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BY THE COMPTROLLER GENERAL

Report To The Congress

OF THE UNITED STATES

A \$4 Billion Census In 1990? Timely Decisions On Alternatives To 1980 Procedures Can Save Millions

Inflation and the pressure to obtain a complete count helped push the cost of taking the 1980 census over \$1 billion. Inflation and an increased workload could quadruple the cost for 1990. Census Bureau estimates indicate censuses are reasonably accurate. The emphasis now should be placed on controlling rising costs while maintaining accuracy.

Congress and the Census Bureau must soon decide on plans for the 1990 census to allow enough time to plan and test procedures. After reviewing the 1980 census to identify opportunities to reduce costs, GAO found that millions could be saved by

- updating the 1980 mailing lists for sending census forms to households,
- initially using the mail rather than personal visits to obtain forms from nonresponding households, and
- modifying programs for reducing the number of persons missed by census takers.

The Census Bureau agreed to develop 1990 census procedures with reduced cost as a major objective. The Postal Service concurred and agreed to cooperate with the Bureau.



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COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON D.C. 20548

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To the President of the Senate and the
Speaker of the House of Representatives

This report examines the billion dollar cost of the 1980 census and explores less costly alternative procedures that could be used in the 1990 census. The Census Bureau's attempts to count everyone through use of inefficient, labor-intensive procedures, along with inflation, are the main forces behind the high cost of the census. The report identifies opportunities to save millions in 1990 census costs. The procedures we suggest will require testing as part of the planning for the next census.

We made this review at this time because preparing for the census can take 6 to 7 years. We also wanted to emphasize the need to rethink census procedures in order to control costs. Simply repeating the 1980 census procedures for the 1990 census could cost \$4 billion.

Copies of this report are being sent to the Secretary of Commerce; to the Postmaster General; and to the Director, Office of Management and Budget.

A handwritten signature in cursive script that reads "Charles A. Bowsher".

Comptroller General
of the United States

D I G E S T

In planning for the 1990 census of population and housing, a major concern is how to maintain reasonable accuracy without excessive cost. Inflation and an increased workload could more than quadruple the \$1 billion spent for the 1980 census. To aid the Congress and the Census Bureau in planning for the next census, GAO reviewed portions of the 1980 census program concerning (1) mailing list development, (2) followup on nonrespondents, and (3) activities to reduce the number of persons missed.

By changing current census procedures millions could be saved in conducting the 1990 census. Since preparing for the census can take 6 to 7 years, the Congress and the Census Bureau will need to develop plans soon for the 1990 census. GAO's review did not encompass the entire census program; therefore, further evaluation of the program could identify other opportunities to reduce the cost of the census. (See p. 1.)

HIGH-COST CENSUSES

The 1970 census cost \$222 million, the 1980 census cost over \$1 billion, and the 1990 census, because of an increasing population and under various assumptions regarding future inflation, could, "optimistically," cost as little as \$2.3 billion, or as much as \$4 billion. (See p. 4.)

Census results are extremely important to the Nation. They determine the apportionment of seats in the House of Representatives and the boundaries of congressional districts for 10 years. They also affect distribution of billions of Federal dollars annually.

The census' importance has resulted in pressure to ensure that everyone is counted--a pressure which, along with inflation, has contributed greatly to the high cost. Inflation added over

\$300 million to the 1980 census cost; programs to reduce the undercount added \$342 million. (See p. 4.)

According to Census Bureau estimates, its procedures--although costly--are reasonably effective. The Bureau acknowledges, however, that it has no acceptable method for determining how accurate and complete census counts are. (See p. 9.)

Attempting to get a complete count is an impossible task that is becoming increasingly costly and complex. GAO recognizes people are missed in censuses and believes procedures to limit the undercount are needed. GAO believes that the value of individual procedures in reducing the undercount should be reviewed and efforts made to control their costs while maintaining reasonable accuracy.

LOWER MAILING LIST COST

Compiling a national mailing list prior to census day is critical to ensuring as complete a count as possible. In 1980, the national mailing list cost \$97 million. Inflation and housing growth could push the cost of compiling a mailing list for the 1990 census to over \$440 million if current Census Bureau methods are used again. (See p. 11.)

The cost of compiling mailing lists can be reduced. For the 1980 census, commercial firms could provide only 47 percent of the addresses that the Census Bureau needed. Most of the other addresses were obtained by canvassing--sending census takers into areas to identify households and to check known addresses. Canvassing, however, is expensive. On a unit basis, canvassing was up to 21 times more expensive than using commercial sources. (See p. 11.)

Canvassing is also time-consuming and labor-intensive. Failure to complete it on time contributed to 6 million unnecessary questionnaires being mailed because needed corrections were not available. This resulted in needless costs of \$2 million in postage and probably about \$38 million in followup activities to determine why the questionnaires were not returned. (See p. 13.)

In the 1980 census, the Postal Service checked the accuracy of addresses, made corrections and added missing addresses. GAO's analysis shows that obtaining addresses directly from the Postal Service could significantly reduce the amount and cost of canvassing for 1990. Preliminary Postal Service and Census Bureau data show that for 1990 the Postal Service can supply or refine address data for the Nation's homes at \$129 million to \$258 million less than the projected cost of using 1980 census procedures again. (See p. 15.)

LOWER FOLLOWUP COSTS

About 74 percent of the Nation's households which were asked to return their census questionnaires in the mail did. Followup on the nonrespondents created a substantial workload. The Census Bureau spent \$122 million to conduct personal visits to the nonresponding households. Although followup got the job done, it was costly. (See p. 27.)

GAO observed that wasteful followup practices increased census costs by millions of dollars. For example, an estimated \$19 million may have been paid to census takers for visits to 3 million households that had already returned their questionnaires. Increasing the time between mailout and start of followup operations could help solve this problem. (See pp. 27 and 32.)

The Census Bureau should also explore the use of mail reminder cards and followup mailings as comparatively low-cost methods of increasing the response rate and thus reducing the need for personal visit followup. Each 1-percent increase in the mail response would have saved \$4 million in 1980 followup costs and reduced the number of census takers needed by 6,000. (See pp. 29, 30, and 35.)

Increased use of the statistical technique imputation to count noncooperative households offers another alternative to reduce the high cost of followup. (See pp. 2 and 32.)

LOWERING THE COST OF PROGRAMS TO REDUCE THE UNDERCOUNT

According to the Census Bureau, programs aimed at reducing the undercount are among the least cost-

effective operations conducted during a census. In 1980, \$342 million was budgeted for 14 programs aimed at reducing the undercount. GAO examined two of the most costly programs: the national vacancy check and the records check programs.

The vacancy check program provided for a second personal visit to each dwelling originally classified as vacant. The program cost \$29 million and added about 2.5 million persons to the count, at a cost of about \$12 each. Judging from 1970 census results, sampling procedures could have been used more effectively in the 1980 census and at a much lower cost. (See p. 36.)

The records check program used records such as driver license files to check the accuracy of census responses. GAO's review of 0.8 million of the 6.8 million names checked showed that about 2 percent of them were added. At this rate, the cost was over \$200 for each person added. (See p. 37.)

RECOMMENDATIONS TO COMMERCE AND THE POSTAL SERVICE

The Secretary of Commerce, in conjunction with the Postmaster General, should:

- Conduct pilot tests on using the Postal Service to provide address data.
- Compare pilot test results with 1980 census procedures and other alternatives in selecting the method to be used in compiling 1990 census mailing lists.

The Secretary of Commerce should:

- Explore the feasibility of using mail reminder cards and followup mailings.
- Evaluate the feasibility of increased use of imputation, where legally permissible, for developing census information on noncooperative households.
- Evaluate the costs and benefits of 1980 census coverage improvement programs to determine if they should be used in the 1990 census.

These and related recommendations to the Secretary are discussed on pages 22 and 40.

RECOMMENDATION TO THE CONGRESS

If the Secretary of Commerce decides to purchase address information for the 1990 census from the Postal Service, the Congress should enact legislation to enable the Service to provide such information and to protect its confidentiality. (See p. 23.) Draft legislation to implement GAO's recommendation is in appendix I.

AGENCY COMMENTS

The Postal Service agreed that the cost of the 1990 census could be significantly reduced if it provides the Census Bureau addresses. The Postal Service also agreed that there is a need for legislation authorizing it to provide addresses and to insure the confidentiality of address information provided. The Postal Service concurred with GAO's recommendations and will cooperate fully with the Secretary of Commerce in carrying them out. (See app. IV.)

Commerce said this report is a constructive contribution to planning and testing procedures for the 1990 census. Although it has reservations about some of the details of the report, Commerce said that it fully supports the need to investigate ways to hold down costs and plans to develop 1990 census procedures with reduced costs as a major objective. (See app. III.)

Commerce agreed to investigate with the Postal Service alternatives for developing address data. Also, it agreed to further test reminder cards and second mailings and to evaluate the cost-effectiveness of coverage improvement programs. It agreed to minimize followup of late mail returns by revising checkin and followup procedures. (See pp. 23 and 41.)

Commerce plans to delay evaluating the feasibility of increased use of imputation until pending litigation is resolved. This is consistent with GAO's recommendation. (See p. 41.)

C o n t e n t s

		<u>Page</u>
DIGEST		i
CHAPTER		
1	INTRODUCTION	1
	Objectives, scope, and methodology	2
	Reviews of the census	3
2	A COMPLETE CENSUS: COSTLY, COMPLEX, AND UNACHIEVABLE	4
	The high cost of census-taking	4
	An overview of the 1980 census	6
	Mail census proves effective	8
	Is the 1980 census complete?	9
	Agency comments and our evaluation	10
3	MILLIONS CAN BE SAVED IN PREPARING FOR A MAIL CENSUS IN 1990	11
	Address data--why is it needed?	11
	1980 address data--a \$97 million investment	11
	Trimming the cost of canvassing	15
	Conclusions	21
	Recommendations to Commerce and the Postal Service	22
	Recommendation to the Congress	23
	Agency comments and our evaluation	23
4	HOW MILLIONS MIGHT BE SAVED ON CENSUS FOLLOWUP PROCEDURES AND COVERAGE IMPROVEMENT PROGRAMS	27
	Personal visit followup--effective but costly and inefficient	27
	Alternative followup procedures could save millions	28
	Lowering the cost of improving coverage	36
	Conclusions	39
	Recommendations to the Secretary of Commerce	40
	Agency comments and our evaluation	41
APPENDIX		
I	Amendment to Section 411 of Title 39, United States Code	44
II	1980 Coverage Improvement Programs	45

III	December 22, 1981, letter from Department of Commerce	48
IV	December 15, 1981, letter from U.S. Postal Service	53

CHAPTER 1

INTRODUCTION

A decennial census is required by the Constitution. Decennial census results are extremely important to the Nation during the ensuing decade because they are used to apportion seats in the House of Representatives, redistrict congressional districts, distribute billions of Federal dollars annually, and aid government and businesses in managing their operations.

The importance of the decennial census to governments at all levels and ultimately to the Nation's citizens has resulted in increased pressure to ensure that everyone is counted, regardless of the cost involved. Despite external pressure, improved and expanded procedures, and a billion dollar price tag the 1980 census did not achieve the goal of counting everyone. This goal may never be achieved regardless of how much time, effort, or money is put into taking a decennial census: there will always be persons who will not cooperate.

The 1970 census cost \$222 million. By 1980, inflation and new procedures used to reduce the number of persons missed helped push the cost to over \$1 billion. If inflation and the Nation's growth continue in the 1980s as they did in the 1970s and if no changes are made in Census Bureau programs, it could cost as much as \$4 billion to take the next census.

Planning for the 1990 census will start in 1983. Because of the long lead time for planning a census, the executive branch and the Congress will have to decide soon whether to continue existing 1980 census programs and procedures or to adopt alternatives. Short of relying on the way things have been done before, policymakers will need to analyze the Census Bureau's plans and strategy for the 1990 census to determine how the Government's need for population and housing data can be most efficiently, effectively, and economically met. Experience from the 1980 census shows that decisions are needed soon on census programs and procedures to avoid confusion and delays.

This report (1) provides insight into the problems and complexities of census-taking, (2) identifies areas where opportunities exist for improving census efficiency while lowering the cost, and (3) raises questions which congressional and executive branch policymakers should consider in planning for the 1990 census.

OBJECTIVES, SCOPE, AND METHODOLOGY

Because of the high cost of the 1980 census, we reviewed the program to identify opportunities to reduce the cost and improve the efficiency of future censuses. The report does not review the entire census program or the many controversial policy issues concerning the census. Instead, it is meant (1) to alert policymakers to opportunities which exist to lower the cost of collecting census data and (2) to serve as a catalyst for timely review of the other parts of the census program and policies in preparation for the 1990 census.

Specifically, our review was limited to the procedures for collecting and processing address data, following up on non-respondents to census questionnaires, and improving the completeness of census counts. These three activities accounted for two-thirds of the cost of the 1980 census. We did not examine Census Bureau procedures related to processing census results. This report does not attempt to resolve the many policy issues which also bear on census costs or caused concern over the accuracy of the 1980 census, such as:

- Should illegal aliens be counted?
- The use of sampling as an alternative to an actual enumeration.
- The use of imputation and other statistical techniques, including sampling, to determine the population. 1/
- The need and feasibility of adjusting census counts for over or undercounting.
- The hiring of employees through political patronage.
- The need for all the information collected from respondents.

In our review we analyzed 1980 census costs, explored with the Census Bureau and U.S. Postal Service benefits and problems of increased use of the Service for developing mailing lists, and examined some procedures to lower both the cost of followup and the cost of programs to reduce the number of persons not counted. Our report is based on information obtained during this review and previous GAO reviews in which we

1/Imputation is a statistical procedure used to insert a person or household into census records because the records did not show the characteristics of the person or household in spite of good evidence that they, in fact, exist. (A discussion of how imputation is used by the Census Bureau is in ch. 4.)

- analyzed the effect that changes to census procedures for developing a mailing list and for followup could have on lowering cost and improving response;
- analyzed Census Bureau procedures and training manuals, instructions, and reports on precensus tests of 1980 census procedures;
- interviewed Census Bureau officials and observed operations at 40 of 409 temporary district offices in New York, New York; Philadelphia and Pittsburgh, Pennsylvania; Cleveland, Ohio; Detroit, Michigan; Chicago, Illinois; Los Angeles and San Francisco, California; Newark and West New York, New Jersey;
- interviewed Census Bureau and Postal Service officials at the national level;
- examined Postal Service laws, regulations, and instructions for checking and providing mailing lists and handling 1980 census questionnaires; and
- analyzed the work done by the Department of Commerce's Office of Inspector General on the 1980 census.

Our work was performed in accordance with GAO's current "Standards for Audit of Governmental Organizations, Programs, Activities, and Functions."

REVIEWS OF THE CENSUS

GAO and the Department of Commerce's Office of Inspector General have issued several reports on various aspects of the 1980 census process. Our reports include "Programs To Reduce the Decennial Census Undercount" (GGD-76-72, May 5, 1976); "Problems in Developing the 1980 Census Mail List" (GGD-80-50, Mar. 31, 1980); "Problems in Test Censuses Cause Concern for 1980 Census" (GGD-80-62, June 3, 1980); "Procedures to Adjust 1980 Census Counts Have Limitations" (GGD-81-28, Dec. 24, 1980); and, "An Assessment of 1980 Census Results in 10 Urban Areas" (GGD-81-29, Dec. 24, 1980). We also issued two other reports on census pretests and planning, budgeting, and accounting for the 1980 census: GGD-78-2, Oct. 11, 1977 and GGD-79-7, Nov. 9, 1978.

Office of Inspector General reports on the 1980 census covered such areas as security provided over confidential census information, preparatory work for the census, and space management and leasing agreements.

CHAPTER 2

A COMPLETE CENSUS: COSTLY, COMPLEX, AND UNACHIEVABLE

The U.S. Constitution, article 1, section 2, clause 3, requires an actual enumeration of the Nation's population every 10 years. Obtaining a complete count is an impossible task that has become very costly--over \$1 billion for the 1980 census--and increasingly complex. Contributory factors include inflation, a growing population, changes in life styles, and increased pressure to reduce undercounting. Inflation added over \$300 million to the 1980 costs and could add about \$2 billion to the cost of the 1990 census if a similar rate of inflation continues. Programs to reduce the number of persons not counted added about \$342 million to the 1980 census.

The quest for a complete census also led to the expanded use of the mail-out/mail-back census, or self-enumeration. Under this method, households were asked to complete census forms and mail them back. For the 1980 census, the Census Bureau placed greater reliance on self-enumeration than in the 1970 census--an increase from 60 percent of the Nation's households to over 90 percent. Census takers sought out householders only when they failed to return their forms or when their returned questionnaires failed office reviews and could not be completed by telephone. Because of the way it was conducted, the mail census, although effective, was also very costly.

THE HIGH COST OF CENSUS-TAKING

The cost of census-taking has been skyrocketing. Skyrocketing costs result from such factors as inflation, a growing population, and the use of expensive programs designed to improve coverage by lowering the number of persons not counted. In recent censuses, Census Bureau claims and actual counts show that we are getting more accurate and complete counts with each census. The Bureau acknowledges, however, it has no acceptable method for determining just how accurate and complete its counts are.

The billion dollar census

The following table shows the growth in the cost of censuses since 1950.

<u>Year</u>	<u>Total cost</u> (millions)	<u>Converted to 1980 dollars (note a)</u>		
		<u>Total cost</u> (millions)	<u>Cost per housing unit counted</u>	<u>Cost per capita</u>
1950	\$ 67.7	\$ 232.3	\$ 5.04	\$1.53
1960	128.0	353.0	6.05	1.95
1970	221.6	470.7	6.85	2.30
1980	b/ 1,068.8	1,068.8	12.10	4.72

a/Conversion based on the Consumer Price Index.

b/Census Bureau estimate as of August 1981.

As the table shows, the 1980 census ushered in the era of the billion dollar census. Did the Government have to spend \$1 billion for the 1980 census? The 1970 census cost \$221.6 million. Inflation, together with an increased workload, accounted for half of the difference between the cost of the 1970 census and the estimated cost of the 1980 census. The Census Bureau estimated that the 1980 census, if done in the same way as the 1970 census, would have cost approximately \$535 million.

What then accounted for the difference? The Census Bureau budgeted \$406 million for improvements which can be divided into three basic categories: (1) \$203 million to improve procedures directly aimed at obtaining a better population count than in the prior census; (2) \$139 million to change field staff management and to improve coverage; and (3) \$64 million to improve the quality of the data and to meet new legal requirements. By 1980, inflation had added \$64 million to the budgeted cost of improvement programs. Another \$64 million was spent on data processing activities.

For 1990, it could cost \$4 billion to repeat the 1980 census procedures. Inflation alone could increase the cost of the census by \$2 billion, should the 11.59 percent average rate of inflation experienced between 1971 and 1980 continue. An increase in the population and housing supply would further increase the cost. Since 1950 the population has been increasing by an average of 14 percent between decennial censuses; the housing supply has been increasing by an average of 24 percent. If this trend continues, it would add almost another \$1 billion to the cost of the 1990 census. Lower rates of inflation would still result in

an expensive census. For example, assuming that the average rate of inflation in the 1980s is 5.5 percent, the total cost of the 1990 census would be \$2.3 billion. If an 8.5 percent inflation rate occurs, the census would cost \$3.0 billion.

AN OVERVIEW OF THE 1980 CENSUS

Further insight into why censuses are becoming costly can be gained from understanding the size of the task of counting the Nation's population and the complexity of the procedures used. There were two procedures used in 1980 to collect census information--a mail procedure and a conventional procedure.

In most areas of the United States, census questionnaires were mailed to households. A member of each household was asked to complete the questionnaire and mail it back to a designated census office on census day, April 1. In mail areas, which the Census Bureau estimated covered about 95 percent of the Nation's population, the Postal Service delivered the returned questionnaires to the appropriate census district office. They were then checked in and reviewed for missing or incomplete entries. Incomplete questionnaires were completed through telephone followup from the district office, when possible. Census takers visited and counted households which did not return a questionnaire and those whose questionnaires failed office reviews and could not be completed by phone.

The conventional method, which closely resembled the traditional house-to-house canvass, was used in very rural areas of the country. Questionnaires were left by the Postal Service at residential addresses in those areas, and a member of each household was asked to complete the form and hold it for pickup by a census taker. After census day, the census takers systematically canvassed and listed every address in their assignment areas. At the same time, the census takers stopped at each household and collected the questionnaire left by the Postal Service. If a household had not completed the questionnaire or did not receive one in the mail, the census taker conducted an interview to get the census information.

Taking the 1980 census was an enormous job. The objective was to gather an estimated 3 billion items of information on more than 226 million persons in about 88 million housing units. By the time all work is finished, the 1980 census will have taken 9 years, cost over \$1 billion, and employed over 275,000 people.

Census operations fell into three broad categories: preparation, data collection, and data processing. During the preparatory

phase the Census Bureau planned, tested, and developed procedures and material to be used during the data collection phase. Among the materials prepared were mailing lists for households in mail census areas. Preparing mailing lists involved:

- collecting address data for housing units so that a questionnaire could be delivered to each unit by the Postal Service;
- identifying the geographical location or residential address of each housing unit so that census results could be reported by State, congressional district, and governmental unit, such as city and county;
- preparing maps and address registers for the 323,000 enumeration districts covering 3 million blocks to control delivery and retrieval of census questionnaires; 1/ and
- addressing and delivering about 87 million questionnaires to the Postal Service for housing units in mail census areas.

In addition, the Census Bureau delivered 5 million unaddressed questionnaires to the Postal Service for delivery to housing units in conventional census areas.

The Postal Service began delivering questionnaires on March 28, 1980, and data collection activities began on April 1. During the data collection phase census personnel

- recorded the return of questionnaires mailed back in the address registers,
- edited questionnaires for completeness,
- located and completed questionnaires which were not returned by mail,
- contacted respondents to complete questionnaires that failed the edit, and
- searched for persons and housing units not counted or not included in other census procedures.

1/Census Bureau geography for taking the census included dividing the Nation into work units called enumeration districts. Each district contained an average of 699 persons (about 270 housing units).

Data were processed at three processing centers. In this phase, collected data were tabulated and compiled into summary information. By law, 13 U.S.C. 141, the tabulation of total population by States as required for apportioning congressional representatives must be provided to the President within 9 months of census day. Within 1 year of census day, the Census Bureau must present to the State legislatures population totals for all counties, cities, and certain recognized political and statistical subdivisions. These data will be needed for potential redistricting of the legislatures. Considerable pressure is thus placed on the Census Bureau to complete the census in time to meet the statutory reporting dates. These requirements were met. The Bureau is aggregating census information on population and housing characteristics for 39,500 governmental units. The publication of major census data is expected to be completed by mid-1983.

MAIL CENSUS PROVES EFFECTIVE

The Census Bureau's workload accomplishment goals for the mail census effort provide some insight into the success of the mail census procedure. The Census Bureau's goals included the completeness of the mailing list, number of forms returned, and the quality of the forms returned in terms of prescribed editing standards. The Bureau met or exceeded the goals it set in these three areas.

The Census Bureau hoped to develop a mailing list by census day which accurately reflected the housing supply in mail census areas. The Bureau collected over 90 million addresses by census day. About 9 million of the listings were duplicates, erroneous, or incomplete. Another 2 million missed housing units were found after census day, apparently through coverage improvement programs. Overall, Bureau efforts to develop a mailing list appear to have been successful because address listings for 98 percent of the 83 million housing units counted in mail census areas had been obtained before census day.

The Census Bureau expected 60 million households to return their forms through the mail. The Bureau, however, saw this goal exceeded. About 64 million households responded.

The Bureau also expected 80 percent of the short form questionnaires and 65 percent of the long form questionnaires returned by mail to meet the Bureau's standards for completeness. Of the forms received, 87 percent of the short forms and 64 percent of the long forms met these standards.

As the above data show, the Bureau achieved its goals for the 1980 mail census. Further, the data demonstrate that the use of the

mail census procedure is an effective method for counting the Nation's population and housing supply. They also demonstrate that households can be relied upon to supply complete and timely data about themselves.

IS THE 1980 CENSUS COMPLETE?

The 1980 census is not complete, but it was effective in achieving reasonably complete results. In each census since 1950 there has been a net undercount of the population. The Census Bureau estimates that the undercount rate was 3.3 percent for the 1950 census, 2.7 percent for the 1960 census, and 2.5 percent for the 1970 census. The Census Bureau is preparing an estimate of the undercount rate for the 1980 census.

The Census Bureau credits improved procedures with decreasing undercoverage. In 1970 the Bureau spent \$11 million to reduce the undercount by 0.2 percent. The Bureau spent an estimated \$342 million in 1980 to reduce the undercount through program improvements and actually counted more persons than its precensus estimates anticipated.

Unfortunately, after all this effort, the Census Bureau acknowledges that it did not count everyone and still does not know precisely how many persons were missed. Census Bureau data on census completeness are based on its estimate of the population. Because the data available for making such estimates are incomplete, the Census Bureau's estimates represent only close approximations of the population. In 1980 the Bureau estimated the population to be 222 million persons; the final count was 226 million.

It is becoming quite costly to reduce the undercount experienced in decennial censuses. Putting additional money into future censuses will probably not significantly improve the count. We believe the question that now faces policymakers is how to maintain the existing accuracy and completeness of the census without unduly increasing its costs.

The remaining chapters show areas where future census costs could be reduced by:

- using alternative sources of addresses,
- changing Bureau followup practices, and
- modifying programs designed to reduce the number of persons not counted.

There may be other opportunities to reduce census costs through use of alternative procedures and policy changes not considered in the scope of this report.

AGENCY COMMENTS AND OUR EVALUATION

In commenting on this report, the Department of Commerce said it was concerned about the cost of the census and, therefore, plans to develop the 1990 census with reduced costs as a major objective. (See app. III.) Commerce also said it was too early to predict the cost of the 1990 census because the Census Bureau has not determined the methods to be used in taking the next census.

We agree that it will not be possible to accurately predict future census costs until the methods to be used are settled upon. We also believe that speculating about alternative procedures and forecasting their costs at this time are important steps toward ensuring that the most effective, efficient, and economical methods are selected. The evidence shows that planning for the 1990 census must start soon and a methodology selected by 1985. This means that the Congress and Commerce will have to decide shortly whether to continue existing 1980 census procedures or to adopt alternatives. As emphasized in this report, the Census Bureau's experience in the 1980 census shows that timely decisions are needed if the confusion and delays experienced in 1980 are to be avoided.

CHAPTER 3

MILLIONS CAN BE SAVED IN PREPARING

FOR A MAIL CENSUS IN 1990

An important feature of the 1980 census was that it involved compiling address data for about 95 percent of the Nation's 88 million dwellings before census day. Compiling address data cost \$97 million. Use of census takers to collect and verify address data accounted for 73 percent of the money spent. If improvements are not made, inflation and continued growth in the housing supply could drive the cost of compiling address data for the 1990 census to over \$440 million.

However, opportunities do exist to lower the cost. Our analysis shows that obtaining address listings through the Postal Service could save about \$129 million of the projected cost; updating address data obtained in 1980 could save even more--\$258 million.

ADDRESS DATA--WHY IS IT NEEDED?

The outcome of a mail census depends largely on the completeness and accuracy of the Census Bureau's address data. For an address listing to be considered complete, the Bureau needs the residential and mailing address for each housing unit to be surveyed by mail.

The residential address is related to census geography which permits the Census Bureau to tabulate results by area, including State, county, city, or congressional district. In addition, this type of address is used to monitor nonresponse and organize followup efforts. An accurate mailing address allows the Census Bureau to use the Postal Service to deliver questionnaires to housing units.

1980 ADDRESS DATA--A \$97 MILLION INVESTMENT

In compiling the 1980 address data, the Census Bureau relied on commercial mailing lists, canvassing operations, ^{1/} and reviews by the Postal Service. Commercial firms provided 42.5 million

^{1/}Canvassing involved sending census takers to systematically travel, block by block, all streets, roads, and paths in given areas to look for and list places where people lived or could live. Canvassing was used to (1) develop lists of addresses for housing units in rural and small urban areas and (2) update commercial mailing lists purchased for metropolitan areas.

addresses and the Postal Service another 9.1 million addresses. The Census Bureau compiled address listings for another 38.5 million dwellings through a nationwide canvass using census takers.

The Census Bureau invested \$97 million and 4 years of effort into compiling the address listings. The Bureau's experience shows that developing addresses by purchasing mailing lists is considerably less expensive than developing them through canvassing operations. The following table shows the yield and cost of obtaining addresses for 1980 through commercial firms and canvassing. In addition, the table shows the cost and yield of using the Postal Service to upgrade the lists.

<u>Source</u>	<u>Number of addresses</u> (millions)	<u>Cost</u>	
		<u>Per activity</u> (millions)	<u>Per address</u>
Commercial lists: purchasing and processing	42.5	\$ 11	\$0.26
Canvassing:			
Rural and small urban areas	34.5	49	1.42
Commercial mail list areas	4.0	22	5.50
Upgrading mailing lists: purchasing and processing Postal Service address data	<u>9.1</u>	<u>15</u>	1.65
Total	<u><u>90.1</u></u>	<u><u>\$ 97</u></u>	

The 90 million addresses collected included the addresses of 81 million residences and 9 million duplicate, erroneous, or incomplete address listings. Only 3 million duplicate and incorrect address listings were deleted by census day. Questionnaires were sent for the remaining 87 million addresses, including 6 million duplicate and incorrect listings, according to Census Bureau officials. Census Bureau officials viewed the overmailing as a means of further verifying the accuracy and completeness of address data.

Overall, the table shows that purchasing and upgrading available commercial mailing lists is less expensive than developing addresses through canvassing operations. The table shows that Census Bureau canvassing operations accounted for 73 percent of

the cost to collect addresses and 43 percent of the addresses listed. On the other hand, commercial mailing lists accounted for 11 percent of the cost and 47 percent of the addresses listed. Another way to view the cost is on a unit basis. As the table shows, it cost the Bureau either \$1.42 or \$5.50 to obtain an address through canvassing. This was 5 to 21 times more expensive than obtaining addresses using commercial sources.

Delays in canvassing impeded
preparation efforts and wasted
millions

In collecting rural and small area addresses, the Census Bureau encountered problems which delayed canvassing operations. Problems contributing to the delay included:

- Delayed preparation of area maps needed by census takers to locate and list dwellings.
- Poor quality maps which hindered canvassing. Many maps were missing features, were too small in scale for marking address locations, and were difficult to read.
- Workloads for many census takers were greater than planned because the Census Bureau underestimated the number of housing units to be listed by over 3 million. This miscalculation forced the Bureau to alter work assignments and hire more personnel.
- High turnover and low production, coupled with heavy workloads, made full staffing difficult to achieve.

Overall, rural and small urban area canvassing operations, originally planned to be completed in 3-1/2 months, took 8 months.

The failure to complete rural and small urban area canvassing on time affected subsequent preparatory operations. For example, a Postal Service review of rural and small urban area addresses scheduled for mid-1979 was cancelled. In all, six operations were either delayed or cancelled. The table on the following page shows the impact that the canvassing delay had on other operations.

<u>Activity</u>	<u>Status of activity</u>
Postal Service review of rural and small urban area addresses	Cancelled
Compiling address registers and preparing address labels	Delayed
Preparation of address lists and registers for district office use	Delayed
District office finalizing of address lists and registers	Delayed
A precensus review of housing counts by communities	Cancelled
Labeling and delivering questionnaires to the Postal Service for review by March 5, 1980	Delayed

On March 5, census takers were still canvassing areas for missed housing units. As a result, the Census Bureau could not complete about 12 million mailing pieces at the time mailing pieces were sent to the Postal Service for the March 5 casing check. During the casing check, the Postal Service matched census mailing addresses with addresses on mail carrier route cases. This review also checked that a mailing piece was received for each housing unit on the carrier's route.

According to the Postal Service, the casing check showed that addresses for large urban area questionnaires did not always reflect the corrections, deletions, and additions made by the Postal Service in June 1979. Also, many rural area questionnaires had incomplete or incorrect mailing addresses. The Postal Service could not always match a dwelling with the mailing address provided. In addition, the Postal Service observed at the time it began delivering questionnaires to the households that the Bureau had not always prepared questionnaires reflecting the corrections, deletions, and additions identified by the Postal Service during the March 5 casing check.

According to Bureau officials, during this period the Bureau encountered problems and delays which affected the production of address labels and address registers for the areas covered by the commercial mailing lists. The Postal Service delayed returning the results of the casing check to the Bureau. Also, a flood caused by the discharge of the overhead sprinkler system in the Bureau's

computer room forced the Bureau to locate offsite facilities which could service its needs and to modify computer programs and software in order to complete the work at the offsite facilities.

By failing to complete canvassing operations on time, the Census Bureau estimated it mailed out 6 million more questionnaires than necessary; this cost the Government about \$2 million in postage. In addition, when the questionnaires were not returned, census takers were assigned to make personal visits to determine if a dwelling and persons existed for the address listings. Our analysis of Census Bureau cost data shows that \$38 million may have been spent making personal visits to resolve the 6 million cases. (Additional information on followup costs is included in ch. 4.)

There were other consequences of the delays which cannot be quantified in terms of money or time. In particular, Census Bureau field employees and community officials we interviewed said they lost confidence in the Bureau's procedures to get a complete and accurate census.

TRIMMING THE COST OF CANVASSING

Our analysis indicates that if no improvements are made, inflation and continued growth in the housing supply could drive the cost of obtaining address data for 1990 to over \$440 million. One way to hold down cost increases would be to limit the amount of canvassing done in collecting address data. Canvassing operations accounted for 73 percent of the cost of developing address data for the 1980 census.

The need for costly canvassing operations can be minimized by (1) purchasing address data from the Postal Service or (2) updating the address data gathered during the 1980 census. The following table compares the effectiveness and cost of three options which should be considered in planning for the next census. The following assumptions were used in preparing the table: In 1990

- 95 percent of the Nation's housing will be in mail census areas.
- The housing inventory in mail census areas will have increased to 101 million units. Census Bureau data show that the housing supply could increase by 21 percent over the decade.
- Repeating current procedures, the Census Bureau, after Postal Service checks, would obtain 97 million addresses given no improvement to current procedures. The remaining

4 million addresses would be obtained through coverage improvement activities conducted after census day.

--All cost estimates are based on 1980 dollars. Should inflation continue at the 11.59 percent average rate experienced between 1971 to 1980, the cost estimates will triple.

Effectiveness and Cost

<u>Operation</u>	<u>Current procedure extended</u>	<u>Purchase Postal Service address data</u>	<u>Update 1980 address data</u>
	----- (millions) -----		
Residential addresses obtainable without canvassing	55	92	92
Addresses obtainable through canvassing	42	9	9
Cost of developing address lists and labels	\$148	\$105	\$62
Cost of canvassing operations	\$85	\$13	\$13

The table shows it may be more economical to update 1980 address data than to compile new data. But, if the Census Bureau decides to compile new address data, purchasing it from the Postal Service appears to be more economical than repeating the procedures used in the 1980 census. Updating could save \$86 million, while using Postal Service lists could save \$43 million. Should inflation continue at an average rate of 11.59 percent, updating could save over \$258 million, while purchasing data from the Postal Service could save \$129 million. We caution readers that before a decision is made, the Postal Service and the Census Bureau will need to develop more precise cost and production figures.

Updating 1980 address data

If canvassing costs are to be cut, the Census Bureau needs to seriously study the cost-saving opportunities updating offers. It

appears that \$72 million in canvassing costs can be saved. Additional savings of \$14 million could result from reducing the number of operations and addresses to be processed. Moreover, updating could also reduce the number of overmailings made. In the 1980 census about 6 million overmailings were made. This figure could rise to 7 million overmailings for 1990 if improvements are not made. At stake would be \$46 million in additional postage and followup costs.

Using available Bureau data, we estimated it could cost \$62 million to update the 1980 list. This figure includes the following:

- \$1 million to merge 1980 census address files into a single mailing list.
- \$23 million to have the Postal Service check and revise the list and provide 11 million address listings to account for the increase in housing units on Postal Service routes in mailing list areas.
- \$21 million to make geographic changes reflecting changes in political boundaries as well as changes in road and street patterns; to establish boundaries for areas when adjustments to political boundaries also require adjustment to census boundaries; and to print mailing labels.
- \$13 million to develop data for 9 million housing units not directly serviced by the Postal Service.
- \$4 million to computerize the 20 million additional address listings added to the list.

We previously recommended that the Census Bureau update decennial census address data. In a report titled, "Problems in Developing the 1980 Census Mail List" (GGD-80-50, March 31, 1980) we pointed out the problems the Bureau experienced in developing accurate and complete address data, including

- delayed completion of lists for rural and small urban areas, which caused the cancellation of a Postal Service review;
- limitations in address lists purchased for major urban areas from commercial mailing list vendors; and
- lack of controls over Postal Service reviews to insure the quality of the Bureau's mailing lists. 1/

1/In commenting on a draft of the Mail List report the Postal Service said as a result of our findings it planned to implement a quality control program.

Our 1980 report recommended that the Director, Bureau of the Census, use the mailing list developed for the 1980 census in the major urban areas for future Bureau needs, by periodically updating the list through Postal Service reviews.

The Bureau said it would explore updating the current list, but it thought updating would be more expensive than the current procedure for developing a mailing list. The Census Bureau estimates we used in this study to determine mailing list updating costs are not exact and will therefore require some refinement. However, they do show, in our opinion, that significant savings can be achieved through updating.

Purchasing Postal Service address data

The Census Bureau has the option to purchase address data from the Postal Service. A major advantage of this option is that the Postal Service has the capability of providing the single most up-to-date mailing list available.

An analysis of Bureau and Postal Service data shows it could cost \$105 million to purchase address data for the 1990 census from the Postal Service. This figure includes the following:

- \$40 million to purchase address data for an estimated 92 million housing units to which the Postal Service could deliver mail.
- \$13 million to develop address data for 9 million housing units not directly serviced by the Postal Service.
- \$21 million to computerize the address data purchased from the Postal Service.
- \$10 million to have the Postal Service check the completeness and accuracy of the address data.
- \$21 million to make geographic changes reflecting changes in enumeration district boundaries and codes which are used to assign code numbers to address listings, update reference maps, and print mailing labels.

According to Service officials, the Service can provide the Census Bureau with three types of address data when mailing lists are being compiled. The Service can provide address listings which would represent

- the places where household mail is delivered, in other words, mailing addresses;

- possible residential mail delivery points, or structures to which the Service would deliver mail if sent; and
- complete address lists of individual housing units on carrier routes regardless of their condition, occupancy, or habitability with the possible exception of units in condemned or rundown apartment buildings.

According to Postal officials, the more detailed the listing, the more expensive it will be. The Postal Service estimates it could supply lists of mailing addresses at a cost of 10 cents for each address listed.

Using 1980 census cost data the Postal Service estimates it could provide the Census Bureau with lists of possible residential mail delivery points at a cost of 43 cents for each address listed. The fees include providing each unit's street address and mailing address. The Service estimates it can deliver mail directly to about 91 percent of the Nation's housing units. About 9 percent of the Nation's housing units share a mail stop. In some apartment buildings, for example, letter carriers leave the mail with a desk clerk who then delivers it to the building's residents.

As part of the fee, the Service believes it could

- code the delivery points listed to meet Census Bureau geography requirements,
- identify delivery points which serve more than one housing unit,
- ascertain the total number of housing units served at the delivery points, and
- identify those delivery points which represent vacant or seasonal housing units.

By 1990 Postal Service routes could include 92 million possible residential mail delivery points. Purchasing the detailed data could cost \$40 million based on 1980 census costs.

Canvassing would be necessary to identify the remaining 9 million housing units. Either Census Bureau or Postal Service employees could be used to do the work. Postal officials pointed out that the Postal Service could provide the workforce needed to do the work. Moreover, the officials say they would be using individuals who are thoroughly familiar with the areas because they work in them 6 days a week. The officials said canvassing could be done on slow mail delivery days, which are generally Tuesdays and Thursdays.

The Postal Service lacks an accurate estimate of what it would cost to do the canvassing. Canvassing could cost as little as \$4 million according to one Postal Service estimate. The estimate is premised on the Service's experience in the 1980 census. The Postal Service updated the address registers for some areas in Brooklyn, New York. It charged the Census Bureau 43 cents for each street address added. To do the check, the Postal Service had mail carriers inspect buildings to identify addresses of dwellings missing from the Census Bureau's address registers.

As another alternative, the Census Bureau could use census takers to obtain address data. In the 1980 census, using census takers to locate and list addresses in rural and small urban areas, the Bureau spent \$1.42 for each address obtained. It should, therefore, cost the Bureau about \$13 million in 1990 to canvass areas using census takers. By using the Postal Service data, census takers should be able to quickly locate any unit in question. Our estimate may be understated to the extent that travel time between housing units to be listed will increase over 1980 census rates. However, the cost should not rise to the \$5.50 spent in 1980 to have census takers walk commercial mail list areas looking for missed addresses.

The Census Bureau may want to verify on a sample basis address data provided by the Postal Service. The check could be used to ensure the accuracy, completeness, and reliability of the Service's address data. Although the check would add to the cost of compiling address data, we believe the overall cost would be less than the cost of repeating 1980 procedures. In the 1980 census, the Bureau spent \$22 million to have census takers verify the accuracy and completeness of address listings provided by commercial mailing list firms.

The Postmaster General believes serious consideration should be given to an expanded role for the Postal Service in future censuses. He believes there may well be opportunities to do this while still providing savings to the taxpayer, particularly in preparing mailing lists.

The Postal Service is concerned, however, about public disclosure of any mailing list it might provide, and more fundamentally, about its statutory authority to provide such a list to the Census Bureau. Under Section 411 of Title 39, U.S. Code, the Service is authorized to furnish property and services to executive branch agencies on a reimbursable basis. However, the Privacy Act, 5 U.S.C. §552a(n) (1976), provides that an individual's name and address may not be sold or rented by an agency unless such action is specifically authorized by law. The only explicit reference to mailing lists in the Postal Service's enabling legislation is Section 412 of Title 39, U.S. Code, which generally prohibits the public disclosure of mailing lists by any means or for any purpose.

In view of the Privacy Act provision, the Postal Service has reservations about whether sections 411 and 412 of title 39 contain sufficiently specific language to authorize disclosure to the Census Bureau of a mailing list. The Postal Service believes that Congress would need to enact specific authorizing legislation if purchase of a mailing list is contemplated. The Service also believes that appropriate steps should be taken to guard against public disclosure of such a list once it is released to the Census Bureau. Appendix I contains our suggested draft legislative language which, if enacted, would specifically authorize implementation of the mailing list purchase option. Under our proposal, mailing lists provided the Bureau would be subject to the same requirements of confidentiality as other census information.

A decision on the role of the Postal Service in the next census is needed by 1985, according to the Postal Service's city delivery manager. This would allow sufficient time to assess how the Postal Service can best meet Census Bureau address needs, finalize cost estimates, negotiate contracts, and reach agreement on the methods and formats to be used in providing address listings to the Census Bureau.

CONCLUSIONS

Many issues will have to be considered by the Census Bureau in planning the next census. Perhaps the most basic will be the need to develop more economical methods for developing address data. As inflation and continued growth increase the cost of developing decennial census address data, the need for more economical and efficient techniques to obtain the data will also increase. Although the Census Bureau has developed an effective technique for collecting address data, the technique is very costly, time-consuming, and troublesome.

One way to hold down cost increases is to reduce the amount of canvassing done to collect addresses. For 1980 the Census Bureau used canvassing to provide about half the addresses on the mailing list. The Bureau could not, however, complete canvassing on time. This raises doubts about the Bureau's ability to carry out extensive canvassing operations in a timely fashion. Given the Bureau's past performance, a repetition of 1980 procedures may not guarantee the timely and economical development of a mailing list for the 1990 census.

The need for canvassing can be minimized by (1) purchasing address data from the Postal Service or (2) updating the address data from the 1980 census. The Postal Service has the capability of providing the single most complete, accurate, and up-to-date mailing list available. The Postal Service can supply or refine

address data for the Nation's housing units at a cost that is estimated to be at least \$129 million less than the projected cost of repeating the 1980 procedures.

Only the Census Bureau's 1980 mailing list comes close to the type of address data the Postal Service can supply. The gap between the two lists will widen over the next decade, the closer it comes to census day 1990. The 1980 list can be updated, and the comparatively lower cost of updating makes it the most desirable alternative. The least desirable option would be to repeat the costly, labor-intensive procedures used in the 1980 census.

Regardless of the method selected, we believe a decision is needed by 1985. If address data are to be purchased from the Postal Service, the Service will need to know by 1985 so that it can gear up to meet the Census Bureau's needs. If 1980 procedures are to be repeated, the Census Bureau will need at least 5 years to prepare the mailing list to insure that canvassing operations are completed in time.

The alternatives discussed above represent departures from the way the Census Bureau has operated in the past. The costs and effects of each cannot be precisely estimated. It is also impossible to predict how well the alternatives would work, compared to the procedures used in 1980. Before any change is implemented, it must be tested and refined by the Bureau. Perfecting a new method may take several years. Small pilot tests of the alternatives, therefore, may be appropriate as a way of obtaining better cost and effectiveness information before the Congress and the Census Bureau commit resources to a full-scale effort that is based on any one of the alternatives.

RECOMMENDATIONS TO COMMERCE AND THE POSTAL SERVICE

We recommend that the Secretary of Commerce, in cooperation with the Postmaster General, comprehensively evaluate alternatives for developing address data for the 1990 census. By 1984 the Secretary should:

- Have the Census Bureau conduct pilot tests to develop better cost and effectiveness information on updating the 1980 mailing lists and for purchasing lists from the Postal Service to ascertain the quality and cost of mail lists produced by these alternatives.
- Compare the results of the pilot tests with comparable information compiled on the 1980 census and any other alternative the Census Bureau may identify, and, after considering the quality and cost of the mailing lists produced, select the best method.

RECOMMENDATION TO THE CONGRESS

If the Secretary decides to purchase address information for the 1990 census from the Postal Service, we recommend that the Congress enact legislation that:

- Specifically authorizes the Postal Service to provide the Census Bureau address information.
- Protects the confidentiality of address information provided to the Census Bureau by the Postal Service.

(Draft legislation is included in app. I.)

AGENCY COMMENTS AND OUR EVALUATION

U.S. Postal Service

The Postal Service agreed that the cost of the 1990 census could be significantly reduced if the Census Bureau could obtain addresses directly from the Service. (See app. IV.) The Postal Service recognized, as stated in the report, that there is a need for legislation authorizing it to provide addresses and to insure the confidentiality of this information.

The Postal Service concurred with our recommendations and will cooperate fully with the Secretary of Commerce in carrying them out.

Department of Commerce

The Department of Commerce agreed with our recommendations that it investigate with the Postal Service various alternatives for the development of address listings for the next census. The Department pointed out that any joint planning effort between it and the Service would depend on the results from evaluation studies in progress at the Census Bureau, the actual procedure selected for the next census, a more detailed examination of Postal Service costs, as well as adequate levels of funding for planning and testing.

Commerce also stated it is considering an alternative method for distributing census questionnaires. Commerce said that during the 1980 census it conducted a list-leave experiment in selected areas. Census takers in selected district offices canvassed areas listing addresses and leaving questionnaires for households to complete and mail-in. Commerce said it plans to evaluate the results of the list-leave experiment to ascertain if the technique warrants further testing before the 1990 census. Commerce believes use of the list-leave technique could alter many aspects of census procedures, including the development of mailing lists.

Evaluation of the list-leave technique is in accordance with our recommendation that the Census Bureau, in planning for the census, consider alternative procedures to minimize costs. Until the evaluation is completed, it would be premature to speculate about its effect on the development of mailing lists.

In the 1980 census, the Census Bureau tried an experimental list-leave method whereby census takers were given prepared address lists and asked to update address data on the lists and to list any overlooked addresses. Census takers used the address lists because of shortcomings previously experienced in having census takers directly list addresses and drop off questionnaires. According to Census Bureau officials, the update-list-leave procedure was used because straight list-leave operations had several limitations. First, it was difficult to implement effective quality controls to ensure high coverage levels. Second, the short time period limited the number of Postal Service reviews which could be made to check the accuracy of the lists. Furthermore, coverage could have suffered because of the number of tasks census takers would have been required to perform.

Address lists used in the list-leave experiment came from two sources. For urban areas, commercial mailing lists were purchased and updated by the Postal Service. For rural areas, address lists were prepared from a canvassing operation. The methods used to prepare address lists for the list-leave experiment are the same ones used to develop mailing lists for the 1980 census.

Commerce agreed that purchasing lists from commercial sources and the Postal Service is cheaper than developing such lists through canvassing. Commerce stated that canvassing, however, produced benefits which we failed to emphasize and which limit cost comparisons between canvassing and purchasing options. According to Commerce, canvassing (1) permits verification and correction of addresses with census geography by direct observation, (2) helps determine procedures to employ for vacant and seasonal housing units, and (3) assists in classifying group quarters such as prisons, hospitals, and college dormitories. Commerce believes that such information is needed and cannot be obtained from either commercial mailing lists or Postal Service address lists without additional cost.

Purchasing address data from the Postal Service will not eliminate the need for canvassing. However, it will hold canvassing activities to a minimum. As pointed out on pages 17, 18, and 20, canvassing would be necessary to develop data for 9 million housing units not directly serviced by the Postal Service. As part of our cost estimates shown on page 16, we included \$13 million to cover the cost of having Census Bureau personnel canvass housing units not directly serviced by the Postal Service.

Our report also emphasizes, on page 20, that the Census Bureau may want to verify on a sample basis the accuracy, completeness, and reliability of address data provided by the Postal Service. We recognize that the check would add to cost estimates shown on page 16 for purchasing Postal Service address data and for updating 1980 address data. For example, should the Census Bureau update its 1980 address list rather than develop a new one, an estimated 22 million address changes would have to be made by the Postal Service. On the basis of 1980 census costs, a 100-percent check of the addresses through canvassing could add \$31 million to the cost shown for the updating option in the table on page 16. Although the check would add to the cost of updating, the evidence available shows updating would still be less costly than repeating 1980 procedures. Also, appropriate quality controls over Postal Service work could eliminate the need for extensive verification of address listings.

Commerce stated that a larger Postal Service role will most likely carry additional costs not considered in our analysis. Commerce expressed concern that services performed by the Postal Service during the 1980 census were not of uniform quality and timeliness. Commerce also said procedures would be needed to identify and correct inconsistent Postal Service performance. The cost of the new procedures should be added to our analysis according to Commerce.

We agree that procedures should be established to identify and correct inconsistent Postal Service performance. In 1980 in a report titled "Problems in Developing the 1980 Census Mail List" (GGD-80-50, Mar. 31, 1980) we reported on the need for the Census Bureau to design a quality control procedure to help reduce the number of addresses missed by postal carriers when reviewing mailing lists. We also agree that implementation of a quality control procedure would add to the costs shown in the table on page 16. We do not believe the added costs should significantly affect the cost comparison of the three alternatives because the procedure would be a part of all three alternatives.

Commerce said that a larger Postal Service role would most likely carry additional employee wage costs because postal carriers earn hourly wages about 3 times those of the average 1980 census taker. According to Postal Service officials, the Postal Service plans to seek reimbursement only for that portion of a work day spent by postal carriers on census-related work. For example, if carriers spend about one-third of their work day preparing address data, then the cost to the Census Bureau would be about the same as the average daily cost of using census takers. Also, our analysis of three alternatives for developing address lists using 1980 Census Bureau costs and preliminary

Postal Service costs shows that updating the 1980 census mailing list through the Postal Service is the least costly. We believe that until the Postal Service's performance is tested and evaluated, it is premature to make generalizations that higher Postal Service payrates will result in higher address data costs.

CHAPTER 4

HOW MILLIONS MIGHT BE SAVED ON CENSUS

FOLLOWUP PROCEDURES AND COVERAGE

IMPROVEMENT PROGRAMS

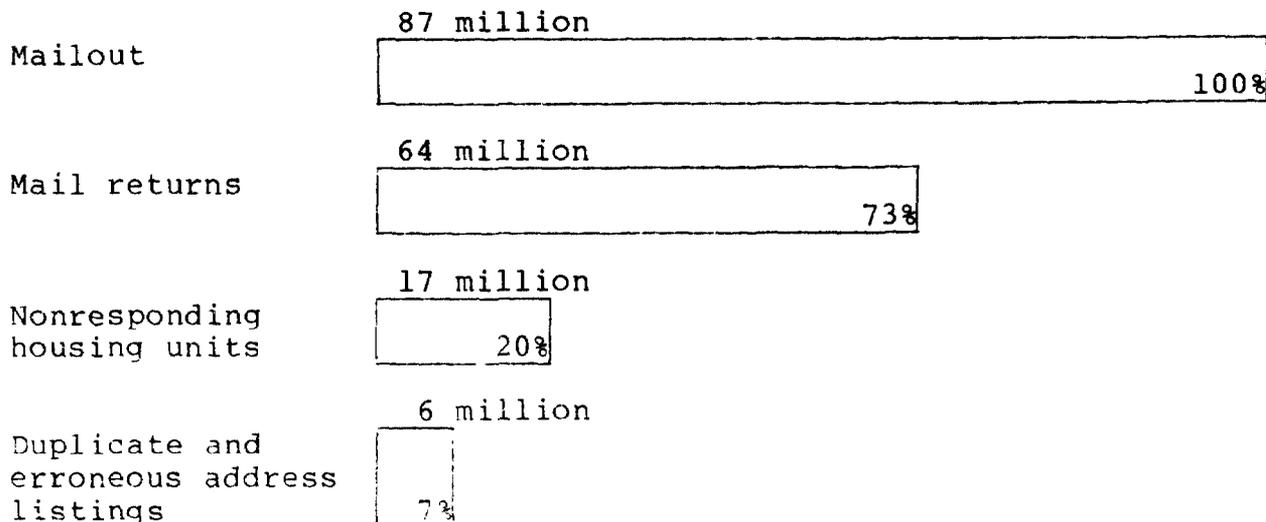
The Census Bureau did not rely entirely on the Postal Service to deliver and return census questionnaires. Followup procedures and coverage improvement programs played an important part in the Bureau's efforts to find everyone; however, they also proved to be costly and inefficient.

During our examination of 1980 census operations, we observed inefficient and wasteful practices that increased the cost of the census by millions of dollars. This chapter demonstrates that opportunities may exist to eliminate such practices and significantly reduce the cost of the census. Moreover, operational improvements could contribute to a smoother census in 1990 and could lessen the concerns about the effectiveness of census procedures caused by sloppy and inefficient practices.

PERSONAL VISIT FOLLOWUP--EFFECTIVE
BUT COSTLY AND INEFFICIENT

The Census Bureau asked 95 percent of the Nation's households to count themselves. The chart below shows the results of the mail census operation as of April 14, 1980.

RESULTS OF THE 1980 MAIL CENSUS



The Census Bureau's policy for the 1980 census was to send census takers to each housing unit where a questionnaire was to be returned in the mail and was not received by April 14, 1980. At the start of followup operations, 23 million questionnaires had not been received. Of the nonresponse cases, 21 million were assigned for followup and 2 million were deleted for various reasons, such as duplicate or incomplete address listings and some late mail returns. Census takers completed over 19 million of the assigned cases. The remaining 2 million cases included some additional duplicate and incorrect addresses, late mail returns, and incomplete cases.

About \$145 million may have been spent to follow up on non-response cases. Our analysis of Census Bureau cost data 1/ indicates that:

- \$38 million may have been spent to follow up on 6 million housing units that visits would show were duplicate listings or nonexistent units.
- \$31 million may have been spent to visit and count 5 million nonresponding households.
- \$19 million may have gone to pay census takers to unnecessarily duplicate 3 million questionnaires received in the mail at district offices after the start of followup operations.
- \$57 million was spent on visits to 9 million vacant housing units.

Because Census Bureau records relating to followup operations are incomplete, we could not ascertain the exact number of each type of followup case completed by census takers or the cost involved.

ALTERNATIVE FOLLOWUP PROCEDURES COULD SAVE MILLIONS

The primary purpose of followup is to reduce the percentage of nonresponse, thereby making the census more complete and

1/Cost estimates were computed by multiplying the number of cases reported as completed by census takers by the average cost of followup, \$6.28. (Census Bureau followup costs of \$121.8 million divided by followup cases reported completed, 19.4 million.)

accurate. The Census Bureau needs to explore the feasibility of using alternative, less costly methods to follow up on nonrespondents. The Bureau should explore the use of mail reminder cards and followup mailings as comparatively low-cost methods of increasing the response rate. Increased use of imputation to count noncooperative individuals may also be helpful. The use of imputation to determine the population for apportionment purposes is under review by the courts.

Mail reminder cards

Studies by the Census Bureau show that reminder cards will produce more responses at less cost than personal visits. Census Bureau tests of reminder cards, while not conclusive, showed that they could have increased the 1980 mail response rate by perhaps 1 to 6 percent. There would have been a savings of about \$4 million for each 1-percent increase in response.

Bureau managers decided not to use the cards because they believed:

- Results in three census tests did not provide conclusive evidence that the use of a reminder card would yield a sufficient increase in mail returns necessary to make it cost-effective.
- They could not rely on test census mail return rates as an accurate predictor of the national mail return rate and its related timing.
- Reminder cards would be of only marginal utility in light of the exhaustive publicity campaign mounted for the census.
- Reminder cards would have placed additional operational demands on the Bureau and the Postal Service.

Postal Service officials, however, disagreed that the reminder cards would have placed additional operating demands on the Service.

The reminder card was first tested during the Oakland, California, pretest. The test generated some interesting and encouraging conclusions. It appeared reminder cards resulted in a conservative gain of 6 percent in the mail return rate. While preliminary conclusions drawn from the test were positive, the Census Bureau appropriately chose to test the effectiveness of the reminder card further during other test censuses.

During the Richmond, Virginia, census test, the results from use of the reminder card were less encouraging. In Richmond the gains from the use of the reminder card appeared to be no greater than approximately 1 percent, according to the Bureau. These

results disappointed the Bureau and raised concerns about the effectiveness of the reminder card.

The Bureau again tested the reminder card in Lower Manhattan, New York, a small but difficult area to enumerate. The results in New York showed that there was less than one-tenth of 1 percent difference in overall response variance between those areas receiving reminder cards and those which did not receive them. In fact, those areas which did not receive the reminder card had the greater overall response rate.

On the basis of the test data, the Bureau concluded that the actual influence of the reminder card on mail response was negative and that it was not cost-effective. Beyond the cost benefit issue, which was of major concern to the Bureau, were the issues of implementing such a large effort nationally and the uncertainty of the national mail return rate. Also, the Bureau was confident that its nationwide census publicity program would be successful in emphasizing the importance of responding to the census. The Bureau finally decided not to use the reminder cards in 1980.

In retrospect, the Bureau believes its decision not to use the reminder card during the 1980 census was correct. The national mail return rate was substantially higher than expected, exceeding that realized in all earlier census tests. However, because of the inconclusiveness of the Bureau's tests and the potential savings associated with using reminder cards, the Bureau should not yet dismiss their use.

For example, although the Bureau's test results were inconclusive, they lacked essential documentation on the methods used to select groups to be tested. The Census Bureau could not show if the households selected for the tests were comparable in terms of education, age, race, or marital status. These are factors which can affect response rate. In conducting future tests of reminder cards, the Census Bureau should adjust reminder card results to reflect any differences in test households. Reminder cards may be used cost effectively in some areas and not in others, depending on the population's characteristics.

Second wave mailings

A second mailing is another technique for increasing the mail response rate. A second wave mailing involves sending another copy of the questionnaire to nonrespondents. The second mailing is done when the returns from the first wave start slowing down.

In preparing for the 1980 census, the Bureau did not conduct second wave mailing tests. The Bureau's own experience in the 1978 Census of Agriculture, our experience, and the experience of private researchers show that followup mailings have advantages.

They increase mail response rates regardless of the size of the initial response rate. Although the groups surveyed do not represent a cross section of the population, the results point out the value of followup mailings as a low-cost technique for increasing response rates.

An analysis of percentage-of-response statistics by a private researcher for 103 mail surveys demonstrates the effectiveness of mail followup. ^{1/} The analysis shows that for surveys with a response rate of about 85 percent (approximately the same response rate experienced in the 1980 census) the expected return rate after a followup mailing would be between 90 to 95 percent. The 103 mail surveys ranged from small pilot studies of 200 or fewer people to major research projects with mailings to 10,000 or 20,000 people. These included surveys to (1) subscribers to publications, (2) industrial concerns, (3) businessmen and professional groups, and (4) consumers.

Percentage of response statistics for the Census Bureau's 1978 Census of Agriculture substantiate the value of mail followup as an effective way to increase response rates. The Bureau conducts the Census of Agriculture every 5 years to count essentially all farm and ranch operations in the United States and outlying territories. Since 1969 data collection has been done by mail. Data collection efforts in 1978 consisted of an initial mailout of 4.4 million questionnaires and six followup mailings. Followup mailings began about 2 months after the initial mailout, and were carried out at 1-month intervals. The second, fourth, and sixth followup mailings involved sending another questionnaire to nonrespondents. The other three mailings were letters requesting response, pointing out the uses of the census data, and reminding addressees of the legal requirement to respond. On average, each followup mailing resulted in a 5-percent increase in the response rate. Overall, the Bureau was able to cut the amount of nonresponse by about 70 percent using followup mailings.

We experienced similar success with followup mailings in conducting mail surveys. An examination of percentage-of-response statistics for 10 mail surveys conducted since January 1, 1981, showed that followup mailings enabled us to cut the amount of nonresponse by about 45 percent. For example, the second mailing resulted in a 15-percent increase in response to a survey which had an initial response rate of 72 percent. The same results occurred in surveys with initial response rates as low as 37 percent. The surveys ranged from groups of 100 to 2,100 people. These included surveys to professional groups, businessmen, and individuals.

^{1/}Paul L. Erdos, Professional Mail Surveys (New York: McGraw-Hill Inc., 1970) p. 258.

We also use mailgrams as a low-cost alternative to personal interviews. Mailgrams are usually sent to nonrespondents about 3 to 4 weeks after a second wave mailing. This followup technique enabled us to further reduce nonresponse rates by about 20 percent in the 10 surveys studied. By using followup mailings and mailgrams in the 10 mail surveys, we were able to lower nonresponse rates by 65 percent.

Second wave mailings can be economical. Depending on the response, it would have cost between \$17 million and \$20 million to make a second mailing in 1980 to the 23 million nonrespondents. The second mailing could have resulted in an additional 3 million to 6 million responses. The personal visit followup method could have produced about 5 million responses at a cost of \$31 million. It appears that followup mailings could provide the Bureau with a comparatively low-cost way to lessen the need for personal followup on nonrespondents. Although mail followup can help lower the need for personal visits, it will not entirely eliminate the need for them.

Duplicate questionnaires

Another benefit is that a second mailing could provide field staffs with time to eliminate duplicate and erroneous address listings identified by the Postal Service at the time of delivery. This could help lower followup costs. In 1980, up to \$38 million could have been spent on canvassing duplicate and erroneous address listings. This was caused in part because the Census Bureau had scheduled only 1 day between the time operations for opening and logging in returned questionnaires were to stop and followup operations were to begin. We observed that 1 day was not sufficient time to allow district offices to eliminate duplicate and undeliverable addresses from address registers. At one district office, over 29,000 duplicate and erroneously addressed mailing pieces should have been sorted out and corrected before followup efforts began.

Extending the time period between mailout and followup operations would also allow field staffs time to process late mail returns. In the 1980 census, for example, had the Bureau waited 3 weeks longer before starting followup operations, it would have received an additional 3 million responses. A \$19 million savings could have resulted from such a delay. The evidence suggests that future followup operations should be delayed until there is a significant slowdown in mail returns.

What to do about noncooperative households

In the 1980 Census, personal visits by census takers were made to millions of housing units. The Census Bureau required

census takers to make at least three callbacks to each unit where no one was home on the first visit. For a variety of reasons, it proved impossible to get responses from every household. In some instances the nonresponse resulted from a refusal to answer the questionnaire. A basic issue in reducing census costs is the extent to which other means can be used to develop demographic data on persons who either choose not to cooperate with the census or who are members of nonresponding households.

By law, 13 U.S.C. §221 (1976), persons over 18 can be fined not more than \$100 for refusing or willfully neglecting to answer census questions. Whether the existence of criminal penalties has any discernible effect on increasing cooperation with the census is difficult to measure. As a practical matter, the Census Bureau uses a statistical technique--imputation--to count these persons and other nonrespondents.

Imputation was used to count about one-half percent of the Nation's population in the 1980 census. The Census Bureau imputed a person or persons into some housing units which census takers could not determine to be occupied or vacant. In addition, persons were imputed into housing units which census takers determined to be occupied but could not determine the household size. In the final tally the Bureau imputed 761,000 persons into 283,000 housing units.

The Bureau spent \$122 million for followup in 1980. If inflation continues as in the 1970s, the cost could triple. Given the high cost of followup procedures, both in terms of dollars spent and time wasted, the question inevitably becomes, should the Census Bureau place less emphasis on followup and rely more on imputation for the count? An answer to this question will involve a careful weighing of the merits and problems associated with each approach.

In addition to the time and dollar savings that could be realized through greater reliance on imputation, there is some indication that accuracy also could be improved. Because the Bureau required at least three return visits to units where information was unobtainable, there was pressure on the census takers to obtain information on these units as soon as possible. In some cases, this pressure may have led census takers to invent population counts in order to terminate followup cases. Not only is the reporting of fictitious figures a disturbing practice in itself, but, it interferes with the Bureau's control over its more statistically defensible imputation process. Increased use of imputation could reduce the pressure on census takers to obtain responses from noncooperative households.

Imputation is not without potential shortcomings, however. First, it introduces an unknown error into the final count. Further statistical study is needed to determine the precise extent of the error. A decision can then be made as to the amount of error that can be tolerated without significantly affecting census results.

The second potential problem with the use of imputation techniques is a legal one. A lawsuit has been filed in a Federal court in Indiana challenging the use of the 1980 census results in apportioning members of the U.S. House of Representatives. 1/ The suit alleges that the use of imputation violated section 195 of the Census Act. 2/ Section 195 requires the Secretary of Commerce to authorize the use of sampling whenever he considers it feasible. 3/ This requirement does not extend to the determination of the population for purposes of apportionment.

The plaintiffs in the Indiana case believe that by negative implication section 195 prohibits the use of sampling in determining the population for purposes of apportionment. They allege that the statistical technique known as imputation is a form of sampling and that, as such, its use for purposes of apportionment violates section 195. Three other Federal district courts which have had occasion to construe section 195 concluded that the section does not totally preclude the use of

1/Orr v. Baldridge, Civ. No. IP81-604-C (S.D. Ind., filed June 5, 1981).

2/Section 195 reads:

"Except for the determination of population for purposes of apportionment of Representatives in Congress among the several States, the Secretary shall, if he considers it feasible, authorize the use of the statistical method known as 'sampling' in carrying out the provisions of this title."

31 U.S.C. §195 (1976).

3/Section 195 does not define sampling. The question of what constitutes sampling (e.g., is imputation a form of sampling) is an issue to be resolved in the Indiana suit.

statistical techniques in the apportionment context. 1/ These courts viewed the section as permitting the use of statistical techniques for apportionment purposes but only in addition to the more traditional tools for measuring the population. However, these courts did not specify what statistical techniques they had in mind. It is not clear what effect, if any, these decisions will have on the resolution of the issues involved in the Indiana case. 2/ Whatever the outcome of the Indiana case, it should be emphasized that for purposes other than apportionment, namely where program funding levels are based on population, section 195 is an unambiguous directive from the Congress to employ sampling whenever feasible.

Followup practices affect staff size

An area sensitive to changes in followup practices is the size of the temporary workforce needed for followup operations. According to Census Bureau data developed during 1980 precensus

1/The three reported cases that have construed section 195 are: Young v. Klutznick, 497 F. Supp. 1318 (E.D. Mich. 1980), rev'd on other grounds, 652 F.2d 617 (1981); City of Philadelphia v. Klutznick, 503 F. Supp. 663 (E.D. Pa. 1980); and Carey v. Klutznick, 508 F. Supp. 404 (S.D. N.Y. 1981).

2/The uncertainty arises in part because these cases involved statistical techniques other than imputation. Further uncertainty results from the status of these cases. The Young decision was reversed by the court of appeals which held that the plaintiffs lacked standing to maintain the suit: Young v. Klutznick, 652 F.2d 617 (1981). The City of Philadelphia case was transferred to the United States District Court for the District of Maryland and consolidated for trial with several other cases involving the 1980 census. The Carey case was reversed and remanded for a new trial due to the trial court's failure to adequately protect the interests of those States that were not made parties to the suit: Carey v. Klutznick, 653 F.2d 732 (2d Cir. 1981). To date, no Federal court of appeals has squarely addressed the issue of the proper role of imputation or other statistical techniques in the apportionment context.

tests, a 1-percent increase in mail returns reduces the number of census takers needed by 3.2 percent, or 6,000 persons.

During our visits to 40 district offices, 21 district office managers complained about problems they were having in hiring competent staff. The managers said that, while they had no problems in meeting their hiring goals, they could not attract and retain enough competent people. In general, the managers said they saw the need for the Census Bureau to begin assessing alternative ways to follow up on nonresponders. Managers believed a reduction in the labor force would improve census quality, accuracy, and completeness by enabling managers to build a team of more capable and dedicated staff.

LOWERING THE COST OF IMPROVING COVERAGE

On the basis of the Census Bureau's own estimates, coverage improvement programs are among the most costly, lowest yielding operations it conducts during a census. Because of the high cost and low yield, we examined two costly coverage improvement programs to ascertain if they were cost-effective. The two programs were the national vacancy check and the records check programs.

Vacancy check

Misclassification of occupied units as vacant has been determined by the Census Bureau to be a major source of undercoverage. To improve coverage and reduce misclassifications in the 1980 census, the Census Bureau elected to revisit all units identified as vacant by census takers. On the basis of the data available, there was no alternative to complete rechecking to correct for a misclassification error, according to the Census Bureau. The Bureau believed the procedure could add 3 million persons to the 1980 population count at a cost of \$14 for each person added.

During the 1980 census, 9 million units were initially classified as vacant. A recheck of the units showed that about 1 million units had been misclassified. Approximately 2.5 million people were added to the count by the check at a Bureau-estimated cost of \$29 million, or about \$12 for each person found.

If the 1980 procedures are repeated in 1990, a nationwide vacancy check could cost about \$87 million. The Census Bureau needs to explore the feasibility of using other alternatives to adjust for misclassification.

In the 1970 census, housing units classified as vacant were rechecked on a sample basis to determine their true status at the

time of the census. The Bureau found that one unit in nine was improperly classified as vacant.

On the basis of the sample, ratios were developed showing the proportion of misclassified units and the average number of persons per misclassified unit for 12 areas of the United States. During computer processing, the ratios were used to reclassify reportedly vacant units in each enumeration district. According to Bureau records, an estimated 1 million persons were added to the count because of this procedure at a cost of \$3,000. Bureau officials believe the cost may be understated but do not have better cost data available.

A comparison of the two methods used to check vacancy rates in 1980 and 1970 show that both methods reliably derive the misclassification rate. Under the 1970 procedure, it cost less than 1 cent to add a person; in 1980 it cost \$12 to add a person. Despite the substantial difference in the cost of 1970 and 1980 vacancy check programs, we recognize that the Census Bureau also would conform to requirements applicable to the determination of population for purposes of apportionment.

Records checks

The Census Bureau obtained 6.8 million names and addresses from outside sources, such as State Motor Vehicles Departments and the Immigration and Naturalization Service, to use as second checks of the accuracy and completeness of coverage. The steps in this process were difficult and expensive, according to the Bureau. The Bureau estimates it spent \$22 million in hopes of counting between 400,000 and 900,000 individuals who were overlooked in other operations. The program was conducted on a selective basis in Black and Hispanic areas. The names and addresses from the lists were matched with completed census questionnaires. Unmatched names represented potential misses in census counts. District office staff tried to contact households having unmatched persons, either by telephone or personal visit.

On the basis of precensus test results, the Bureau believed the coverage improvement yield from the program looked encouraging. The Bureau concluded the program would be an effective means for improving coverage of minority persons. Precensus test results for Camden, New Jersey, showed that the matching of 6,000 names and addresses yielded 370 persons (about 6 percent) who had been missed. A similar yield of 6 percent was obtained in pretests done in Pima County, Arizona, and Travis County, Texas.

These kinds of yields were not experienced in the 1980 census. We found in three urban areas that about 16,000 persons were added to the counts through records checks / Details of our findings can be found in our report titled "An Assessment of 1980 Census

Results in 10 Urban Areas" (GGD-81-29, Dec. 24, 1980)7. District offices examined in the three areas were assigned about 0.8 million of the 6.8 million names to check. The results showed that the program's yield was about 2 percent for the district offices reviewed. With the \$22 million spent for the records check program, it thus cost over \$200 to add a person.

It could cost \$66 million to repeat the records check program in the 1990 census. The cost of the program and the low yield require that the value of repeating the program in the 1990 census be critically evaluated. The Census Bureau needs to determine how much additional resources should be spent on a program that will yield only a very small percentage of people.

Coverage improvement planning for 1990

This report deals with only two of the coverage improvement programs used in the 1980 census. The two programs analyzed illustrate that coverage improvement costs can be reduced.

In all, the Census Bureau budgeted \$342 million for 14 programs aimed at improving census coverage. (These programs are discussed in app. II.) The programs should be examined for areas where costs can be cut and programs made efficient. Before the next census is undertaken, decisions must be reached on whether to extend 1980 coverage improvement programs for the next census. The Congress and the Census Bureau will need to answer such questions as:

- Should the 1980 coverage improvement programs be repeated at the same level of effort in 1990, or should some be modified or eliminated?
- What alternatives exist for improving coverage while lowering costs?
- To what groups or areas of the country should coverage improvement operations be directed?
- What should be the cost results expectations for any coverage improvement programs designed to improve the census count of targeted groups or areas?

Answers to the questions will not come easily. Except for the vacancy check program, the Census Bureau collected little cost or results data from its 1980 census effort by which the effectiveness and utility of the programs can be assessed. As a result, information required for program evaluation purposes will have to be extracted laboriously from district office records now in storage. This may not be practical. One alternative is to evaluate the programs in precensus tests.

At present, the best available data regarding the shortcomings and effectiveness of coverage improvement programs can be found in reports prepared on pretest censuses and in our report titled "An Assessment of 1980 Census Results in 10 Urban Areas" (GGD-81-29, Dec. 24, 1980). Analysis of the reports shows that coverage improvement programs are not always effective and that the results vary widely by area. The reports do not address why the variances occur and what could be done to eliminate them.

CONCLUSIONS

Nonresponse has been a problem in every decennial census. There are many ways of reducing it. In the past the Census Bureau has used personal visit interviews. These, however, can be very expensive and time-consuming. As the cost of census-taking and, in particular, the cost of personal visit interviews increases, the need for less costly but equally effective followup methods will also increase. Although the Census Bureau has tested the use of mail reminder cards, the tests were inconclusive. The Bureau should do more to assure the Congress and itself that it is employing the most economical, efficient, and effective follow-up methods. If 1990 census costs are to be held down, the Census Bureau must thoroughly test and study alternatives to its 1980 followup practices of relying primarily on personal interviews.

The Bureau spent \$122 million to follow up on nonrespondents in 1980. For each 1-percent increase in the mail response rate the Bureau could have saved about \$4 million. In 1990 the savings could be even greater. For example, the Bureau could save about \$12 million in followup costs for each 1-percent increase in mail returns, should inflation continue at an average rate of about 11.59 percent (see p. 15) and if the Nation's housing supply grows by 21 percent (see p. 15).

Extending the time period between census day and the start of followup operations could, in our opinion, help hold down followup costs. The delay would provide time for field staffs to eliminate late mail returns and duplicate and other erroneous address listings from followup assignments. In 1980 this could have saved as much as \$57 million in followup costs. The amount of savings to be gained in future censuses is difficult to estimate. The size of the problem is directly related to the quality of the address registers, the speed of household responses, and the timely return by the Postal Service of duplicate and undeliverable questionnaires.

Because the Congress and the executive branch want to reduce spending and waste in government programs, the Secretary of Commerce should review 1980 coverage improvement programs for opportunities to improve their efficiency and reduce their costs for 1990. On the basis of the data available at this time, we

believe the vacancy check and records check programs should be the first to be critically analyzed to determine if the 1990 costs of these two programs will outweigh their benefits. Modifications to the programs could save millions of dollars in 1990 census costs. Exactly how much can be saved depends on factors such as the rate of inflation and the extent to which the programs are cut back.

RECOMMENDATIONS TO THE SECRETARY OF COMMERCE

In order to help control 1990 census costs while obtaining a reasonably accurate count, we recommend that the Secretary of Commerce:

- Test the feasibility of using mail reminder cards and followup mailings. If one or both of the techniques prove to be adequate to meet the Department's needs, they should be used as alternatives to reduce the need for personal visit interviews for the 1990 census.
- Extend the time between census day and the start of followup operations to allow field staffs enough time to sort out duplicate and inappropriately mailed questionnaires and to allow them time to check in late mail returns.
- Evaluate the feasibility of increased use of imputation, where legally permissible, as a method for developing census information on difficult-to-enumerate households.
- Evaluate the cost and effectiveness of 1980 census coverage improvement programs to determine if they should be used in the 1990 census. When practical, the evaluation should:
 - (1) identify the cost and result of each 1980 coverage improvement program for various geographical areas and target groups;
 - (2) test the sensitivity of program costs and results to changes in the assumptions upon which the programs are based, such as increasing or decreasing the levels of program activity on target groups and in geographic areas; and
 - (3) express 1990 estimates of cost and results for coverage improvement programs in ranges of values by target groups and geographic areas rather than just a single national value.

--Evaluate coverage improvement programs used in future censuses by compiling aggregate cost and results data on the operations. The data to be gathered should track the results of coverage improvement programs at the State and sub-State levels, also by target groups.

AGENCY COMMENTS AND OUR EVALUATION

The Department of Commerce agreed with our recommendation calling for further evaluation of the costs and effectiveness of various coverage improvement programs. Commerce also agreed that operations like the vacancy check program would be less expensive if performed on a sample basis rather than a complete inventory basis as in 1980. The Department stated that the extent to which such sampling is permissible during the enumeration for the production of data used for apportionment will be affected by litigation still in progress. The litigation and the issues it raises are discussed on pages 34 and 35 of this report.

Commerce believes we have prematurely concluded that coverage improvement through independent record checks is expensive and not very substantial. We have not drawn such a conclusion. We have concluded, however, that before a decision on the value of the program can be reached, a thorough review of the program's cost and yield is needed.

Commerce advised us that the Census Bureau has a comprehensive program to review the records check program. It is therefore reserving judgment as to whether the yield from the program was as low as we found at 16 district offices in 3 urban areas. Commerce said that even if the program had problems, its experience with the program may enable it to refine the procedure or use the procedure more selectively to produce higher yields in the next census. Because record checks are aimed at specific coverage problems relating to within household coverage or difficult-to-enumerate areas, Commerce said a given yield may be cost-effective for a small area even at a relatively high overall unit cost. Commerce agreed to evaluate the records check program in the context of other coverage improvement techniques which may be less costly.

After reviewing the Census Bureau's tentative plans for evaluating the records check program, we question whether the Bureau's effort will be extensive enough to provide better information than we have already obtained. During fiscal year 1982, the Bureau plans to select 5 of the 267 district offices which participated in the program. The Bureau will review between 2,000 to 10,000 of the record checks made in the 5 offices. The Bureau will use the results to estimate the program's overall cost, yield, and value in future censuses.

In a general comment on evaluating coverage improvement programs, Commerce said that analyzing the cost-effectiveness of coverage improvement programs used in the 1980 census for the entire population counted would be inappropriate because many of the programs were aimed at reducing undercoverage differentials among minority populations. We disagree that many of the programs were aimed specifically at minority groups. As discussed on page 45, the Census Bureau had 14 programs in the 1980 census aimed at improving census coverage. According to the Census Bureau, only 2 of the 14 programs were specifically designed for improving census coverage of minority populations. The remaining 12 programs were intended to ensure that the housing and population counts were complete. (See app. II.)

We agree with Commerce that the cost-effectiveness of coverage improvement programs should be evaluated on the basis of program objectives and target populations. Our recommendations emphasize this point. We believe Commerce should, when it is practical to do so, report the results of its coverage program evaluations in terms of results obtained for various target populations and by geographic area.

Commerce agreed to further test mail reminder cards and second mailings. Commerce stated that the tests might disclose problems with controlling second mailings and difficulties in locating persons who move after the initial mailing. Commerce said that the final decision on reminder cards or second mailings must be based on the results of experiments the Census Bureau will conduct, as well as the actual system to be used to collect data in the 1990 census.

The Department said it was reserving comment on our recommendation to evaluate the feasibility of increased use of imputation until the courts have decided the appropriateness of using imputation and other statistical techniques to adjust for undercounting. Commerce stated that should imputation be found to be an acceptable substitute for the direct enumeration of persons, it will evaluate the imputation techniques used in the 1980 census because it wants to ensure the techniques produce accurate and reliable results. This is consistent with our recommendation.

Commerce also agreed with our conclusion that steps must be taken to minimize the followup of late mail returns. Commerce did not, however, agree with extending the time between census day and the start of followup operations. Commerce opposes extending the time period because of the considerable trouble it had completing the 1980 census on time, and it believes extending the time could make problems worse for 1990. Commerce said it plans to examine, prior to designing 1990 census pretests, other alternatives such as extending the use of telephone followup for non-response, alternative questionnaire designs, refinements or changes in the publicity program, and the possibility of automating

questionnaire receipt and checkin as ways to minimize followup of late mail returns.

We agree that our recommendation is not the only way to minimize unnecessary followup activities. One or more of the alternatives mentioned by Commerce may be equally as effective in achieving the desired objective. Until each of the alternatives is tested and evaluated by the Census Bureau, we have no basis to assess which alternatives are valid, economical, and efficient.

Amendment to Section 411 of Title 39, United States Code

Existing Section 411 of Title 39, United States Code, is redesignated section 411(a), and the following new subsection (b) is added immediately thereafter:

"(b) Subject to the terms of subsection (a) of this section, the Postal Service is authorized to provide to the Secretary of Commerce for use by the Census Bureau such addresses or lists of addresses of housing units or other locations as may be deemed by the Secretary to be appropriate for any census or other enumeration being conducted by the Bureau of the Census. Any information furnished or otherwise made available to the Secretary under this subsection shall be subject to the confidentiality provisions of Section 9 of Title 13, United States Code."

1980 COVERAGE IMPROVEMENT PROGRAMS

In the 1980 census, the Census Bureau used a number of programs for improving coverage. The programs were generally considered as procedural improvements by the Bureau and were used during or just before census-taking began. Some of the programs were used to identify persons or housing units which could have been missed by the general census procedures. Other programs were used to improve public cooperation and assist individuals in filling out census questionnaires. In all, the Bureau used 14 programs in an effort to improve coverage.

1. Precanvass: Prior to census day, a list of all addresses within most urban areas was purchased from commercial vendors and updated by the Postal Service. The list was used as a basis for mailing out census questionnaires in over 50 percent of the country. The prec canvass operation was designed to ensure that the list of addresses was accurate. Census takers physically canvassed the areas with the purchased list (updated only by the Postal Service) in their hands. They verified the accuracy of the list and added any units not on the list.
2. Records Check Program: The 1980 records check program was aimed at reducing the differential undercount of minorities. Lists were obtained from the Department of Motor Vehicles in each State and from the U.S. Immigration and Naturalization Service. The lists were screened to identify persons in areas of concentrated minority populations. These persons were matched to the census; nonmatches were followed up and persons determined to be missed were added to the census.
3. Vacant Check: If occupied housing units are incorrectly classified as vacant, their occupants are likely to be missed in the census. For the 1980 census, all census-identified vacant units were revisited to verify their vacancy status. Occupants of units reclassified from vacant to occupied were added to the census if they were not enumerated elsewhere. Similar procedures were applied for addresses classified by a census taker as nonexistent at the time of the initial visit.
4. Census Questionnaire Coverage Items: Several questions on the census questionnaire were designed to obtain better coverage of persons and housing units. For example, question Q1 asked respondents to list all household members on the outside of the schedule. If this list disagreed with the number of person columns filled out inside the questionnaire, a followup interview was conducted to resolve the differences. Question H4 was intended to

identify missed units within small multi-unit structures. For areas that received a mailed questionnaire, item A2 on the cover of the questionnaire indicated the number of questionnaires mailed to units with the same basic street address. The H4 entry (inside the questionnaire) asked "How many living quarters are at this address?" If the H4 entry was larger than the A2 entry, the original pre-mail address register was further checked and if the discrepancy still existed, a followup was made. Three housing questions were also designed to verify the completeness of the household roster. Again these items were verified and persons were added to the census as a result of the followup operation.

5. Dependent Roster Check: The dependent roster check was designed to improve within-household coverage. Certain households enumerated in the census were followed up for various reasons, such as failing the edit. At the time of the interview, respondents were asked to verify whether any persons were left off the questionnaire. This provided an opportunity to add persons to the census.
6. Whole Household Usual Home Elsewhere: This operation was designed to correctly enumerate households temporarily away from their usual residence on census day. In previous censuses these households, if identified as temporary residents, were assumed to be enumerated at their usual residence. The 1980 census procedures checked at the usual place of residence to make sure that the household was enumerated there. If not, it was added to the census at that usual address.
7. Were You Counted? Program: The Were You Counted? campaign was designed to discover and add to the census persons who were missed. At the conclusion of the regular census enumeration, a Were You Counted? questionnaire listing all population questions was sent to newspapers, which had discretion whether or not to publish it and, if so, how long it was published. Respondents were asked to complete the questionnaire if they believed they or any members of their family had not been enumerated. For persons who responded to this inquiry, the Bureau determined if they were already enumerated in the census. They were added if it was determined that they were missed.
8. Casual Count Program: This is an operation where interviews were conducted by census takers in places frequented by persons with a high probability of being missed in the census. Examples of places to be canvassed were bars, pool halls, theaters, and city parks. It was then determined if these persons had been enumerated by the census;

they were appropriately added to the census if they were missed.

9. Local Review: At approximately the midpoint of the census, small area population and housing counts were provided to local government officials to review. Replies from these sources, if sufficiently substantiated, were investigated by the census field offices. As a result of these operations, a recanvass operation could occur in specific areas with the result that housing units and persons could be added to the census. Geographic problems could also be identified at this time.
10. Postenumeration Post Office Check: The check was designed to improve census coverage in conventional areas where a list-enumeration procedure was used. After the census enumeration was completed, the Postal Service reviewed addresses identified by the Census Bureau. From this review process, housing units that the census possibly missed were identified and followed up. Both housing units and persons could be added to the census from this operation.
11. Postal Service Reviews: The commercial mailing list was updated three times by the Postal Service. Addresses obtained by census takers underwent two checks. In each operation, the Service completed blue cards to indicate units not on the list. These cards were matched to the address lists and added, as appropriate.
12. Effectiveness of Assistance Centers: Assistance centers were established throughout the United States to help people fill out the census questionnaire. Assistance was given by both telephone and in person, either in the local census office or in centralized locations, such as storefront sites.
13. Recanvass: Approximately 40 percent of the census mailout 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 coverage problems to be relatively severe. The recanvass was done during followup operations. In addition to adding units that the census missed, the recanvass also identified and removed duplicate units.
14. Spanish Questionnaires: Census questionnaires were made available in Spanish and could be requested either by phone or by marking an appropriate box on the English questionnaires. Census takers also had Spanish questionnaires available to use upon request.



UNITED STATES DEPARTMENT OF COMMERCE
The Inspector General
Washington, D.C. 20230

December 22, 1981

Mr. William J. Anderson
Director, General Government Division
U. S. General Accounting Office
441 G. Street, N. W.
Washington, D. C. 20548

Dear Mr. Anderson:

This is in reply to your letter of November 16, 1981, requesting comments on the draft report entitled "The 1990 Census Could Cost \$4 Billion: Timely Decisions on Alternatives to 1980 Procedures Can Save Millions."

We have reviewed the enclosed comments of the Director, Bureau of the Census for the Department of Commerce and believe they are responsive to the matters discussed in the report.

Sincerely,

Sherman M. Funk
Inspector General

Enclosure



UNITED STATES DEPARTMENT OF COMMERCE
Bureau of the Census
Washington, D.C. 20233

OFFICE OF THE DIRECTOR

DEC 8 1981

Mr. William J. Anderson
Director, General Government Division
General Accounting Office
441 G Street, N.W.
Washington, D.C. 20548

Dear Mr. Anderson:

Thank you for the invitation to comment on the draft report of the General Accounting Office (GAO) entitled, "The 1990 Census Could Cost \$4 Billion: Timely Decisions on Alternatives To 1980 Procedures Can Save Millions."

We believe this report is a constructive contribution to planning and testing for the 1990 Decennial Census. While we have reservations on some of the details of the report, we fully support its general thrust of investigating alternatives in order to hold down census costs.

We are concerned that the GAO recommendations are primarily based on cost-benefit analysis and that certain census operations are examined without consideration of the overall census process. In addition, we have some questions about some of the costs quoted in the report. We feel it is somewhat early to predict the cost of the 1990 census, especially since the Census Bureau has not determined the methodology to be used. The Census Bureau is as concerned as others about the cost of a census and plans to develop the 1990 census with reduced relative cost as a major objective.

The Census Bureau intends to investigate with the Postal Service various alternatives for the development of address listings for the next census. Any joint planning effort between the Postal Service and the Census Bureau will depend on the results from evaluation studies currently in progress at the Bureau, the actual procedure to be used in the next census, a more detailed examination of Postal Service costs, as well as adequate levels of funding for 1990 census planning and testing. We also agree with the recommendations for further testing of reminder cards and/or second mailings and evaluating the costs and effectiveness of the various coverage improvement procedures.

The feasibility of increased use of imputations or other statistical methods as a substitute for direct enumeration is a more difficult problem. Such a decision is not merely one of cost-effectiveness. We must consider the legal and judicial issues as well as the technical merit of the particular statistical method. Right now the issue of using statistical methods to adjust for the undercount is before the court. Public perception of the legitimacy, validity, and accuracy of the census, and the effect of imputation on small area data are also important considerations. (See GAO note 1 on p. 52.)

Mr. William J. Anderson

2

We have some specific reservations about details of the report which are noted below.

1. One point the report seems to miss is that many of the coverage improvement procedures used in the 1980 census were aimed at reducing undercoverage differentials among minority population segments. In that case, analysis of the cost-effectiveness of the program for the entire population is inappropriate.
2. The report correctly notes that the costs of obtaining address lists from commercial sources and the Postal Service are substantially lower than the costs of canvassing. Canvassing does, however, produce benefits not emphasized in the GAO's report which limits direct cost comparisons. For example, canvassing permits verification and correction of addresses and census geography by direct observation, helps determine what procedures to employ for vacant and seasonal units, and assists in classifying group quarters for special place operations. Such information is necessary and cannot be obtained from commercial or Postal Service address listings without additional cost.
3. Services the Postal Service performed during the 1980 census were not of uniform quality and timeliness, even after allowing for the difficulties created for the Postal Service by delays and inaccuracies in census operations. In a mail census, the accuracy of the mail list is extremely important; therefore, procedures would be needed to identify and correct inconsistent Postal Service performance. The cost of such procedures was not considered in the GAO's analysis. Further, since census requirements and mail service requirements are not identical, they must be blended without compromising either activity. A larger role for the Postal Service to accomplish these goals will most likely carry further additional costs in that postal carriers earn hourly wages about three times those of the average 1980 census enumerator.
4. The use of reminder cards or second mailings would require longer periods of time for related stages of census work. Though the GAO's report advocates a longer period, our current intention is to try to reduce that time period. We had considerable trouble completing the census on time in 1980, and extending this time period could make the problem worse for 1990. In addition, there are problems of controlling second mailings and the difficulty with people who move after the initial mailing. The final decision on reminder cards or second mailings must be based on these problems, the results of experiments the Census Bureau is conducting, as well as the actual system to be used to collect data in the 1990 census. The GAO's report assumes the 1990 census will be taken in the same manner as the 1980 census. We feel it is too early to make such a determination.

Mr. William J. Anderson

3

5. The Census Bureau has a large-scale program to evaluate major aspects of the 1980 census. For example, a list-leave experiment was conducted during the census in selected offices in which questionnaires were left for self-enumeration and mail return. This technique may have sufficient value for further testing before the 1990 census. If such a technique proves successful and efficient, it could alter many other aspects of census procedures, including the development of mailing lists.

The Census Bureau will also be examining, prior to the design of 1990 census pretests, such matters as extending the use of telephone follow-up for nonresponse, alternative questionnaire designs that may improve response, refinements or changes in the publicity program, and the possibility of much greater automation of questionnaire receipt and check-in to minimize follow-up of late mail returns. The results of these investigations can lead to census procedures that may negate or weaken some of the GAO's recommendations.

6. As the report notes, operations like the vacancy check program would be less expensive if performed on a sample basis rather than a complete inventory basis as in 1980. The extent to which such sampling is permissible during the enumeration for the production of data used for apportionment will be affected by litigation still in progress.
7. We disagree with the GAO's definition of imputation. Imputation is not "a procedure used by the Census Bureau to collect population information." Rather, imputation is a technique to account for characteristics that were not reported by respondents and, rarely, to account for the nonresponse of persons.

(See GAO note 2 on p. 52.)

Although imputation may be termed a statistical procedure, it should not be confused with the concept of statistical adjustment of census data whereby census counts could, in theory, be adjusted on the basis of population estimates and evaluation studies not wholly dependent on the census itself. This type of adjustment is also the subject of current litigation.

As mentioned, solution for these types of problems is not a simple cost-benefit decision. Once the interpretation of the census law is clarified, the Census Bureau will take steps to ensure that the Congress has an early opportunity to review the adequacy of various provisions of the law as it impacts on the plans for the 1990 census.

8. We feel the GAO's conclusion that coverage improvement through independent record checks was expensive and perhaps not very substantial is premature. The Census Bureau has a comprehensive program to review the coverage improvement program. We would reserve

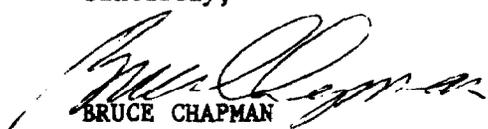
Mr. William J. Anderson

4

judgment as to whether the yield from this program was as low as estimated by the GAO based on its observations of field operations. Moreover, even if the program had problems, our experience with this program may enable us to refine the procedures or use them more selectively to produce higher yields in the next census. Since record checks are aimed at specific coverage problems relating to within household coverage or difficult-to-enumerate areas, a given yield may be cost effective for a small area even at a relatively high overall unit cost. The value of record checks will, of course, continue to be evaluated in the context of other coverage improvement techniques that may be less costly.

I would like to thank the GAO for its efforts. I can assure you that the points mentioned in the report will be considered in planning the next census.

Sincerely,



BRUCE CHAPMAN

Director
Bureau of the Census

GAO note 1: Commerce clarified its comments on imputation by stating it intended to reserve comment on GAO's recommendation until the courts have decided on the appropriateness of using imputation and other statistical techniques to adjust for undercounting. If imputation is deemed an acceptable substitute for direct enumeration of persons, Commerce will evaluate its imputation techniques to ensure they provide accurate and reliable results. After the techniques are validated, action will be taken on GAO's recommendation.

GAO note 2: The definition of imputation used in this report on page 2 was provided by the Census Bureau and agrees with the definition in the Department of Commerce's comments. The definition Commerce took issue with was a generalization used by GAO on page 33. The discussion of imputation on page 33 has been expanded to more fully disclose how imputation was used in the 1980 census to arrive at population counts and to account for unreported characteristics of household members.



THE POSTMASTER GENERAL
Washington, DC 20260

December 15, 1981

Dear Mr. Anderson:

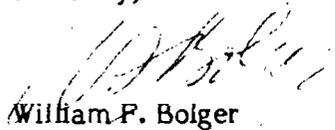
This refers to your proposed report entitled, "The 1990 Census Could Cost \$4 Billion: Timely Decisions on Alternatives to 1980 Procedures Can Save Millions."

We agree that the cost of the 1990 census could be significantly reduced if the Census Bureau could obtain the addresses of housing units or other locations directly from the Postal Service. However, as the report recognizes, there is a need for legislation authorizing the Postal Service to provide such addresses and insuring the confidentiality of the address information provided.

We concur in the report's recommendations and will cooperate fully with the Secretary of Commerce in carrying them out.

Thank you for the opportunity to comment on this fine report.

Sincerely,



William P. Bolger

Mr. William J. Anderson
Director, General
Government Division
U.S. General Accounting Office
Washington, D.C. 20548

(275159)

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