census products.

Linotron

The Linotron phototypesetting system at the Government Printing Office was used in the printing of the census reports. Some of the system equipment was modified by GPO to accommodate the larger image size of the census publication pages. Linotron used 1,500 magnetic tapes produced by the Bureau as input, and produced 133,000 tabular pages of output. After research and testing in the 1970's, it was decided for 1980 to adapt the Linotron system used for 1970 to the VideoCOMP phototypesetting equipment used for the 1977 economic censuses, with a number of major improvements.

1980

Data for Redistricting

State and local governments use census data in determining the boundaries of congressional, state, and local legislative districts, and have done so particularly after a series of Supreme Court decisions beginning in 1962 that required such districts to be relatively balanced in population. The Bureau worked with the National Conference of State Legislatures and state and local officials to try to meet their needs for data. In December 1975 Public Law 94-171 was enacted. This law included several requirements for the Bureau to provide data and for the states to specify the geographic areas for which they wished to receive 1980 census population tabulations. The Bureau was to transmit the data to the states within one year after census day.

This is now an established part of the decennial census publication program, and is listed in the Bureau's tabulation and publication guides as the P.L. 94-171 program. It provides early release of small-area data for the population by race and Hispanic origin, for all ages and for ages 18 and over. Housing-unit counts are also tabulated.

For 1980, the Bureau made the data available for its own established geographic areas down to city blocks. For 1990, with the entire nation divided into blocks or block equivalents, the Bureau offered the states a classification also by voting districts if the states provided the geographic information for aggregating the blocks into voting districts. All of the states participated.

1990

Data by ZIP Codes

In 1980 ZIP Code data were obtained only in a special tabulation paid for by a consortium of private organizations. For 1990, the Bureau is producing its own 5-digit ZIP Code computer tapes presenting detailed demographic data, for general public use.

New Forms of Output

Technological advances in the past decade allow the Bureau to use new dissemination media in addition to printed reports, microfiche, and computer tapes. They will be made available after the printed reports, microfiche, and tapes have been issued.

One new form is an on-line information service, called CENDATA. It was begun in 1984; the data base is being expanded as 1990 data become available. Other new forms are CD-ROM (Compact Disk-Read Only Memory--a type of laser disk), and flexible diskettes for microcomputers.

PROMOTION AND PUBLIC RELATIONS

1950

Advertising Council

The Advertising Council was organized in 1942 to communicate messages to the American people in support of the war effort. Having demonstrated the efficacy of such public-support advertising, the organization decided to continue to provide publicity for deserving public service campaigns. The Council's operations are supported primarily by contributions of funds and services by advertisers, advertising agencies, and media.

It was officially requested to assist in the 1950 census, and did so. It prepared a series of magazine and newspaper advertisements which were published without charge. It also designed and distributed posters. One of these, which emphasized census confidentiality, was placed in every streetcar and bus. The Advertising Council has participated in every decennial census since 1950.

1970

Intergovernmental Communication

An effort began in the latter 1960's to bring about improved communication with federal, state, and local groups to (1) identify urgent needs for statistics, (2) promote joint efforts toward common classifications and better data collection, (3) promote interrelated use of federal and locally generated data, and (4) make state and local officials better informed about federal statistics. The foundations were laid by the 1965 National Governors' Conference, followed by the 1966 National Conference on Comparative Statistics. The Census Bureau then established an Intergovernmental Services Program for state and local government officials, and conducted a series of five-day seminars.

User Services

The Bureau in late 1967 established the Data Access and Use Laboratory to produce communications to users, develop user products, and document the new computer-related products planned by the Bureau.

The New Haven census in April 1967 was a pretest census and also the first census use study. Assistance in, and observation of, the local uses of the pretest census data helped to evaluate the

eventual impact and utility of the 1970 census use program. A consortium of federal agencies funded the research and development activities. The city of New Haven provided office space, personnel, computer time, and equipment and facilities. Several state and local agencies provided funds or services in return for tabulations. Many local agencies made use of the pretest census data, with the assistance of 14 of the Bureau's use study staff members. Experiments were conducted in record matching, computer mapping, and other procedures.

The Bureau in late 1969 established the Central Users' Service (later called Users' Service Staff) to fill customer orders for data in any form other than printed reports, that is, special tabulations, summary tapes, computer programs, maps.

The Census Use Study that began with the New Haven pretest census in 1967 was phased out during the 1970's. The Bureau now has, as an integral and continuing entity, the Data User Services Division, put together and expanded from various predecessor units.

Minority Cooperation

With increasing awareness of the disproportionate undercount of minority population groups in the census, the Bureau undertook large new publicity initiatives to promote cooperation in the census. A number of groups, such as the Coalition for a Black Count, were formed to collaborate in the effort.

1980

Reconsideration of Advertising Council

In its 1978 report, the Panel on Decennial Census Plans of the Committee on National Statistics included the following recommendation: "The Census Bureau should shift to paid advertising in 1980, rather than the free publicity provided through the efforts of the Advertising Council." The panel's reasons for this recommendation were concerns that the Bureau would be dependent on the willingness of the advertising agency chosen by the Council to devote sufficient energy and resources to the campaign, that the Bureau would have inadequate control over the placement and the media used and the timing of the campaign, and that the desired goal of disproportionate attention to the population groups most likely to be underenumerated would not be achieved because the media serving minorities could least afford to carry free advertising.

The Bureau, after consideration, opted for continuing to seek the services of the Advertising Council for a number of reasons, including the following: (1) the Council and its supporting

agencies look to the 1980 census statistics as highly valuable to them and their clients and would be strongly motivated to do a good job; (2) much of the Bureau's own promotion efforts were being conducted through voluntary organizations, especially those serving minority communities, and the Bureau could not ask these groups for voluntary support while paying others; (3) there was no assurance that the Congress would appropriate the money, estimated at \$40 million or more, for a paid campaign, or do so promptly enough; and (4) even if funds were appropriated, the time needed to screen, negotiate, and contract would delay the campaign, and there would be pressures involved in selecting the agencies and media.

A detailed review and evaluation was conducted during and after the advertising campaign. It was estimated that, for media advertising alone, not including other activities, the Advertising Council secured census advertising that commercially would have cost \$38 million, including \$4.2 million in black and Spanish language media.

School Project

This project was aimed at creating awareness of the census among students in grades 4 to 12 and their families. For the younger children, the goal was to involve parents and other family members through take-home assignments. For teenagers, there was an additional aim: to involve the students in filling out the census questionnaires in households where the adults had language or other reading difficulties. In January 1980, curriculum packages were mailed to 106,500 schools. There were separate packages for the elementary and secondary school levels. Also mailed were census posters and a letter from the Director of the Census Bureau. The school materials reached an audience estimated at about 10 million students.

The operation was considered successful, and was repeated, with some expansion in scope and materials, for 1990, under the title of Census Bureau Education Program.

1990

Outreach Evaluation

As noted in an earlier section, the Bureau conducted, after the census, the 1990 Outreach Evaluation Survey, a nationwide survey in two phases to evaluate the impact of the Bureau's promotional activities, and a telephone survey in New York City and Cleveland to provide information on why the census response had been lower than expected.

PRIVACY AND CONFIDENTIALITY

1940

Confidential Income Form

Because of the controversy about invasion of privacy that arose when the Bureau announced its intention to inquire about income in the 1940 census, the Bureau printed a large supply of special forms, entitled "Confidential Report on Wage and Salary Income, 1939," identified for use "by those who are unwilling to give to the census enumerator the answers to questions 32 and 33."

The census enumerators carried these forms with them on their rounds. When a respondent refused, in the course of the interview, to give the income information to the enumerator, who might be a neighbor, the enumerator was to provide a copy of the form, enter the state, enumeration district number, and schedule and line numbers on it, hand it to the respondent, and wait for the respondent to fill it in and seal it in an envelope addressed to the Director of the Census. The enumerator was then to mail the envelope, or allow the respondent to mail it. A much smaller number of forms was used than had been anticipated. The direct response rate to the income questions was very satisfactorily high.

1950

Public Access to Census Records

Although the earliest censuses were taken without any legal guarantee of confidentiality, and their records were open to the public, the Census Bureau had generally taken the attitude that the later censuses were confidential in perpetuity. The census law, once it acquired a section on confidentiality, did not specify any time limit (nor did it specify perpetuity). The National Archives and Records Administration, which has responsibility not only for storage of government records but also for making them available to the public, has been provided with legislative authority (Title 44 U.S. Code, Section 2108) to determine at what date records may be opened to public inspection, under appropriate conditions. In negotiations between Archives and the Census Bureau in 1952, it was agreed that the decennial census records, on microfilm at National Archives and its regional centers, would be made publicly available after 72 years. Under this agreement, the individual records of the 1920 census were made available this year.

Individuals are able to obtain transcripts of their own records in any census through the Bureau's Personal Census Services Branch. Millions of people have used this service to obtain needed evidence of age, citizenship, or other details, in order to qualify for old-age assistance, to get a job, to obtain naturalization papers, to get a passport, to establish a claim to an inheritance, to get an insurance policy, to trace ancestry, or for other purposes.

Bureau Access to Tax Records

The Census Bureau was authorized to acquire information from individual and business tax records in the possession of the Internal Revenue Service by Presidential executive orders in 1944 and 1961. The authority now rests in amendments to the census law (Title 13) and IRS law (Title 26). The Bureau is required to maintain the confidentiality of any such records it obtains, and to use them only for statistical purposes.

1960

The issue of privacy was involved in the case of the United States v. Rickenbacker in 1962. The defendant argued that his refusal to respond in the 1960 census, and his advocacy of a boycott of the census, was justified because the census questionnaire was an unreasonable invasion of privacy and hence in violation of the Fourth Amendment, which protects against unreasonable searches and seizures. The District Court reached a decision in favor of the government and, upon appeal, the Second Court of Appeals upheld this action, stating "The authority to gather reliable statistical data reasonably related to governmental purposes and functions is a necessity if modern government is to legislate intelligently and effectively." This was the final judgment in the case, since the Supreme Court declined to review it.

Confidentiality of Copies

In the late 1950's the Federal Trade Commission sought copies from the Census Bureau of economic census returns as a possible source of evidence of monopoly in certain industries. The Bureau, in accordance with its statutory responsibilities for confidentiality, refused. The Commission then made demands upon companies to turn over copies of the census forms held in the companies' files. A number of companies went to court to seek relief from the Commission's demands, citing the confidentiality of census information. District Courts in various parts of the country differed in their decisions, and so the issue went to the Supreme Court, with the St. Regis Paper Company's case serving as the exemplary case. The Supreme Court, in a 6-to-3 decision, was

*December 1961 (368 U.S. 208, 82 S. Ct. 289)

sympathetic to the concept of census confidentiality, but said that it could find no specific language in the census law that protected copies in respondents' files.

Evidence was soon forthcoming that the decision had adverse effects on respondent cooperation. Newspapers and magazines carried stories saying that Census Bureau confidentiality was not as strong as had been believed. Survey response rates declined. Early in 1962, bills were introduced in the Congress to amend Title 13 to provide specific immunity from legal process for respondents' file copies of confidential information that had been supplied to the Census Bureau. By October 1962, remedial legislation had been passed by both houses of the Congress and signed by the President.

Since then, the Census Bureau has had the unique distinction of having an umbrella of confidentiality that extends over materials held by individuals and business firms in their own files. The issue arose in connection with economic census forms, but the remedial legislation applies to the demographic censuses as well, although copy-keeping is not a regular practice for those censuses. The protection would presumably extend to transcripts from the population census that individuals can obtain.

1980

Expanded Use of Administrative Records

The 1980 and 1990 censuses used administrative records more extensively and intensively than any previous population and housing censuses. In 1980 administrative records were used to help compile the urban address list, improve coverage of hard-to-enumerate population groups, and evaluate the census count, among other purposes. In 1990 they were also used, to a somewhat greater extent, for such purposes. In the post-census evaluation program, there are plans to match census records to IRS, Social Security, and Medicaid records, and to explore matching with some state and local record files.

SELECTED CHANGES IN CENSUS LAW 1940-1992

This summary describes amendments to the Census Law (Title 13: Census, of the U.S. Code) that are of some significant relevance to the decennial census, during the period from 1940 to date. Most of the changes are amendments to previously existing sections; some are new sections. Many include more provisions and more language than are included in this selective summary.

Section 5. Amended to change "schedule" to "questionnaire" to reflect Congressional recognition that it no longer prescribes the "schedule" of questions for inclusion in the censuses.

Former Section 5(c). This former subsection on duties of supervisors and enumerators included the following language: "It shall be the duty of each enumerator to visit personally each dwelling house in his subdivision, and each family therein, and each individual living out of a family in any place of abode, and by inquiry made of the head of each family, or of the member thereof deemed most competent and trustworthy, or of such individual living out of a family, to obtain each and every item of information and all particulars required for the census; and in case no person shall be found at the usual place of abode of such family, or individual living out of a family, competent to answer the inquiries, then it shall be lawful for the census employee to obtain the required information as nearly as may be practicable from the family or families or person or persons living nearest to such place of abode who may be competent to answer such inquiries."

This provision was repealed in 1964. The repeal removes any legal obstacle to the Census Bureau using means other than personal visit and interview to obtain information for the census. The repeal is another example of the Congress moving away from its former role of enacting into law the details of decennial census content and procedures. Such determinations are now the responsibility of the Secretary of Commerce, and, by delegation, the Director and staff of the Census Bureau.

Section 6. Consolidates and strengthens the authority of the Secretary of Commerce to call upon any other federal department or agency for information pertinent to work provided for in Title 13, and to acquire from states, counties, cities, and private persons or agencies, such copies of records, reports, and other material as may be required for the efficient and economical conduct of all censuses and surveys provided for in this title. Also provides that to the maximum extent possible and consistent with the kind, timetables, quality, and scope of the statistics required, the Secretary shall acquire and use information available from any source instead of conducting direct inquiries.

Section 9. Amended to provide that copies of census reports retained by any establishment or individual are immune from legal process, just as are copies in the files of the Census Bureau.

Section 12. Authorizes the Secretary to have conducted mechanical and electronic development work for the purposes of this title and to enter into developmental contracts.

Section 13. Authorizes the Secretary to contract with educational and other research organizations for the preparation of monographs and other reports.

Section 23. Authorizes the Secretary to establish, at rates of compensation to be fixed by him without regard to the Classification Act, temporary positions to meet the requirements of the work, to employ employees of the Department of Commerce and other departments and agencies of the federal government for field work without regard to the Dual Compensation Act, and to utilize employees of federal, state, or local agencies and of private organizations.

Section 24. Specifies special employment provisions, including that enlisted men (sic) and officers of the uniformed services may be appointed and compensated for service in temporary enumerator positions for the enumeration of personnel of the uniformed services.

Section 102. Authorizes, but does not require, the Secretary to collect decennially statistics relating to religious bodies.

Section 131. Changed the timing of the economic censuses so as not to coincide with the decennial census of population and housing.

Section 141. Amended to authorize the use of sampling and special surveys in the decennial census.

Provides for a mid-decade census of population and housing in 1985 and every 10 years thereafter.* The mid-decade census is not to be used for congressional apportionment or redistricting.

Provides also that, for each decennial or mid-decade census, the Secretary shall submit to the committees of Congress having legislative jurisdiction over the census (1) not later than 3 years before the census date, the determination of subjects to be covered, (2) not later than 2 years before the census date, the questions proposed to be included, (3) a report on changes after the above reports, if the Secretary finds new circumstances exist which necessitate changes.

* See p. 65.

The tabulation of total population by states for the apportionment of Representatives shall be completed within 9 months after the (decennial) census date and reported to the President.

Officers or public bodies having initial responsibility for the legislative apportionment or districting of each State may, not later than 3 years before the decennial census date, submit to the Secretary a plan identifying the geographic areas for which specific tabulations of population are desired. The Secretary has final authority for determining the format of such plan. Tabulations shall be completed, reported, and transmitted within one year after the decennial census date.

"As used in this section, 'census of population' means a census of population, housing, and matters related to population and housing."

Section 181. Requires, during the intervals between censuses of population, the annual production and publication for each state, county, and local unit of general government with a population of 50,000 or more, of current data on total population and population characteristics.

Section 193. Authorizes the Secretary in advance of, in conjunction with, or after the taking of each census, to make surveys and collect such preliminary and supplementary statistics related to the main topic of the census as are necessary.

Section 195. Authorizes the use of sampling except for the determination of population for purposes of apportionment of Representatives.

Section 221. Provides that the censuses (except the census of governments) are mandatory and specifies fines for willful neglect or refusal to answer census questions. Amended to remove the provision authorizing imprisonment as a penalty. No person shall be compelled to disclose information relative to his religious beliefs or to membership in a religious body.

Public Law 94-311. This Joint Resolution of the Congress, enacted as a Public Law in 1976, is essentially an amendment to Title 13. It requires the Department of Commerce, in cooperation with appropriate federal, state, and local agencies and population study groups and experts, to undertake a study to determine what steps would be necessary for developing creditable estimates of undercounts of Americans of Spanish origin or descent in future censuses. It also requires that the Secretary of Commerce ensure that, in Census Bureau data-collection

activities, the needs and concerns of the Spanish-origin population are given full recognition through the use of Spanish-language questionnaires, bilingual enumerators, and other such methods as deemed necessary.

There are many federal laws that establish, or at least imply, a need for a federal agency to make use of decennial census data. A Census Bureau report entitled "Federal Legislative Uses of Decennial Census Data" lists 644 such uses, each called for by one or more federal laws.

One law that not only requires census statistics but determination by the Director of the Bureau is the Voting Rights Act of 1965, as amended. Section 4(b) of the original act states "The provisions of subsection(a) [regarding tests or devices to abridge the right to vote] shall apply to any state or in any political subdivision of a state...with respect to which the Director of the Census determines that less than 50 per centum of the persons of voting age residing therein were registered on November 1, 1964, or that less than 50 per centum of such persons voted in the presidential election of November 1964." Section 13 also refers to determination by the Director of the Census. Section 4 of the 1982 amendment to the Voting Rights Act states "...the extension made by this section shall apply only to determinations made by the Director of the Census under clause (i) of section 203(b) for members of a single language minority who do not speak or understand English adequately enough to participate in the electoral process when such a determination can be made by the Director of the Census based on the 1980 and subsequent census data."

MID-DECADE CENSUS

The mid-decade census, thought of as a modern (but as yet unfulfilled) innovation, actually has a long history. Following are extracts from "The History and Growth of the United States Census" by Carroll D. Wright and William L. Hunt (1900) telling the beginning of the story.

"An effort was made to have a national census taken in 1875, the suggestion of Superintendent Walker (General Francis A. Walker, Superintendent of the Census) meeting with the approval and recommendation of the Secretary of the Interior (the Census office was then located in the Department of the Interior) in three annual reports and forming a part of two of the annual messages of President Grant. Such a census seemed highly desirable, not only on account of the long interval between the decennial enumerations, causing the information gathered at one decennial period to become of little practical value after the expiration of the first half of the ten-year period, but also because it would constitute a noble monument to the progress of the United States during the first century of its political life. It was not contemplated, however, to use the results for the reapportionment of Congressional representation, and the proposed census was to be divested of all political character and no reapportionment was to be made until after the census of 1880. This proposal met with general approval on the part of the press of the country, and received the attention of the Centennial Committee of the House of Representatives, to whom it was referred, General Walker being called before a subcommittee to give his views concerning its feasibility.

"This effort for a quinquennial census had no practical result, however, and no further action was had with respect to the census until the necessity of preparing for the tenth census was brought to the attention of Congress in 1878...

"Provision was also made (in the census act of March 3, 1879, authorizing the decennial census of 1880) for an interdecennial census, to be taken by any State or Territory, through its daily appointed officers or agents, during the two months beginning with the first Monday in June of the year which is the mean between the decennial censuses of the United States, according to the schedules and forms similar in all respects to those used in the United States census, and upon a full and authentic copy of said census being deposited with the Secretary of the Interior on or before the 1st of September following, such State or Territory was to receive, upon the requisition of the governor thereof, a sum equal to 50 per cent of the amount paid to all supervisors

and actual enumerators within such State or Territory at the United States census next preceding, increased by one-half the percentage of gain in population in such State or Territory between the two United States censuses next preceding. This provision of law was only applicable to the period between 1880 and 1890, not being reenacted in the act governing the eleventh census, and in accordance with its requirements, censuses were taken in 1885 in the States of Florida, Nebraska, and Colorado, and in the Territories of New Mexico and Dakota, and the copies required under the act were filed in the Office of the Secretary of the Interior, but no publication of the returns was made so far as the United States Government was concerned.

"Several other States took a census in 1885, notably Massachusetts, Rhode Island, District of Columbia, Kansas, Oregon, New Jersey, Wisconsin, Iowa, Minnesota, and Michigan in 1884, but under the provisions of State laws and wholly at the expense of the State."

There was a resurgence of interest in a mid-decade census in the 1930's, when a need was felt for updated figures for use in administering emergency relief programs. The American Statistical Association proposed a mid-decade census, and the proposal attracted widespread support. Legislation was introduced in the Congress, but it was attacked as a political maneuver to provide election-time jobs, and the legislation died in the Senate in November 1934.

Another revival of interest took place in the 1960's, spurred by the need for statistics for revenue-sharing programs and by court decisions on equity in legislative apportionments. Congressional hearings were held, and a mid-decade census bill, drafted and managed by E.D. Goldfield as staff director of the House Subcommittee on Census and Statistics, was passed by the House with substantial bipartisan majorities. The bill was referred to the Senate, but Goldfield was told by the chairman of the Senate committee having jurisdictional responsibility that he favored the bill but could not promulgate it at that time because he was running for reelection and his opponent was charging him with supporting spending programs. The Senator promised enactment in the next Congress, but he failed to win reelection.

Eventually, in 1976, Public Law 94-521 was enacted, amending Title 13 to provide for a mid-decade census in 1985 and every 10 years thereafter. No funds were appropriated for the 1985 census, and there is no current expectation for funding for a 1995 census.

Canada, which has conducted decennial censuses since 1851, has taken national mid-decade censuses since 1956. Some of the Canadian provinces had taken their own mid-decade censuses during 1906 to 1946. The 1956 mid-decade census had a lesser scope than the decennial, but then grew; by 1986 the mid-decade census was basically no different in content size or field methodology than the decennial censuses of 1981 or 1991.

On the other hand, the Netherlands, which began taking regular censuses in 1830, has not taken any census since 1971. After an orderly and peaceful period of preparation for the 1971 census, it ran into an unexpected storm of political controversy before the field work began. Opponents alleged that the census was dangerous, citing the notorious misuse of census records in Germany during the Nazi regime. Others joined the fray, complaining that the census was compulsory, that it was an invasion of privacy, that it was too expensive. Nevertheless, the census was conducted, and the recorded number of outright refusers was only 0.2 percent of the population. However, the scheduled 1981 census was canceled because tests in 1979 showed an average nonresponse rate of 26 percent, with higher rates in the big cities. Recently, the census act was revoked and the Central Bureau of Statistics now has no obligation to conduct a census.